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Implementation of CAPM and Performance Analysis of Stock Portfolio with Risk-Adjusted Return on LQ45 Stock

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Abstract

This study aims to analyze the return and risk of the LQ45 stock group on the Indonesia Stock Exchange and determine investment decisions using the Capital Asset Pricing Model by distinguishing between undervalued and overvalued stocks based on 2017 data. – 2021, so that a portfolio that can produce optimal returns can be formed. Based on Treynor's performance measures, 24 stocks were found to be superior to the market. By using Jensen's Alpha it was found that 24 stocks had a positive alpha (outperform) compared to other stocks studied. The results also show that 14 stocks have a beta coefficient of less than one (<1) and 30 stocks have a beta coefficient of more than one (>1); 24 undervalued stocks and 20 overvalued stocks. In this study, it was also found that stocks with high betas do not automatically provide high returns.

Keywords
CAPM; LQ45, Treynor; Jensen's Alpha

I. Introduction

According to PT. The Indonesian Central Securities Depository (KSEI) in kompas.com December 10, 2021, the number of investors in the Indonesian capital market until November 2021 was 7.1 million, an increase of 85.3% over the same period the previous year. This number is 8 times higher than in 2016. Of the 7.1 million investors, 99.51% are retail investors, while the remaining 0.49% are institutional investors. People are interested in investing in the capital market, because they think that this investment will bring a large return.

According to Reilly and Brown, 2012, the purpose of investors is their investment objectives which are expressed in terms of risk and return. Expressing goals only in terms of returns can lead to inappropriate investment practices, such as the use of high-risk investment strategies that involve rapid movement in and out of investments in an attempt to buy low and sell high.

According to Ross, Westerfield, Jordan (2010,428), the total risk associated with an asset has 2 parts, namely systematic risk and unsystematic risk. Unsystematic risk can be easily reduced through diversification, so only systematic risk remains. Systematic risk has an impact on the entire market for example inflation, changes in interest rates, events of war or terrorism etc. This risk is beyond the control of investors and cannot be avoided or reduced.

Risk and reward always go hand in hand. However, because unsystematic risk can be eliminated at no cost through diversification, there is no reward for bearing it. In this case, according to Ross, Westerfield, Jordan (2010, 416) the reward for taking the risk only depends on the systematic risk of an investment. This principle is referred to as the systematic risk principle. An important implication of this principle is that the expected return of an asset depends only on the systematic risk of the asset, so that no matter how much total risk an asset has, only the systematic part is relevant in determining the

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expected return on the asset. To measure the systematic risk of an asset used what is called the beta coefficient ( ). The beta measures the sensitivity of an asset to market risk (systematic), in this case the stock market price represented by the Composite Stock Price Index (CSPI). So beta shows the sensitivity of security returns to changes in JCI returns. Tandelilin 2010, said the line that connects the expected return of a security with systematic risk (beta) is called the Security Market Line (SML). SML is used to assess individual securities in a balanced market condition, namely assessing the expected rate of return of an individual security at a certain level of systematic risk (beta).

Investors are looking for a return on some investments. In the United States, the lowest risk is if we invest in US Treasury Bills. This is because Treasury Bills provide a definite return, in the sense that it is not affected by what is happening in the market. This certainty causes this asset to be called risk free. According to Pieree Vernimmen, 2005, risk-free assets are assets that have a definite rate of return. In other words Treasury Bills have Beta=0 . Investors also consider riskier investments, namely market portfolios of common stock. Wise investors don't take risks for fun. Therefore they need a return from the market portfolio that is higher than Treasury Bills. So in this case, investors consider investments that are much riskier, namely investments from common stocks. The average market risk beta is 1. (Brealey, Myers and Allen, 2011). The difference in return from the market portfolio with Treasury Bills is called the market risk premium.

In Indonesia, stocks with large capitalization, high liquidity, good company fundamentals and high compliance levels are grouped by the Indonesia Stock Exchange into the LQ45 index. There are 45 companies that are members of LQ45 with a share of around 70%. So large is their share, so that the movement of ups and downs in stock prices is usually quite influential on the movement of the stock price index (JCI). The LQ45 index is usually reviewed by the Indonesia Stock Exchange 4 times a year. 2 times major review and 2 times minor review. Major reviews are conducted every January and July aimed at evaluating the index constituents and the weights used for index calculations. Meanwhile, a minor review is conducted every April and October (with the implementation in May and November) with the aim of evaluating the weight of the index.

Investors who have minimal knowledge of the capital market often receive advice or because of the factors involved in investing in LQ45 shares which are assumed to have lower risks or provide higher returns. However, LQ45 shares still have risks. So the problem faced by an investor is the possibility of choosing the wrong stock related to the return and risk it faces. Rationally, investors will choose an efficient portfolio, namely the one that provides the largest expected return with a certain risk or provides the smallest risk with a certain expected return.

Tandelilin, 2010, one of the important stages in the investment process is the evaluation of portfolio performance. The basic question to be answered is to what extent the portfolio that has been formed is able to provide satisfactory performance for investors? Or is the portfolio return formed (after deducting costs) able to compensate for the level of risk that must be borne by investors? In addition, evaluation of portfolio performance will allow us to identify whether the portfolio that has been formed is able to provide a relatively higher rate of return compared to other portfolio returns and whether the return is also in accordance with the level of risk borne.

According to Frank K. Reilly, Keith C. Brown, 2012, comparing the historical return of a portfolio with returns generated by managers or other indices is certainly useful, but this will not produce a complete picture of portfolio performance. In accordance with the main principles of modern performance measurement (modern performance measurement),

a thorough evaluation of an investment is not possible without explicitly controlling portfolio risk.

Risk adjusted return (return adjusted for risk) can be obtained through superiority in choosing the right time (timing) or superiority in selecting superior stocks. This is done by predicting the peaks or troughs in the market, so as to adjust the portfolio composition to anticipate this trend, namely holding a fully diversified portfolio of high beta stocks when the market is up and choosing low beta stocks when the market is down. A larger gain in a rising market and a smaller loss in a declining market will provide an above-average risk-adjusted return.

II. Review of Literature

2.1 Capital Asset Pricing Model (CAPM)

Tandelilin, 2010, said the CAPM is a model that relates the expected rate of return of a risky asset with the risk of the asset in a balanced market condition. According to Mamduh M. Hanafi, 2020, the Capital Asset Pricing Model specifically has two objectives: To

1. Explain the relationship between risk and return.
2. Explain the conditions of equilibrium in financial markets.
   In economics, equilibrium occurs when the supply curve with a positive slope meets a demand curve with a negative slope. So that the equilibrium price and quantity can be determined. In the discipline of finance the demand for financial assets is usually assumed to be unlimited. So the financial demand curve will look flat. Whatever the supply of securities, demand will be able to absorb the supply. The quantity of the security will not determine the price of the security. A more important factor in determining the price of a security is the risk of the security. The higher the risk, the lower the stock price, which means the higher the expected rate of return.

According to Tandelilin, 2010, in discussing the relationship between risk and return, we can look at it from two contexts, namely the context of an efficient portfolio and the context of individual securities. The relationship between risk and return of an efficient portfolio will produce a capital market line (Capital Market Line), while the relationship between individual risk and return will produce a security market line (Security Market Line) which will be the focus of this research.

2.2 Security Market Line (SML)

Jogiyanto, 2019, said the Security Market Line (SML) or securities market line is a line that shows the tradeoff between risk and expected return for individual securities. This line is a graphical representation of the CAPM model.

$E\ (Ri_i) = R_f + \beta_i * [E(R_m) - R_f]$ which is called the Capital Asset Pricing Model (CAPM) where:

$E\ (Ri_i)$ Expected return on shares i

R_f Risk free (risk-free rate of return)

β_i coefficient Beta

$E(R_m)$ expected rate of return in the market (market return/market return)

Tandelilin, 2010 said that the risk premium of security i is calculated by multiplying the beta of security i by the market risk premium or $\beta_i * [E(R_m) - R_f]$, where

$[E(R_m) - R_f]$ is the market risk premium, which is the difference between the market return and the risk free rate.

2.3 Ri3k Free Rate

Tandelilin, 2010, investors can choose to invest their funds in risky assets and risk-free assets or a combination of the two depending on the extent of the investor's preference for risk. The more reluctant an investor is to risk (risk averse), the investment choice will tend to risk-free assets. Meanwhile, risk-free assets are assets whose future rates of return can be ascertained at this time, and are indicated by a return variance equal to zero.

Ross, Westerfield, Jordan, 2010, 377, said that it is very logical if a return is compared with one another. One such comparison is to involve government-issued securities. These securities are free from much of the variability that we see such as the stock market for example. In the United States, the government borrows money by issuing bonds in various forms such as Treasury Bills (T-Bills). Since the government can always raise taxes to pay its bills, the debt is essentially free from any risk of default. So the rate of return on such debt can be called a risk-free return.

Kontan.co.id March 09, 2010 said a risk-free instrument similar to T-Bills is Bank Indonesia Certificates. According to Bank Indonesia Regulation no.15/5/PBI/2013 article 1 paragraph 7, Bank Indonesia Certificates (SBI) are securities in rupiah currency issued by Bank Indonesia as an acknowledgment of short-term debt.

2.4 Beta Coefficient

Systematic risk is the most crucial determinant in estimating the expected return of an asset. This specific measure is known as the beta coefficient. Beta coefficient or abbreviated beta explains to us how much systematic risk a particular asset has relative to the average asset or the amount of systematic risk that exists in a particular risky asset relative to the average risk asset. It must be remembered that the expected return, and thus the risk premium (risk premium) of an asset depends only on its systematic risk. So assets with a larger beta have a greater systematic risk, they will have a greater expected return (Ross, Westerfield, Jordan, 2010).

According to Brealey, Myers and Allen, 2011, the contribution of a security to the risk of a well-diversified portfolio depends on how the security can be affected by a general downturn in the market. This sensitivity to market movements is known as beta ( ). Beta measures the amount of change in the share price that investors expect for each additional 1% change in the market. The average beta of all shares is 1.0 (one). Stocks with a beta greater than 1 are very sensitive to market movements; stocks with betas below 1 are not sensitive to market movements. The standard deviation of a well-diversified portfolio is proportional to its beta. So a diversified portfolio invested in stocks with beta 2.0 will have twice the risk of a diversified portfolio with beta 1.0.

2.5 Undervalued and Overvalued Securities

Frank K. Reilly, Keith C. Brown, 2012, says if we have understood how to calculate the expected return or required return for certain risky assets using the Security Market Line, then we can compare (differentiate) the expected (required) rate of return with the estimated rate of return of an asset in a certain investment horizon to determine whether it will be the right investment or not. This difference between the estimated rate of return and the expected rate of return is sometimes referred to as the stock's expected alpha or excess return. If this alpha is positive, then the stock is said to be undervalued and if the alpha is negative then the stock is said to be overvalued (stocks are overvalued). If alpha is equal to

zero (or almost zero), it means that the stock is on the Security Market Line because it is in accordance with systematic risk. This is referred to as properly valued.

2.6 Measurement of Portfolio Management (Portfolio Performance)

The portfolio that has been formed needs to be evaluated for its performance. Tandelilin, 2010, the evaluation of portfolio performance is intended to answer the basic question: Is the portfolio return that has been formed able to compensate for the level of risk that must be borne by investors? Besides, portfolio performance evaluation will allow us to identify whether the portfolio that has been formed is able to provide a relatively higher rate of return than other portfolio returns and whether the return is also in accordance with the level of risk borne.

Jogiyanto, 2019, the portfolio management process begins with determining the investment targets of investors. These targets are focused on achieving the best combination of return and risk from an investor's point of view. This combination shows the trade off between the required return that can be accepted by investors and the level of risk tolerance faced (risk tolerance). The trade off between required return and risk tolerance will be different between individual investors and institutional investors.

2.7 Treynor

The Treynor index or Treynor Measure developed by Jack Treynor relates the level of portfolio return to the amount of risk and is often called the reward to volatility ratio. Treynor assumes that the portfolio formed should be an optimal or well-diversified portfolio, so that the only risk that is considered relevant is systematic risk as measured by beta. According to Tandelilin, 2010, the benchmark used in the Treynor index is the security market line. The way to measure the Treynor index is to divide the risk premium by the portfolio beta. So the Treynor index is a ratio of compensation to risk.

2.8 Jensen Index (Jensen's Alpha)

The Jensen index was introduced by Michael C. Jensen to measure the risk-adjusted return of a security or a portfolio of several securities in relation to the Capital Asset Pricing Model (CAPM).

According to Tandelilin, 2010, the Jensen Index can easily be interpreted as a measure of how many portfolios 'beat the market'. The Jensen index or often called Jensen's Alpha is the excess return above or below the Security Market Line (SML). An index that is positive means that the portfolio provides a return greater than the expected return (above SML), so it is a good thing because the portfolio has a relatively high return for its systematic risk level. Meanwhile, a negative index indicates that the portfolio has a relatively low return for its systematic risk level.

The similarity between the Jensen index and the Treynor index is that both performance measure indices use the Security Market Line (SML) as the basis for making the equation (Tandelilin, 2010). The difference is that the Treynor index measures the angle or slope of the portfolio, so the greater the angle or slope of the portfolio, the better the portfolio performance, while the Jensen index is determined by the intercept.

III. Research Method

3.1 Operational Definition

CAPM is a balance model that relates the expected rate of return of a risky asset with the risk of that asset under balanced market conditions. The variables used in this study can be seen in the table below:

3.2 Method Analysis

a. Calculating Realized Return (Individual Return)
b. Calculating Market Return
c. Calculating Risk Free
d. Calculating Beta (systematic risk)
e. Calculating Expected Return
f. Describing Security Market Line
g. Classifying stocks as overvalued or undervalued
h. Calculating stock Treynor Index and Treynor Index JCI
i. Comparing stock Treynor Index with JCI Treynor Index
j. Calculating Jensen's Alpha

3.3 Research Instrument

Data used in this study are as follows:

1. JCI return data for the period 2017-2021
2. Realized (Actual) stock return data from LQ45 for the 2017-2021 period
3. Risk Free data, namely Bank Indonesia interest rates for the 2017-2021 period

IV. Result and Discussion

4.1 e-Government Innovation

To calculate the expected return required data: risk free rate (R_f), beta coefficient and market return (ER_m). The risk-free rate is obtained and processed from Bank Indonesia interest rate data for 2017-202. Beta is obtained from processing stock returns and JCI returns. Market returns use JCI returns. To find out whether a stock is overvalued or undervalued, the expected stock return must be compared with the realized (actual) average stock return (in this case the geometric average is used). The results can be seen in the table below:

CODE SAHAM	RATA-RATA GEO BULANAN REALIZED RETURN SAHAM	RATA-RATA GEO ANNUALIZED REALIZED RETURN SAHAM	RISK FREE	BETA	RATA-RATA GEO BULANAN RETURN IHSG	RATA-RATA GEO ANNUALIZED IHSG	EXPECTED RETURN	UNDERVALUED / OVERVALUED
AMRT	1,286%	16,56%	7,05%	0,2992	0,376%	4,607%	6,32%	UNDERVALUED
ANTM	1,384%	17,93%	7,05%	2,4724	0,376%	4,607%	1,01%	UNDERVALUED
ASII	-0,391%	-4,60%	7,05%	1,2705	0,376%	4,607%	3,95%	OVERVALUED
BBCA	1,655%	21,77%	7,05%	0,9136	0,376%	4,607%	4,82%	UNDERVALUED
BBNI	0,674%	8,40%	7,05%	2,1063	0,376%	4,607%	1,90%	UNDERVALUED
BBRI	1,168%	14,95%	7,05%	1,4278	0,376%	4,607%	3,56%	UNDERVALUED
BBTN	-0,098%	-1,17%	7,05%	2,4981	0,376%	4,607%	0,95%	OVERVALUED
BFIN	2,629%	36,53%	7,05%	1,7674	0,376%	4,607%	2,73%	UNDERVALUED
BRPT	2,731%	38,17%	7,05%	1,6848	0,376%	4,607%	2,93%	UNDERVALUED
CPIN	1,338%	17,29%	7,05%	0,7507	0,376%	4,607%	5,22%	UNDERVALUED
EMTK	1,149%	14,70%	7,05%	0,4571	0,376%	4,607%	5,93%	UNDERVALUED
ERAA	2,759%	38,63%	7,05%	1,7106	0,376%	4,607%	2,87%	UNDERVALUED
EXCL	0,259%	3,15%	7,05%	1,1557	0,376%	4,607%	4,23%	OVERVALUED
GGRM	-0,879%	-10,05%	7,05%	0,9617	0,376%	4,607%	4,70%	OVERVALUED
HMSP	-1,963%	-21,17%	7,05%	1,1551	0,376%	4,607%	4,23%	OVERVALUED
ICBP	0,273%	3,33%	7,05%	0,2252	0,376%	4,607%	6,50%	OVERVALUED
INCO	1,167%	14,94%	7,05%	1,7312	0,376%	4,607%	2,82%	UNDERVALUED
INDF	-0,069%	-0,82%	7,05%	0,5242	0,376%	4,607%	5,77%	OVERVALUED
INKP	3,435%	49,98%	7,05%	1,8746	0,376%	4,607%	2,47%	UNDERVALUED
INTP	-0,156%	-1,85%	7,05%	1,3732	0,376%	4,607%	3,69%	OVERVALUED
ITMG	1,543%	20,16%	7,05%	1,9684	0,376%	4,607%	2,24%	UNDERVALUED
JPFA	0,213%	2,59%	7,05%	1,3223	0,376%	4,607%	3,82%	OVERVALUED
KLBF	0,357%	4,37%	7,05%	0,6540	0,376%	4,607%	5,45%	OVERVALUED
MEDC	1,241%	15,95%	7,05%	2,6052	0,376%	4,607%	0,68%	UNDERVALUED
MIKA	0,098%	1,18%	7,05%	0,3797	0,376%	4,607%	6,12%	OVERVALUED
MNCN	-1,039%	-11,78%	7,05%	1,7772	0,376%	4,607%	2,71%	OVERVALUED
PGAS	-0,935%	-10,66%	7,05%	2,6937	0,376%	4,607%	0,47%	OVERVALUED
PTBA	0,992%	12,58%	7,05%	1,0372	0,376%	4,607%	4,52%	UNDERVALUED
PTPP	-2,040%	-21,92%	7,05%	3,3112	0,376%	4,607%	-1,04%	OVERVALUED
SMGR	-0,340%	-4,00%	7,05%	1,5995	0,376%	4,607%	3,14%	OVERVALUED
TBIG	2,034%	27,33%	7,05%	1,0385	0,376%	4,607%	4,51%	UNDERVALUED
TKIM	3,624%	53,29%	7,05%	2,1303	0,376%	4,607%	1,84%	UNDERVALUED
TLKM	0,380%	4,66%	7,05%	0,7826	0,376%	4,607%	5,14%	OVERVALUED
TOWR	0,899%	11,34%	7,05%	0,8838	0,376%	4,607%	4,89%	UNDERVALUED
TPIA	1,266%	16,30%	7,05%	1,3844	0,376%	4,607%	3,67%	UNDERVALUED
UNTR	0,412%	5,06%	7,05%	0,7361	0,376%	4,607%	5,25%	OVERVALUED
UNVR	-0,981%	-11,16%	7,05%	0,4237	0,376%	4,607%	6,01%	OVERVALUED
WIKA	-1,360%	-15,15%	7,05%	2,5311	0,376%	4,607%	0,87%	OVERVALUED
WSKT	-2,288%	-24,25%	7,05%	3,2145	0,376%	4,607%	-0,80%	OVERVALUED
ADRO	1,056%	13,44%	7,05%	1,1956	0,376%	4,607%	4,13%	UNDERVALUED
BMRI	0,844%	10,62%	7,05%	1,2839	0,376%	4,607%	3,91%	UNDERVALUED
HRUM	2,857%	40,22%	7,05%	1,1950	0,376%	4,607%	4,13%	UNDERVALUED
MDKA	3,847%	57,30%	7,05%	0,8274	0,376%	4,607%	5,03%	UNDERVALUED
TINS	0,678%	8,44%	7,05%	2,7811	0,376%	4,607%	0,25%	UNDERVALUED

Undervalued stocks are stocks whose realized returns are greater than their expected returns. On the other hand, if the realized return is less than the expected return, the stock is overvalued. From the table above, it can be seen that there are 24 undervalued stocks, while 20 stocks are overvalued.

To see the relationship between risk (beta) and realized return, namely whether a high return will have a high risk (beta) or vice versa, a table is compiled as follows:

SAHAM	EXPECTED RETURN	REALIZED RETURN	BETA	UNDER/OVER
PTPP	-1,04%	-21,92%	3,3112	OVERVALUED
WSKT	-0,80%	-24,25%	3,2145	OVERVALUED
TINS	0,25%	8,44%	2,7811	UNDERVALUED
PGAS	0,47%	-10,66%	2,6937	OVERVALUED
MEDC	0,68%	15,95%	2,6052	UNDERVALUED
WIKA	0,87%	-15,15%	2,5311	OVERVALUED
BBTN	0,95%	-1,17%	2,4981	OVERVALUED
ANTM	1,01%	17,93%	2,4724	UNDERVALUED
TKIM	1,84%	53,29%	2,1303	UNDERVALUED
BBNI	1,90%	8,40%	2,1063	UNDERVALUED
ITMG	2,24%	20,16%	1,9684	UNDERVALUED
INKP	2,47%	49,98%	1,8746	UNDERVALUED
MNCN	2,71%	-11,78%	1,7772	OVERVALUED
BFIN	2,73%	36,53%	1,7674	UNDERVALUED
INCO	2,82%	14,94%	1,7312	UNDERVALUED
ERAA	2,87%	38,63%	1,7106	UNDERVALUED
BRPT	2,93%	38,17%	1,6848	UNDERVALUED
SMGR	3,14%	-4,00%	1,5995	OVERVALUED
BBRI	3,56%	14,95%	1,4278	UNDERVALUED
TPIA	3,67%	16,30%	1,3844	UNDERVALUED
INTP	3,69%	-1,85%	1,3732	OVERVALUED
JPFA	3,82%	2,59%	1,3223	OVERVALUED
BMRI	3,91%	10,62%	1,2839	UNDERVALUED
ASII	3,95%	-4,60%	1,2705	OVERVALUED
ADRO	4,13%	13,44%	1,1956	UNDERVALUED
HRUM	4,13%	40,22%	1,1950	UNDERVALUED
EXCL	4,23%	3,15%	1,1557	OVERVALUED
HMSP	4,23%	-21,17%	1,1551	OVERVALUED
TBIG	4,51%	27,33%	1,0385	UNDERVALUED
PTBA	4,52%	12,58%	1,0372	UNDERVALUED
GGRM	4,70%	-10,05%	0,9617	OVERVALUED
BBCA	4,82%	21,77%	0,9136	UNDERVALUED
TOWR	4,89%	11,34%	0,8838	UNDERVALUED
MDKA	5,03%	57,30%	0,8274	UNDERVALUED
TLKM	5,14%	4,66%	0,7826	OVERVALUED
CPIN	5,22%	17,29%	0,7507	UNDERVALUED
UNTR	5,25%	5,06%	0,7361	OVERVALUED
KLBF	5,45%	4,37%	0,6540	OVERVALUED
INDF	5,77%	-0,82%	0,5242	OVERVALUED
EMTK	5,93%	14,70%	0,4571	UNDERVALUED
UNVR	6,01%	-11,16%	0,4237	OVERVALUED
MIKA	6,12%	1,18%	0,3797	OVERVALUED
AMRT	6,32%	16,56%	0,2992	UNDERVALUED
ICBP	6,50%	3,33%	0,2252	OVERVALUED

From the table it can be seen that high risk (beta) is not always followed by realized return positive ones. This can be seen in the following 10 stocks: PTPP, WSKT, PGAS, WIKA, BBTN, MNCN, SMGR, INTP, ASII and HMSP which have high beta but provide negative realized returns. It turns out that there are also stocks with low beta but positive realized returns such as BBCA, TOWR, MDKA, TLKM, CPIN, UNTR, KLBF, EMTK, MIKA, AMRT and ICBP (11 shares).

High risk (beta) with positive returns is found in 20 stocks, namely: TINS, MEDC, ANTM, TKIM, BBNI, ITMG, INKP, BFIN, INCO, ERAA, BRPT, BBRI, TPIA, JPFA, BMRI, ADRO, HRUM, EXCL , TBIG, PTBA.

There are 3 stocks that have a low beta (<1) but provide negative realized returns, namely on stocks: GGRM, INDF and UNVR.

In addition to grouping stocks with high and low betas in relation to returns, we try to see if there are similarities between stocks in certain groups, in this case we try to look at the sector and sub-sector of each stock. In addition, we also tried to see the correlation between beta and realized return of each group. The results are as follows:

SAHAM	EXPECTED RETURN	REALIZED RETURN	BETA	SECTOR	SUB SECTOR
PTPP	-1,04%	-21,92%	3,3112	INFRASTRUCTURES	HEAVY CONSTRUCTIONS & CIVIL ENGINEERING
WSKT	-0,80%	-24,25%	3,2145	INFRASTRUCTURES	HEAVY CONSTRUCTIONS & CIVIL ENGINEERING
PGAS	0,47%	-10,66%	2,6937	ENERGY	OIL, GAS & COAL
WIKA	0,87%	-15,15%	2,5311	INFRASTRUCTURES	HEAVY CONSTRUCTIONS & CIVIL ENGINEERING
BBTN	0,95%	-1,17%	2,4981	FINANCIALS	BANKS
MNCN	2,71%	-11,78%	1,7772	CONSUMER CYCLICALS	MEDIA AND ENTERTAINMENT
SMGR	3,14%	-4,00%	1,5995	BASIC MATERIALS	BASIC MATERIALS
INTP	3,69%	-1,85%	1,3732	BASIC MATERIALS	BASIC MATERIALS
ASII	3,95%	-4,60%	1,2705	INDUSTRIALS	MULTI-SECTOR HOLDINGS
HMSP	4,23%	-21,17%	1,1551	CONSUMER NON -CYCLICALS	TOBACOO

From the data of 10 stocks of high beta group, low realized return mentioned above, a negative correlation coefficient is obtained which is -0.4094, so it can be said that an increase in beta will be followed by a decrease in realized return.

SAHAM	EXPECTED RETURN	REALIZED RETURN	BETA	SECTOR	SUB SECTOR
BBCA	4,82%	21,77%	0,9136	FINANCIALS	BANKS
TOWR	4,89%	11,34%	0,8838	INFRASTRUCTURES	TELECOMMUNICATION
MDKA	5,03%	57,30%	0,8274	BASIC MATERIALS	BASIC MATERIALS
TLKM	5,14%	4,66%	0,7826	INFRASTRUCTURES	TELECOMMUNICATION
CPIN	5,22%	17,29%	0,7507	CONSUMER NON-CYCLICALS	FOOD & BEVERAGE
UNTR	5,25%	5,06%	0,7361	INDUSTRIALS	INDUSTRIALS GOODS
KLBF	5,45%	4,37%	0,6540	HEALTHCARE	PHARMACEUTICALS A& HEALTH CARE RESEARCH
EMTK	5,93%	14,70%	0,4571	TECHNOLOGY	SOFTWARE & IT SERVICE
MIKA	6,12%	1,18%	0,3797	HEALTHCARE	HEALTHCARE EQUIPMENT & PROVIDERS
AMRT	6,32%	16,56%	0,2992	CONSUMER NON-CYCLICALS	FOOD & BEVERAGE
ICBP	6,50%	3,33%	0,2252	CONSUMER NON-CYCLICALS	FOOD & BEVERAGE

From the data of 11 stocks in the low beta group (<1) and high realized returns above, it is found that there is a positive correlation although not too strong from the beta and realized returns variables, which is 0.3732.

SAHAM	EXPECTED RETURN	REALIZED RETURN	BETA	SECTOR	SUB SECTOR
TINS	0,25%	8,44%	2,7811	BASIC MATERIALS	BASIC MATERIALS
MEDC	0,68%	15,95%	2,6052	ENERGY	OIL, GAS & COAL
ANTM	1,01%	17,93%	2,4724	BASIC MATERIALS	BASIC MATERIALS
TKIM	1,84%	53,29%	2,1303	BASIC MATERIALS	BASIC MATERIALS
BBNI	1,90%	8,40%	2,1063	FINANCIALS	BANKS
ITMG	2,24%	20,16%	1,9684	ENERGY	OIL, GAS & COAL
INKP	2,47%	49,98%	1,8746	BASIC MATERIALS	BASIC MATERIALS
BFIN	2,73%	36,53%	1,7674	FINANCIALS	FINANCING SERVICE
INCO	2,82%	14,94%	1,7312	BASIC MATERIALS	BASIC MATERIALS
ERAA	2,87%	38,63%	1,7106	CONSUMER CYCLICALS	RETAILING
BRPT	2,93%	38,17%	1,6848	BASIC MATERIALS	BASIC MATERIALS
BBRI	3,56%	14,95%	1,4278	FINANCIALS	BANKS
TPIA	3,67%	16,30%	1,3844	BASIC MATERIALS	BASIC MATERIALS
JPFA	3,82%	2,59%	1,3223	CONSUMER NON CYCLICALS	FOOD & BEVERAGE
BMRI	3,91%	10,62%	1,2839	FINANCIALS	BANKS
ADRO	4,13%	13,44%	1,1956	ENERGY	OIL, GAS & COAL
HRUM	4,13%	40,22%	1,1950	ENERGY	OIL, GAS & COAL
EXCL	4,23%	3,15%	1,1557	INFRASTRUCTURES	TELECOMMUNICATION
TBIG	4,51%	27,33%	1,0385	INFRASTRUCTURES	TELECOMMUNICATION
PTBA	4,52%	12,58%	1,0372	ENERGY	OIL, GAS & COAL

From the data of 20 stocks in the high beta group and high realized returns above, it is found that a positive correlation between beta and realized returns is found, although it is very weak at 0.0896.

SAHAM	EXPECTED RETURN	REALIZED RETURN	BETA	SECTOR	SUB SECTOR
GGRM	4,70%	-10,05%	0,9617	CONSUMER NON -CYCLICALS	TOBACOO
INDF	5,77%	-0,82%	0,5242	CONSUMER NON-CYCLICALS	FOOD & BEVERAGE
UNVR	6,01%	-11,16%	0,4237	CONSUMER NON -CYCLICALS	NONDURABLE HOUSEHOLD PRODUCT

In the low beta group, low realized return (3 shares) found a negative correlation of -0.2468 which means that the increase in beta will be followed by a decrease in realized return.

4.2 Treynor Index Calculation Results

Portfolio performance using the Treynor Measure (Treynor Index) or also called Reward to Volatility (RVOL) is calculated by dividing the excess return by the systematic risk or portfolio beta. The higher the Reward to Volatility or Treynor index, the better the portfolio performance will be. To perform the benchmark, the Treynor index is calculated for the JCI in the same way. The first is to reduce the JCI's annualized return of 4.61% with a risk free rate of 7.05%. This result is then divided by the market beta in terms of 1 (one). Then the results of the Treynor index for the JCI are -0.0244.

We then compare the entire Treynor index (benchmark) with the JCI Treynor index and the results can be seen in the table below.

	BETA	ANN.RETURN	RISK FREE	TREYNOR
MDKA	0,8274	57,30%	7,05%	0,6073
AMRT	0,2992	16,56%	7,05%	0,3180
HRUM	1,1950	40,22%	7,05%	0,2776
INKP	1,8746	49,98%	7,05%	0,2290
TKIM	2,1303	53,29%	7,05%	0,2170
TBIG	1,0385	27,33%	7,05%	0,1953
BRPT	1,6848	38,17%	7,05%	0,1847
ERAA	1,7106	38,63%	7,05%	0,1846
EMTK	0,4571	14,70%	7,05%	0,1673
BFIN	1,7674	36,53%	7,05%	0,1668
BBCA	0,9136	21,77%	7,05%	0,1611
CPIN	0,7507	17,29%	7,05%	0,1364
TPIA	1,3844	16,30%	7,05%	0,0668
ITMG	1,9684	20,16%	7,05%	0,0666
BBRI	1,4278	14,95%	7,05%	0,0553
ADRO	1,1956	13,44%	7,05%	0,0534
PTBA	1,0372	12,58%	7,05%	0,0533
TOWR	0,8838	11,34%	7,05%	0,0485
INCO	1,7312	14,94%	7,05%	0,0456
ANTM	2,4724	17,93%	7,05%	0,0440
MEDC	2,6052	15,95%	7,05%	0,0342
BMRI	1,2839	10,62%	7,05%	0,0278
BBNI	2,1063	8,40%	7,05%	0,0064
TINS	2,7811	8,44%	7,05%	0,0050
IHSG	**1,0000**	**4,61%**	**7,05%**	**-0,0244**
UNTR	0,7361	5,06%	7,05%	-0,0270
TLKM	0,7826	4,66%	7,05%	-0,0305
BBTN	2,4981	-1,17%	7,05%	-0,0329
EXCL	1,1557	3,15%	7,05%	-0,0337
JPFA	1,3223	2,59%	7,05%	-0,0338
KLBF	0,6540	4,37%	7,05%	-0,0410
INTP	1,3732	-1,85%	7,05%	-0,0648
PGAS	2,6937	-10,66%	7,05%	-0,0657
SMGR	1,5995	-4,00%	7,05%	-0,0691
PTPP	3,3112	-21,92%	7,05%	-0,0875
WIKA	2,5311	-15,15%	7,05%	-0,0877
ASII	1,2705	-4,60%	7,05%	-0,0917
WSKT	3,2145	-24,25%	7,05%	-0,0974
MNCN	1,7772	-11,78%	7,05%	-0,1060
INDF	0,5242	-0,82%	7,05%	-0,1501
MIKA	0,3797	1,18%	7,05%	-0,1546
ICBP	0,2252	3,33%	7,05%	-0,1652
GGRM	0,9617	-10,05%	7,05%	-0,1778
HMSP	1,1551	-21,17%	7,05%	-0,2443
UNVR	0,4237	-11,16%	7,05%	-0,4298

Thus, MDKA, AMRT, HRUM, INKP, TKIM are the 5 stocks that have the best portfolio performance seen from the Treynor index or Reward to Volatility. Meanwhile, MIKA, ICBP, GGRM, HMSP, UNVR are the 5 stocks that have the lowest portfolio performance with the same approach.

From the table above, it can be seen that MDKA, AMRT, HRUM, INKP, TKIM, TBIG, BRPT, ERAA, EMTK, BFIN, BBCA, CPIN, TPIA, ITMG, BBRI, ADRO, PTBA, TOWR, INCO, ANTM, MEDC, BMRI, BBNI, TINS are stocks that show a risk-adjusted portfolio performance that is better (superior) than the overall market. Meanwhile, the performance of UNTR TLKM BBTN EXCL JPFA KLBF INTP PGAS SMGR PTPP WIKA ASII WSKT MNCN INDF MIKA ICBP GGRM HMSP UNVR is still below the JCI performance or inferior.

4.3 Jensen's Alpha Calculation Results

For Jensen Alpha, a positive number indicates the portfolio is able to provide a return above the systematic risk borne (beta), while a negative number indicates the portfolio's performance is below the Bourne systematic risk level. It means that the bigger and more positive, the better the portfolio performance. According to the table below, MDKA, TKIM, INKP, ERAA and BRPT are the 5 best in terms of their performance. Meanwhile, WIKA UNVR PTPP WSKT HMSP were the 5 stocks that showed the lowest performance.

	BETA	ANN.RETURN (TRP)	RISK FREE	IHSG (RM)	TRP-RBR	RM-RBR	BETA*(RM-RBR)	(TRP-BR) - BETA (RM-RBR) ALPHA
MDKA	0,8274	57,30%	7,05%	4,61%	50,25%	-2,44%	-2,02%	52,27%
TKIM	2,1303	53,29%	7,05%	4,61%	46,24%	-2,44%	-5,20%	51,43%
INKP	1,8746	49,98%	7,05%	4,61%	42,93%	-2,44%	-4,57%	47,50%
HRUM	1,1950	40,22%	7,05%	4,61%	33,17%	-2,44%	-2,92%	36,09%
ERAA	1,7106	38,63%	7,05%	4,61%	31,58%	-2,44%	-4,17%	35,75%
BRPT	1,6848	38,17%	7,05%	4,61%	31,12%	-2,44%	-4,11%	35,23%
BFIN	1,7674	36,53%	7,05%	4,61%	29,48%	-2,44%	-4,31%	33,79%
TBIG	1,0385	27,33%	7,05%	4,61%	20,28%	-2,44%	-2,53%	22,81%
ITMG	1,9684	20,16%	7,05%	4,61%	13,11%	-2,44%	-4,80%	17,92%
BBCA	0,9136	21,77%	7,05%	4,61%	14,72%	-2,44%	-2,23%	16,95%
ANTM	2,4724	17,93%	7,05%	4,61%	10,88%	-2,44%	-6,03%	16,91%
MEDC	2,6052	15,95%	7,05%	4,61%	8,90%	-2,44%	-6,36%	15,26%
TPIA	1,3844	16,30%	7,05%	4,61%	9,25%	-2,44%	-3,38%	12,62%
INCO	1,7312	14,94%	7,05%	4,61%	7,89%	-2,44%	-4,22%	12,11%
CPIN	0,7507	17,29%	7,05%	4,61%	10,24%	-2,44%	-1,83%	12,07%
BBRI	1,4278	14,95%	7,05%	4,61%	7,90%	-2,44%	-3,48%	11,39%
AMRT	0,2992	16,56%	7,05%	4,61%	9,51%	-2,44%	-0,73%	10,24%
ADRO	1,1956	13,44%	7,05%	4,61%	6,39%	-2,44%	-2,92%	9,31%
EMTK	0,4571	14,70%	7,05%	4,61%	7,65%	-2,44%	-1,12%	8,76%
TINS	2,7811	8,44%	7,05%	4,61%	1,39%	-2,44%	-6,79%	8,18%
PTBA	1,0372	12,58%	7,05%	4,61%	5,53%	-2,44%	-2,53%	8,06%
BMRI	1,2839	10,62%	7,05%	4,61%	3,57%	-2,44%	-3,13%	6,70%
BBNI	2,1063	8,40%	7,05%	4,61%	1,35%	-2,44%	-5,14%	6,49%
TOWR	0,8838	11,34%	7,05%	4,61%	4,29%	-2,44%	-2,16%	6,44%
UNTR	0,7361	5,06%	7,05%	4,61%	-1,99%	-2,44%	-1,80%	-0,19%
TLKM	0,7826	4,66%	7,05%	4,61%	-2,39%	-2,44%	-1,91%	-0,48%
EXCL	1,1557	3,15%	7,05%	4,61%	-3,90%	-2,44%	-2,82%	-1,08%
KLBF	0,6540	4,37%	7,05%	4,61%	-2,68%	-2,44%	-1,60%	-1,09%
JPFA	1,3223	2,59%	7,05%	4,61%	-4,46%	-2,44%	-3,23%	-1,24%
BBTN	2,4981	-1,17%	7,05%	4,61%	-8,22%	-2,44%	-6,10%	-2,13%
ICBP	0,2252	3,33%	7,05%	4,61%	-3,72%	-2,44%	-0,55%	-3,17%
MIKA	0,3797	1,18%	7,05%	4,61%	-5,87%	-2,44%	-0,93%	-4,94%
INTP	1,3732	-1,85%	7,05%	4,61%	-8,90%	-2,44%	-3,35%	-5,55%
INDF	0,5242	-0,82%	7,05%	4,61%	-7,87%	-2,44%	-1,28%	-6,59%
SMGR	1,5995	-4,00%	7,05%	4,61%	-11,05%	-2,44%	-3,90%	-7,15%
ASII	1,2705	-4,60%	7,05%	4,61%	-11,65%	-2,44%	-3,10%	-8,55%
PGAS	2,6937	-10,66%	7,05%	4,61%	-17,71%	-2,44%	-6,57%	-11,14%
MNCN	1,7772	-11,78%	7,05%	4,61%	-18,83%	-2,44%	-4,34%	-14,49%
GGRM	0,9617	-10,05%	7,05%	4,61%	-17,10%	-2,44%	-2,35%	-14,76%
WIKA	2,5311	-15,15%	7,05%	4,61%	-22,20%	-2,44%	-6,18%	-16,03%
UNVR	0,4237	-11,16%	7,05%	4,61%	-18,21%	-2,44%	-1,03%	-17,17%
PTPP	3,3112	-21,92%	7,05%	4,61%	-28,97%	-2,44%	-8,08%	-20,89%
WSKT	3,2145	-24,25%	7,05%	4,61%	-31,30%	-2,44%	-7,84%	-23,46%
HMSP	1,1551	-21,17%	7,05%	4,61%	-28,22%	-2,44%	-2,82%	-25,40%

Based on the Jensen index (Jensen's Alpha) the performance of 24 stocks has a positive or superior apha to the market. These shares are called outperformers. The shares in succession based on their performance are: MDKA, TKIM, INKP, HRUM, ERAA, BRPT, BFIN, TBIG, ITMG, BBCA, ANTM, MEDC, TPIA, INCO, CPIN, BBRI, AMRT, ADRO, EMTK, TINS, PTBA , BMRI, BBNI and TOWR. This positive alpha indicates that the stock's return rate is above its systematic risk. While the remaining 20 shares in a row: UNTR, TLKM, EXCL, KLBF, JPFA, BBTN, ICBP, MIKA, INTP, INDF, SMGR, ASII, PGAS, MNCN, GGRM, WIKA, UNVR, PTPP, WSKT and HMSP are shares which have a negative alpha, namely stocks that are inferior to the market. These stocks are also called underperforming stocks. This means that the stock's return rate is below its systematic risk.

V. Conclusion

Based on the data processing and analysis carried out, the following conclusions can be drawn:

1. From the LQ45 group stocks for the period January 2017 – December 2021, there are 31 stocks with positive realized returns, which are in a row from the highest: MDKA, TKIM, INKP , HRUM, ERAA, BRPT, BFIN, TBIG, BBCA, ITMG, ANTM, CPIN, AMRT, TPIA, MEDC, BBRI, INCO, EMTK, ADRO, PTBA, TOWR, BMRI, TINS, BBNI, UNTR, TLKM, KLBF, ICBP , EXCL, JPFA and MIKA. Meanwhile, 13 stocks had negative realized returns, namely: INDF, BBTN, INTP, SMGR, ASII, GGRM, PGAS, UNVR, MNCN, WIKA, HMSP, PTPP and WSKT.
2. Of the LQ45 group stocks studied for the period January 2017 – December 2021, there are 30 stocks that have a beta coefficient greater than 1, namely: PTPP, WSKT, TINS, PGAS, MEDC, WIKA, BBTN, ANTM, TKIM, BBNI, ITMG, INKP, MNCN , BFIN, INCO, ERAA, BRPT, SMGR, BBRI, TPIA, INTP, JPFA and BMRI. The 10 stocks include: PTPP, WSKT, TINS, PGASm MEDC, WIKA, BBTN, ANTM, TKIM and BBNI have a beta coefficient greater than 2. This illustrates that these stocks have a greater systematic risk than the market. Thus these stocks are called aggressive.
3. There are 14 stocks that have a beta coefficient smaller than 1, namely: GGRM, BBCA, TOWR, MDKA, TLKM, CPIN, UNTR, KLBF, INDF, EMTK, UNVR, MIKA, AMRT and ICBP. This illustrates that these stocks have less systematic risk than the market, so they are called defensive stocks.
4. The results of stock data processing for the LQ45 group for the period January 2017 - December 2021 using the Capital Asset Pricing Model approach show 24 undervalued stocks because the average return generated is higher than investor expectations (expected return). The shares are: MDKA, TKIM, INKP, HRUM, ERAA, BRPT, BFIN, TBIG, ITMG, BBCA, ANTM, MEDC, TPIA, INCO, CPIN, BBRI, AMRT, ADRO, EMTK, TINS, PTBA, BMRI, BBNI , TOWR. In this case, investors can be recommended to buy the undervalued shares.
5. Furthermore, there are 20 stocks that are overvalued because the average return generated is lower than expected by investors. The shares are: UNTR, TLKM, EXCL, KLBF, JPFA, BBTN, ICBP, MIKA, INTP, INDF, SMGR, ASII, PGAS, MNCN, GGRM, WIKA, UNVR, PTPP, WSKT, HMSP. The recommendation for investors is to sell the overvalued shares.
6. Stocks with high risk (beta) do not necessarily provide high returns. From the research, it turns out that 10 stocks have a high beta (> 1) but the realized return is negative. In fact, of the 10 stocks, 5 of them namely PTPP, WSKT, PGAS, WIKA, BBTN have

betas above 2 (very aggressive). Of the 10 stocks, there are 3 stocks from the infrastructures / heavy constructions and civil engineering sub-sector, namely Waskita Karya (WSKT), Housing Development (PTPP) and Wijaya Karya (WIKA), 2 shares from the basic materials sector / sub-sector related to closely related to the infrastructures/heavy constructions and civil engineering sub-sectors, namely from the basic materials sector/sub-sector, in this case the shares of Semen Indonesia (SMGR) and Indocement Tunggal Prakarsa (INTP). The remaining 1 share each from the consumer sector/sub sector: energy/oil, gas & coal, namely Perusahaan Gas Negara (PGAS) from the energy/oil, gas & coal sector/sub sector, State Savings Bank (BBTN) from the sector/sub sector financials/banks, namely BBTN, Media Nusantara Citra (MNCN) from the consumer cyclicals/media and entertainment sector/sub-sector, Astra International (ASII) shares from the industrials/multi-sector holdings sector/sub-sector namely ASII and finally HM Sampoerna (HMSP) stock) from the non-cyclical/tobacco consumer sector/sub-sector. Furthermore, the correlation coefficient between beta and realized return is -0.4094 which shows a negative correlation between the two, so it can be said that the increase in beta will be followed by a decrease in realized return.

7. There are 11 stocks with low beta (<1) but have high realized returns. The shares are: Bank Central Asia (BBCA), Sarana Menara Nusantara (TOWR), Merdeka Cooper Gold (MDKA), Telkom Indonesia (TLKM), Charoen Pokphand Indonesia (CPIN), United Tractors (UNTR), Kalbe Farma (KLBF) , Eagle Mahkota Teknologi (EMTK), Eagle Mahkota Teknologi (EMTK), Mitra Keluarga Karya Sehat (MIKA), Sumber Alfaria Trijaya (AMRT) and Indofood CBP Sukses Makmur (ICBP). However, of the 11 stocks, 3 stocks, namely KLBF, MIKA and ICBP, had realized returns of 4.37%, 1.18% and 3.33%, respectively, which was below the JCI average return in the same period of 4.607%. . Furthermore, it can be seen that there are 3 stocks from the same sector / sub-sector, namely consumer non-cyclicals / food & beverage. The stocks are: CPIN, AMRT and ICBP. Then 2 stocks from the infrastructures/telecommunication sector/sub-sector, namely TOWR and TLKM. There are 2 stocks from the healthcare sector but different sub-sectors, namely KLBF from the pharmaceuticals & healthcare research sub-sector and MIKA shares from the healthcare equipment & providers sub-sector. While the remaining 1 share each, namely BBCA from the financials/banks sector/sub-sector which provided the highest return of 21.77% with a stock beta of 0.9136, MDKA shares from the basic materials/basic materials sector/sub-sector, UNTR from the/basic materials sector/sub-sector. industrial / industrial goods sub-sector and EMTK from the technology / software & IT service sector / sub-sector. From the data of this group it was found that there is a positive correlation between the beta variable and realized return, although it is not too strong, which is 0.3732.
8. There are 20 stocks with high beta and high realized returns as well. However, there are 2 stocks, namely Japfa (JPFA) and XL Axiata (EXCL) which have realized returns of 2.59% each and EXCL, whose average realized returns are below the JCI average return of 4.607%. Of the 20 stocks, 7 stocks came from the basic materials sector/sub-sector: Tin (TINS), Aneka Tambang (ANTM), Tjiwi Kimia Paper Factory (TKIM), Indah Kiat Pulp and Paper (INKP), Vale Indonesia (INCO), Barito Pacific (BRPT) and Chandra Asri Petrochemical (TPIA). Then there are 5 stocks from the energy / oil, gas & coal sector / sub sector, namely: Medco Energy International (MEDC), Indo Tambangraya Megah (ITMG), Adaro Energy Indonesia (ADRO), Harum Energy (HRUM) and Bukit Asam (PTBA). . Furthermore, there are 4 stocks from the financials sector, of which 3 come from the banks sub-sector namely Bank Negara Indonesia (BBNI), Bank Rakyat Indonesia (BBRI) and Bank Mandiri (BMRI) and 1 other share comes from the

financing service sub-sector, namely BFI Finance Indonesia. (BFIN). Furthermore, the other 2 stocks came from the infrastructures/telecommunication sector/sub-sector, namely XL Axiata (EXCL) and Tower Bersama Infrastructure (TBIG). The last 2 stocks, namely Erajaya Swasembada (ERAA) came from the consumer cyclicals/retailing sector/sub-sector and Japfa (JPFA) from the food and beverage sub-sector non-cyclical consumer. The correlation coefficient in the high beta stock group and high realized return is positive, although very weak, which is 0.0896.

9. There are 3 stocks that have low beta and low realized. All stocks in this group came from the consumer non-cyclicals sector, namely Gudang Garam (GGRM) from the tobacco sub-sector, Indofood Sukses Makmur (INDF) from the food & beverage sub-sector and Unilever Indonesia (UNVR) from the non-durable household product sub-sector. In this group, a negative correlation was found, namely -0.2468, which means that an increase in beta will be followed by a decrease in realized return.
10. In terms of evaluating the performance of a risk-adjusted portfolio using the Treynor index (Treynor Measure) or Reward to Volatility (RVOL) calculation, the higher the RVOL value, the better the portfolio performance. Thus, based on the stock portfolio performance rankings, the shares are consecutively: MDKA, AMRT, HRUM, INKP, TKIM, TBIG, BRPT, ERAA, EMTK, BFIN, BBCA, CPIN, TPIA, ITMG, BBRI, ADRO, PTBA, TOWR, INCO, ANTM, MEDC, BMRI, BBNI, TINS, UNTR TLKM BBTN EXCL JPFA KLBF INTP PGAS SMGR PTPP WIKA ASII WSKT MNCN INDF MIKA ICBP GGRM HMSP UNVR. When the benchmark is carried out, namely Treynor stocks are compared with the market portfolio (the entire market in this case the JCI) which has a Treynor index of -0.0244 there are 24 stocks that have a risk-adjusted performance that is better (superior) than the overall market (JCI) or so-called outperform. The stocks in order from those with the best performance were: MDKA, AMRT, HRUM, INKP, TKIM, TBIG, BRPT, ERAA, EMTK, BFIN, BBCA, CPIN, TPIA, ITMG, BBRI, ADRO, PTBA, TOWR, INCO, ANTM, MEDC, BMRI, BBNI, TINS. Meanwhile, shares: UNTR TLKM BBTN EXCL JPFA KLBF INTP PGAS SMGR PTPP WIKA ASII WSKT MNCN INDF MIKA ICBP GGRM HMSP UNVR has a risk-adjusted performance which is still below the JCI performance or is called underperform.
11. Based on the Jensen index (Jensen's Alpha) the performance of 24 stocks has a positive or superior apha to the market. These shares are called outperformers. The shares in succession based on their performance are: MDKA, TKIM, INKP, HRUM, ERAA, BRPT, BFIN, TBIG, ITMG, BBCA, ANTM, MEDC, TPIA, INCO, CPIN, BBRI, AMRT, ADRO, EMTK, TINS, PTBA , BMRI, BBNI and TOWR. This positive alpha indicates that the stock return is above the systematic risk. While the remaining 20 shares in a row: UNTR, TLKM, EXCL, KLBF, JPFA, BBTN, ICBP, MIKA, INTP, INDF, SMGR, ASII, PGAS, MNCN, GGRM, WIKA, UNVR, PTPP, WSKT and HMSP are shares which have a negative alpha, namely stocks that are inferior to the market. These stocks are also called underperforming stocks. This means that the stock's return rate is below its systematic risk.
12. If you use undervalued stocks, low beta but high realized returns, superior stocks according to Treynor and Jensen's alpha indexes, the best stocks are: Bank Central Asia (BBCA), Sarana Menara Nusantara (TOWR), Merdeka Copper Gold (MDKA), Charoen Pokphand Indonesia (CPIN), Eagle Mahkota Teknologi (EMTK) and Sumber Alfaria Trijaya (AMRT).

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