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COMPARISON ANALYSIS OF OPTIMAL PORTFOLIO WITH THE CAPITAL ASSET PRICING MODEL (CAPM) BEFORE AND DURING THE COVID-19 PANDEMIC (Study on Liquid-45 Index Stock Period 2018-2021)

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Abstract

This study aims to compare the optimal portfolio composition of stocks, the proportion of funds in each stock, and calculate the return and portfolio risk on stocks that are included in the index of the liquid-45 (ILQ-45) before and during Covid-19 on the Indonesia Stock Exchange in the period May 2018 – December 2021. The research method uses a comparative description. The research sample using the purposive sampling method was obtained from the 30 stocks before Covid-19 and 35 shares during Covid from the index liquid-45 (ILQ-45). The results showed: 1.) an arrangement of the optimal portfolio using the CAPM before the Covid-19 pandemics on the LQ45 index with 30 stock varieties shows that none of the stocks are included in the optimal portfolio category because the Expected return (E(Ri) CAPM and Excess Return to Beta (ERB) value results are both negative. These are greatly influenced by the Return Market (Rm) that has a negative value, while the arrangement of the optimal portfolio during Covid-19 on the LQ45 index with 35 sample stocks is that 14 stocks fall into the category optimal portfolio. 2.) The results from the optimal stock portfolios before and during Covid-19 cannot be compared

Keywords: Capital Asset Pricing Model, Covid-19, Index Liquid-45, Optimal Stock Portfolio.

1. Introduction

The capital market has a big role in the economy of a country because the capital market carries out two functions at once, namely the economic function, in this case, the capital market provides facilities or vehicles that bring together two interests, namely those who have excess funds (investors) and those who need funds (investors). issuer) long term. The financial function, in this case, the capital market, provides the possibility and opportunity to obtain returns or capital gains or interest for investors according to the characteristics of the chosen investment. The capital market is a market that brings together those who offer and need long-term funds, be it stocks (equity), debt securities (bonds), mutual funds, and other derivative instruments.

Stock prices in the capital market are an illustration of all available information. Various events that occur in the capital market environment are an illustration of all activities in the capital market, both economic and non-economic, containing information that is used as a basis for decision-making for investors so that it becomes one of the factors that determine the rise and fall of stock prices. The rise and fall of stock prices is an important thing that is of interest to investors because stock prices reflect the company's performance.

The COVID-19 pandemic (Corona Virus Disease 2019), a respiratory disease caused by the SARS-Cov-2 (Severe Acute Respiratory Syndrome Corona Virus-2) virus or popularly referred to as the coronavirus, which has hit the world until now is one of the emergency events that related to the non-economic environment of the capital markets which has had a tremendous impact on global and Indonesian stock prices.

Stock is a sign of ownership or participation of a person or entity in a company or limited liability company. Stock is in the form of a piece of paper that explains that the owner of the paper is the owner of the company that issued the securities. The portion of ownership is determined by how much participation or ownership is invested in the company.

Investment is a commitment of funds to obtain profit in the future. Future profits are compensation for time and investment risk. In the context of investment, future profits represent unrealized expectations. Therefore, future profits are better known as expected returns. In the context of investment management, returns are divided into two, first, (actual return) the return that has occurred which is calculated based on historical data, and second, (expected return) the return that is expected to be obtained in the future.

In portfolio theory, there is a capital asset pricing model (CAPM) which is a model for determining the price of an asset in equilibrium conditions. The goal is to determine the minimum required return on risky investments. In a state of equilibrium, the required return by investors for a stock will be affected by the risk. The calculated risk is a systematic risk or market risk which is called beta (β). Meanwhile, unsystematic risk is irrelevant because this risk can be eliminated by diversification.

This study was conducted to compare the optimal stocks using the Capital Asset Pricing Model-CAPM method on the Indonesia Stock Exchange (IDX) regarding the Composite Stock Price Index and Index Liquid-45. The research object chosen in this research stocks on the IDX with the basis of the stock market being the Composite Stock Price Index and those included in the Index Liquid-45 (ILQ-45). The research period used in this study is the period before Covid-19, namely, May 2018 - February 2020, and during Covid-19, namely, March 2020 - December 2021.

2. Research Methods

2.1. Investation

Investment can be interpreted as a commitment to invest a certain amount of funds at this time to obtain profits in the future. In other words, investment is a commitment to sacrifice current consumption (sacrifice current consumption) to increase consumption in the future. Investment can be related to investing several funds in real assets such as land, gold, houses, and other real assets or financial assets such as deposits, stocks, bonds, and other securities.

In the context of investment management, it states that returns or profits are rewards obtained from investments. This yield or profit is divided into two, first, (actual return) the return that has occurred which is calculated based on historical data, and second, (expected return) the return that is expected to be obtained by investors in the future.

There are two types of risk, the total investment can be separated based on whether a certain type of risk can be eliminated by diversification, or not. The two types of risk are systematic risk and unsystematic risk. The systematic risk or known as market risk, which some authors refer to as general risk, is the risk associated with changes that occur in the market as a whole. In other words, systematic risk is a risk that cannot be diversified. Meanwhile, unsystematic risk or known as specific risk (company risk), is a risk that is not related to changes in the overall market. The company's risk is more related to changes in the micro condition of the securities issuing company. In portfolio management, it is stated that the company's risk can be minimized by diversifying assets in a portfolio.

2.2. Stock

Stock can be defined as a sign of participation or ownership of a person or entity in a company or limited liability company. Shares are in the form of a piece of paper that explains that the owner of the paper is the owner of the company that issued the securities.

2.3. Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) was first introduced by Sharpe, Lintner, and Mossin in the mid-1960s. The capital Asset Pricing Model (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. The CAPM model is a balance model that describes the relationship between risk and returns in a simpler way because it only uses one variable (also known as the beta variable) to describe risk. CAPM is a method that incorporates the element of stock risk into the minimum return. The higher the risk of a stock, the higher the minimum expected return. The risk measure used is stock beta. The minimum return of the CAPM model consists of the risk-free rate and market return. The amount of the risk-free rate depends on the behavior of investors in making risk-free investments, for example, the interest rate issued by Bank Indonesia, namely the interest on Bank Indonesia Certificates (SBI).

2.4. Portfolio Return and Risk

The return and risk of a portfolio for single security are important, but the return and risk of all securities in the portfolio are more important. Calculating the return and risk for single security is useful because it will be used to calculate the return and risk of a portfolio. Portfolio risk is the return variance of the securities that make up the portfolio. In calculating portfolio risk, it is different from calculating the portfolio return (portfolio realized return) which is the weighted average of all returns of a single security. Portfolio risk is not a weighted average of all the risks of single security so it can be less than the weighted average risk of every single security.

2.5. Method

3. Results And Discussion

Efficient Portfolio Based on Index LQ-45 Before and During Covid-19

No.	Stock Code	Before *Covid-19*		No.	Stock Code	During *Covid-19*	
		Ri	***E(Ri)***			***Ri***	***E(Ri)***
1	BBCA	0,01703	- 0,00374	1	ADRO	0,03925	0,00824
2	BBRI	0,01356	- 0,00530	2	AKRA	0,02603	0,01541
3	EXCL	0,01426	- 0,00043	3	ANTM	0,08139	0,02254
4	ICBP	0,00905	- 0,00095	4	ERAA	0,04245	0,01712
5	JSMR	0,00557	- 0,00495	5	EXCL	0,01634	0,01368
6	MNCN	0,01095	- 0,00915	6	INCO	0,03683	0,01293
7	SMGR	0,01091	- 0,01252	7	INKP	0,02826	0,01514

8	WIKA	0,01676	- 0,01494	8	ITMG	0,04011	0,01722
				9	JPFA	0,02080	0,01371
				10	KLBF	0,01475	0,00361
				11	PTBA	0,01384	0,00774
				12	TKIM	0,02974	0,02177
				13	TLKM	0,00995	0,00980
				14	UNTR	0,01885	0,00554

The results of this study show an efficient stock portfolio based on the LQ-45 Index before and during Covid-19. In the calculation results of the 30 sample stocks 8 efficient stocks have Ri>E(Ri) based on the Index LQ-45 before covid-19 and in the calculation results of 35 sample stocks, 14 efficient stocks have Ri>E(Ri) based on the Index LQ-45 during Covid-19.

From the results of this study, it means that it can be described that the comparison of efficient stocks before Covid-19 can be used as a reference or recommendation and consideration in making investment decisions for investors to invest in the 8 efficient stocks, as well as when Covid-19 can be used as a reference or recommendation and consideration in making investment decisions for investors to invest in the 14 efficient stocks, but investors also still have to follow the development of market return (Rm), risk-free (Rf), beta and the level of the composite stock price index and analyze both fundamental analysis and technical analysis of each, what will each company be like in the future.

Excess Return to Beta Based on Index LQ-45 Before and During Covid-19

No.	**Stock Code**	**Before *Covid-19***	**No.**	**Stock Code**	**During *Covid-19***
		ERB			***ERB***
1	BBCA	-0,00626	1	ADRO	0,08070
2	BBRI	-0,00732	2	AKRA	0,04111
3	EXCL	-0,00578	3	ANTM	0,03907
4	ICBP	-0,00549	4	ERAA	0,03704
5	JSMR	-0,00706	5	EXCL	0,03576
6	MNCN	-0,01050	6	INCO	0,02853
7	SMGR	-0,01357	7	INKP	0,02770
8	WIKA	-0,01584	8	ITMG	0,02497
			9	JPFA	0,01984
			10	KLBF	0,01563
			11	PTBA	0,01291
			12	TKIM	0,01222
			13	TLKM	0,01015
			14	UNTR	0,00866

The results of this study show the excess return to beta stock portfolio based on the Index LQ-45 before and during Covid-19. The calculation results from 8 stocks that none of the ERB values were positive before Covid-19 and the calculation results of 14 stocks during Covid-19 were all positive based on the Index LQ-45 during Covid-19.

Optimal Portfolio Based on Index LQ-45 During Covid-19

No.	Stock Code	During *Covid-19*	
		ERB	***Ci***
1	ANTM	0,08070	0,00349
2	ERAA	0,04111	0,00261
3	ITMG	0,03907	0,00261
4	ADRO	0,03704	0,00076
5	INCO	0,03576	0,00324
6	TKIM	0,02853	0,00280
7	INKP	0,02770	0,00249
8	AKRA	0,02497	0,00551
9	JPFA	0,01984	0,00233
10	EXCL	0,01563	0,00328
11	PTBA	0,01291	0,00162
12	KLBF	0,01222	0,00070
13	UNTR	0,01015	0,00018
14	TLKM	0,00866	0,00330

The results of this study indicate the optimal portfolio with ERB≥Ci criteria. Of the 14 stocks based on the LQ-45 Index during Covid-19, all of them were included in the optimal portfolio. The calculation results show that the C* (Maximum Ci) value of 0.00551 is in AKRA shares.

After obtaining the optimal stock portfolio, the next step is to determine the proportion of shares in the optimal portfolio based on the Index LQ-45 during Covid-19.

Proportion of Funds (Wi) Based on Index LQ-45 During Covid-19

No.	Stock Code	During *Covid-19*
		Wi
1	AKRA	0,21689
2	ANTM	0,20404
3	INCO	0,12806
4	ERAA	0,10389
5	ITMG	0,08241
6	TKIM	0,06344
7	INKP	0,04715
8	EXCL	0,04554
9	ADRO	0,03777
10	JPFA	0,03206

11	PTBA	0,01450
12	KLBF	0,01031
13	TLKM	0,00915
14	UNTR	0,00479
	TOTAL	**1,00000**

The results of this study show the proportion of each stock in the optimal portfolio of the index LQ-45 during Covid-19. The stock with the largest proportion in the optimal portfolio of the index LQ-45 during Covid-19 was AKRA at 0.21689 or 21.689%, while the smallest proportion in the optimal portfolio was UNTR at 0.00479 or 0.479%.

In the index LQ-45 during Covid-19, AKRA has the largest proportion because the stock has the smallest Variance Error Residual (σei2) of 0.00389, so it has the largest Wi of 0.21689.

After getting the stock proportion from the optimal stock portfolio, then calculating the return and risk of the stock portfolio based on the LQ-45 Index during Covid-19.

Return and Risk Based on Index LQ-45 During Covid-19

No.	**Stock Code**	**During *Covid-19***
1	ANTM	0,00460
2	AKRA	0,00334
3	ERAA	0,00178
4	INCO	0,00166
5	ITMG	0,00142
6	TKIM	0,00138
7	INKP	0,00071
8	EXCL	0,00062
9	JPFA	0,00044
10	ADRO	0,00031
11	PTBA	0,00011
12	TLKM	0,00009
13	KLBF	0,00004
14	UNTR	0,00003
	E(Rp)	0,01653
	σp^2	0,00826
	σp	0,09089

This research shows the optimal portfolio return and risk based on the Index LQ-45 during Covid-19. The result of the calculation of portfolio return is 0.01653 or 1.653% and portfolio risk is 0.09089 or 9.089%. The largest proportion of E(Ri) is ANTM of 0.00460 or 0.460%, while the smallest proportion of E(Ri) is UNTR of 0.000003 or 0.003%.

From the results of this study, it can be described that the comparison of optimal portfolio analysis before and during covid-19 with the capital asset pricing model (CAPM) method can be used as a reference or recommendation for investors to find out or provide an overview of the proportion of funds for efficient and optimal stocks with actual returns, and the risks to be borne. However, the capital asset pricing model (CAPM) method is not the only method used in the calculation and formation of efficient stocks and optimal portfolios, many other methods can be used, for example, arbitrage pricing theory and the Markowitz method.

4. Conclusions

Based on the results and discussion of the research on the Capital Asset Pricing Model method on stocks included in the LQ-45 Index before and during Covid-19, the following conclusions can be drawn:

4.1. There are no stocks that meet the criteria for forming an optimal portfolio using the Index LQ-45 in the period before Covid-19 (May 2018 - February 2020) because the ERB values in stocks before Covid-19 were all negative, this is because the value of E(Ri) negative which is influenced by the value of the market return (Rm) which on average is negative. So that in this study, the criteria for the formation of an optimal portfolio are not continued, because basically, investors invest because they want to get the expected rate of return E(Ri) with a certain risk, by getting the expected return or profit. So that in this study the comparison of the optimal portfolio of stocks before and during Covid-19 cannot be compared, as well as the criteria for the size of the proportion of funds, returns, and risks of the optimal portfolio of stocks. Meanwhile, for the criteria for the formation of an optimal portfolio using the Index LQ-45 during Covid-19 (March 2020 – December 2021), there were 14 stocks that met the criteria for forming an optimal portfolio, namely AKRA (AKR Corporindo Tbk), ANTM (Aneka Tambang (Persero) Tbk) , INCO (Vale Indonesia Tbk), ERAA (Era Jaya Swasembada Tbk), TKIM (Tjiwi Kima Paper Factory Tbk), INKP (Indah Kiat Pulp & Paper Tbk), EXCL (XL Axiata Tbk), ADRO (Adaro Energy Tbk), JPFA (Jafpa Comfeed Indonesia Tbk), KLBF (Kalbe Farma Tbk), TLKM (Telekomunikasi Indonesia (Persero) Tbk), and UNTR (United Tracktor Tbk).

4.2. The proportion of funds resulting from the optimal portfolio of stocks using the Index LQ-45 during Covid-19 is the highest is AKRA at 0.21689 or 21.689%, while the smallest proportion is the optimal portfolio is UNTR at 0.00479 or 0.479%.

4.3. The amount of return and risk from the results of the optimal portfolio of stocks using the Index LQ-45 during Covid-19 (March 2020 - December 2021) the optimal portfolio return is 0.01653 or 1.653% and the optimal portfolio risk is 0.09089 or 9.089 %.

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