



Blue Chip Stock Return and Risk Analysis

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Abstract. Investment is an investment for one or more assets owned and usually long term with the hope of getting a profit in the future. One of the investments that is often made is stock investment, stock investment requires analysis to determine the risk and return that investors will get. The author will examine the analysis of risk and stock returns to minimize losses that will be obtained by investors, especially in the blue chip company group that is most in demand by investors. Researchers analyzed risk and stock returns using analytical methods, fundamentals and Markowitz methods.

Keywords: Investment · Stocks · Markowitz Fundamentals

1 Introduction

Economic life throughout the world, even in Indonesia today, cannot be separated from the role of the capital market. So that it can be said that now the trend of world economic order is determined and influenced by developments in the capital market. According to Robbert Ang (1997:3:2) the capital market is an indicator of a country's economic progress and supports the country's economic development. He also said that in the wheel of a country's economy, sources of funds to finance the operation of companies which are the backbone of the economy are very limited. Therefore, the capital market appears as an alternative long-term financing solution. Currently, the capital market is an alternative investment for investors who cannot be separated from promising profits and losses. To reduce these losses, there are several ways to be taken, including diversifying investments to form a portfolio, namely a combination of several investments. In this writing, the selected form of securities is stock. In addition, the capital market also functions as the development of financial instruments, diversifies risks and increases the mobilization of public funds and creates a more efficient allocation of funding sources (Suta. 2000: 21).

In capital market investments will always be associated with risks and returns where the greater the risks involved. Taken, the greater the profit you will get. But in taking this risk, various analyzes are needed in order to be able to choose companies that have the potential to provide returns. One of the analyzes to see the risk and potential of a company is by analyzing the investment portfolio. The portfolio definition model that emphasizes the relationship between return and investment risk is the Markowitz model. This model can overcome the weakness of random hashing. The Markowitz model shows

that fluctuations in returns on financial stock portfolios depend not only on how risky the individual assets in the portfolio are, but rather on the relationship of those risks to securities (Suqaier and Ziyud, 2011). This model assumes that the addition of stock continuously at a certain point in time further reduces the benefits of diversification and actually increases the risk (Tandelilin, 2010: 116).

Determining an efficient portfolio is the most important thing to consider in determining an optimal portfolio. The attitude of an investor who expects a certain return must consider how much risk must be borne from the investment. Generally, the greater the expected return, the greater the risk that must be borne. Risk is defined as the possibility that the actual return is different from the expected return. Specifically, it refers to the possibility of realizing an actual return that is lower than the expected minimum return. For this reason, investors need to predict the return and risk of the shares they will buy. The calculation of return and risk is based on historical data collected by investors in the form of stock prices and dividends. Based on these data, investors can analyze how likely the return that will be obtained (commonly referred to as the expected return) and minimize the risk (deviation from the expected return) from the stock investment. According to E.Tandelilin (2002: 5) the relationship between risk and return expected from an investment is a unidirectional and linear relationship. Means, the greater the risk that must be borne, the greater the return expected as an investor, apart from having to pay attention to returns high.

However, there are many inexperienced investors who invest without taking big risks. That's why blue chip stocks are an investment opportunity, especially for beginners. Blue chip stocks or large cap stocks can be interpreted as mainstream stocks. We also know that companies in this blue chip category make huge profits and pay their investors regularly. Because blue-chip stocks can be defined as shares in companies that have a national reputation for quality, ability and reliability to operate profitably in a variety of economic situations, good and bad. One of them is facing a looming global recession.

According to the International Monetary Fund, that the global recession is a state of inflation in the world's Gross Domestic Product (GDP) based on world macroeconomic indicators, including the unemployed population, capital flows, industrial production, world oil consumption, and stock trading. When a global recession occurs, the condition of developed countries will face a deep contraction, and the economic impact of developing countries will slow down immediately. Trading stocks declined rapidly.

There are many challenges for companies, one of which is facing a recession. A recession is defined as a significant decrease in economic activity over a long period of time and stagnates. This condition usually lasts for months to years, considering that a recession is closely related to massive shocks in economic activity. One of the things that affects companies during a recession is reduced production activity and decreased demand and demand. So the company must be able to face the situation in order to survive the threat of an economic recession. So this research is expected to be able to see opportunities for investors to see which companies can invest in the long term and can plunge into a state of global economic recession. Based on the description above, to find out how optimal the portfolio of investors is to buy shares listed on.

This research will be conducted on the top 10 groups of stocks on the Indonesia Stock Exchange (IDX), which consist of Based on this background, the authors are

interested in conducting research with the title “**Analysis of Return and Risk of Blue Chip Stocks**”

Problem Formulation

Based on the above phenomenon, the main problem of this research is to see how much risk and stock returns are using technical and fundamental analysis in order to minimize the risks that will be experienced by potential investors, and the problems faced are that there are several problem formulations that become research benchmarks. First, what method can determine the optimal portfolio and how to calculate the optimal portfolio using the Markowitz method and which companies are good for long-term investment when there is a global recession?

2 Literature Review and Method

Research Objectives

The aim of this study is to calculate a portfolio that provides optimal returns by calculating returns on blue chip and getting an overview of risks and returns for each company so that they can be invested in the long term when a global recession occurs.

Research Methods

Types and sources of data

The method that the authors use in this study is a descriptive method with a quantitative approach. The meaning of the descriptive method is to find out the existence of an independent variable, whether only one variable or more (stand-alone variable) by not comparing variables in other samples and not looking for relationships with other variables. Then in this study the authors used a quantitative approach.

This study uses quantitative secondary data types. Quantitative secondary data sources are obtained from the annual stock price list for the 2019–2021 period from the Indonesia Stock Exchange (IDX) via the website www.idx.co.id, as well as other attachments relevant to the research which will later be analyzed using technical and fundamental analysis which will then be interpreted and a conclusion drawn.

This research will be conducted on the top 10 stock groups on the Indonesia Stock Exchange (IDX), which consist of PT Adaro Energy Tbk (ADRO), PT Aneka Tambang Tbk (ANTM), PT Astra International Tbk (ASII), PT Bank Rakyat Indonesia (Persero) Tbk (BBRI), PT Bank Tabungan Negara Tbk (BBTN), PT BFI Finance Indonesia Tbk (BFIN), PT Barito Pacific Tbk (BRPT), PT Elang Mahkota Teknologi (EMTK), PT Gudang Garam Tbk (GGRM), and PT Handjaya Mandala Sampoerna Tbk (HMSP).

Because the blue chip stock group is a stock whose profits are stable and can be profitable in good or bad situations. Stocks blue chip will be of great interest to investors. These stocks will be calculated using the Markowitz method in order to find out the optimal portfolio in a global recession situation in 2023.

Data Collection Techniques

The data used by the author in this study are secondary data including literature and

documentation studies. In relation to this research, the data collection technique uses a literature study whose documentation is carried out by collecting secondary data that has been provided by the IDX, which aims to explore past data systematically and objectively, of course the data collected is relevant data. With ongoing research, closing stock price data, dividend distribution data.

Data Analysis Techniques

Data analysis is an activity carried out after all research data has been collected. The data analysis technique in this study uses a descriptive technique with a quantitative approach, because it processes research data in the form of numbers using the Microsoft Excel program and also stock chart tables.

Markowitz Method

Markowitz's portfolio theory, also known as the mean- variance model, emphasizes trying to maximize expected return (mean) and minimize uncertainty/risk (variance) to select and develop an optimal portfolio. That is, it can also be said that the investor's optimal portfolio selection method is based on his preference for the expected return and the expected risk of each investment decision. Markowitz diversification differs from naïve diversification and is more effective because it aims to maintain existing returns and reduce risk by analyzing the covariance between asset returns. Investors who invest their funds in a portfolio format can use the Markowitz model to help choose the stocks to invest.

Return

Return is the result obtained from the investment. Returns can be realized returns or expected returns that have not occurred but are expected to occur in the future. Realized returns are calculated based on historical data. Revenue recognition is important because it is used as a measure of company performance. This historical return is also useful as a basis for determining the expected rate of return and risk in the future. Realized performance measurement can occur:

Total return, relative return, cumulative return, and adjusted return. Calculating the return (gain rate) of stock from each sample of banking sector company shares expressed as one percent using the formula:

$$R = \frac{P_t - P_{t-1}}{P_{t-1}}$$

Where:

P_t = stock price in period t

P_{t-1} = stock price in period t - 1

D1 = dividends distributed

Expected Return

Before looking for the expected return value, first look for the individual stock return value (R_i) for several portfolio candidate stocks based on weekly stock prices during

the observation period, once obtained, the expected return can be known with the seller (Husnan, 2009:50):

$$E(R_i) = \frac{\sum_{i=1}^N R_{ij}}{N}$$

Information:

$E(R_i)$ = average *expected return* on company stock i

R_{ij} = return on investment i

N = number of events that may occur

Variant

Calculating the variance of each stock with the formula (Tandelilin, 2010:55):

$$\sigma_j^2 = \frac{\sum_{i=1}^N (R_{jt} - R_j)^2}{(n - 1)}$$

Covariance

A negative covariance value indicates the values of the two variables move in opposite directions, that is, if one increases, the other decreases or one decreases, the other increases. The zero covariance value indicates the value of the two independent variables, namely the movement of one variable has nothing to do with the movement of the other variable. The covariance is the average of the stock deviations. Within the portfolio management framework, covariance shows how the returns from each security have a trend to move together.

3 Result and Discussion

Closing prices and stock returns of 10 companies

The closing price of a stock is the price that appears when the stock exchange closes. The closing price of a stock is very important because it becomes the reference for the opening price the next day. The closing stock price is usually used to predict the stock price in the next period. The following are the closing prices for shares of ten blue chip in Indonesia in the period January 1 2019 to December 1 2021. And we find the return results for each month for each company using the calculation method.

Closing prices and *returns for 10 Blue Chip*

Date	AMTA		ADCO		ASI		BBN		BETH	
	close	RETURN	close	RETURN	close	RETURN	close	RETURN	close	RETURN
01/01/2019	948	0.001212	1.190	0.000191	1.400	0.000000	1.800	0.000000	2.444	0.000000
02/01/2019	950	0.002119	1.190	0.000191	1.400	0.000000	1.800	0.000000	2.444	0.000000
03/01/2019	940	-0.1137759	1.190	0.000191	1.400	0.000000	1.800	0.000000	2.444	0.000000
04/01/2019	940	0.000000	1.190	0.000191	1.400	0.000000	1.800	0.000000	2.444	0.000000
05/01/2019	725	-0.1844711	1.190	0.000191	1.400	0.000000	1.800	0.000000	2.444	0.000000
06/01/2019	640	-0.1457143	1.190	0.000191	1.400	0.000000	1.800	0.000000	2.444	0.000000
07/01/2019	530	-0.2055886	1.170	0.0061741	1.700	0.0000240	1.800	0.000000	2.412	-0.000000
08/01/2019	370	-0.1449029	1.170	-0.1171722	1.875	-0.0440121	1.700	-0.0049171	1.975	-0.000000
09/01/2019	430	-0.0879042	1.170	0.1466647	1.800	0.0111394	1.700	0.0011216	1.800	0.0000000
10/01/2019	490	-0.0817469	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
11/01/2019	490	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
12/01/2019	440	-0.1017033	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
01/02/2020	570	0.2011888	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
02/02/2020	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
03/02/2020	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
04/02/2020	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
05/02/2020	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
06/02/2020	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
07/02/2020	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
08/02/2020	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
09/02/2020	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
10/02/2020	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
11/02/2020	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
12/02/2020	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
01/03/2021	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
02/03/2021	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
03/03/2021	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
04/03/2021	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
05/03/2021	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
06/03/2021	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
07/03/2021	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
08/03/2021	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
09/03/2021	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
10/03/2021	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
11/03/2021	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
12/03/2021	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
01/04/2022	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
02/04/2022	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
03/04/2022	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
04/04/2022	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
05/04/2022	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
06/04/2022	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
07/04/2022	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
08/04/2022	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
09/04/2022	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
10/04/2022	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
11/04/2022	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
12/04/2022	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
01/05/2023	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
02/05/2023	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
03/05/2023	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
04/05/2023	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
05/05/2023	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
06/05/2023	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
07/05/2023	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
08/05/2023	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
09/05/2023	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
10/05/2023	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
11/05/2023	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
12/05/2023	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
01/06/2024	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
02/06/2024	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
03/06/2024	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
04/06/2024	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
05/06/2024	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
06/06/2024	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
07/06/2024	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
08/06/2024	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
09/06/2024	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
10/06/2024	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
11/06/2024	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
12/06/2024	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
01/07/2025	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
02/07/2025	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
03/07/2025	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	0.0000000
04/07/2025	570	0.000000	1.170	0.000000	1.800	0.000000	1.800	0.000000	1.800	

BBTN	BBFT	EMTK	GGRM	HMSP
DATE	DATE	DATE	DATE	DATE
CLOSE	RETURN	CLOSE	RETURN	CLOSE
RETURN	CLOSE	RETURN	CLOSE	RETURN
481	0.07193445	527	0.70	3.00
482	0.1444229	885	-0.02071041	85.400
483	0.01212614	715	0.1096669	790
484	0.13012147	825	0.0714207	88.475
485	-0.08479612	860	-0.1014838	790
486	-0.0663	862	-0.072727	790
487	0.09339313	796	0.1296722	728
488	0.0580251	905	0.1062171	895
489	0.07184829	905	0.07929288	865
490	0.12072917	905	-0.040604	865
491	0.07184829	905	0.14117039	905
492	0.1794889	1.310	0.11079412	358
493	0.08397171	1.305	-0.1076306	358
494	0.1794889	985	-0.2612127	985
495	-0.06099505	725	-0.2609398	505
496	0.1066008	1.402	0.1	512
497	0.10430004	1.105	-0.083963	899
498	-0.11873	1.105	-0.1407967	890
499	0.04381764	905	-0.1010261	890
500	0.11379103	840	-0.117891	945
501	0.0097961	790	-0.0952188	790
502	0.04181719	900	0.1024051	800
503	-0.0023813	1.005	-0.1046467	810
504	0.04059038	1.105	0.04791205	1.400
505	0.001217418	1.005	0.1046467	1.105
506	0.04181719	1.105	0.04791205	1.105
507	0.04181719	1.005	-0.1046467	1.105
508	0.001217418	1.005	-0.1046467	1.105
509	0.04181719	1.005	-0.1046467	1.105
510	0.001217418	1.005	-0.1046467	1.105
511	0.04181719	1.005	-0.1046467	1.105
512	0.001217418	1.005	-0.1046467	1.105
513	0.04181719	1.005	-0.1046467	1.105
514	0.001217418	1.005	-0.1046467	1.105
515	0.04181719	1.005	-0.1046467	1.105
516	0.001217418	1.005	-0.1046467	1.105
517	0.04181719	1.005	-0.1046467	1.105
518	0.001217418	1.005	-0.1046467	1.105
519	0.04181719	1.005	-0.1046467	1.105
520	0.001217418	1.005	-0.1046467	1.105
521	0.04181719	1.005	-0.1046467	1.105
522	0.001217418	1.005	-0.1046467	1.105
523	0.04181719	1.005	-0.1046467	1.105
524	0.001217418	1.005	-0.1046467	1.105
525	0.04181719	1.005	-0.1046467	1.105
526	0.001217418	1.005	-0.1046467	1.105
527	0.04181719	1.005	-0.1046467	1.105
528	0.001217418	1.005	-0.1046467	1.105
529	0.04181719	1.005	-0.1046467	1.105
530	0.001217418	1.005	-0.1046467	1.105
531	0.04181719	1.005	-0.1046467	1.105
532	0.001217418	1.005	-0.1046467	1.105
533	0.04181719	1.005	-0.1046467	1.105
534	0.001217418	1.005	-0.1046467	1.105
535	0.04181719	1.005	-0.1046467	1.105
536	0.001217418	1.005	-0.1046467	1.105
537	0.04181719	1.005	-0.1046467	1.105
538	0.001217418	1.005	-0.1046467	1.105
539	0.04181719	1.005	-0.1046467	1.105
540	0.001217418	1.005	-0.1046467	1.105
541	0.04181719	1.005	-0.1046467	1.105
542	0.001217418	1.005	-0.1046467	1.105
543	0.04181719	1.005	-0.1046467	1.105
544	0.001217418	1.005	-0.1046467	1.105
545	0.04181719	1.005	-0.1046467	1.105
546	0.001217418	1.005	-0.1046467	1.105
547	0.04181719	1.005	-0.1046467	1.105
548	0.001217418	1.005	-0.1046467	1.105
549	0.04181719	1.005	-0.1046467	1.105
550	0.001217418	1.005	-0.1046467	1.105

Based on the pictures, it shows that the largest stock data was in February 2019 for GGRM (PT Gudang Garam Tbk) shares with a final value of 85,400, and the lowest stock was in March 2020 for BBIN shares (PT BFI Finance Indonesia Tbk) with a final value 240.

And we can see that the highest profit rate is found in BRPT shares in April 2020 of 1, while the lowest profit rate is found in BBTN shares in March of -0.505882335. For the it value (total average profit level), the 2019–2021 stock data that has the highest profit is EMTK company shares of 0.04028273, and company stock data that has the lowest profit, namely HMSP company shares of -0.0350346.

Expected Return

Calculating the Expected Return (expected profit) of each stock (E(R_i)), in determining the Expected Return (expected profit) of each stock sample of 10 blue chip, then the following is expressed using equality:

$$E(R_i) = \frac{\sum_{t=1}^N R_{it}}{N}$$

Description:

- ANTM Shares: E(R_i) = = 0.0110176
- ADRO Shares: E(R_i) = = 0.000603837
- ASII shares: E(R_i) = = -0.000169637
- BBRI Shares: E(R_i) = = 0.000165397
- BBTN Shares: E(R_i) = = 0.000134726
- BBIN shares: E(R_i) = = 0.000815799
- BRPT shares: E(R_i) = = 0.000956533
- EMTK Shares: E(R_i) = = 0.001118965
- GGRM Shares: E(R_i) = = 0.000638138
- HMSP Shares: E(R_i) = = -0.000973183

Determination of *Expected Return* (expected profit) of each share

Share Name	Expected Return $E_{(R_i)}$
ANTM	0,0110176
ADRO	0,000603837
ASII	-0,000169637
BBRI	0,000165397
BBTN	0,000134726
BFIN	0,000815799
BRPT	0,000956533
EMTK	0,001118965
GGRM	0,000638138
HMSP	-0,000973183

The expected profit level which has a positive value is found in the company shares of PT Adaro Energy Tbk (ADRO), PT Aneka Tambang Tbk (ANTM), PT Bank Rakyat Indonesia (Persero) Tbk (BBRI), PT Bank Tabungan Negara Tbk (BBTN), PT BFI Finance Indonesia Tbk (BFIN), PY Barito Pacific Tbk (BRPT), PT Elang Mahkota Technology (EMTK), and PT Gudang Garam Tbk (GGRM). Meanwhile, stocks that have a profit level that are expected to have a negative value are PT Astra International Tbk (ASII) and PT Handjaya Mandala Sampoerna Tbk (HMSP). Shares that have a positive expected profit rate mean that they can provide benefits for shareholders. On the other hand, if the expected profit rate is negative, it will cause losses for the shareholders.

Covariance Variant Matrix

The following is the covariance variant matrix of the 10 stocks that are included in the Blue Chip in Indonesia in 2022.

Variant matrix

	ANTM	ADRO	ASII	BBRI	BBTN
ANTM	0,061322271	0,001522735	0,009152311	0,006997853	0,011765545
ADRO	0,001522735	0,007398889	0,004844220	0,004058007	0,001307007
ASII	0,009152311	0,004545522	0,010169371	0,004066387	0,006580155
BBRI	0,006997853	0,004058007	0,004066387	0,008943379	0,030613811
BBTN	0,011765545	0,001307007	0,006580155	0,030613811	0,008133466
BFIN	0,014244328	0,001073797	0,004686596	0,006886596	0,009411319
BRPT	0,009795988	-0,001041466	0,001511819	0,001511819	0,008799892
EMTK	0,001531855	-0,000802238	0,000711591	0,000711591	0,000652721
GGRM	0,00048529	0,000616889	0,003538935	0,003538935	0,000107704
HMSP	0,004115466	0,004369906	0,004385194	0,004385194	0,001941467

	BRPT	EMTK	GGRM	HMSP
BRPT	0,008799892	0,000557211	0,000107704	0,001941467
EMTK	0,000557211	0,000946688	0,000706161	0,000706161
GGRM	0,000107704	0,000706161	0,000946688	0,000946688
HMSP	0,001941467	0,000706161	0,000946688	0,000946688

Variant return is a way of calculating stocks with the help of the excel formula, namely:

$$= \text{var}(\text{number1}; \text{number2})$$

Description:

=var: excel formula

Number 1: first stock return in the company

Number 2: last stock return in the company

The number is the return result of each company over a 3 year period. As shown in Table 5.3, the yellow color is the result of the variance of returns for each company. Stock variance is a deviation that may occur between stock returns and the average stock return during the study period. In accordance with the variance calculation, the shares that have the highest variance value are BRPT shares with a variant value of 0.052619447 and the lowest variant is owned by HMSG of 0.007278901.

The Covariance Matrix

Tandelilin (2010: 118) says that a positive covariance value indicates the values of the two variables move in the same direction, that is, if one increases, the other also increases or if one decreases, the other also decreases. A negative covariance value indicates the values of the two variables move in opposite directions, that is, if one increases, the other decreases or one decreases, the other increases. The zero covariance value indicates the value of the two independent variables, namely the movement of one variable has nothing to do with the movement of the other variable. The covariance is the average of the stock deviations. Within the portfolio management framework, covariance shows how the returns from each security have a trend to move together.

	ADTM	ADRO	ADJ	BRPT	EMTK
ADTM	0.006173021	0.00132233	0.00911213	0.00699781	0.01178104
ADRO	0.00151221	0.0179689	0.00454226	0.00403487	0.00130107
ADJ	0.0044226	0.0044226	0.0044226	0.0044226	0.0044226
BRPT	0.00699781	0.00403487	0.00403487	0.052619447	0.01081181
EMTK	0.01178104	0.00130107	0.00130107	0.01081181	0.00343496
BFIN	0.01424438	0.00171797	0.00688056	0.00428217	0.00941131
BRPT	0.00699781	0.00403487	0.00403487	0.052619447	0.01081181
EMTK	0.01178104	0.00130107	0.00130107	0.01081181	0.00343496
GGRM	0.00248529	0.00061689	0.00313893	0.00264529	0.00210770
HMSG	0.00411486	0.00416906	0.00416906	0.00416906	0.00394362

	BRPT	EMTK	GGRM	HMSG
BRPT	0.052619447	0.00130107	0.00130107	0.00130107
EMTK	0.00130107	0.00343496	0.00343496	0.00343496
GGRM	0.00130107	0.00343496	0.00343496	0.00343496
HMSG	0.00130107	0.00343496	0.00343496	0.00343496

Calculating the covariance between two stocks in a portfolio using the excel formula:

$$= \text{covar}(\text{array1}; \text{array2})$$

Description:

=covar: excel formula

Array 1: stock return value in company table column 1

Array 2: stock return value in company table column 2

Based on Table 5.4 it is explained that the covariance values of the shares are positive and negative values, there is no covariance value which is zero so that it can be said that there are no independent stocks, namely the movement of one stock has nothing to do with the movement of other shares. The largest share covariance value is between shares coded BRPT with a value of 0.052619447 and the smallest share covariance value is EMTK and ADRO coded shares with a value of -0.002802228 .

The positive covariance value of BRPT shares shows that the value of these shares moves in the same direction, that is, if one increases, the other also increases or if one

decreases, the other also decreases. The negative covariance value of EMTK and ADRO shares shows the value of the two stocks moving in opposite directions, that is, if one increases, the other decreases or one decreases, the other increases.

Shares Blue Chip in the study period. So that it can be found that the covariance results of each company return are in the table above.

Inverse

	ANTM	ADRO	ASII	BBRI	BBTN
ANTM	31,11436164	3,257682341	-25,09107803	-16,8211313	-3,053895664
ADRO	3,257682341	79,47063911	-24,4082265	-38,00195994	10,18963898
ASII	-25,09107803	-24,4082265	200,4802913	42,41038298	-27,66337479
BBRI	-16,8211313	-38,0019599	42,41038298	509,0252949	-130,5314134
BBTN	-3,053895664	10,18963898	-27,66337479	-130,5314134	70,41563431
BFIN	7,732302944	4,459922576	-46,20309163	-84,33461218	11,96854322
BRPT	-6,422551425	2,991451068	23,89242	57,68758366	-18,49428985
EMTK	-18,97338314	3,568655018	27,53952867	32,17767548	0,985903277
GGRM	4,080217325	28,86196838	-9,345358393	-8,722637359	0,382513771
HMSP	2,333931478	-39,0469038	-95,74740296	-258,9970215	81,26871338

BBTN	BFIN	BRPT	EMTK	GGRM	HMSP		
-3,053895664	7,732302944	-6,422551425	-18,97338314	4,080217325	2,333931478	1	0,039663
10,18963898	-4,459922576	2,991451068	3,568655018	28,86196838	-39,04690385	1	0,021798
-27,66337479	-46,20309163	23,89242	27,53952867	-9,34535839	-8,72263736	1	-0,00611
-130,5314134	-84,33461218	57,68758366	32,17767548	-8,72263736	-258,9970215	1	0,000564
70,41563431	11,96854322	-18,49428985	0,985903277	0,382513771	81,26871338	1	0,000485
11,96854322	80,9087217	-14,30270086	-48,42011389	-13,2644705	44,53779228	1	0,023369
-18,49428985	-24,30270086	33,31001039	13,75910122	7,746580396	40,80928927	1	0,044425
0,985903277	-48,42011389	13,75910122	48,36664161	5,667343439	-8,290748644	1	0,046383
0,382513771	-13,26447047	7,746580396	5,667343439	152,0197897	-113,4296535	1	-0,02297
81,26871338	44,53779228	-10,89039057	-8,290748644	-113,4296535	457,1236691	1	-0,03502

Description:

Minverse: inverse function in excel

Array: all values of the covariance variance matrix for each company

Each inverse of the covariance variant matrix will be multiplied by vector 1 to get the V1 matrix.

V1, V2, W1, and W2

v1	v2	w1	w2
-21,84354383	0,409299499	-0,076615107	0
31,34286718	2,911658146	0,109933496	
65,86409067	1,51258898	0,23101	
103,8921613	10,72564232		
-4,532026761	-3,268026173		
-57,92275584	-1,16094		
29,06881503			
76,37962808			
53,9			

V1 uses the excel function from MMULT(array1; array2)

Description:

MMULT: excel formula function

Array 1: all inverse values of covariant stock variants

Array 2: all vector values for each company

All inverse values for covariant stock variants multiplied by all vector values for each company that have been determine its value, namely vector 1.

V2 uses the MMULT formula function (array 1; array2)

MMULT: excel formula function

Array 1: all inverse covariant variant stock values

Array 2: all vector values for each company

V2 is obtained by multiplying the inverse variance covariance matrix by the average return value of each stock.

W1 is the result of the V1 value of one of the shares divided by the sum of all the shares in V1. The result of w2 is not much different from W1 which is calculated in W2, that is, one share is divided by the sum of all shares from V2, and produces the value shown in the table above.

Alpha

alpha	ANTM	ADRO	ASII	BBRI	BBTN
0.1	0.448790242	3.149076997	1.653317164	11.59616303	-3.523752114
0.2	0.407437451	2.811394986	1.495283581	10.34618897	-3.133990307
0.3	0.366048637	2.473117175	1.337249997	9.300214497	-2.74422861
0.4	0.324731864	2.136029164	1.179216414	7.852408208	-2.354446693
0.5	0.283379071	1.798346552	1.021182831	6.60426676	-1.964704886
0.6	0.242026279	1.460669941	0.861349147	5.356202691	-1.574840079
0.7	0.200673486	1.122981133	0.705115664	4.108318623	-1.185181272
0.8	0.159320693	0.785298718	0.547082208	2.860344554	-0.795419465
0.9	0.1179679	0.447616107	0.389044497	1.612370485	-0.405657658

BBIN	BRPT	EMTK	GGRM	HMSF
-1.271544887	3.085975817	1.448581811	1.509853957	-17.081139302
-1.153855559	2.754148121	1.337396679	1.363135666	-15.170781610
-1.03412625	2.422860608	1.186207547	1.216417356	-13.27842302
-0.915416941	2.091303003	1.055020414	1.069699055	-11.37706502
-0.790767623	1.759745988	0.923833382	0.922980755	-9.475707332
-0.677998324	1.428187794	0.79254615	0.776262454	-7.574349023
-0.559289015	1.096630189	0.661459017	0.629544154	-5.672991024
-0.440579707	0.765072584	0.530271895	0.480232853	-3.771633024
-0.321870394	0.43351498	0.399084751	0.336307552	-1.870275026

Alpha value consists of 0.1–0.9. Alpha has a formula function, namely:

Weight $W1 + (1 - \alpha) \times \text{weight } W2$.

After knowing the value of the company weights of each alpha when added together it will produce a value of 1. Alpha can calculate the value of portfolio return, portfolio variance and risk.

Alpha	Return portfolio	Variasi portfolio	resiko
0.1	0.819135552	0.929930888	0.964329
0.2	0.729121219	0.737520017	0.85879
0.3	0.639106886	0.567557707	0.753364
0.4	0.549092554	0.420038227	0.648104
0.5	0.459078221	0.294956538	0.543099
0.6	0.369063888	0.192308299	0.43853
0.7	0.279049556	0.112089862	0.334798
0.8	0.201974499	0.054298273	0.23302
0.9	0.09902089	0.018931274	0.137591

The portfolio return value is the result of the formula:

Weight value x average value of each stock.

So that the portfolio return alpha 0.1–0.9 can be seen that the lowest portfolio return is at alpha 0.9 worth 0.09902089.

Portfolio variations have calculations:

The value of the 1st company's weight \times the 1st company's variation + the 2nd company's weight \times the 2nd company's variation + ...

For example, if someone invests Rp. 135,000,000 multiplied by the weight of an alpha of 0.9, the largest value will be for the BBRI company, Rp. 298,967,375 and the smallest value will be for the HMSP company, which is -Rp. 376,655,878.

In the alpha portfolio variation 0.1–0.9 it can be seen that the lowest portfolio variation is at alpha 0.9 of 0.018931274.

Portfolio risk also has a formula function:

SQRT (root) portfolio variance

The lowest risk is at alpha 0.9, namely 0.137591

Separation

Conclusions and Suggestions

Conclusion

Based on the results and discussions that have been carried out, the researcher can draw several conclusions as follows:

1. Based on Table 5.1 above, it shows that the largest stock data was in February 2019 for GGRM (PT Gudang Garam Tbk) shares with a final value of 85,400, and the lowest stock was in March 2020 for BFIN shares (PT BFI Finance Indonesia Tbk) with a final value 240.
2. The highest profit rate was found in BRPT shares in April 2020 of 1, while the lowest profit rate was found in BBTN shares in March of -0.505882335 (Table 5.1)
3. value it (total average profit level) that the 2019–2021 stock data that has the highest profit is on EMTK company shares of 0.04028273, and the company stock data that has the lowest profit is on HMSP company shares of -0.0350346 . (Table 5.1).
4. After calculating *Expected return* on stocks, it produces positive and negative stocks. Shares that have a positive expected profit rate mean that they can provide benefits for shareholders. The company that has the largest positive value is the share of the company PT Elang Mahkota Teknologi (EMTK). And shares that have a negative loss rate are found in the company PT Handjaya Mandala Sampoerna Tbk (HMSP).
5. In accordance with the variance calculation, the shares that have the highest variance value are BRPT shares with a variant value of 0.052619447 and the lowest variant is owned by HMSP of 0.007278901.
6. The best weight is at alpha 0.9 with a portfolio return of 0.09902089, a portfolio variation of 0.018931274 and the lowest risk of 0.137591. In accordance with investor preferences, investors prefer to take investment risks by looking at the lowest possible risk with a high rate of return.

Suggestions

Based on these conclusions, the researchers provide the following suggestions:

1. Investors should invest their shares in PT Elang Mahkota Teknologi (EMTK) company shares because they have the potential to have the highest profit value according to the calculations using the Markowitz method above.

2. Investors are expected to continuously monitor the development of these portfolio shares because these stocks are not optimal forever. Stocks that are not optimal are caused by changes in economic conditions that can affect changes in these shares.
3. For further research, it is recommended to use a large number of stock samples from various sectors in the portfolio. Besides that, it can also be done by making comparisons with other portfolio determination models.

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