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Influence of Markowitz Method Risk and Return Calculations as a Basis for Investment Decisions in BEI BUMN Shares 20 Period 2019-2022

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Abstract

The aim of writing this scientific article is to determine the influence of the Markowitz Method of risk and return calculations on Investor Rationality for the Security of Investing in 20 BUMN IDX Shares for the 2019-2022 Period. The method used in this research is a descriptive method with a quantitative approach. The type of data used is secondary data which takes data from the official website idx.com and also investing.com. The sample used was 20 state-owned companies. The data collection technique in this research is by using documentation techniques. The data collection process consists of: calculating the expected return for each company, conducting statistical tests using SPSS 24, and finally conclusions. The results of this research are that the Markowitz method of calculating risk & return has a significant effect on investors' rationality in investing in BUMN 20 shares.

Keywords: Risk and Return, Markowitz Method, Investment, Stocks, Investor

Introduction

The world economy is currently developing increasingly rapidly, one of which can be seen in the development of the business or industrial world in Indonesia. In this development process, investment is very important for a company. A company and even every individual essentially does not only think about today's needs but also thinks about future needs which are full of uncertainty. Therefore, investment activities are needed that prepare for future needs

using funds obtained today. (Hartono, Jogiyanto, 2017) investment delays the entry of current consumption into production assets for a certain period of time.

In accordance with the investment principle, namely high return, high risk, in investing there are always benefits and risks. Return itself has two components, namely yield and capital gain. Apart from considering profits, investors must also consider the level of investment risk as a basis for making investment decisions. Risk is the difference that may occur between the actual profit that will be received and the expected profit. Rational investors can be measured by how they choose a portfolio that provides maximum returns at a certain level of risk or certain returns with minimum risk. Stock risk and return are always related to stock prices.

This share price is used as a basis for calculations to find out the profits and risks obtained. The type of investor rationality is different for each person, this is the same as the thinking pattern that exists in an investor. Investors don't only think about the profits they get, but they also think about whether the risks they get are big or not, because risk is also a consideration for investors (Mardhiyah, Ainun, 2017).

There are several methods for the process of making investment decisions based on risk and return analysis, one of which is the Markowitz method. Investing in the stock market is one of the most common forms of investment made by investors to achieve their financial goals. In an effort to achieve optimal investment results, investors need to consider the risk and return factors associated with stock investments. One approach used to measure and manage the risk and return of stock investments is the Markowitz method. This method was developed by Harry Markowitz in 1952 and has become the basis for many investors and portfolio managers in making investment decisions (Afriyanti, Intan, 2016-2020)

Shares of State-Owned Enterprises (BUMN) which are included in the BEI BUMN 20 index are an attractive investment instrument because of the government's involvement in their management (Nainggolan. Yohanna, Ahmad Juliana, Citra A. Alantina, 2020). The performance of these stocks can have a major impact on an investor's portfolio, therefore it is important for investors to understand how calculating risk and return using the Markowitz method can affect the rationality of their investment decisions (Binangkit, Wan L. Hardilawati, 2021).

Problem Formulation

1. Does the Markowitz method of calculating stock risk have a partial effect on Investor Rationality for the Security of Investing in BEI BUMN 20 Shares?
2. Does the Markowitz method of calculating stock return have a partial effect on Investor Rationality for the Security of Investing in BEI BUMN 20 Shares?
3. Does the calculation of risk and return using the Markowitz method simultaneously influence Investor Rationality for the Security of Investing in BEI BUMN 20 Shares?

Research Purpose

1. Knowing the effect of the Markowitz method of calculating stock risk on investor rationality for the security of investing in BEI BUMN 20 shares.

2. Knowing the effect of the Markowitz method of calculating stock returns on investor rationality for the security of investing in BEI BUMN 20 shares.
3. Knowing the effect of the Markowitz method of stock risk and return calculations on investor rationality for the safety of investing in BEI BUMN 20 shares.

Literature Review

Risk and Return

In a general context, risk can be defined as the potential for uncertainty or loss in a decision or action. Risks can arise in various aspects of life, including in the business environment and capital markets (Scott E. Harrington, Gregory R. Nieahaus, 2003)

Risk is used to describe a situation of uncertainty regarding the results that will be obtained. In the financial world, risks often occur in financial assets that fluctuate in value, such as shares in the capital market. It is important to understand that in investment, risk and return are always closely related. Risk is the possibility of loss or fluctuation in the value of an investment, while return is the expected profit from the investment. Risk and return are two sides of one coin that must be considered by investors or capital market players.

The existence of a positive correlation between risk and return means that generally, the higher the risk taken in an investment, the higher the expected return. However, this does not guarantee that taking high risks will always produce high returns. High risk also means the potential for large losses. Therefore, risk taking must be balanced and in accordance with individual risk tolerance or investment objectives.

This research is expected to understand the extent of risk that can be taken to achieve certain investment objectives, as well as how to manage this risk so that it is in line with the expected level of return. In addition, to identify investment strategies that minimize risk while still achieving adequate returns (Luqman, 2010)

Portfolio Theory and Markowitz Method

Harry Markowitz introduced the portfolio concept in 1952 which became known as portfolio theory. Portfolio theory provides a basis for managing investment risk and returns by finding the optimal combination of shares or other assets to achieve investment goals. Markowitz's theory uses several basic statistical measures to develop portfolio plans, including expected returns, standard deviations of securities and portfolios, and correlations between returns. This theory articulates the existence of performance and risk elements in investment, where the risk element can be minimized by diversifying into different investment instruments and combining portfolios (Setyawati, Ni Putu E, Gede M. Sudiartha, 2019).

Understanding the Markowitz Method is a tool used to minimize risk and maximize returns in a portfolio by considering the correlation between assets. In the context of this research, this method is used to calculate the risk and return of BUMN 20 shares.

The Markowitz model believes that continuously adding assets to a portfolio will, at a certain point, further reduce the benefits of diversification and will actually increase the level of risk (Eduardus. Tandelilin, 2017). The Markowitz model only considers the relationship between expected returns and risk and does not consider risk-free assets. Therefore, this model is also called the mean-variance model.

Markowitz's theory uses several basic statistical measures to develop portfolio plans, including expected returns, standard deviations of securities and portfolios, and correlations between returns. This theory states that there is an element of performance and risk in investment, where the element of risk can be minimized by diversifying and combining different investment instruments in a portfolio.

Investor Rationality

Investor rationality refers to the extent to which investment decisions are made based on rational information and analysis. Traditional financial theory assumes that investors behave rationally, that is, they maximize utility or return by considering risk. However, in practice, psychological and behavioral factors can influence investment decisions, and investors are often not completely rational in making investment decisions. Therefore, investor behavior will result in irrational decisions in investment (Natapura, Cecilia, 2009)

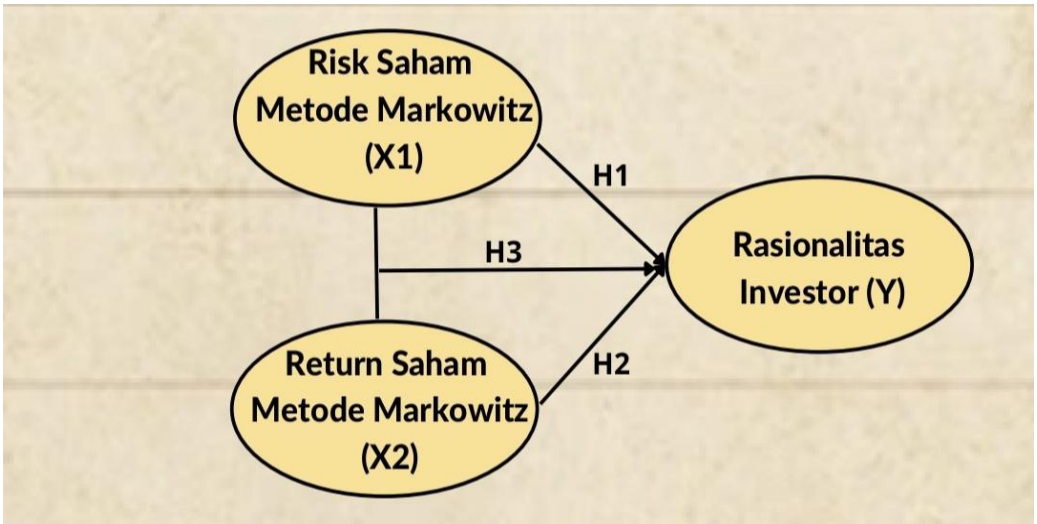
Harga Saham

The share price is the price of a share that occurs in the capital market in a certain period where the price of a share is determined by the number of requests and offers for the shares concerned in the capital market (Jogiyanto, Hartono, 2017). In the capital market, share prices will always change according to market conditions. According to Darmadji and Fakhrudin (2012: 102), share prices in the capital market can change quickly, within minutes or even seconds, depending on the demand and supply of shares. Based on the understanding of experts, it can be concluded that the share price is the price of company shares that can be bought and sold on the capital market, where the share price is formed according to the size of demand from the public, companies and stock suppliers.

Share prices reflect investors' perceptions about trends that will occur in the future. Another statement about share prices is investor expectations regarding earnings, dividends, and so on, thus the share price that has been formed will become investors' benchmark for future economic conditions (Tandelilin, Eduardus, 2010).

Conceptual Framework

Based on the description above, it can be described in the form of a thinking framework scheme as follows:



Research Method

Research design

Quantitative research according to (Sugiyono) is as follows: Quantitative methods can be understood as research methods based on the philosophy of positivism. This method is used to study certain populations or samples, collect data using research tools, analyze quantitative / statistical data for the purposes of testing predetermined hypotheses.

Descriptive methodology with a quantitative approach will be used in this research because the testing will be carried out using appropriate statistical data tests.

The aim of this research is to determine the effect of the Markowitz method of calculating risk and return on investors' rationality regarding the safety of investing in BEI BUMN 20 shares.

Place and Time of Research

This research was conducted on 20 state-owned companies listed on the Indonesia Stock Exchange by taking the necessary data via the official websites www.investing.com and www.idx.co.id for the period 2019-2022 and the time used was also very vulnerable to anytime and anywhere, because the website can be accessed at any time.

Data Types and Sources

The type of data used in this research is secondary data. The data sources obtained in this research came from:

1. Indonesia Exchange (IDX) Monthly Statistics data.
2. Closing price data on investing.com
3. Literature related to research.
4. Previous research related to this research.

Population and Sample

The population of this research is all shares of issuers or publicly traded companies registered with BUMN for the 2019-2022 period. The sample for this research was determined using a purposive sampling method, which determined that the sample criteria were companies listed on the Indonesia Stock Exchange and included BUMN and the required closing price data could be accessed and available during the 2019-2022 period. Based on these criteria, there are 20 companies whose shares meet the criteria as research samples :

Data collection technique

The data collection technique in this research is by using documentation techniques. This collection technique aims to view data that is already available or in the form of historical data that has been documented, namely by recording or copying data listed on the Indonesian Stock Exchange (BEI) via the website www.idx.co.id and the website investing.com as well as various literature for the use of research results and required concepts.

Variable Definition and Operational Definition

The operational definition of a variable is an aspect of research that gives us information or instructions about how to measure a variable. Operational definitions can also help other researchers who want to conduct research using the same variables. According to (Sugiyono 2019) the operational definition of a variable is anything in any form that is determined by the researcher to be studied so that information about it is obtained and then conclusions are drawn. The variables used in this research are the dependent variable (dependent variable) and the independent variable (independent variable). The dependent variable in this research is Investor Rationality for Investment Security. while the independent variable is the Markowitz Method of Risk and Return Calculation.

Data Processing Process

Quantitative methods are methods where the data contained in them is numerical, statistical and objective. Quantitative data is used as material to test the relationship between quantitative research variables. Quantitative data processing is the process of processing raw data into data ready for analysis using statistical techniques. So, after collecting some data, the next step is to process the data in several ways, including the following:

1. Calculate the levels of expected return, standard deviation, and realized return determined in this research. Expected return can be defined as an estimate that can be used as a basis for decision making by investors for their investment activities. Meanwhile, standard deviation is an estimate that can be used to measure the level of risk that exists or is occurring. This is used as the first step so that researchers can know to what extent the data has an influence.
2. Test the hypothesis using the paired two-sample T test and F test.
   These data will be tested using the F test partially and also with the T test simultaneously.
3. Testing distribution with 5% significance.

The test results will be compared using a significance of 5% or 0.05 to determine the results of the test.

4. Make conclusions
   After everything is done, the last thing is to draw conclusions about the tests that the researcher has carried out.

Following are the steps to create an optimal portfolio with the Markowitz formula:

a. Calculate the return on each share

$$Ri = \frac{(P_t - P_{t-1})}{P_{t-1}} + \frac{D_t}{P_{t-1}}$$

Information:
Ri: Stock Return i-th
Pt: current investment price
Pt-1: investment price last period
Dt : current dividend

b. Calculate the expected daily stock return for each stock

$$E(Ri) = \frac{\sum_{t=1}^{n} Rit}{n}$$

Information:
E(Ri): expected return
Rit : return on asset i in period t
n : Number of historical data observations for large samples with n (at least 30 observations) and for the sample slightly used (n-1)

c. Calculate the stock standard deviation (risk) of each stock

$$SD = \frac{\sum_{t=1}^{n} [Rit - E(Ri)]^2}{n}$$

Information:
SD : standard deviation
Rit : return value of the I-th stock in the t-th period
E (Ri): expected return value
n : Number of historical data observations for a large sample with n (at least 30 observations) and for the sample small is used (n-1).

d. Calculate the stock variance of each stock

$$\sigma^2_i = SD^2_i = \frac{\sum_{t=1}^{n} [Rit - E(Ri)]^2}{n}$$

e. Calculating the covariance between sample company shares

$$\sigma ij = \frac{\sum [(Rit - E(Rit)).(Rjt - E(Ri))]}{n}$$

Information:
σij : return covariance between share I and share j
Rit : return of stock i in the t-th period
Rji : return of stock j in the t period
E(Ri): expected return of stock i
E(Rj) : expected return of stock j
n : the number of historical data observations for large samples (minimum 30 observations and for small samples used (n – 1)

f. Determine the proportion of funds from portfolio candidate shares. Function The objective used is the portfolio risk function based on the model Markowitz

$$\sigma p^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} Wi.\, Wj.\, \sigma ij$$

Information:
σp : portfolio standard deviation
σij : covariance between share proportions i and j
Wi: weight or proportion of funds invested in share i
Wj : weight or proportion of funds invested in share j
n : number of single securities

Result and Discussion

The following is a list of 20 state-owned companies:

	BUMN 20
ADRO	ADARO ENERGY TBK
ASII	ASTRA INTERNATIONAL TBK
BBCA	BANK CENTRAL ASIA TBK
BBNI	BANK NEGARA INDONESIA (PERSERO) TBK
BBRI	BANK RAKYAT INDONESIA (PERSERO)
BJBR	BANK PEMBANGUNAN DAERAH JAWA BARAT TBK
BJTM	BANK PEMBANGUNAN DAERAH JAWA TIMUR TBK
BMRI	BANK MANDIRI (PERSERO)
DMAS	PURADELTA LESTARI TBK
GGRM	GUDANG GARAM TBK
HMSP	HM SAMPOERNA TBK
HRUM	HARUM ENERGY TBK
INDF	INDOFOOD SUKSES MAKMUR TBK
INTP	INDOCEMENT TUNGGAL PRAKARSA TBK
ITMG	INDO TAMBANGRAYA MEGAH TBK
LPPF	MATAHARI DEPARTEMENT STORE TBK
MPMX	MITRA PINASTHIKA MUSTIKA TBK
TLKM	TELEKOMUNIKASI INDONESIA (PESRO) TBK
UNTR	UNITED TRACTORS TBK
UNVR	UNILEVER INDONESIA TBK

TABEL 1

Furthermore, Table 2 contains the final and initial stock prices from daily data at the end of the year for calculations from 2019 to 2022.

BUMN 20	2019			
	Harga Akhir	Harga Awal	Dividen	RA
ADARO ENERGY TBK	1555	1565	56	0.03
ASTRA INTERNATIONAL TBK	6925	6925	57	0.01
BANK CENTRAL ASIA TBK	6685	6680	100	0.02
BANK NEGARA INDONESIA (PERSERO) TBK	7850	7950	20	-0.01
BANK RAKYAT INDONESIA (PERSERO)	4400	4450	132	0.02
BANK PEMBANGUNAN DAERAH JAWA BARAT TBK	1185	1250	89	0.02
BANK PEMBANGUNAN DAERAH JAWA TIMUR TBK	685	675	46	0.08
BANK MANDIRI (PERSERO)	7675	7725	241	0.02
PURADELTA LESTARI TBK	296	300	21	0.06
GUDANG GARAM TBK	53000	53000	2600	0.05
HM SAMPOERNA TBK	2100	2140	117	0.04
HARUM ENERGY TBK	264	265	39	0.14
INDOFOOD SUKSES MAKMUR TBK	7925	7900	171	0.02
INDOCEMENT TUNGGAL PRAKARSA TBK	19025	19625	550	0.00
INDO TAMBANGRAYA MEGAH TBK	11475	11225	705	0.09
MATAHARI DEPARTEMENT STORE TBK	4210	4210	333	0.08
MITRA PINASTHIKA MUSTIKA TBK	665	665	480	0.72
TELEKOMUNIKASI INDONESIA (PESRO) TBK	3970	3980	55	0.01
UNITED TRACTORS TBK	21525	21675	408	0.01
UNILEVER INDONESIA TBK	8400	8560	430	0.03

BUMN 20	2020			
	Harga Akhir	Harga Awal	Dividen	RA
ADARO ENERGY TBK	1430	1490	44	-0.01
ASTRA INTERNATIONAL TBK	6025	6100	27	-0.01
BANK CENTRAL ASIA TBK	6770	6800	98	0.01
BANK NEGARA INDONESIA (PERSERO) TBK	6175	6300	20	-0.02
BANK RAKYAT INDONESIA (PERSERO)	4068	4088	168	0.04
BANK PEMBANGUNAN DAERAH JAWA BARAT TBK	1546	1596	94	0.03
BANK PEMBANGUNAN DAERAH JAWA TIMUR TBK	680	700	48	0.04
BANK MANDIRI (PERSERO)	6325	6525	353	0.02
PURADELTA LESTARI TBK	246	252	25	0.08
GUDANG GARAM TBK	41000	41075	-	0.00
HM SAMPOERNA TBK	1505	1520	120	0.07
HARUM ENERGY TBK	596	616	-	-0.03
INDOFOOD SUKSES MAKMUR TBK	6850	6825	278	0.04
INDOCEMENT TUNGGAL PRAKARSA TBK	14475	14450	225	0.02
INDO TAMBANGRAYA MEGAH TBK	13850	14250	570	0.01
MATAHARI DEPARTEMENT STORE TBK	1275	1320	-	-0.03
MITRA PINASTHIKA MUSTIKA TBK	494	515	90	0.13
TELEKOMUNIKASI INDONESIA (PESRO) TBK	3310	3420	41	-0.02
UNITED TRACTORS TBK	26600	26750	171	0.00
UNILEVER INDONESIA TBK	7350	7450	87	0.00

BUMN 20	2021			
	Harga Akhir	Harga Awal	Dividen	RA
ADARO ENERGY TBK	2250	2180	66	0.06
ASTRA INTERNATIONAL TBK	5700	5775	45	-0.01
BANK CENTRAL ASIA TBK	7300	7350	25	0.00
BANK NEGARA INDONESIA (PERSERO) TBK	6750	6725	44	0.01
BANK RAKYAT INDONESIA (PERSERO)	4110	4080	99	0.03
BANK PEMBANGUNAN DAERAH JAWA BARAT TBK	1331	1346	96	0.06
BANK PEMBANGUNAN DAERAH JAWA TIMUR TBK	790	800	49	0.05
BANK MANDIRI (PERSERO)	3513	3550	220	0.05
PURADELTA LESTARI TBK	191	191	12	0.06
GUDANG GARAM TBK	30600	30675	2600	0.08
HM SAMPOERNA TBK	965	975	73	0.06
HARUM ENERGY TBK	2065	2200	40	-0.04
INDOFOOD SUKSES MAKMUR TBK	6325	6400	278	0.03
INDOCEMENT TUNGGAL PRAKARSA TBK	12100	11625	500	0.08
INDO TAMBANGRAYA MEGAH TBK	20400	21050	1218	0.03
MATAHARI DEPARTEMENT STORE TBK	4150	4340	100	-0.02
MITRA PINASTHIKA MUSTIKA TBK	1145	1140	115	0.11
TELEKOMUNIKASI INDONESIA (PESRO) TBK	4040	4130	42	-0.01
UNITED TRACTORS TBK	22150	22800	335	-0.01
UNILEVER INDONESIA TBK	4110	4130	66	0.01

Then the following calculation is produced:

1. Calculating Expected Stock Returns

20 State-Owned Enterprises 2019-2022

BUMN 20	Expected Return
	E(Ri)
ADARO ENERGY TBK	0.13
ASTRA INTERNATIONAL TBK	0.01
BANK CENTRAL ASIA TBK	0.02
BANK NEGARA INDONESIA (PERSERO) TBK	-0.01
BANK RAKYAT INDONESIA (PERSERO)	0.14
BANK PEMBANGUNAN DAERAH JAWA BARAT TBK	0.18
BANK PEMBANGUNAN DAERAH JAWA TIMUR TBK	0.24
BANK MANDIRI (PERSERO)	0.16
PURADELTA LESTARI TBK	0.28
GUDANG GARAM TBK	0.23
HM SAMPOERNA TBK	0.23
HARUM ENERGY TBK	0.12
INDOFOOD SUKSES MAKMUR TBK	0.13
INDOCEMENT TUNGGAL PRAKARSA TBK	0.14
INDO TAMBANGRAYA MEGAH TBK	0.19
MATAHARI DEPARTEMENT STORE TBK	0.05
MITRA PINASTHIKA MUSTIKA TBK	1.12
TELEKOMUNIKASI INDONESIA (PESRO) TBK	0.02
UNITED TRACTORS TBK	0.02
UNILEVER INDONESIA TBK	0.04

TABEL 3

Table 3 explains that 19 shares have a positive expected return and 1 company has a negative value, namely BBNI, so it can be concluded that these 19 shares are able to provide an expected return from the portfolio. Shares coded MPMX have the largest expected return with a value of 5% and shares coded ASII have the smallest expected return with a value of 0.28%. So shares coded MPMX share a greater expected return than shares coded ASII.

2. Calculating Standard Deviation

BUMN 20	Standar Deviasi dari Expected Return yang Posit
	σi
ADARO ENERGY TBK	0.03
ASTRA INTERNATIONAL TBK	0.00
BANK CENTRAL ASIA TBK	0.01
BANK RAKYAT INDONESIA (PERSERO)	0.03
BANK PEMBANGUNAN DAERAH JAWA BARAT TBK	0.04
BANK PEMBANGUNAN DAERAH JAWA TIMUR TBK	0.05
BANK MANDIRI (PERSERO)	0.03
PURADELTA LESTARI TBK	0.05
GUDANG GARAM TBK	0.04
HM SAMPOERNA TBK	0.04
HARUM ENERGY TBK	0.03
INDOFOOD SUKSES MAKMUR TBK	0.03
INDOCEMENT TUNGGAL PRAKARSA TBK	0.03
INDO TAMBANGRAYA MEGAH TBK	0.04
MATAHARI DEPARTEMENT STORE TBK	0.01
MITRA PINASTHIKA MUSTIKA TBK	-0.03
TELEKOMUNIKASI INDONESIA (PESRO) TBK	0.00
UNITED TRACTORS TBK	0.01
UNILEVER INDONESIA TBK	0.01

TABEL 4

Table 4 reveals that the lowest stock standard deviation value compared to other bank shares is owned by MPMX because the standard deviation is negative. The highest standard deviation value is owned by BJTM and DMAS with a value of 0.05 (Hasbiah, Siti, Anwar, Basri Bado, 2022).

3. Calculating the Proportion of Shares Included in the Portfolio

After that, the calculations are obtained as in the following table

BUMN 20	Variansi		
	beta i	alpha i	risiko unik
ADARO ENERGY TBK	0.03	0.13	0.0007838
ASTRA INTERNATIONAL TBK	0.03	0.01	0.0000077
BANK CENTRAL ASIA TBK	0.01	0.02	0.0000329
BANK RAKYAT INDONESIA (PERSERO)	0.00	0.14	0.0008667
BANK PEMBANGUNAN DAERAH JAWA BARAT TBK	0.01	0.18	0.0013679
BANK PEMBANGUNAN DAERAH JAWA TIMUR TBK	0.01	0.24	0.0021378
BANK MANDIRI (PERSERO)	0.01	0.16	0.0011808
PURADELTA LESTARI TBK	0.00	0.28	0.0025666
GUDANG GARAM TBK	0.03	0.22	0.0019590
HM SAMPOERNA TBK	0.00	0.23	0.0019845
HARUM ENERGY TBK	0.22	0.09	0.0006382
INDOFOOD SUKSES MAKMUR TBK	0.00	0.13	0.0008076
INDOCEMENT TUNGGAL PRAKARSA TBK	0.03	0.13	0.0008901
INDO TAMBANGRAYA MEGAH TBK	0.02	0.19	0.0015152
MATAHARI DEPARTEMENT STORE TBK	0.16	0.04	0.0001539
MITRA PINASTHIKA MUSTIKA TBK	-1.91	3.27	-0.0031005
TELEKOMUNIKASI INDONESIA (PESRO) TBK	0.12	0.01	0.0000167
UNITED TRACTORS TBK	0.03	0.02	0.0000299
UNILEVER INDONESIA TBK	0.02	0.04	0.0000862

BUMN 20	Proporsi Saham
	wi
ADARO ENERGY TBK	0.22%
ASTRA INTERNATIONAL TBK	28.83%
BANK CENTRAL ASIA TBK	1.90%
BANK RAKYAT INDONESIA (PERSERO)	0.03%
BANK PEMBANGUNAN DAERAH JAWA BARAT TBK	0.06%
BANK PEMBANGUNAN DAERAH JAWA TIMUR TBK	0.02%
BANK MANDIRI (PERSERO)	0.05%
PURADELTA LESTARI TBK	0.01%
GUDANG GARAM TBK	0.11%
HM SAMPOERNA TBK	0.01%
HARUM ENERGY TBK	2.19%
INDOFOOD SUKSES MAKMUR TBK	0.01%
INDOCEMENT TUNGGAL PRAKARSA TBK	0.25%
INDO TAMBANGRAYA MEGAH TBK	0.10%
MATAHARI DEPARTEMENT STORE TBK	6.64%
MITRA PINASTHIKA MUSTIKA TBK	3.98%
TELEKOMUNIKASI INDONESIA (PESRO) TBK	46.58%
UNITED TRACTORS TBK	7.49%
UNILEVER INDONESIA TBK	1.52%

BUMN 20	Expected Return dan Standar Deviasi Portofolio	
	E (Rp)	σp
ADARO ENERGY TBK	0.28%	0.06%
ASTRA INTERNATIONAL TBK	3.24%	0.80%
BANK CENTRAL ASIA TBK	0.45%	0.11%
BANK RAKYAT INDONESIA (PERSERO)	0.04%	0.01%
BANK PEMBANGUNAN DAERAH JAWA BARAT TBK	0.12%	0.02%
BANK PEMBANGUNAN DAERAH JAWA TIMUR TBK	0.05%	0.01%
BANK MANDIRI (PERSERO)	0.08%	0.02%
PURADELTA LESTARI TBK	0.02%	0.00%
GUDANG GARAM TBK	0.26%	0.05%
HM SAMPOERNA TBK	0.03%	0.01%
HARUM ENERGY TBK	2.57%	0.57%
INDOFOOD SUKSES MAKMUR TBK	0.02%	0.00%
INDOCEMENT TUNGGAL PRAKARSA TBK	0.35%	0.07%
INDO TAMBANGRAYA MEGAH TBK	0.19%	0.04%
MATAHARI DEPARTEMENT STORE TBK	3.53%	0.83%
MITRA PINASTHIKA MUSTIKA TBK	4.46%	-1.36%
TELEKOMUNIKASI INDONESIA (PESRO) TBK	7.80%	1.92%
UNITED TRACTORS TBK	1.68%	0.41%
UNILEVER INDONESIA TBK	0.59%	0.14%

TABEL 5

Table 5 shows the results of calculating expected returns and also the standard deviation of the Markowitz method with 19 companies included in the portfolio with positive expected returns from 20 BUMN shares.

4. T Test (Partial)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.015	.016		.912	.375
	ExpectedReturn	2.663	.037	.888	71.911	.000
	Risk	-8.763	.441	-.245	-19.856	.000

a. The first T test was carried out to find out whether there was an influence between Because 0.000 < 0.05, it can be interpreted that H1 is accepted. So there is an influence of X1 on Y. This research shows that there are differences in the level of return on 20 BUMN shares so that there are shares that are candidates and are not candidates for the portfolio for making investment decisions.
b. The second T test was carried out to find out whether there was an influence between Because 0.000 < 0.05, it can be interpreted that H2 is accepted. So there is an influence of X1 on Y. This research produces whether the level of risk of each stock included in the investment assessment will affect the level of returns expected by investors.

5. Test F (Simultan)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.477	2	4.738	3698.411	.000[b]
	Residual	.020	16	.001		
	Total	9.497	18			

In the F test results, by looking at the SPSS Anova output table, the resulting significant value (Sig) is 0.000. Because 0.000 < 0.05, it can be said that X1 and X2 or X3 simultaneously influence Y. It can be seen that the ability of investors to be rational can be measured by the way they choose BUMN 20 shares that provide maximum returns at a certain level of risk.

Conclusion

From the results and discussion it can be concluded that

1. The Markowitz stock risk calculation method has a partially positive and significant effect on investor rationality in terms of the safety of investing in BEI BUMN 20 shares. Thus, every investment decision has a strong relationship with the occurrence of risk.
2. The Markowitz share calculation method has a positive and significant effect on investors' reasons regarding the safety of investing in BEI BUMN 20 shares. This means that decision making is not only influenced by risk, but investment decisions can also be influenced by returns. Generally, investors who choose stocks with high returns are people who dare to face high risks.
3. Calculation of Risk and Return on shares using the Markowitz method simultaneously has a significant effect on Investor Rationality for the Security of Investing in BEI BUMN Shares 20. Risk and return have a positive relationship, so the greater the risk borne, the greater the return that must be compensated.

Suggestion

1. For further research, it is recommended to carry out a comparative analysis between the Markowitz method and other methods in making investment decisions.
2. Investors must continuously monitor developments in the risk and return values of these 20 BUMN shares.
3. For the government, this can guarantee economic stability, especially investor confidence in the capital market when alternative investment instruments increase.

References

Afriyanti, Intan. (2016-2020). Ecoomics, Accounting and Business Journal .

Binangkit, Wan L. Hardilawati. (2021). Analisis Portofolio Saham Optimal Model Markowitz.

Eduardus. Tandelilin. (2017). *Pasar Modal "Manajemen Portofolio dan Investasi"*. Yogyakarta: Kanisius.

Hartono, Jogiyanto. (2017). Teori Portofolio dan Analisis Investasi. *Edisi ed BPFE*, Yogyakarta.

Hasbiah, Siti, Anwar, Basri Bado. (2022). Model Markowitz dalam Keputusan Investasi Saham pada Index Lq45 di Bursa Efek Indonesia. *Jurnal Ekonomi dan Pendidikan 5*.

Jogiyanto, Hartono. (2017). Teori Portofolio dan Investasi.

Luqman, H. (2010). *Pengambilan Resiko Secara Strategis Bagi Pengambil Keputusan Bisnis.* Jakarta: PT. Raja Grafindo .

Mardhiyah, Ainun. (2017). Peranan Analisis Return dan Risiko dalam Investasi. *Jurnal Ekonomi dan Bisnis Islam 2*.

Nainggolan. Yohanna, Ahmad Juliana, Citra A. Alantina. (2020). Analisis Value At Risk dalam Pembentukan Portofolio Optimal (Studi Kasus Perusahaan Perbankan di Indonesia). *Jurnal Manajemen* , 10.

Natapura, Cecilia. (2009). Analisis Perilaku Investor Institusional dengan Pendekatan Analytical Hierarchy Process (PHP). *Jurnal Ilmu Administrasi dan Organisasi* , 16.

Scott E. Harrington, Gregory R. Nieahaus. (2003). *Risk Management and Insurance.* Boston: LibUI eng rda.

Setyawati, Ni Putu E, Gede M. Sudiartha. (2019). Pembentukan Portofolio Optimal Menggunakan Model Markowitz. *E-Jurnal Manajemen 8*.

Sugiyono. (2019). Metodelogi Penelitian Kuantitatif dan Kualitatif. *R&D*.

Tandelilin, Eduardus. (2010). *Portofolio dan Investasi: Teori dan Aplikasi*. Yogyakarta: Kanisius.