ANALYSIS OF THE APPLICATION OF THE SINGLE INDEX MODEL IN THE FORMATION OF THE OPTIMAL PORTFOLIO ON IDXBUMN20 STOCK IN THE PANDEMIC PERIOD

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ABSTRACT

Investors are always looking for the best stock with a high return when it comes to investing. This research goals is to use the single index approach to establish the best stock portfolio on the Indonesia Stock Exchange using IDXBUMN20 stocks. This research is during pandemic era, it covers the period from April 2020 to June 2021, which is when the pandemic is expected to occur. This research is based on numbers. This is quantitative research. This research uses a population of IDXBUMN20 stock, which totals are 20 stocks and uses sampling technique of saturated sampling or total sampling which 20 IDXBUMN20 stocks are sampled in this research. This research uses descriptive research to examine IDXBUMN20 stocks on the Indonesia Stock Exchange in order to combine stocks into an optimal portfolio with the appropriate proportion of funds, as well as portfolio returns and risks determined from the optimal portfolio using the Single Index approach. From 20 stocks analyzed, 7 belong into the optimal portfolio category, with proportions of funds from PTBA (132.24 percent), WIKA (-4.61 percent), TINS (-600.05 percent), SMBR (-18.65 percent), SMGR (57.82 percent), WSKT (-6.75 percent), and PTPP (-0.01 percent). Return portfolio formed is equal to -0.082401654 or -8.24 percent which is smaller than individual stock returns. Then the portfolio risk formed is -0.177240262 or -17.72 percent. The portfolio risk is then -0.177240262 or -17.72 percent, means that the value is less than the risk of each stock individually.

Keywords: Optimal Portfolio, Single Index Model, IDXBUMN20

INTRODUCTION

Since the first detection of the Covid 19 virus in Wuhan, China in December 2019, the world has been shocked by the epidemic. The existence of government programs to minimize the death rate for Covid 19 cases, spanning from PSBB policies to PPKM Level, has resulted in numerous changes in life. Many sectors have been impacted, and Indonesia's economy has suffered as a result especially Indonesia's capital market. The capital market is a long-term trading platform where diverse parties can trade financial instruments. Stocks, bonds, warrants, mutual funds, options, rights, and other long-term financial instruments are exchanged on the capital market. Indonesia's stock exchange is now known as the Indonesian Stock Exchange (IDX). When it comes to investing, you have the option of putting your money into real or financial assets. When it comes to investing, a successful investor is one who achieves the highest profit with the lowest risk. Both go hand in hand, with the higher the profit you seek, the higher the risk you'll have to take. Diversification is critical since it reduces risk without lowering the rate of return. Diversification can be achieved by putting together a portfolio with a variety of assets. The Markowitz approach and the single index method can both be used to determine the best portfolio. When utilizing the single index approach to analyze stocks, the excess return to beta (ERB) is compared to the Cut Off Rate (Ci). Excess return is the difference between the actual return and the expected return. The IDXBUMN20 Index evaluates the performance of 20 issuer stocks, including State-Owned Businesses (BUMN), Regional-Owned Businesses (BUMD), and subsidiaries. This index includes blue-chip stocks that are sought after by both domestic and international investors. Some stocks in the IDXBUMN20 index are fluctuative. As a result, investors should select the appropriate stocks from the IDX-BUMN20 index.

Several previous studies examined the LQ-45 stock index with the pre-pandemic period, one of which was research conducted by Oktafiani & Maruddani (2017) which showed six stocks included in the optimal portfolio, namely GGRM (Gudang Garam Ltd.), BBCA (Bank Central Asia Ltd.), JSMR (Jasa Marga Persero Ltd.), LPKR (Lippo Karawaci Ltd.), BBRI (Bank Rakyat Indonesia Persero Ltd.), and INDF (Indofood Sukses Makmur Ltd.

The current study uses IDX-BUMN20 shares and uses the pandemic period (April 2020 – June 2021), as well as the research sampling technique in the previous study above using purposive sampling while the current study uses saturated sampling.

QUESTIONS OF THE RESEARCH

The problem in this study is formulated as follows, based on the context described above:

1. Which IDXBUMN20 stocks are listed in the optimal portfolio category?
2. What is the proportion of funds that can be invested to create the optimal portfolio of IDXBUMN20 stocks?
3. What is the level of risk and return formed from the optimal portfolio of IDXBUMN20 stocks?

PURPOSE OF THE RESEARCH

The purpose of the research is:

1. To find out which stocks are listed in the optimal portfolio category on IDXBUMN20 stocks.
2. To find out the proportion of funds that can be invested to create the optimal portfolio in IDXBUMN20 stocks.
3. To determine the level of return and risk formed from the optimal portfolio of IDXBUMN20 stocks.

LITERATURE OF RELATED REVIEW

According to Firmansyah (2018:4) planning, arranging, collating, directing, and monitoring human resources to meet defined goals is the science and art of management.

According to Fahmi (2016:2) claims that financial management is a mix of science and art that studies and evaluates how a financial manager collects capital, manages, and separates funds from resources in order to maximize profitability, welfare, and business continuity.

The capital market, according to Hartono (2017:29) is a place where sellers and buyers interact with the risk of profit or loss.

Meanwhile, according to Samsul (2015:57) the capital market, which is made up of the words market and capital, is a place where supply and demand for capital, whether in the form of stock or long-term debt, meet.

According to Hartono (2014:5) investment is the process of deferring present consumption in order to invest in productive assets at a later date.

Meanwhile according to Tandelilin (2014:2) investment is the responsibility for the money that are now being used in order to achieve the predicted profit.

Financial investment can be done in two ways, according to Suteja & Gunardi (2016:2). They are direct investing and indirect investing. The level of profit obtained from an investment is referred to as return. Expected return (future return) and realized return (current return) are the two types of returns (return obtained by investors in the past).

Several types of return sources are Yield and Capital Gains (Losses). Yield is a component of a return that is dependent on the trajectory of organizational performance rather than changes in the value of stocks or bonds Suteja & Gunardi (2016:2). Meanwhile, capital gain (loss) is defined by Hartono (2014:236) as the difference between the gain or loss from the current investment price and the previous investment price.

Risk is something that no investor wants to deal with. According to Hartono (2014:257) risk is related to the disparity between the actual and predicted results. Risk is separated into two categories; they are Systematic Risk and Unsystematic Risk. In Halim's opinion Halim (2015:41) a portfolio is a mix of many assets that investors have. The goal of creating a portfolio is to reduce investment risk through diversification or dividing money among a range of abilities.

A portfolio that delivers a higher return with the same risk, or a portfolio that offers the same return including a lower risk, is called an efficient portfolio (Hartono ,2017:386). The best portfolio is one that has the best combination of expected return and risk (Hartono, 2014:340). The Markowitz approach and the single index approach can both be used to create the optimal portfolio.

The estimation of portfolio returns and portfolio risk using the Markowitz model is considered too complex and inefficient when faced with a large number of securities because it requires the covariance of Stocks. This developed model is used to simplify complex Markowitz model calculations by providing input parameters needed in Markowitz calculations. Model of single index assumes that the price of a security moves in synch with the market price index. It indicate that a stock's profit level appears to be linked to market fluctuations according to Husnan (2013:9).

There are two sorts of returns to consider when calculating investment returns: realized returns and expected returns. Returns that have already been realized are made reference to as realized returns. The expected return, on the other hand, is a return which has not yet happened but is predicted to do so in the future.

Covariance is a metric that illustrates how closely two variables are related. Covariance can only be calculated or securities correlated in this single index model if the securities (between stocks) have the same response to market fluctuations. The gap among expected rate of return and risk-free return on assets (RBR) is referred to as ERB. This ERB ratio depicts the link between two investing factors: return and risk (Hartono, 2017:450).

The optimum level of a high ERB value is established by the cut-off point, which is the maximizing point. The cut-off point is a value that is compared to the ERB, the candidate portfolio includes stocks having an ERB value equal to or greater to the cut-off mark.

Investors must be correct in determining which stocks can produce maximum returns with a certain risk or a specified amount of return with a minimal risk in investing. Investors can choose stocks with maximum returns by evaluating the value of Excess Return to Beta that is bigger than the value of its Cut off Rate (ERB > Ci) while determining the best portfolio using a single index method. Investors can determine the proportion of funds invested after obtaining the shares that enter the best portfolio candidate. Then, based on the level of return earned or the level of risk taken, investors evaluate portfolio success.

METHOD OF RESEARCH

The type of research conducted is descriptive to analyze stocks of IDXBUMN20 so that equities can be integrated into a portfolio that is optimal. The analytical tool is the Single Index Model. The research time lasted for 4 months, from October 2021 to January 2021. Quantitative data was used in conjunction with secondary sources of data. Secondary data is data collected and published by the relevant institutions. The data used is the monthly close price data of IDXBUMN20 shares on the IDX for the April 2020-June 2021 period, the monthly JCI rate published through Yahoo Finance, and the monthly deposit interest found on the official Bank Indonesia website.

The population is all stock in IDXBUMN20, totaling 20 shares listed on the Indonesia Stock Exchange, for the period of April 2020-June 2021. This sampling technique is saturated sampling or total sampling where 20 IDXBUMN20 shares that listed on the Indonesia Stock Exchange and Period of April 2020-June 2021 is the sample for this study. Documentation and literature review were utilized as data collection approaches in this study.

The data analysis strategy employed was to establish the optimal portfolio by using a single index models analysis tool. Meanwhile, the Microsoft Excel 2019 program was used to perform all calculations. The following steps were conducted in conjunction with the formulas:

1. Collect and describe information on Stock closing prices, JCI, and Bi rate.
2. Determining the return and expected return of individual stocks

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

   $E(Ri) = \frac{\sum_{i=1}^{n}(Ri)}{n}$
3. Determining market returns and expected returns

   $R_m = \frac{IHSG_t - IHSG_{t-1}}{IHSG_{t-1}}$

   $E(R_m) = \frac{\sum_{t=1}^{n} R_m}{n}$
4. Determining stock risk and market risk and standard deviation

   $\sigma_i^2 = \frac{\sum_{i=1}^{n}(Ri - E(R_i)^2}{n-1}$

   $\sigma_i = \sqrt{\sigma_i^2}$

   $\sigma_m^2 = \frac{\sum_{i=1}^{n}(R_m - E(R_m)^2}{n-1}$

   $\sigma_m = \sqrt{\sigma_m^2}$
5. Determining the covariance between stock returns and market returns

   $\sigma_{im} = \beta_i . \beta_m . \sigma_m^2$ atau σ_{im} = Ri - E(Ri) x Rm - E(Rm)
6. Determining the alpha and beta of each stock

   $\alpha_i = E(R_i) - \beta_i . E(R_M)$

   $\beta_i = \frac{\sigma_{im}}{\sigma_m^2}$ atau $\beta_i = \frac{[(Ri - E(R_i) - (R_m - E(R_m)]}{[E(R_m) - R_m]^2}$

7. Determining the residual error variance

$\sigma e_i^2 = \sigma_i^2 - (\beta_i^2 . \sigma_m^2)$ atau $\sigma e_i^2 = (Ri - (\alpha + (\beta . Rm))^2$

8. Determining risk-free asset return

$Rbr = \frac{\sum_{t=1}^{n}(\text{deposit interest rate})}{n}$

9. Determining Excesss Returns to Beta

$ERB. = \frac{E(R_i) - R_{BR}}{\beta_i}$

10. Sorting stocks from the highest to the lowest ERB value. Stocks with large value of ERB will be selected as optimal portfolio candidates.
11. Determining Ai and Bi of each stock

$Ai = \frac{(E(R_i) - R_{BR}).\beta_i}{\sigma e_i^2}$

$Bi = \frac{\beta_i 2}{\sigma e_i^2}$

12. Determining the stock's cut-off rate.

$Ci = \frac{\sigma_M^2 \sum_{j=1}^{i} A_j}{1 + \sigma_M^2 \sum_{j=1}^{i} B_j}$

Then, using the MAX function in Excel, calculate the Cut-offpoints (C*), which is the biggest value of Ci.

13. Determining the optimal portfolio with criteria ERB > Ci (Hartono, 2017:452)

Stocks that have ERB > Ci are a part of the best portfolio candidate..

14. Determining the proportions of money to be invested

$Zi = \frac{\beta_i}{\sigma e_i^2} (ERB - C^*)$

$Wi = \frac{Zi}{\sum_{j=1}^{k} Z_j}$

15. Determining the expected return of optimal portfolio
16. Determining the risk of optimal portfolio

$$\alpha_p = \sum_{i=1}^{n} Wi\ (\alpha_i)$$

$$\beta_p = \sum_{i=1}^{n} Wi\ (\beta_i)$$

$$E(R_p) = \alpha_p + \beta_p\ .\ E(Rm)$$

$$\sigma_p^2 = \beta_p^2 . \sigma_m^2 + \sum Wi^2 . \sigma_{ep}^2$$

RESULT OF THE RESEARCH

This research uses the IDX BUMN20, there are currently 20 listed companies on the IDX. The period of April 2020 to June 2021, the following companies are featured in the IDX BUMN20:

Table 1 Companies list in the IDX BUMN20 Index from April 2020 to June 2021

No.	Issuer Code	Issuer Name
1	ANTM	Aneka Tambang Tbk.
2	BBNI	PT Bank Negara Indonesia (Persero) Tbk.
3	BBRI	PT Bank Rakyat Indonesia (Persero) Tbk.
4	BBTN	PT Bank Tabungan Negara (Persero) Tbk.
5	BJBR	Bank Pembangunan Daerah Jawa Barat dan Banten Tbk.
6	BMRI	PT Bank Mandiri (Persero) Tbk.
7	BRIS	Bank BRIsyariah Tbk.
8	ELSA	Elnusa Tbk.
9	JSMR	PT Jasa Marga Tbk.
10	KAEF	Kimia Farma Tbk.
11	PGAS	PT Perusahaan Gas Negara Tbk.
12	PTBA	Bukit Asam Tbk.
13	PTPP	PP (Persero) Tbk.
14	SMBR	Semen Baturaja (Persero) Tbk.
15	SMGR	Semen Indonesia (Persero) Tbk.
16	TINS	PT Timah Tbk.
17	TLKM	PT Telkom Indonesia (Persero) Tbk.
18	WIKA	PT Wijaya Karya (Persero) Tbk.
19	WSBP	PT Waskita Beton Precast Tbk.
20	WSKT	PT Waskita Karya (Persero) Tbk.

When determining the optimals portfolio using the method of single index, the researcher must first decide which IDX-BUMN20 shares have been included in the best portfolio candidate using a formula. Following that, proportion of funds to be invested is calculated after determining the shares that are candidates. After that, the portfolio's return and risk are calculated. As a summary of the attached research analysis processed data, the results will be presented in the form of tables and simple calculations in a systematic manner.

1. Determining Expected Return E(Ri), standard deviation ($\boldsymbol{\sigma_i}$), Beta (β), Alpha (α), dan Variance Error ($\sigma^2 ei$) of each individual stock.

Table 2 Expected Return E(Ri), standard deviation (σ_i), Beta (β), Alpha (α), dan Variance Error (σ^2ei) of each individual stock

No	Kode Emiten	E(Ri)	σi	β	α	σ^2ei
1	ANTM	0.134959421	0.228363605	-0.175379363	0.13821299	0.052091755
2	BBNI	0.014973422	0.114702687	0.023172641	0.014543532	0.013155691
3	BBRI	0.030722450	0.092502009	0.011053474	0.03051739	0.008556390
4	BBTN	0.054672605	0.228809702	-0.41748048	0.062417538	0.052024194
5	BJBR	0.038247161	0.135015474	0.009793937	0.038065468	0.018228997
6	BMRI	0.023879657	0.086313505	0.681128496	0.011243632	0.006572444
7	BRIS	0.239966813	0.343565712	-1.489939954	0.267607587	0.113838216
8	ELSA	0.032844100	0.150788198	0.199551742	0.029142095	0.022661756
9	JSMR	0.013088374	0.104365753	0.3852263	0.005941809	0.010611500
10	KAEF	0.100594366	0.312826351	-2.322082666	0.143672722	0.087660739
11	PGAS	0.025339710	0.167803995	0.463023102	0.016749889	0.027752642
12	PTBA	0.008465271	0.090305067	-0.017613614	0.008792031	0.008154418
13	PTPP	0.039480949	0.196050902	0.82037458	0.024261685	0.037162888
14	SMBR	0.088002450	0.306892780	0.242600805	0.083501817	0.094071848
15	SMGR	0.018668709	0.111058199	-0.275211112	0.023774316	0.012190652
16	TINS	0.105598834	0.199547719	0.306544823	0.099911936	0.039641540
17	TLKM	-0.003559291	0.091392701	0.104012713	-0.005488893	0.008332161
18	WIKA	0.462323275	1.812312426	0.277512962	0.457174965	3.284330651
19	WSBP	0.017176256	0.181686721	1.267299501	-0.006334181	0.029972079
20	WSKT	0.048467448	0.220041950	1.489694907	0.020831219	0.044220658

Source: processed data

2. Determining Expected Return of Market E(Rm) and IHSG Standard Deviation

Table 3 Expected Return of Market E(Rm) and IHSG Standard Deviation

E(Rm)	0.018551603
σm	0.043492425

From data above, Expected Return Market's value is 0.018551603 or 1.86%. The market standard deviation value (σm) is a reflection of how much market risk there is, which is 0.043492425 or 4.35% of market risk that must be borne.

3. Determining Risk Free Rate

Table 4 Data of Risk-Free Rate

No	Period	BIR (Monthly)
1	April 14, 2020	4.50 %
2	Mei 19, 2020	4.50 %
3	Juni 18, 2020	4.25 %
4	Juli 16, 2020	4.00 %
5	Agustus 19, 2020	4.00 %
6	September 17, 2020	4.00 %
7	Oktober 13, 2020	4.00 %
8	November 19, 2020	3.75 %
9	Desember 17, 2020	3.75 %
10	Januari 21, 2021	3.75 %
11	Februari 18, 2021	3.50 %
12	Maret 18, 2021	3.50 %
13	April 20, 2021	3.50 %
14	Mei 25, 2021	3.50 %
15	Juni 17, 2021	3.50 %
	Average	3.87%

Source: processed data

Determining the risk-free rate as a benchmark in calculating excess return to beta and Ai in determining the optimal portfolio. The risk-free rate can be calculated by the total number of observations of the SBI then divided by the number of observations made, these results then divided by 12 SBI to determine the risk-free rate per month.

4. Determining Excesss Returns to Beta

Excess return is the gap between predicted and risk-free assset returns. The ERB is used to decide which equities are included in the optimal portfolio.

Table 5 Data of Excess Return to Beta

No	Issuer Code	E(Ri)	Rbr	βi	ERB
1	ANTM	0.134959421	0.03866667	-0.175379363	-0.549054079
2	BBNI	0.014973422	0.03866667	0.023172641	-1.022466315
3	BBRI	0.030722450	0.03866667	0.011053474	-0.718707723

4	BBTN	0.054672605	0.03866667	-0.417480480	-0.03833937
5	BJBR	0.038247161	0.03866667	0.009793937	-0.042833184
6	BMRI	0.023879657	0.03866667	0.681128496	-0.021709574
7	BRIS	0.239966813	0.03866667	-1.489939954	-0.135106214
8	ELSA	0.032844100	0.03866667	0.199551742	-0.029178229
9	JSMR	0.013088374	0.03866667	0.385226300	-0.066398095
10	KAEF	0.100594366	0.03866667	-2.322082666	-0.026669033
11	PGAS	0.025339710	0.03866667	0.463023102	-0.028782488
12	PTBA	0.008465271	0.03866667	-0.017613614	1.714662105
13	PTPP	0.039480949	0.03866667	0.820374580	0.000992573
14	SMBR	0.088002450	0.03866667	0.242600805	0.203361995
15	SMGR	0.018668709	0.03866667	-0.275211112	0.072664064
16	TINS	0.105598834	0.03866667	0.306544823	0.218343819
17	TLKM	-0.003559291	0.03866667	0.104012713	-0.405969195
18	WIKA	0.462323275	0.03866667	0.277512962	1.526619174
19	WSBP	0.017176256	0.03866667	1.267299501	-0.016957642
20	WSKT	0.048467448	0.03866667	1.489694907	0.006579053

Source: processed data

5. Determining Ci of each individual stock

Table 6 Ci value of each individual stock

No	Issuer Code	Ai	Bi	Ci
1	ANTM	-0.324192611	0.59045661	-0.0006125557
2	BBNI	-0.041733656	0.04081666	-0.0000789369
3	BBRI	-0.010262644	0.01427930	-0.0000194122
4	BBTN	-0.128443449	3.35017107	-0.0002414325
5	BJBR	-0.000225389	0.00526201	-0.0000004263
6	BMRI	-1.532436572	70.58805391	-0.0025572850
7	BRIS	-2.634661202	19.50066638	-0.0048064062
8	ELSA	-0.051271547	1.75718500	-0.0000966635
9	JSMR	-0.928561579	13.98476239	-0.0017111918
10	KAEF	-1.640429216	61.51063740	-0.0027796058
11	PGAS	-0.222345997	7.72504445	-0.0004145303
12	PTBA	0.065235276	0.03804556	0.0001233896
13	PTPP	0.017975359	18.10985319	0.0000328758
14	SMBR	0.127231484	0.62564042	0.0002403854
15	SMGR	0.451465608	6.21305199	0.0008440683
16	TINS	0.517581038	2.37048632	0.0009746812
17	TLKM	-0.527118498	1.29841994	-0.0009946497
18	WIKA	0.035797309	0.02344875	0.0000677109
19	WSBP	-0.908671944	53.58480628	-0.0015606476
20	WSKT	0.330166367	50.18448398	0.0005703932
	Σ	-7.404901865	311.5155716	

Source: processed data

The cuts-off points (C*) is the acceptance limit for each of the stocks in the portfolio. Then the cuts-off points (C*) is the maximum value obtained from a MAX formula in excel. So that the value of C* on TINS Stocks is 0.0009746812

6. Determining Cut-Off Point (C*) on Criteria of the Optimal Portfolio

Table 7 Cut-Off Point (C*) on Criteria of Optimal Portfolio

No	Issuer Code	ERB	Ci	C*	Decision
1	PTBA	1.714662105	0.0001233896	0.0009746812	Optimal
2	WIKA	1.526619174	0.0000677109	0.0009746812	Optimal
3	TINS	0.218343819	0.0009746812	0.0009746812	Optimal
4	SMBR	0.203361995	0.0002403854	0.0009746812	Optimal
5	SMGR	0.072664064	0.0008440683	0.0009746812	Optimal
6	WSKT	0.006579053	0.0005703932	0.0009746812	Optimal
7	PTPP	0.000992573	0.0000328758	0.0009746812	Optimal
8	WSBP	-0.016957642	-0.0015606476	0.0009746812	-
9	BMRI	-0.021709574	-0.0025572850	0.0009746812	-
10	KAEF	-0.026669033	-0.0027796058	0.0009746812	-
11	PGAS	-0.028782488	-0.0004145303	0.0009746812	-
12	ELSA	-0.029178229	-0.0000966635	0.0009746812	-
13	BBTN	-0.03833937	-0.0002414325	0.0009746812	-
14	BJBR	-0.042833184	-0.0000004263	0.0009746812	-
15	JSMR	-0.066398095	-0.0017111918	0.0009746812	-
16	BRIS	-0.135106214	-0.0048064062	0.0009746812	-
17	TLKM	-0.405969195	-0.0009946497	0.0009746812	-
18	ANTM	-0.549054079	-0.0006125557	0.0009746812	-

19	BBRI	-0.718707723	-0.0000194122	0.0009746812	-
20	BBNI	-1.022466315	-0.0000789369	0.0009746812	-

Source: processed data

The Stocks included in the portfolio must have ERB> C* conditions. The portfolio is categorized as optimal because it has a high ERB ratio value. The 7 stocks above are included in the optimal portfolio candidates because they meet the ERB criteria greater than the cut off point (C*). While the other 13 stocks have ERB values that are smaller than the cut off point (C*), therefore they are not included in the optimal portfolio.

7. Calculate the Optimal Portfolio Individual Stock Fund Proportion

After determining the Stocks which are formed of the portfolio's optimal, 7 company stock were obtained, namely PTBA, WIKA, TINS, SMGR, ADHI, WSKT, and PTPP. To build an ideal portfolio, the next step is to figure out what percentage of your portfolio's money comes from every stocks.

Table 8 Portfolio's Optimal Individual Stock Fund Proportion

No	Issuer Code	Zi	Wi
1	PTBA	-3.701579625	1.322430771
2	WIKA	0.128910931	-0.046054874
3	TINS	1.680897968	-0.600519621
4	SMBR	0.52193431	-0.186466877
5	SMGR	-1.618429795	0.578202167
6	WSKT	0.188798722	-0.067450458
7	PTPP	0.000394973	-0.000141108
	Σ	-2.799072516	1

Source: processed data

From the calculation summary table above, the largest proportion of funds forming the optimal portfolio is PTBA Stocks of 1.322430771 or 132.24%, then SMGR Stocks of 0.578202167 or 57.82%, WIKA Stocks of -0.046054874 or -4.61%, WSKT Stocks of -0.067450458 or -6.75%, SMBR Stocks are -0.186466877 or -18.65%, TINS Stocks are -0.600519621 or -60.05%, and the smallest proportion of funds is PTPP Stocks at -0.00014111 or -0.014%. The proportions of PTBA and SMGR funds are positive, namely 132.24% and 57.82%, which means that in total the proportion is 190.06%. The value of -90.06% means 90.06% of debt from Stocks of WIKA, WSKT, SMBR, TINS, and PTPP.

Meanwhile, the proportion value of WIKA's Stock funds is -4.61%, which is negative, which means that if there is an assumption of short sales, then the Stocks must be short sold as much as 4.61% of the funds owned by investors taken from 6 Stocks, namely PTBA, TINS, SMBR, SMGR, WSKT, and PTPP. Then from the short sales, investors can invest up to 104.61%. if there is no assumption of short sells, Investors can invest according to their finances in companies with a positive proportion value, such as PTBA and SMGR.

8. Determining Expected Returns and Risks of the Optimal Portfolio

Table 9 Expected Return of the Optimal Portfolio Calculation

No	Issuer Code	βi	αi	σ²ei	Wi	αp	βp	σ²ep
1	PTBA	-0.017613614	0.008792031	0.008154418	1.322430771	0.011626853	-0.023292785	0.010783654
2	WIKA	0.277512962	0.457174965	3.284330651	-0.046054874	-0.021055135	-0.012780824	-0.151259433
3	TINS	0.306544823	0.099911936	0.039641540	-0.600519621	-0.059999078	-0.184086181	-0.023805523
4	SMBR	0.242600805	0.083501817	0.094071848	-0.186466877	-0.015570323	-0.045237014	-0.017541284
5	SMGR	-0.275211112	0.023774316	0.012190652	0.578202167	0.013746361	-0.159127661	0.007048662
6	WSKT	1.489694907	0.020831219	0.044220658	-0.067450458	-0.001405075	-0.100480603	-0.002982704
7	PTPP	0.820374580	0.024261685	0.037162888	-0.000141108	-0.000003424	-0.000115762	-0.000005244
					Σ	-0.072659821	-0.525120831	-0.177761872

E(Rm)	0.018551603
E(Rp)	-0.082401654
σm²	0.001891591
σp²	-0.177240262

Source: processed data

The expected return portfolio value that has been chosen when it comes to building together the best portfolio is -0.082401654 or -8.24 %, which implies the expeccted returns portfolios are less thaan expectd market return of 0.018551603 or 1.86 %, causing a loss of -8.24 %.

The portfolio risk from table above is -0.177240262 or -17.72%.

Based on the above analysis, it can be inferred that investors in investment funds should not form a portfolio because the portfolio's expected return value and risk is less than the expected return value and risk of individual stocks.

9. Determining Expected Risk and Return of Individual Stocks

Table 10 Data of the Optimal Portfolio Risk

No	Issuer Code	E(Ri)%	σi%
1	PTBA	0.85%	9.03%
2	WIKA	46.23%	181.23%
3	TINS	10.56%	19.95%
4	SMBR	8.80%	30.69%
5	SMGR	1.87%	11.11%
6	WSKT	4.85%	22.00%
7	PTPP	3.95%	19.61%

Source: processed data

From table 4.18 above, among the 7 stocks it is known that WIKA's stock provides the largest expected return of 0.462323275 or 46.23% with the largest risk of 1.812312426 or 181.23%. Then TINS stocks with an expected return of 0.105598834 or 10.56% with a risk of 0.199547719 or 19.95%, SMBR stocks with an expected return of 0.088002450 or 8.8% with a risk of 0.306892780 or 30.69%, WSKT stocks with an expected return of 0.048467448 or 4.85% with a risk of 0.220041950 or 22%, stocks PTPP with an expected return of 0.039480949 or 3.95% with a risk of 0.196050902 or 19.61%, SMGR Stocks with an expected return of 0.018668709 or 1.87% with a risk of 0.111058199 or 11.11%, and stocks with the smallest expected return, namely PTBA which has an expected return of 0.008465271 or 0.85% with the smallest risk that is 0.090305067 or 9.03%.

CONCLUSION AND SUGGESTION

Conclusion

Based on this study, stoccks that are listed in the portfolio's optimal category in IDX-BUMN20 Stocks for the April 2020 – June 2021 period are PTBA, WIKA, TINS, SMBR, SMGR, WSKT, and PTPP.

The proportions of investable fund that create the portfolio's optimal of IDX-BUMN20 Stocks for the period April 2020 – June 2021 is PTBA of 1.322430771 or 132.24%, WIKA of -0.04605487 or -4.61%, TINS of -0.6051962 or -60.05%, SMBR of -0.18646688 or -18.65%, SMGR of 0.578202167 or 57.82%, WSKT of -0.06745046 or -6.75%, and PTPP of -0.00014111 or -0.01%.

The return's expected rate from the formed portfolio's optimal is - 0.082401654 or -8.24 %, which implies that the portfolio's expected return is less than the return of expected market of 0.018551603 or 1.86 %, causing a loss of -8.24 %. With a portfolio risk borne of -0.177240262 or -17.72%.

Suggestion

Rather than forming a portfolio, investors in investment funds should invest their assets in individual stocks, selecting the desired expected return with a specific level of risk.

For companies that have not yet reached the optimal category, it is need to evaluate, their performance in order to increase in the future and attract investors.

Further research if you want optimal portfolio research on the IDX-BUMN20 object, you should use daily close price stock data for a few months or a year to get a more detailed description of the returns and risks in the short term.

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