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ANALYSIS OF OPTIMAL PORTFOLIO AND PORTFOLIO PERFORMANCE PERSISTENCE ON THE IDX30 INDEX USING SINGLE INDEX MODEL

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ABSTRACT

This research aims to analyze the optimal portfolio formation in each semester based on the Single Index Model in companies included in the IDX30 index for the period 2018 – 2022 and analyze the persistence of optimal portfolio performance in companies included in the IDX30 index category on the Indonesia Stock Exchange for the period 2018 – 2022. Population and sample, all stocks of go-public companies listed in the IDX30 Index on the Indonesia Stock Exchange (IDX) for Feb 2018 – Jan 2022. The data analysis method used in this research is a determination of the optimal portfolio with a Single Index Model and stock portfolio performance persistence test to determine whether there is an implication between optimal portfolio performance in the past and optimal portfolio performance in the future (persistence). As measured by the Sharpe method, the results of the persistence test analysis of portfolio performance show that past portfolio performance has no data value dependence (no persistence) with future portfolio performance.

ABSTRAK

Penelitian ini bertujuan menganalisis formasi portofolio optimal di setiap semester berdasarkan Model Indeks Tunggal pada perusahaan yang masuk ke dalam indeks saham IDX30 Periode 2018 - 2022 dan menganalisis persistensi kinerja portofolio optimal pada perusahaan yang masuk ke dalam kategori indeks saham IDX30 di Bursa Efek Indonesia periode 2018 – 2022. Populasi dan sampel, seluruh saham perusahaan go public yang terdaftar dalam kelompok saham Indeks IDX30 di Bursa Efek Indonesia (BEI) periode Feb 2018 – Jan 2022. Metode analisis data yang digunakan penelitian ini penentuan portofolio optimal dengan Model Indeks Tunggal dan uji persistensi kinerja portofolio saham untuk mengetahui apakah terdapat implikasi antara kinerja portofolio optimal di masa lalu dengan kinerja portofolio optimal di masa depan (Persistensi). Hasil analisis uji persistensi kinerja portofolio saham yang diukur dengan metode Sharpe menunjukan bahwa kinerja portofolio pada masa lalu tidak memiliki ketergantungan nilai data (tidak memiliki persistensi) dengan kinerja portofolio masa depan.

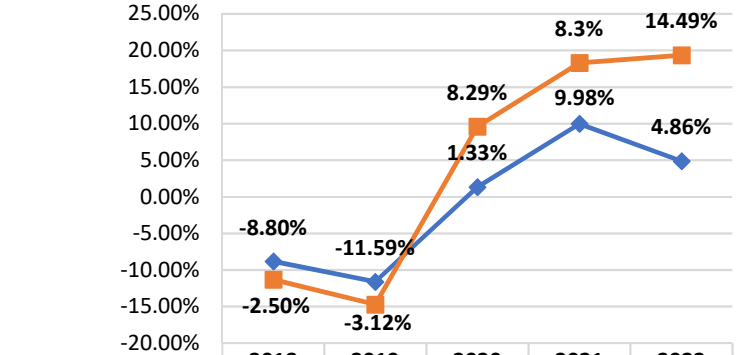
INTRODUCTION

Portfolio investment performance was able to grow positively by recording a surplus of USD5.3 billion. This is higher than in 2020 which amounted to USD3.4 billion amid high uncertainty in global financial markets. More aggressive monetary policy normalization in advanced economies (especially the United States) to contain inflationary pressures, increasing geopolitical tensions between Russia and Ukraine, and the escalation of global COVID-19 cases due to both the delta and omicron variants have caused high volatility in financial markets so far this year. The Indonesian Central Securities Depository (KSEI) has shown data on growth in the number of capital market investors in Indonesia which has increased every year. A significant increase occurred during the COVID-19 pandemic. In 2020, Indonesian capital market investors increased by 56% to 3.87 million Single Investor Identification (SID) accompanied by an increase in stock investors by 53% from the previous year. In 2021, Indonesian capital market investors increased to 7.59 million SID or 92.99%. This has shown an increase in the interest of the Indonesian people in investing in capital market products.

Investment is the postponement of present consumption to be put into productive assets over a specified period. Investment can be made in the real sector (land, houses, gold, etc.) as well as in the financial sector (such as forex, deposits, securities, and so on). One form of financial sector investment is stock investment which can be done through the stock exchange or capital market (Hartono, 2017). Generally, investors want a high return from their investment, therefore financial investment especially stock investment becomes one of the good prospect choices because of it gives a high return with easier transaction and investment (Partono dkk., 2017).

Diversification in investing is the most important thing. Diversification is a concept used in the formation of an optimal portfolio (Setyo, 2020). There is a philosophy in the investment world that says that "wise investors do not put all their eggs into just one basket". This philosophy ultimately encourages investors to diversify stocks to reduce existing risks. In portfolio formation, investors always want to maximize the expected return with a certain level of risk that they are willing to take or find a portfolio that offers the lowest risk with a certain level of return (Rivaldi dkk., 2021).

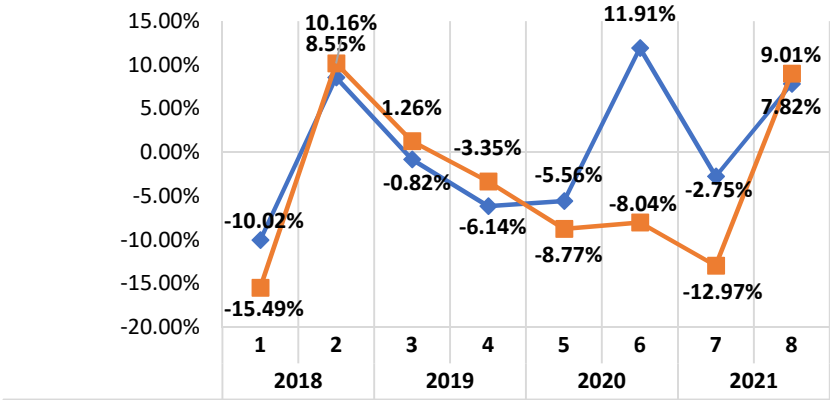
The single Index Model was first proposed by William Sharpe in 1963. This model is quite good at explaining the risk of each stock consisting of systematic and corporate risk (Hartono, 2017). A single index model is expected to be an alternative in the preparation of optimal portfolios that are more easily (Gunawan, 2019).



	2018	2019	2020	2021	2022
IDX30 Index	-2.50%	-3.12%	8.29%	8.3%	14.49%
IDX Composite	-8.80%	-11.59%	1.33%	9.98%	4.86%

Figure 1: The Growth of the Indonesia Composite Index and IDX30 Index for the Period February 2018 – January 2022

Source: www.idx.co.id



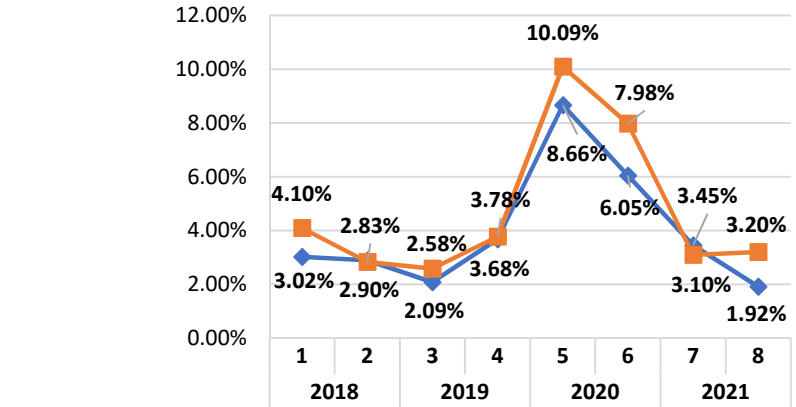
	1	2	3	4	5	6	7	8
IDX Composite Return	-10.02%	8.55%	-0.82%	-6.14%	-5.56%	11.91%	-2.75%	7.82%
IDX30 Return	-15.49%	10.16%	1.26%	-3.35%	-8.77%	-8.04%	-12.97%	9.01%

Figure 2. Return Of Indonesia Composite Index and IDX30 For Period February 2018 – January 2022

Source: www.idx.co.id

The data analysis in Figure 1 shows that the development trend of IDX30 is always in line with the development trend of the Indonesia Composite Index for 2018 – 2022. In 2021, the Indonesia Composite Index and IDX30 figures weakened or decreased market returns, based on the Indonesia Composite Index return, which increased to 9,98%, and IDX30 to 8,3% in 2021. This shows that there are significant fluctuations.

The Indonesia Composite Index returns provide fluctuating results from the first semester of the period February 2018 – July 2018 to the eighth semester of the period August 2021 – January 2022 and IDX30 from the first semester of the period February 2018 – July 2018 to the eighth semester of period August 2021-January 2022. The negative values that occurred in IDX30 and Indonesia Composite Index in the seventh semester of the February 2021 – July 2021 period to the fifth semester of period February 2020 – July 2020 then returned to positive values in the eighth semester.



	1	2	3	4	5	6	7	8
IDX Composite Risk	3.02%	2.90%	2.09%	3.68%	8.66%	6.05%	3.45%	1.92%
IDX30 Risk	4.10%	2.83%	2.58%	3.78%	10.09%	7.98%	3.10%	3.20%

Figure 3. Risk Of Indonesia Composite Index and IDX30 For The Period February 2018 – January 2022

IDX30 return fluctuated and decreased by -12.97% in the seventh semester of period February 2021 – July 2021. Likewise, Indonesia Composite Index returns fluctuated and decreased to -5,56% in the fifth semester of period February 2020 – July 2020.

Based on the analysis in Figure 3, the average risk of IDX30 is greater than the average risk of the Indonesia Composite Index and the average return of IDX30 is lower than the average return of the Indonesia Composite Index, this proves that the IDX30 index in eight semesters during the period February 2018 – January 2022 has not been able to maximize performance to be able to exceed the average return of Indonesia Composite Index.

Portfolios are created as a strategy to maximize the level of profit in investing and minimize risk. A portfolio that has performed well can be seen based on the continuation of performance in the future. Evaluating portfolio performance is essentially a matter of comparing the return earned by one portfolio with the return earned by one or more other portfolios (Elton dkk., 2014). The continuation of performance in this portfolio is called persistence. Persistence is a test of whether a data series in a time series is free of persistence. A persistence test is conducted to see if there is an association between past and future portfolio performance.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Return

Return is a reward for the investors' courage to take risks in the investments they make. In addition to calculating returns, investors also need to consider the risk of an investment as a basis for making investment decisions (Tandelilin, 2017) Return is the total gain or loss of an investment over a period of time. It is usually measured as the cash distributions during the period, plus the change in value, from the investment value at the beginning of the period. (Gitman & Zutter, 2015:226). The return from holding an investment over a period of time - say, a year - is all the cash payments received due to ownership, plus the change in market price, divided by the initial price. (Van Horne and Wachowicz, 2008:98).

Optimal Portfolio

The optimal portfolio provides a combination of high return with low risk (Hartono, 2017:6). According to Tandelilin (2010) an efficient portfolio is a portfolio with the highest return at a certain risk or a portfolio with the lowest risk at a certain return. Optimal portfolios are made to reduce the level of risk in investing to a minimum (Puspitasari dkk., 2022).

Single Index Model

The single Index Model is an analysis developed by William Sharpe in 1963. The single index model assumes that one reason securities returns are correlated is a common response to market changes (Pratiwi & Yunita, 2015). The single index model or the one-factor model assumes that the yields between two or more securities will be correlated and have the same reaction to one factor (Halim, 2015).

Sharpe Method

The portfolio performance measurement methods that are often used Sharpe, Treynor, and Jensen methods. In this research, the portfolio performance measurement method used the Sharpe method. The Sharpe index of portfolio performance is measured by comparing the portfolio risk premium with the portfolio risk which is stated with a standard deviation (Lestari, 2020; Gunawan & Arini, 2016; Hasanah dkk., 2019). The Sharpe method is a method of measuring portfolio performance that assesses by comparing portfolio risk premium (difference between the average portfolio profit rate and the average risk-free interest rate) divided by portfolio risk by standard deviation (total risk). If the Index Sharpe Portfolio (Sp) value is positive then the portfolio performance is getting better. The Sharpe method is

commonly used by investors who use their funds mostly in the portfolio, so the portfolio risk is expressed in the form of standard deviations (Halim, 2015).

Persistence of Portfolio Performance

To find out whether there is an association between past performance and future performance (persistence), the Spearman Rho Correlation Rank Test is conducted. A Persistence Test is independent of each value in the scale line. To conduct persistence testing, the magnitude of the correlation coefficient must be calculated, one of which is the Spearman method rank correlation test. The serial correlation efficiency of the Spearman method can be known by the following formula (Soewarno, 2014; Dwianggoro dkk., 2012; Rimbawan dkk., 2023).

IDX30 Index

IDX30 Index is an index that measures stock price performance consisting of 30 stocks that have high liquidity and large market capitalization and are supported by good company fundamentals. The stock price determines the shareholder value maximization of shareholder wealth translated to maximize the company's stock price. The stock price at any given time will depend on the expected future cash flows received by investors "on average" when investors buy the stock (Brigham & Houston, 2021). IDX30 index is one of the indices that has 30 stocks in the composite index whose elements are selected from the LQ45 index which has good performance and is widely used in the formation of stock portfolios.

H_1: there is persistence in optimal portfolio performance in companies included in the IDX30 index category on the Indonesia Stock Exchange for the period February 2018 – January 2022.

RESEARCH METHOD

The type of research used in this research is descriptive research with quantitative methods. The population used in this research is all stocks of publicly listed companies in the IDX30 Index stock group on the Indonesia Stock Exchange (IDX) for the 2018 to 2022 period. The data obtained by researchers are literature research data recorded in www.idx.co.id, www.yahoo.finance.com, and www.bi.go.id, as well as various literature to find out the association between the author's research and previous research, the use of research results and the concepts needed.

The sampling technique in this research used purposive sampling technique. Purposive sampling is a sampling technique considering that the company stocks were listed actively on the IDX30 index during the research period 2018 – 2022 on the Indonesia Stock Exchange (IDX), companies that have monthly historical stock price data from 2018 to 2022, the stocks did not stock split during the research period 2018 – 2022. Because it will result in unstable return stock due to the split in a number of outstanding stocks.

The data analysis method carried out in this research, uses a Single Index Model to determine the optimal portfolio. The optimal portfolio will be determined by eliminating stocks that have a negative E(Ri) value first, followed by eliminating stocks that have a negative Excess Return to Beta (ERB) value and have an ERB value lower than the cut-off point (C*). Where the calculation to find Excess Return to Beta (ERB) is obtained by finding the average return of each stock and the standard deviation of each stock in the IDX30 index first then finding the Beta value of stock and Alpha stock along with the Variance used to find Excess Return to Beta (ERB) value in semester 1, Feb – Jul 2018 to semester 8, Aug – Jan 2022. Stocks with an Excess Return to Beta (ERB) value higher than the cut-off point (C*) have qualified to be categorized as optimal portfolios. Portfolio performance measurement with the Sharpe method and Spearman Rho Correlation Rank Test to find out whether there is an association between past performance and future performance (persistence).

Persistence of Portfolio Performance

Spearman Rank correlation is used to find associations or test the significance of a hypothesis if each link is in the form of data source variables that are not the same.

$$R_S = 1 - \frac{6 \sum bi^2}{n\,(n^2 - 1)} \qquad (1)$$

The Correlation Indonesia Composite Index value in Spearman's rho Test is determined by a 2-way test (two-tail test). If the Sig. (2-tailed) RS < (0,05), then the portfolio has performance consistency and the correlation coefficient is significant. If the Sig. (2-tailed) RS> (0,05), then the portfolio does not have performance consistency and the correlation coefficient is not significant.

RESULT AND DISCUSSIONS

Optimal Portfolio Formation with Single Index Model

The first step to create an optimal portfolio is to get an Excess Return to Beta (ERB) value. Where the calculation to find Excess Return to Beta (ERB) is obtained by finding the average return of each stock and the standard deviation of each stock in the IDX30 index first then finding the Beta value of stock and Alpha stock along with the Variance used to find Excess Return to Beta (ERB) value in semester 1 Feb - Jul 2018 to semester 8 Aug - Jan 2022.

The average stock return is the average of each stock during the research period and the average standard deviation of each stock during the research process. ERB is the difference between expected return and risk-free asset return. The RM value is the average return value of IDX30 and the average standard deviation of IDX30 which is used as a reference for return and market standard deviation.

After getting the value of E(Ri) and ERB (Excess Return to Beta), then list of stocks that included in the optimal portfolio will be determined by eliminating stocks that have negative E(Ri) value first, followed by eliminating stocks that have a negative ERB value and have an Excess Return to Beta (ERB) value lower than cut-off point (C*). Stocks with an (Excess Return to Beta) ERB value higher than the cut-off point (C*) have qualified to be categorized as optimal portfolios.

Based on the results of the analysis in the table above, it shows that the highest portfolio return per semester occurred in semester 6 of 2020, which was 9.55% applicable for the monthly period with the optimal number of stocks in the portfolio of 10 stocks. The lowest portfolio return per semester occurred in semester 1 at 0,93%, applicable for the monthly period with the number of stocks in the optimal portfolio of 1 stock.

Table 1. Optimal Return, Risk, Beta, and Alpha Portfolio 2018 – 2022

Year	Semester	Number of Stocks	E(Rm)	E(Rp)	σ_m	σ_p	α_p	β_p
2018	1	1	-2,21%	0,93%	0,09%	1,04%	-0,0048	-0,4148
	2	6	1,81%	6,24%	0,10%	0,53%	0,0617	0,0342
2019	3	5	-1,46%	2,13%	0,65%	0,45%	0,0213	0,0040
	4	3	3,65%	5,42%	1,43%	11,01%	0,0534	0,0201
2020	5	4	1,07%	6,18%	0,15%	39,69%	0,0361	2,3981
	6	10	0,36%	9,55%	0,07%	30,50%	0,0894	1,7189
2021	7	1	-1,90%	3,51%	0,07%	19,69%	0,0789	2,3017
	8	7	2,99%	7,68%	0,19%	28,27%	0,0243	1,7541

Table 2. Portfolio Performance Ratios with the Sharpe Method

Year	Semester	RF	Sharpe Ratio Portfolio	Market Sharpe Ratio (IDX30)
2018	1	0,44%	0,1915	-0,8660
	2	0,50%	4,4541	0,4039
2019	3	0,50%	0,2730	-0,2428
	4	0,42%	0,2787	0,2707
2020	5	0,35%	0,3730	0,1876
	6	0,31%	0,6402	0,0163
2021	7	0,29%	0,4001	-0,8041
	8	0,29%	0,8202	0,6196

This happens because only one stock falls into the optimal category. The highest Standard Deviation occurred in semester 4 of 2021, which was 39,69% applicable for the monthly period with the number of stocks in the optimal portfolio of 4 stocks and the lowest occurred in semester 3, which was 0.45% applicable for the monthly period with the number of stocks in the optimal portfolio of 5 stocks. The highest Portfolio Beta occurred in semester 5, which was 2.3981 applicable for the monthly period and the lowest occurred in semester 1, which was -0.4148 for the monthly period.

There is a problem in semester 1, where stock in the optimal portfolio category is only one stock. In addition to only one stock. Alpha and Beta in semester 1 were negative. That is, with a negative alpha value the portfolio in semester 1 is unattractive to investors and indicates that the portfolio is overpriced. A negative Beta value in semester 1 indicates that the return on semester 1 stock is opposite to the market return. It can be concluded that in semester 1 there is no optimal portfolio. The impact of the portfolio beta coefficient on portfolio performance is not in the same direction if there is a change in market conditions in the form of an increase does not necessarily make the portfolio return rise and if there is a decrease it also does not necessarily have an impact on the portfolio return which will also decrease.

In semester 7, stocks included in the optimal portfolio category yield positive Alpha and Beta with the same number of stocks as in semester 1, that is one stock. This is because the stocks included in the optimal portfolio category yielded a portfolio return of 3.51%, greater than the market return of -1.90% with a portfolio alpha level of 0.0789. The alpha value is positive, meaning that the portfolio is attractive to investors and indicates an underpriced portfolio. Then, the beta of the portfolio amounted to 2.3017. The beta value (β> 1) means that the beta in this period has a high sensitivity to changes in market returns.

The results of the analysis of eight optimal portfolios formed from monthly data for the period February 2018 – January 2022 per semester show that, during the research period, the resulting alpha represents the performance of a portfolio relative to a benchmark, it is often considered to represent the value that an investor or portfolio manager adds to or subtracts from a fund's return. Alpha is the return on securities obtained from the results of market index movements. A positive alpha value means that the portfolio is attractive to investors and indicates an underpriced portfolio. While a negative alpha value means that the portfolio is not attractive to investors and indicates an overpriced portfolio. In securities that have the same beta value, securities with higher alpha values will generate higher returns.

The portfolio returns generated in each period are also volatile, this is also the same as the fluctuating market returns. From the results of this analysis, it can be concluded that investing in the optimal portfolio can provide higher returns than market returns.

Table 3: Spearman Rank Correlation with the Sharpe Method

Periods	Correlation Coefficient	Sig (2-tailed)
2018 to 2019	-0,2	0,8
2019 to 2020	-0,6	0,4
2020 to 2021	-0,2	0,8

Portfolio Performance Persistence Test

After the optimal portfolio with a Single Index Model is created, it will then calculate portfolio performance with the Sharpe method to determine the performance resulting from the optimal portfolio. To see the performance of a portfolio, we cannot only look at the rate of return generated by the portfolio, but we also need to pay attention to other factors such as portfolio risk. One measure that has included return and risk factors in its calculation is the Sharpe ratio.

Based on the calculation results in Table 2, the Sharpe ratio performance value has a varied value for the portfolio's Sharpe ratio. Overall, the optimal portfolio using the Single Index Model can yield better performance than the market index (IDX30) performance. Using the Single Index Model in compiling the optimal portfolio is able to yield a Sharpe ratio greater than the market index (IDX30) Sharpe ratio, when the market index (IDX30) Sharpe ratio yields negative performance in semesters 1, 3, and 7, the optimal portfolio is able to yields positive Sharpe ratio performance during the research period (all semesters). Where the highest Sharpe ratio value occurred in semester 2, which was 4.4541 and the lowest occurred in semester 1, which was 0.1915.

This is better when compared to the performance of the market Sharpe ratio (IDX30) which has the highest performance value in semester 4 of 2019, which is 0.2707 and the lowest occurred in semester 1 of 2018, which is -0.8660. Based on results of analysis persistence test of portfolio performance measured by Sharpe method in the period 2018 to 2019. 2019 to 2020. 2020 to 2021 consistently generated (2-tailed) value > α. It can be concluded based on data that has been analyzed, that portfolio performance in the past has no data value dependence (no persistence) with future portfolio performance. This means that in that period optimal portfolio performance has no persistence.

CONCLUSION

The conclusions have been obtained that investors need to rearrange portfolios every semester. Overall, the optimal portfolio using the Single Index Model is able to yield better performance than the market index (IDX30) performance. Using the Single Index Model in compiling the optimal portfolio is able to yield a Sharpe ratio greater than the market index (IDX30) Sharpe ratio, when the market index (IDX30) Sharpe ratio yields negative performance in semesters 1, 3, and 7, the optimal portfolio is able to yield positive Sharpe ratio performance during the research period (all semesters). Based on the results of the analysis of the persistence test of stock portfolio performance measured by the Sharpe method in the period 2018 to 2019. 2019 to 2020. 2020 to 2021 consistently generated (2-tailed) value > α. It can be concluded based on data that has been analyzed, that portfolio performance in the past has no data value dependence (no persistence) with future portfolio performance. These results indicate consistency with the hypothesis of weak market efficiency, where historical performance cannot be used for decision-making in investing in a portfolio.

Stocks included in the IDX30 index do not always provide good returns and good portfolio performance. Therefore, investors can try to invest in stocks outside the IDX30 index, because not all stocks outside the IDX30 index have bad performance. The Single Index Model can be used as an alternative to portfolio formation because it can yield higher portfolio returns compared to market returns. Then, based on the performance of the portfolio Sharpe ratio on the IDX30 index during the

period 2018 – 2022, past portfolio performance has no data value dependence (no persistence) with portfolio performance in the future, which means that good performance at this time is not necessarily good in the future. Therefore, it is necessary to rebalance investment formation every semester in the strategy of investing in stock portfolios to coincide with changes in company members listed on the IDX30 index. Investors can use the Single Index Model to form an optimal portfolio. This model can reflect investors related to stocks that form the optimal portfolio, the large proportion of funds of each issuer, the rate of return, and stock risk that will be borne by investors. This data can be used as a basic reference for investment decision-making in the formation of an optimal portfolio.

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