RISK, RETURN AND EFFICIENCY ASSESSMENT OF PHARMACEUTICAL STOCKS BASED ON MONTE CARLO SIMULATION (STUDY ON KLBF STOCK)

PENILAIAN RISIKO, RETURN DAN EFISIENSI SAHAM FARMASI BERDASARKAN SIMULASI MONTE CARLO (STUDI PADA SAHAM KLBF)

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ABSTRACT

This research comprehensively analyzes the stock performance of PT Kalbe Farma Tbk (KLBF) on the Indonesia Stock Exchange during the period of October 18, 2022, to October 17, 2023, with an emphasis on identifying and predicting associated risks. The Capital Asset Pricing Model (CAPM) method is utilized to calculate KLBF's expected return and stock efficiency level. Monte Carlo simulations with 1000, 5000, and 10,000 iterations are then applied to predict the risk of an unfavorable negative expected return for investors, as well as the risk of inefficient stock performance with actual returns lower than expected returns. The results indicate that KLBF's stock performance over the past year was indeed inefficient, with actual returns lower than expected returns. The Monte Carlo simulations reveal a 0.33 risk of negative expected return, a 0.65 risk of expected return below the risk-free rate, and a 0.52 risk of inefficient stock performance. The more iterations performed, the more accurate the risk predictions. The decline in KLBF's stock performance was caused by increased market volatility due to negative global sentiment. This research concludes that investors should avoid investing in KLBF stocks given the significant risks of losses and low returns.

Keywords: Risk, Return, Efficiency, Stocks, Monte Carlo

ABSTRAK

Penelitian ini menganalisis secara komprehensif kinerja saham PT Kalbe Farma Tbk (KLBF) di Bursa Efek Indonesia selama periode 18 Oktober 2022-17 Oktober 2023 dengan penekanan pada identifikasi dan prediksi risiko terkait. Metode Capital Asset Pricing Model (CAPM) dimanfaatkan untuk menghitung tingkat pengembalian yang diharapkan (expected return) dan tingkat efisiensi saham KLBF. Simulasi Monte Carlo dengan 1000, 5000, dan 10.000 iterasi kemudian diterapkan untuk memprediksi risiko terjadinya expected return negatif yang tidak menguntungkan bagi investor serta risiko kinerja saham yang tidak efisien dengan actual return lebih rendah dari expected return. Hasil penelitian menunjukkan bahwa kinerja saham KLBF selama setahun terakhir terbukti tidak efisien dengan actual return yang lebih kecil dibandingkan expected return. Simulasi Monte Carlo mengungkapkan risiko sebesar 0,33 untuk terjadinya expected return negatif, 0,65 untuk expected return di bawah tingkat bebas risiko, dan 0,52 untuk kinerja saham yang tidak efisien. Semakin banyak iterasi yang dilakukan, semakin akurat prediksi risiko yang dihasilkan. Penurunan kinerja saham KLBF disebabkan oleh volatilitas pasar yang meningkat akibat sentimen negatif global. Penelitian ini menyimpulkan bahwa investor sebaiknya menghindari investasi pada saham KLBF mengingat risiko kerugian dan pengembalian rendah yang cukup signifikan.

Kata Kunci: Risiko, *Return*, Efisiensi, Saham, Monte Carlo

INTRODUCTION

PT Kalbe Farma (KLBF) is a strong competitor in the export market as a national health product company. With more than 17,000 employees, PT Kalbe Farma has become the largest healthcare provider in Indonesia. They have expertise in marketing, branding, distribution, finance, research, and development. In addition, PT Kalbe Farma is also the largest public health product company in Southeast Asia, with a market capitalization of IDR 79.2 trillion and a sales value of IDR 20.2 trillion at the end of 2017 (Nurmutia, 2023).

PT Kalbe Farma Tbk (KLBF) is still showing a continuing trend of financial performance growth amid the surge in COVID-19 cases. The company's performance is also supported by changes in people's habits to live healthier lives. Mirae Asset Sekuritas analysts Hariyanto Wijaya and Emma A. Fauni revealed that, despite the uncertain situation, Kalbe Farma's performance during the first quarter of 2021 was still as expected. This performance was supported by changes in people's habits to live a healthy life during the COVID-19 pandemic. The company also managed to record sales growth until the end of March 2021 of 3.8% to IDR 6 trillion (Situmorang, 2021)

Although the growth of PT Kalbe Farma's financial performance shows a positive trend, this should not be a reason for PT Kalbe Farma to be careless about the changes and challenges that will be present in the future. History records that the era of glory often ends due to unpreparedness to face challenges. Lehman Brothers is one example that illustrates the situation of "too big to fail." One of the largest banks in the United States was called the most stable bank and would not go bankrupt during its heyday, and this was supported by statements from various parties. However, it was unexpected that Lehman Brothers

could also go bankrupt due to the deteriorating housing credit conditions in the US as well as internal factors mentioned if there were allegations of manipulation of financial statements (Syafina, 2008)

Recent data shows that Kalbe Farma's shares have decreased. The share price of pharmaceutical issuer PT Kalbe Farma Tbk (KLBF) closed in a landslide into the red zone on Wednesday (August 23, 2023). Investors seem to highlight the decline in the company's profit margin during 2022. According to data from the Indonesia Stock Exchange (IDX), KLBF shares fell 5.68% to the level of Rp2,160 per share. Today's decline was accompanied by high volume, reaching 59.83 million shares, or higher than the 20-day average movement of 24.05 million shares. This decline made KLBF's weekly performance minus 6.49%. Although, in the past month, the shares of the issuer of Promag ulcer medicine and Komix cough medicine still gained 5.37%. "Despite facing increased uncertainty due to the global financial and geopolitical crisis, the company is committed to maintaining product availability and minimizing the impact of rising raw material prices through price and portfolio management," as written in Kalbe's official statement on Wednesday (2/8/2023).

This information must certainly be captured by PT Kalbe Farma as a dangerous signal. There must be a decision or policy taken regarding the decline in shares. The decision must be made based on an analysis of the stock market and the risks involved in it. In relation to the above, it is necessary to conduct an analysis to ascertain whether the shares of PT Kalbe Farma (KLBF) on the Indonesia Stock Exchange (IDX) get a positive response during 2023, so that it has the opportunity to perform better than several industries in other sectors. This is useful for investors who want to make an investment to find out how much profit will be obtained. Therefore, each investor must determine their own portfolio to get the

most optimal results. Efforts to form an optimal portfolio must be made by every investor (Almunfarijah, 2017). Portfolios are a way for investors to manage risk and reduce investment risks that they may face (Hartono, 2017).

A moderate level of return and risk from an optimal portfolio must be accountable and accepted by investors. Every investor must be prepared to face uncertainties and problems that may occur in determining the shares for the portfolio that he has formed. It really depends on the choice of risk for each investor. In choosing the optimal portfolio, of course, investors must have rational thinking in order to get maximum results. Therefore, when investing, investors will try to minimize the risks that may occur, either the risks that may be faced now or the risks that will occur in the future (Usman et al., 1997).

An efficient portfolio is one that is able to generate a return above the specified risk value. Based on this theory, it is necessary to consider how to determine the profit from an investment so that it can be considered feasible. One way is to use the Capital Asset Pricing Model (CAPM). CAPM is a depiction of the relationship between return and risk in a model. CAPM aims to forecast the expected return and its relationship with risk (Fischer & Jordan, 1995). CAPM can show efficient stocks by looking at the difference between the actual return value and the expected return value. CAPM can be positive or negative. CAPM focuses on a stock that has an individual return rate exceeding the expected return in determining the stock of choice and conducts a review of risk-free assets to determine the level of return (Andriyani et al., 2016).

One of the investment valuations used in CAPM to determine the position of the stock is the security market line, or SML. SML is a line that shows the relationship between risk (measured by beta) and return (Ri), and the line is a linear line. According to Hartono (2017), the CAPM model shows that the higher the beta coefficient obtained from a stock, the higher the level of return and risk that investors will receive. In this model, the rate of return of a market can show the expected return, risk-free return, and systematic risk, or beta (Kholishoh et al., 2020).

One of the analytical tools that can be used to see the possibility of future risks is Monte Carlo simulation. This method can also be used to simulate stock price movements (Silaban et al., 2023). Monte Carlo simulation is a method that involves the generation of random numbers with a probability distribution that can be known and determined. Monte Carlo simulation is a mathematical technique that predicts the possible outcomes of uncertain events (Alijoyo et al., 2019). Computer programs use this method to analyze past data and predict various future outcomes based on a selection of actions. Monte Carlo simulation is strongly applicable in the risk evaluation process and can be applied in the risk analysis process.

Based on the description above, this research will conduct an analysis related to the performance of PT Kalbe Farma (KLBF) shares on the Indonesia Stock Exchange (IDX) during the period October 18, 2022–October 17, 2023, to see the level of return expected by investors for one year and the efficiency value of shares. After that, through the use of Monte Carlo simulation, an iteration process or repetition of the return value that has been obtained will be carried out to predict the possibility of negative expected return rates and the risk of inefficient stock performance.

RESEARCH METHODS
Objects of Research

This research is based on a case study using secondary data from the daily stock returns of Kalbe Farma Tbk (KLBF) during the period October 17, 2022–October 17,

2023, obtained from www.finance.yahoo.com.

Technical Analysis

The following data analysis steps are carried out in achieving efficient stocks using the CAPM method, as follows:

1. Calculating the level of individual stock returns (Ri)

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

Description:
Ri   = individual stock return
Pt   = daily stock price of period t
P_{t-1} = daily stock price of period t-1

2. Calculating the market rate of return (Rm)

Taken from the closing price of the Composite Stock Price Index (JCI), which contains all stock prices, so that the market rate of return is obtained.

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

Description:
Rm   = *return market*
IHSGt   = Composite Stock Price Index period t
$IHSG_{t-1}$ = Composite Stock Price Index period t-1

3. Calculating the level of risk-free return (Rf)

A risk-free return (Rf) is the minimum return that investors expect on their investment. This study uses the SBI (Bank Indonesia Certificate) as a risk-free asset using Bank Indonesia's monthly benchmark interest rate during 2023, with a Bi Rate value of 5.75%.

4. Calculating the beta value of the systematic risk level of each stock (βi)

The beta value (β) of stocks uses a simple linear regression analysis method, with the independent variable being each daily individual stock price in the pharmaceutical sub-sector and the dependent variable being the daily market price or HSG. The regression processing will be done using SPSS 20 software.

5. Calculating the expected return value E(Ri) Using CAPM

E(Ri) = Rf + βi (Rm-Rf)

Description:
E(Ri)   = expected return
Rf   = risk free
Rm   = return market
βi   = systematic risk

6. Calculating the efficiency or not of a stock

According to (Tandelilin, 2001), stocks that are efficient or worth investing in are those whose individual return (Ri) is greater than the expected return. Whether a stock is efficient or not will be described through the excess return value, which is the difference between the Ri and E (Ri) values on the security market line.

Efficient Stock = Ri > E(Ri), or
Efficient Stock = Ri - E(Ri) > 0.

7. Next, calculate the Monte Carlo simulation based on historical stock and market return data with the help of XLRisk add-ins. Perform simulations with iterations of 1000, 5000 and 10.000 times

$$S_t = S_0 exp\left[\left(\mu + \frac{1}{2}\sigma^2\right)\Delta t + \sqrt{t}\sigma\varepsilon_i\right]$$

RESULTS AND DISCUSSIONS

Based on historical data from KLBF daily stock prices for the period October 18, 2022-October 17, 2023, several indicator values are obtained which are presented in table 1. The beta value of KLBF shares (β) of 0.777194 with a standard deviation of 0.24096 is obtained from the results of linear regression between market daily return (Rm) as the independent variable (X) and KLBF daily return as the dependent variable (Y).

Based on the indicators contained in Table 1, it is possible to calculate the expected return value for the last year of KLBF shares using the CAPM method, with the following results:

E(Ri)   = Rf + βi (Rm-Rf)

$$= 5{,}75 + 0{,}77194 (2{,}04542\text{-}5{,}75) = 2{,}8903\%.$$

And the efficiency value can be obtained through the following equation:
Efficiency Value = Ri - E(Ri)

$$= 0{,}977075 - 2{,}89031 = -1{,}91323$$

Interpretation:

The calculation of the market rate of return is used as a benchmark for the average profit of all shares of companies listed on the IDX during the period October 18, 2022–October 17, 2023, which is 2.045% per year. The average value of Risk Free (Rf) for the period October 18, 2022–October 17, 2023 is 5,75%, meaning that if investors invest their funds in the capital market, for example, in January 2023, the profit obtained by investors is 5,75% per year with 0% risk. The profit obtained is definitely received by investors because they are saving money or making deposits that do not contain risk.

Equity Risk Premium is an additional return obtained by investors because they have chosen to invest in capital markets that have risks rather than risk-free or risk-free assets. Equity Risk Premium is negative at -3,705%, meaning that the return on risk-free assets is higher than the stock market return. This is because during the observation period from October 18, 2022, to October 17, 2023, there was a decline due to increased volatility in financial markets due to negative global sentiment. The weakening of JCI was driven by weakening stocks in the energy and basic materials sectors in line with commodity price developments.

The calculation of the beta value in this study uses the help of SPSS20 software and shows that the P value is significant because it is <0,05, meaning that with a 95% confidence level, it can be concluded that market prices have a significant effect on KLBF's share price. The beta value is 0,77194, which means that when there is an increase in market price (JCI) by one unit, it causes the KLBF stock price to increase by 0,77194 times. This means that if the market return (JCI) increases by n%, the KLBF stock return will also increase by 0,77194 x n%.

Expected Return [E(Ri)] is the amount of profit expected by investors from stock investments made. The calculation results show the E(Ri) value of KLBF is 2,89%, which means that during the period October 18, 2022, to October 17, 2023, investors in KLBF shares expect a profit of 2,89% per year. The calculation results show a value of Ri-E (Ri), which is negative, meaning that it can be said that the performance of KLBF shares over the past year has been inefficient. The decision taken against inefficient types of shares is not to buy these shares.

Because, the stock's return is closely tied to the company's performance, with better performance leading to higher returns or profits. This idea is consistent with the signaling theory put forth by (Carter & Kimball, 2011; Connelly et al., 2011). Signaling theory suggests that when a company's financial performance improves, its management will make an effort to communicate this to investors as a positive signal.

Table 1. Values of some stock indicators

No	Indicator	Daily Average	Standard Deviation	Annual Average
1	Actual Return KLBF (Ri)	0,00391%	2,03972%	0,97708%
2	Return Market (Rm)	0,00818%	0,60015%	2,04542%
3	Beta Saham KLBF (β)	0,77194	0,214096	
4	Risk Free (Rf)			5,75%

Source: Secondary Data Processing Results

Monte Carlo Simulation

Based on the values of market return (Rm), beta, KLBF return, expected return, and efficiency that have been obtained from the previous calculation process based on historical data of KLBF daily stock prices for the period October 18, 2022, to October 17, 2023, Then, an iteration process or repetition of these indicator values will be carried out using Monte Carlo simulation with the help of XLRisk add-ins. This is done to obtain a new set of indicator values to predict the possibility of negative expected return risk and inefficient stock performance. In this study, the Monte Carlo simulation process will be carried out three times with a number of repetitions or iterations of 1000, 5000, and 10,000, respectively. In this study, to perform a Monte Carlo simulation, input and output values are required, with several assumptions presented in tables 2 and 3.

To calculate the new market return value (New Rm) and the new return KLBF used in the input process, it is assumed that the probability distribution will follow the normal distribution $N(\mu; \sigma/\sqrt{n})$ from the existing historical data with an average daily market return of 0,000081817 and a standard deviation divided by the amount of data (241) of 0,0003865923. And the average daily return of KLBF is 0,000039083 and the standard deviation divided by the amount of data (241) is 0,001313902.

Based on the results of the Kolmogorov-Smirnov test results, the P value of the return market is 0,796> 0,05 and the P value of the return KLBF is 0,110> 0,05, so it is concluded that with a confidence level of 95%, it can be said that the historical data from the return market (Rm) and KLBF returns follow the normal distribution; in other words, the assumptions are met, namely that the normal distribution model is suitable to be applied to historical data for the period October 18, 2022 to October 17, 2023 from the return market and return KLBF.

In addition, the value of the new beta stocks used in the input process is also assumed to have a probability distribution that will follow the normal distribution of existing historical data, with an average beta stock of 0,771936111 and a standard error of 0,2140964820. This is based on the significant P value of beta stocks (<0,05), so it can be assumed that beta stocks will be normally distributed as well. This is evidenced by the results of the Kolmogorov-Smirnov test, which shows the P value of beta stocks of 0,129> 0,05, so it is concluded that with a confidence level of 95%, it can be said that the historical data for the period October 18, 2022, to October 17, 2023, from beta stocks follows a normal distribution. In other words, it can be concluded that the assumption is met, namely that the normal distribution model is suitable for applying to beta stocks.

Table 2. Assumptions and Formulas Used in the Monte Carlo Simulation Input Process

No	Proses	Asumsi	Formula di XLRisk
1	Return Pasar Baru (New Rm)	Berdistribusi Normal $N(\mu; \sigma/\sqrt{n})$	RiskNormal (0,00008182; 0,0003865923)
2	New Beta	Berdistribusi Normal	RiskNormal (0,771936111;0,214096482)
3	New Actual Return KLBF	Berdistribusi Normal $N(\mu; \sigma/\sqrt{n})$	RiskNormal (0,0000390831; 0,001313902)

Source: Secondary Data Processing Results

Table 3. Formula Used to Generate Output in Monte Carlo Simulation

No	Output	Formula di XLRisk
1	New Expected Return	5,75 + New Beta ((New Rm * 250) - 5,75)
2	New Efisiensi	(New Actual Return KLBF * 250) - New Expected Return

Source: Secondary Data Processing Results

Monte Carlo Output Results of 10,000 Iterations

Based on the input values that have been entered into the Excel worksheet using the XLRisk add-in, the next step is to run the data for 10,000 iterations and generate the output of the cumulative distribution graph of the new annual expected return of KLBF, as presented in Figure 1, and the cumulative distribution of the new efficiency value, as presented in Figure 2.
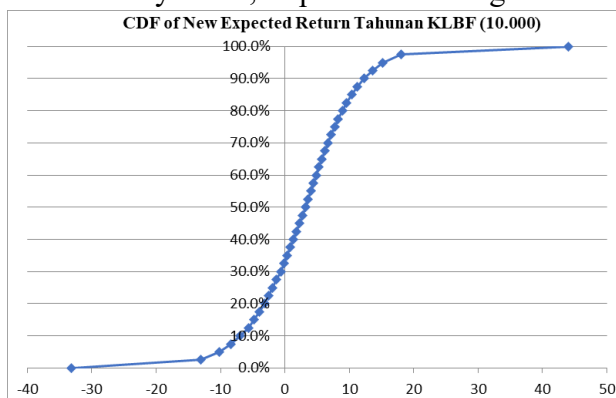

Figure 1. CDF of New Expected Return of KLBF from 10.000 Iterations.
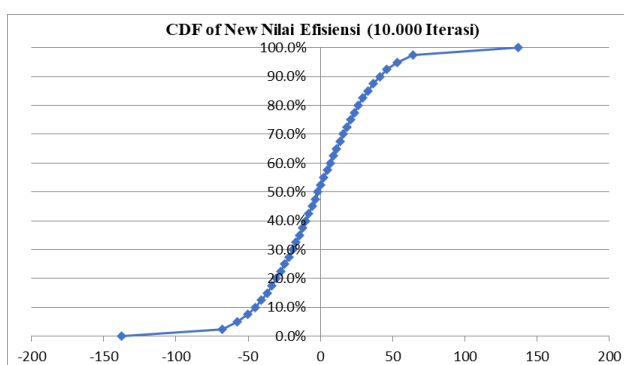

Figure 2. CDF of New Efficiency Value of KLBF from 10.000 Iterations

Table 4. Probability Values of Several Risks on KLBF Stocks
Result of Monte Carlo Simulation (10.000 Iterations)

Several Risks	Percent Rank		
	Input	New Expected Return	Nilai Efisiensi
Return Negatif	Enter Value:	0	0
	% rank:	32,20%	52,20%
Return < Risk Free	Enter Value:	5,75	
	% rank:	64,90	

Source: Secondary Data Processing Results

Interpretation:

Based on figure 1, it can be seen that the results of 10.000 iterations from the simulation of the predicted value of KLBF's annual expected return are in the range of -33,14073 to 44,07552, with an average of 2,89723. This indicates that there is a possibility of a negative annual expected return, which means that it may not provide profits or returns for investors.

Based on Table 4, it can be observed that the probability of the risk of a negative annual expected return of KLBF stocks is 0,322. This means that the probability for an investor to expect that KLBF stocks will not provide profits or returns for one year is 0,322. Table 4 also shows that the

probability of the risk of KLBF's annual expected return being lower than the risk-free rate (5,75) is 0,649. This means that the probability for an investor to expect lower profits or returns compared to investing in risk-free assets such as deposits is 0,649. This indicates that an investor is better off investing their funds in risk-free assets like deposits rather than KLBF stocks.

Table 4 also indicates that the probability of the inefficient performance of KLBF stocks is 0,522. This means that the risk of the actual annual return of KLBF being lower than the expected annual return has a probability of 0,522. This indicates that the performance of the stock over the past year can be considered poor. Especially when considering the previously calculated desired annual expected return, which was already low but still not met by the stock's performance. Therefore, it can be concluded that investors should decide not to invest their funds in KLBF stocks due to the significant risk of losses and low actual annual returns.

Comparison of Monte Carlo Results between 1000, 5000 and 10,000 Iterations

According to table 5, Monte Carlo simulation is carried out with a number of iterations, and the output value is not significantly different. However, in general, the greater the number of iterations performed in Monte Carlo simulation in research, the more accurate the output results. For example: On the average value of *expected return* annual KLBF results iteration 10.000 times, giving results as big as 2,89723, which is not too different from the average value of *expected return* KLBF annual basis based on historical data before done iteration, i.e., amounting to 2,8903. This value is the closest compared to results from iterations of as many as 1000 or 5000. The same thing is also shown in the value efficiency share results: 10.000 iterations closest to (-1,91909) the value efficiency share before the last iteration (-1,91323).

Table 5. Comparison Stock Indicators Based on Monte Carlo Iteration Results

| Indicator	Simulation Output Results		
	Iteration 1000	Iteration 5000	Iteration 10.000
Expected Return Average	2,75109	2,90182	2,89723
Min New Expected Return Value	-26,82231	-35,93285	-33,14073
Max New Expected Return Value	34,38046	33,96457	44,07552
Range of New Expected Return Values	61,20277	69,89742	77,21624
Chance of a Negative New Expected Return	0,329	0,326	0,332
Opportunity < Risk Free	0,648	0,649	0,649
Average Efficiency Value	-1,76009	-1,93016	-1,91909
Stock Efficiency Values	232,08408	263,34781	274,63915
Inefficient Stock Opportunities	0,517	0,518	0,522

Source: Secondary Data Processing Results

Opportunity value happens risk *expected return* KLBF annual value is negative (no profit or returns) from the third iteration, giving almost value. The same value of 0,33. Likewise, for mark opportunity happen risk *expected return* more annual KLBF low from SBI score (5.75) gives the results were the same for the third iteration that is of 0.65. Same thing on value opportunity happen risk performance shares that don't efficient from third iteration, gives almost value the same thing, namely of 0,52.

The more iterations carried out in Monte Carlo simulations, it turns out to

give results with a with a value range of *expected return* annual and a value efficiency increasing shares, too. This matters because the more big data, samples, and iterations carried out, the higher the distribution probability, which will lead to a more normal distribution (central limit theorem) (Kwak & Kim, 2017). This matter can be seen from the normal distribution histogram plot of the third iteration that has been This is done as shown in Figures 3, 4, and 5 below.
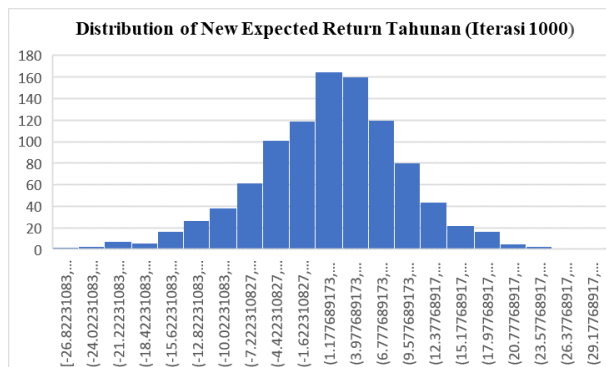
Figures 3. Histogram of the Annual New Expected Return Distribution Results of 1000 Iterations
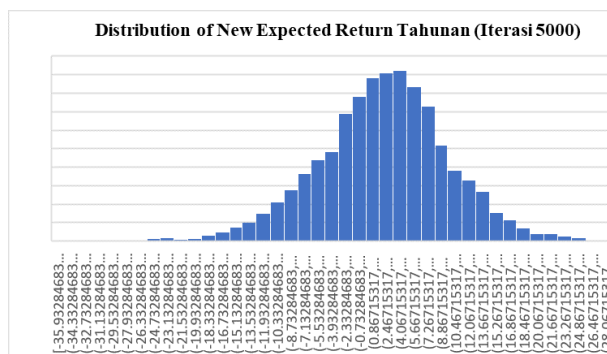
Figures 4. Histogram of the Annual New Expected Return Distribution Results of 5000 Iterations
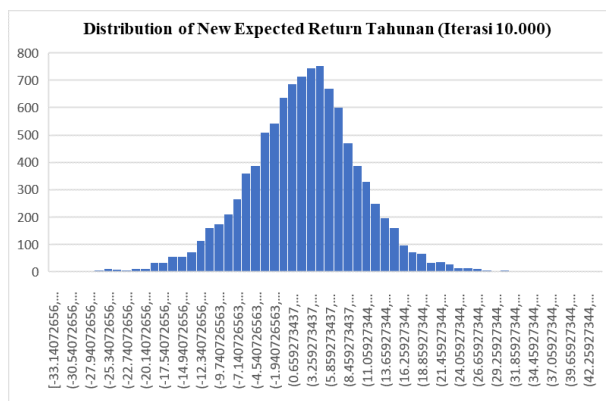
Figures 5. Histogram of the Annual New Expected Return Distribution Results of 10.000 Iterations

CONCLUSION AND SUGGESTION
Conclusion

Study This analysis is comprehensive about the performance PT Kalbe Farma Tbk (KLBF) shares on the Indonesia Stock Exchange during the period of October 18, 2022, to October 17, 2023, with a focus on identification and prediction of risk-related issues. The following is the main conclusion from the study. This :

1. Analysis using the Capital Asset Pricing Model (CAPM) method reveals that the performance of KLBF shares over a year was inefficient, with a higher actual return than expected. This indicates that KLBF shares do not give the return expected by investors.
2. Monte Carlo simulation with 10.000 iterations discloses a number of significant risk-related investments in KLBF shares:
   a. Risk 0,322 for the occurrence of a negative expected return, which means there is no profit for investors.
   b. Risk 0,649 for an expected return below level-free risk (5,75%), which shows that investors will get a lower return compared to investment-free risk like deposits.
   c. Risk 0,522 for performance shares that aren't efficient, where the actual return is lower than the expected return.
3. The more iterations carried out in Monte Carlo simulation, the more accurate predictions result in risks. This matter is in accordance with the central limit theorem, which states that the larger the sample, the higher the distribution probability, and the closer the normal distribution is (Kwak & Kim, 2017).
4. The decline in stock performance that occurred during the observation period of October 18–October 17, 2022, was

caused by increased volatility in financial markets due to negative global sentiment. The weakening of the JCI led to the weakening of shares in the energy and raw materials sectors, which was in line with developments in commodity prices. The decrease was influenced by previous inventory with higher purchase prices.

Suggestion
1. Implications Theoretical:
a. Study This theoretical contribution combines the CAPM method and deep Monte Carlo simulation analysis performance shares, which can enrich literature-related evaluation risk and return investment.
b. Findings of the of the study This supports a modern portfolio theory that emphasizes the importance diversification to minimize risk and maximize return on investment (Markowitz, 1952).
c. Study furthermore can apply methodology similar across sectors or other shares to validate results and expand understanding about evaluation risk and efficiency share.

2. Implications Practical:
a. Investors can use the results of this study as consideration in making investment decisions, especially in related KLBF shares and sectors of pharmacy.
b. KLBF Company can utilize these findings to evaluate performance, share them, and take strategic steps to increase company and power-pull investment.
c. Capital market regulators can use this information to monitor risk systems and protect investors' interests.
d. Academics and analysts in finance can use this methodology study as a reference in doing analysis similar to the object of different research.

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