Analysis of Markowitz Portfolio Performance Evaluation on IDX Quality 30 with the Jensen Alpha Method

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Abstract

The capital market has an important role in the economy as a funding medium and a means for companies to obtain funds from investors. This study aims to evaluate the Markowitz Optimal Portfolio using Jensen Alpha at IDX Quality 30. Evaluation is carried out after the portfolio is formed using the Markowitz Model, then the performance is measured with Jensen Alpha to show that the portfolio is producing *risk-adjusted returns* that exceed the expected returns. The method used was descriptive quantitative with purposive sampling techniques based on certain criteria, using weekly data from January - December 2024. 24 stocks were selected as samples. The optimal portfolio consists of 8 stocks, namely ADRO (4.14%), BBCA (42.85%), BFIN (0.94%), MYOR (28.05%), SIDO (13.86%), and UNTR (4.42%), with portfolio return expectations (0.19%) and risk (1.65%). Evaluation using Jensen Alpha shows that UNTR shares have the best performance based on the SML approach with an alpha value of 14.89%, while ADRO shares show the best performance based on the CML approach with an alpha value of 24.92%, which shows a performance above market expectations. The portfolio's performance was also positive with alphas of 7.63% (SML) and 13.62% (CML). The Markowitz and Jensen Alpha models complement each other in the concept of *Risk-Management* and can be used to manage and evaluate portfolios in the midst of declining market conditions.

Keywords: IDX Quality 30, Jensen Alpha, Markowitz Model, Optimal Portfolio

1.   Introduction

The capital market in Indonesia is a key component of the financial system that plays a significant role in providing investment options for investors (Mahari & Ulama, 2024). In 2024, the performance of the Composite Stock Price Index will decrease by 3.92% due to many *out flow* factors. The existence of these fluctuations emphasizes the importance of investment management. One of the strategies to deal with these fluctuations is by diversifying. Diversification is a strategy that is carried out by dividing the allocation of investment funds into a number of scattered stocks. The main goal is to reduce dependence on one specific type of stock (Budiman, 2024). This can help investors in choosing stocks according to their preference for the level of profit and risk they are willing to bear (Junara & Suhermin, 2018). An efficient portfolio is one that is able to provide the highest return at a risk level that is still tolerable, or conversely, offers the lowest risk for a certain desired return. Meanwhile, the optimal portfolio is a portfolio chosen by investors from a collection of efficient portfolios (*efficient frontier*) based on their preferences and risk tolerance (Bertho, 2020).

Therefore, one of the strategies to manage risk is to form a portfolio. Portfolio formation can be done in various models, including the Marowitz Model, which is Modern Portfolio Theory, developed by Harry Markowitz in 1952. Thanks to his contribution, Markowitz received the Nobel Prize in economics. This theory aims to prepare an optimal portfolio allocation, namely by

maximizing the rate of *return* at a certain level of risk (Budiman, 2024). *Single Index Model* is to determine the optimal portfolio by comparing the value *of excess return* to *beta* (ERB) with the *cut-off* limit value (Ci). Stocks that have an ERB equal to or exceed the *cut-off point* (C*) value are considered worthy candidates to be included in the optimal portfolio (Adiputra, *et.al.,* 2022).

The Capital Asset Pricing Model* (CAPM) is an equilibrium model that describes the relationship between the rate of return on risky assets and the risks they have on balanced market conditions. Market portfolios have an important role in CAPM because this model assumes that the only relevant risk is systematic risk, measured through beta, i.e. the sensitivity *of a security's return to changes in market returns (Nurhayati,* et.al., 2021). Monte Carlo simulations are a method for evaluating a deterministic model by including a random number as one of its inputs. This method is increasingly used because of its ability to handle various complex situations through a relatively simple simulation approach (Priyantono, *et.al.,* 2023)

One of the models that will be used in this study is the Markowitz Model. The Markowitz Model is the Modern Portfolio Theory (MPT) developed by Harry Markowitz in 1952 to become the basis of modern investment management. This theory emphasizes the importance of diversification and states that *returns* can be optimized at a certain level of risk by choosing low- or negatively correlated assets (Sasongko, 2025).

In the previous research conducted by Safitri, 2020 in determining stock portfolios used the Markowitz Model as the basis for determining investments in the LQ45 index listed on the IDX in 2019-2025. The results of the study stated that there are 9 stocks that are optimal portfolio candidates, namely ADRO, ANTM, BBCA, BBRI, BMRI, BSDE, JSMR, KLBF, MNCN with an expected portfolio return of 0.06% and a risk of 1.20%. Then a previous research conducted by Tandirerung, *et.al.,* 2023 which stated that determining the Markowitz Optimal Portfolio in the Sharia Stock Market. The research shows that from the 3 stocks studied, 3 portfolio combinations are formed where each portfolio consists of 2 stocks with weight provisions, namely 60% for stocks that have the highest returns and 40% for stocks that have lower returns. So that 2 optimal portfolios were obtained with a weight (40%:60%), the expected profit rate of 13.62% and the risk of 13.61%. The portfolio is a combination of shares between PT Amman Mineral Internasional Tbk. - PT Chandra Asri Pacific Tbk.

In addition, research conducted by Sodikin (2020) measured portfolio performance using the Sharp, Jensen and Treynor Method on Textile Industry Stocks on the Indonesia Stock Exchange on textile industry stocks covering 18 companies with mostly negative values. However, if it is classified according to non-negative values, then the performance according to the Treynor and Jensen methods can be used as a reference because all the valid values compared have positive values. In the research conducted by Qolbi, 2024 analyzed the performance of the sustainable stock portfolio of the Sri Kehati Index and non-sustainable stocks of the LQ45 Index with the Sharpe, Treynor, and Jensen Alpha ratios. The results of the study showed significant differences from the three analyses.

Several studies used the Treynor ratio to measure the portfolio performance of companies listed on the IDX30 in the early period of the covid 19 pandemic (Suharti, *et.al.,* 2022) and evaluate the performance of portfolio investments in food & beverages companies listed on the IDX (Syulviva, *et.al.,* 2015). This study used Jensen Alpha. As a matter of comparison, the two methods will be analyzed with the same data. The Markowitz model to be developed with Performance Evaluation uses Jensen Alpha at IDX Quality 30. Researchers are interested in using this method because it is still rarely used in previous studies. The selection of the IDX Quality 30 Index is based on its characteristics as a relatively new index, which measures the price performance of 30 stocks of companies with a history of high profitability, good solvency, stable profit growth, adequate transaction liquidity, and good financial performance.

2.   Research Method

The research on the evaluation of Markowitz's optimal portfolio performance using Jensen Alpha on IDX Quality 30 was conducted using a descriptive quantitative approach method. In this approach, a literature study related to modern portfolio theory, risk evaluation, and stock indices on the Indonesia Stock Exchange was conducted. In addition, this study also compares the results of the evaluation with the Treynor Ratio to see the difference in the interpretation of portfolio performance.

2.1.   Data and Data Sources

The data used in this study are secondary data obtained from the Indonesia Stock Exchange (www.idx.co.id) in the form of weekly closing stock prices for the 2024 period. Weekly data were chosen because they are relatively more stable than daily data, which often contain missing values due to non-trading days. The sample was determined using a purposive sampling technique, based on specific criteria, namely stocks that were members of the IDX Quality 30 index during 2024, did not experience changes in index composition throughout January to December 2024, had complete weekly closing price data, and were not subject to temporary trading suspensions during the research period.

After being collected, the data were compiled, organized, and cleaned using Microsoft Excel to ensure accuracy and consistency before analysis. This preparation stage was essential to minimize data errors and to facilitate a systematic analytical process. The cleaned dataset then served as the main input for portfolio analysis and performance evaluation.

Data processing and analysis were carried out using Microsoft Excel by applying the Markowitz Model based on the mean–variance approach. This model explains that an efficient portfolio can be formed by combining various assets to maximize expected return at a certain level of risk (Bertho, 2020). In addition, portfolio performance was evaluated using the Jensen Evaluation method, which is based on the concept of the Security Market Line (SML) describing the relationship between market portfolios and risk-free investment alternatives (Serworwora, 2009).

The calculation of the actual weekly return is the first step in this analysis. Stock return represents the profit or loss obtained from a stock investment within a certain period and is calculated weekly by comparing the closing price of the current week with that of the previous week. The return is formulated as $R_t = (P_t - P_{t-1})/P_{t-1}$, where R_t is the stock return, P_t is the closing price in week t, and P_{t-1} is the closing price in the previous week (Pratama, 2019).

After obtaining the weekly returns, the next step is to calculate the expected weekly return. Expected return is defined as the average of all weekly returns during the observation period. This value is obtained by summing all weekly returns and dividing them by the total number of weeks. The expected return is expressed as $E(R_i) = \sum R_{it}/n$, where $E(R_i)$ is the expected return of stock i, R_{it} is the return of stock i in week t, and n is the total number of weeks in the analysis period (Pratama, 2019).

The third step is calculating the standard deviation for each stock that has a positive expected return. Standard deviation reflects stock risk, which shows the level of volatility of weekly returns around their average value. The standard deviation is calculated using the formula $\sigma = \sqrt{\sum(R_{it} - E(R_i))^2/(n-1)}$, where σ represents stock risk, R_{it} is the weekly return, $E(R_i)$ is the expected return, and n is the number of weeks (Jogiyanto, 2009 in Suharto, 2012).

Next, the covariance between stocks is calculated to measure the relationship between the movements of two stocks in a portfolio. Covariance indicates whether two stocks move in the same direction or in opposite directions. The covariance value is obtained using the formula $\text{Cov}(R_i, R_j) = \sum[(R_{it} - \bar{R}_i)(R_{jt} - \bar{R}_j)]/n$, where R_{it} and R_{jt} are the returns of stocks i and j, $\bar{R}_i$ and $\bar{R}_j$ are their average returns, and n is the number of observation periods (Hartono, 2014 in Hanif et al., 2021).

In addition to covariance, the correlation coefficient is calculated to describe the strength and direction of the linear relationship between the weekly returns of two stocks. This coefficient helps investors understand how closely the movements of two stocks are related. A positive correlation indicates that the stocks tend to move in the same direction, while a negative correlation indicates opposite movements. The correlation coefficient is calculated using a statistical formula based on the returns of both stocks over the observation period (Hartono, 2014 in Hanif et al., 2021).

After the relationships between stocks are identified, the expected return of the portfolio is calculated. Portfolio expected return is the weighted average of the expected returns of each stock in the portfolio. This is calculated using the formula $E(R_p) = \sum W_i \times E(R_i)$, where $E(R_p)$ is the expected return of the portfolio, W_i is the proportion of funds invested in stock i, and $E(R_i)$ is the expected return of stock i (Hartono, 2014 in Hanif et al., 2021).

Portfolio risk is then calculated to determine the probability of investment failure in the portfolio. This risk is measured using the portfolio standard deviation, which considers the risk of each stock and the correlation between them. The portfolio standard deviation is calculated using

a formula that incorporates the weights, standard deviations, and correlation coefficients of the stocks included in the portfolio (Hartono, 2014 in Hanif et al., 2021).

The optimal expected return and portfolio risk are determined by minimizing the variance using objective functions. At this stage, the optimal proportion of funds for each stock is identified to form an optimal portfolio. By following these procedures, the formation of an optimal portfolio based on the Markowitz model is achieved, providing investors with a combination of stocks that offers the best possible return for a given level of risk.

2.2. Calculation Procedure using Jensen Alpha

Jensen Alpha is a performance measurement indicator in finance that evaluates an investment portfolio by comparing its actual return with the return predicted by the Capital Asset Pricing Model (CAPM). In essence, Jensen Alpha reflects the abnormal or excess return generated by a portfolio beyond what is expected based on its level of systematic risk. This indicator can be applied to various financial assets, including individual stocks, bonds, or diversified portfolios, and it incorporates the portfolio's beta and the average market return in its calculation (Chen, 2025).

The Jensen Alpha value is calculated using the following formula (Bodie, Kane, & Marcus, 2011, as cited in Christianti, 2015):

$$\alpha_p = \bar{r}_p - [\bar{r}_f + \bar{\beta}_p(\bar{r}_M - \bar{r}_f)],$$

where α_p represents Jensen Alpha, $\bar{r}_p$ is the expected portfolio return, $\bar{r}_f$ is the risk-free rate, $\bar{\beta}_p$ is the portfolio's sensitivity to market movements, and $\bar{r}_M$ is the expected market return. This formula allows investors to assess whether portfolio managers are able to generate returns that exceed market-based expectations.

In interpreting the results, a positive Jensen Alpha ($\alpha > 0$) indicates that the portfolio or stock outperforms the CAPM expectation and is classified as outperforming. A Jensen Alpha equal to zero ($\alpha = 0$) suggests that the portfolio performs in line with market expectations and is considered fairly valued. Meanwhile, a negative Jensen Alpha ($\alpha < 0$) signifies that the portfolio underperforms relative to the CAPM benchmark and is therefore categorized as underperforming.

3. Results and Discussions

3.1. Data with Sample Criteria

This research uses the IDX Quality Index 30 for the 2024 period. The selection of this index is based on the criteria of a sample of stocks that are members of the IDX Quality 30 index, stocks that do not experience entry and exit (change of composition), stocks that have complete weekly closing price data, stocks that do not experience temporary stops in the 2024 research period. From the IDX Quality 30 index, 24 stocks were selected that met the sample criteria to be used as objects in the formation of an optimal portfolio. The results of stock selection based on the sample criteria are presented in Table 1.

Table 1. IDX Quality 30 Sample Criteria Results

Stock Code	Company Name
ACES	Ace Hardware Indonesia Tbk.
ADMR	Adaro Minerals Indonesia Tbk.
ADRO	Adaro Energy Indonesia Tbk.
AKRA	AKR Corporindo Tbk.
AMRT	Source: Alfaria Trijaya Tbk.
ASII	Astra International Tbk.
BBCA	Bank Central Asia Tbk.
BBRI	Bank Rakyat Indonesia (Persero) Tbk.
BFIN	BFI Finance Indonesia Tbk.
BMRI	Bank mandiri (Persero) Tbk.
BTPS	Bank BTPN Syariah Tbk.
CPIN	Charoen Pokphand Indonesia Tbk.
INCO	Vale Indonesia Tbk.
INTP	Indocement Tunggal Prakarsa Tbk.
KLBF	Kalbe Frama Tbk.
MICAH	Mitra Keluarga Karyasehat Tbk.
MNCN	Media Nusantara Citra Tbk.
MYOR	Mayor Indah Tbk.
PTBA	Bukit Asam Tbk.
SCMA	Surya Citra Media Tbk.
SIDO	Sido Muncul Herbal and Pharmaceutical Industry Tbk.
TKIM	Tjiwi Kimia Paper Factory Tbk.
TLKM	Telkom Indonesia (Persero) Tbk.
UNTR	United Tractors Tbk.

The results of data collection selected 35 stocks that met the sample criteria, namely stocks that are members of the IDX Quality 30 index, stocks that have complete weekly closing price data, and stocks that did not experience temporary stops during the research period. Data was obtained for 52 weeks, from the last week of December 2023 to the last week of December 2024. After the data is downloaded, tidying up is carried out including adjusting the date format, grouping per share, and checking completeness. The prepared data is then used to calculate the actual weekly return, expected return, risk, correlation, and form an optimal portfolio with the Markowitz approach.

3.2. Markowitz Model Optimal Portfolio

Actual return reflects the real results received by investors, both in the form of profits and losses from investments or portfolios owned, and this is different from returns that are projections or expectations The calculation of actual returns is carried out on 35 stocks selected in the IDX uality 30 index for the period of 2024. The data used is weekly closing data consisting of 52 weeks covering the last week of 2023 to the end of 2024. The results of the calculation *of the* actual weekly return are given in Figure 1.

IDX Quality 30 Actual Return Results

WEEK	IHSG	ACES	ADMR	ADRO	AKRA	AMRT	ASII	BBCA	BBRI	BFIN	BMRI	BTPS	CPIN	INCO	INTP	KLBF	MIKA	MNCN	MYOR	PTBA	SCMA	SIDO	TKIM	TLKM	UNTR
1	1.07%	4.17%	0.74%	2.52%	6.10%	-4.78%	-0.44%	1.86%	0.44%	-4.56%	3.22%	-3.85%	-1.49%	0.00%	-1.86%	-1.86%	-9.12%	0.52%	-2.01%	9.02%	-9.41%	-0.95%	-0.68%	-0.68%	2.76%
2	-1.49%	8.00%	-1.09%	-0.32%	-5.38%	-0.44%	1.31%	1.74%	1.30%	5.28%	8.00%	-5.45%	-3.02%	0.54%	0.95%	2.70%	-3.09%	-0.82%	-0.75%	6.49%	0.00%	-4.14%	-4.14%	-4.14%	2.80%
3	-0.19%	-1.23%	-4.43%	-5.65%	4.17%	0.00%	-4.46%	-0.77%	-0.85%	2.58%	-0.76%	-7.69%	-1.07%	-2.39%	-1.08%	-2.51%	-3.76%	1.60%	-0.83%	-0.76%	-3.05%	-0.96%	-4.32%	-4.32%	0.73%
4	-1.25%	2.50%	0.77%	1.71%	3.38%	-0.38%	-5.14%	-2.86%	-6.47%	1.67%	-3.45%	-0.62%	-2.81%	-2.45%	0.54%	-0.96%	1.17%	-5.24%	-3.33%	-3.14%	-2.91%	-1.88%	-1.88%	-1.88%	-4.57%
5	1.42%	0.00%	8.05%	1.68%	-5.36%	0.76%	4.93%	3.74%	7.83%	0.82%	5.95%	-1.24%	3.11%	-2.26%	-3.25%	0.00%	8.88%	0.55%	1.72%	-1.17%	1.95%	0.00%	-1.15%	-1.15%	-0.54%
6	-0.05%	1.22%	3.55%	1.65%	1.89%	-0.75%	0.00%	0.00%	0.00%	4.90%	4.12%	3.77%	1.51%	-5.91%	-1.40%	-2.60%	-1.42%	-2.20%	1.69%	2.76%	-3.18%	0.00%	-1.16%	-1.16%	0.22%
7	-0.52%	-6.63%	-2.74%	2.44%	0.31%	5.32%	-2.35%	2.58%	5.13%	1.56%	3.60%	-13.94%	1.91%	0.82%	0.28%	-1.00%	-3.24%	1.12%	-1.67%	2.68%	-4.61%	12.00%	-1.96%	-1.96%	1.53%
8	1.35%	8.39%	3.52%	-3.97%	0.31%	-3.25%	-1.44%	-1.26%	-0.41%	1.92%	-2.08%	-5.63%	-1.25%	7.05%	2.55%	-0.67%	2.97%	-5.56%	2.12%	-1.87%	4.14%	11.61%	3.60%	3.60%	-1.94%
9	0.23%	-1.79%	1.36%	2.89%	7.36%	1.49%	1.95%	0.00%	0.00%	3.38%	-0.35%	5.97%	4.01%	3.80%	1.38%	1.02%	-5.78%	-5.88%	2.49%	-1.90%	0.66%	-2.40%	9.65%	9.65%	4.06%
10	0.96%	0.00%	-2.35%	7.23%	0.00%	2.57%	-1.44%	3.31%	3.67%	-5.45%	1.42%	-10.92%	4.97%	-2.68%	-4.90%	-3.36%	-1.53%	1.88%	-5.26%	12.40%	4.61%	2.46%	-3.52%	-3.52%	1.90%
11	-0.73%	1.21%	-6.19%	-0.37%	0.00%	3.23%	0.49%	0.00%	-5.91%	-0.77%	3.86%	-1.58%	0.97%	5.51%	-1.15%	-0.69%	0.39%	-1.84%	3.42%	-2.07%	-7.55%	-3.20%	0.73%	0.73%	0.00%
12	0.30%	9.58%	-4.76%	-0.38%	-2.86%	0.69%	3.86%	-0.49%	2.51%	0.78%	-4.73%	9.24%	1.44%	-1.43%	-0.29%	3.85%	5.81%	5.62%	4.96%	3.52%	0.68%	4.13%	4.35%	4.35%	1.76%
13	-0.83%	-3.83%	0.77%	1.89%	1.18%	0.34%	-4.19%	-0.25%	-1.22%	3.08%	2.84%	-0.37%	-0.94%	-1.93%	1.74%	-0.67%	0.37%	0.00%	0.00%	1.02%	-4.73%	-1.59%	-1.04%	-1.04%	-1.73%
14	-0.03%	7.95%	2.29%	0.00%	0.87%	-1.03%	2.43%	-2.48%	-6.61%	-6.72%	-5.86%	-8.86%	0.48%	0.74%	-1.43%	0.34%	2.92%	-1.18%	-4.72%	-1.35%	-2.84%	8.87%	6.32%	6.32%	4.45%
15	-2.74%	-3.16%	4.48%	2.22%	6.34%	-2.78%	-7.11%	-3.56%	-6.64%	-8.80%	-1.47%	-10.93%	-6.16%	7.32%	-11.30%	-5.41%	-4.96%	-8.38%	-5.37%	7.17%	-8.76%	1.48%	2.64%	2.64%	0.40%
16	-0.72%	-1.09%	-5.71%	-5.80%	-13.28%	1.43%	-0.41%	1.58%	-8.44%	-12.28%	0.37%	-7.27%	-2.63%	-7.05%	-0.65%	0.36%	6.34%	-1.31%	5.68%	-8.28%	-6.40%	2.92%	-2.25%	-2.25%	-4.73%
17	1.40%	-3.30%	0.76%	5.00%	3.13%	2.11%	7.07%	2.34%	-1.66%	8.00%	-8.89%	17.65%	3.73%	-0.49%	-5.26%	6.05%	4.91%	11.26%	-2.89%	1.74%	8.55%	2.13%	3.29%	3.29%	-0.83%
18	-0.64%	-0.57%	-1.13%	5.13%	0.61%	-0.69%	-1.91%	-4.82%	-1.47%	-5.09%	2.03%	-2.50%	6.00%	12.53%	-5.56%	-4.70%	2.01%	2.98%	0.85%	0.00%	3.94%	0.00%	4.78%	4.78%	-7.72%
19	3.22%	-3.43%	-1.14%	0.35%	-4.82%	-2.78%	-6.34%	4.00%	5.13%	5.37%	4.78%	8.55%	-0.47%	4.59%	0.74%	5.63%	0.66%	10.98%	-2.11%	-0.34%	8.33%	-0.69%	3.95%	3.95%	0.90%
20	-1.30%	-5.33%	5.38%	1.39%	0.95%	1.07%	-1.88%	-3.33%	-4.07%	-0.93%	-7.98%	-5.91%	-0.95%	2.30%	2.19%	4.00%	0.65%	-5.21%	-1.72%	-11.30%	-1.40%	0.00%	3.22%	3.22%	1.35%
21	-3.48%	2.50%	5.84%	-5.14%	0.31%	-6.36%	-8.92%	-1.86%	-8.05%	-5.14%	-2.48%	-2.51%	-0.48%	1.43%	-7.90%	-4.49%	-6.47%	-15.38%	-0.44%	-3.86%	6.38%	-0.70%	-1.98%	-1.98%	-2.32%
22	-1.04%	1.83%	-8.28%	2.53%	0.00%	4.15%	6.29%	0.81%	0.23%	-3.45%	6.36%	-3.00%	0.48%	-10.46%	18.92%	7.38%	5.19%	6.49%	4.41%	1.61%	-8.67%	7.04%	-1.45%	-1.45%	3.28%
23	-2.36%	0.60%	-1.88%	-2.11%	-1.88%	-1.45%	-3.07%	-1.34%	-3.91%	-17.35%	-8.37%	-7.52%	-6.22%	-8.99%	-6.49%	-2.19%	-1.32%	-8.54%	0.42%	-2.77%	-5.84%	-3.29%	-1.47%	-1.47%	-6.91%
24	2.16%	0.60%	3.45%	-1.80%	0.64%	-0.74%	1.58%	4.35%	6.22%	11.73%	6.52%	3.83%	-2.45%	4.20%	3.47%	0.32%	-1.00%	5.33%	0.00%	-1.63%	12.40%	0.68%	-2.68%	-2.68%	1.88%
25	2.67%	1.18%	-2.22%	2.20%	2.53%	1.85%	-0.67%	3.39%	3.60%	4.42%	0.41%	5.53%	6.17%	0.00%	-2.68%	-2.87%	1.68%	-1.27%	-1.26%	1.24%	-2.07%	4.73%	6.42%	6.42%	1.62%
26	2.69%	-2.34%	3.79%	4.30%	-3.40%	1.09%	2.69%	0.25%	4.35%	-6.88%	4.47%	2.62%	3.94%	-4.27%	2.76%	-2.30%	0.33%	3.85%	3.83%	3.67%	-0.70%	-3.87%	0.86%	0.86%	8.30%
27	1.02%	-4.19%	-1.46%	-2.75%	-4.15%	5.40%	-0.87%	1.26%	2.08%	-1.14%	0.00%	2.55%	5.21%	-7.18%	0.67%	4.70%	-0.99%	-1.85%	1.64%	-0.39%	3.55%	0.00%	-5.98%	-5.98%	-1.26%
28	-0.45%	0.00%	-0.37%	9.54%	1.00%	-1.71%	-0.22%	0.50%	0.00%	-3.45%	1.56%	-0.41%	-1.35%	2.40%	-2.00%	0.96%	-2.00%	3.14%	4.03%	3.95%	-4.11%	0.00%	-1.52%	-1.52%	4.89%
29	-0.09%	2.50%	-1.49%	2.58%	2.64%	-1.04%	1.77%	1.98%	-2.86%	-4.17%	0.38%	-5.00%	-3.20%	-2.60%	-1.02%	0.00%	2.38%	1.22%	1.16%	1.14%	-0.71%	-4.03%	-3.69%	-3.69%	1.32%
30	0.27%	-7.32%	1.89%	4.40%	-1.93%	-4.91%	1.74%	-1.21%	-1.05%	11.80%	3.82%	4.39%	-0.94%	0.80%	-0.69%	4.13%	-2.66%	-8.43%	-5.36%	2.26%	-0.72%	2.80%	2.24%	2.24%	2.70%
31	-0.70%	-5.26%	-2.22%	-4.22%	-4.92%	4.43%	1.49%	-0.49%	-0.85%	0.56%	0.74%	-3.78%	-1.43%	-2.39%	-4.50%	1.52%	2.39%	-0.66%	3.24%	-5.15%	-7.97%	-3.40%	-8.13%	-8.13%	-3.70%
32	2.41%	2.08%	-1.52%	3.14%	4.48%	0.71%	4.41%	1.72%	3.43%	-47.18%	3.28%	5.68%	-0.48%	4.89%	2.54%	-0.90%	-1.00%	5.30%	5.10%	5.81%	0.79%	1.41%	1.70%	1.70%	1.52%
33	1.51%	-1.36%	-1.92%	5.79%	-4.29%	0.00%	2.62%	0.00%	6.63%	113.39%	-0.35%	4.55%	-2.43%	-1.55%	1.06%	4.24%	1.35%	4.40%	0.00%	1.10%	0.00%	-2.08%	0.00%	0.00%	7.38%
34	1.68%	-1.38%	0.78%	2.59%	3.10%	1.75%	0.00%	0.00%	0.00%	-0.49%	1.06%	0.00%	-3.28%	1.05%	-3.50%	-4.07%	1.66%	-1.81%	-0.75%	-1.09%	-4.69%	-6.38%	-1.00%	-1.00%	0.46%
35	0.67%	7.69%	-0.78%	-2.53%	-5.02%	0.69%	-0.98%	-0.24%	1.46%	-1.48%	1.75%	0.40%	-1.44%	-4.17%	-2.17%	3.64%	-3.27%	0.00%	0.75%	-0.73%	0.00%	1.52%	-2.70%	-2.70%	0.00%
36	1.17%	-1.30%	1.96%	5.76%	3.52%	7.88%	0.50%	1.21%	1.44%	0.50%	0.34%	-2.76%	0.21%	-0.27%	1.11%	-0.29%	1.35%	-0.61%	1.12%	0.74%	-0.82%	1.49%	1.74%	1.74%	-2.59%
37	-0.88%	15.79%	3.85%	0.54%	1.70%	-0.95%	2.96%	3.36%	1.42%	1.00%	0.34%	9.72%	4.17%	0.82%	1.10%	0.88%	3.33%	-2.47%	4.43%	8.06%	0.83%	0.74%	-1.37%	-1.37%	2.18%
38	-0.60%	3.98%	11.85%	5.96%	3.68%	2.56%	-2.39%	-1.16%	-5.12%	-0.99%	-3.42%	-6.27%	-4.00%	8.92%	-0.72%	0.87%	3.23%	-0.63%	3.53%	6.44%	0.00%	-2.92%	3.46%	3.46%	2.88%
39	-2.61%	-6.01%	-0.33%	-2.56%	4.19%	-1.56%	0.98%	-1.64%	-4.71%	-8.96%	-1.42%	-7.87%	-0.83%	6.70%	-0.36%	0.29%	-0.62%	-1.91%	-1.71%	-4.78%	-1.64%	-3.76%	-1.00%	-1.00%	-1.53%
40	0.33%	3.49%	-4.98%	1.57%	-4.64%	0.63%	-1.46%	-0.95%	0.82%	3.83%	0.00%	1.71%	2.10%	-3.20%	5.86%	-1.15%	-1.57%	5.19%	-8.33%	1.34%	9.17%	1.56%	2.03%	2.03%	-4.12%
41	3.18%	5.62%	0.00%	-2.33%	-6.17%	5.99%	-3.05%	3.61%	1.43%	-0.53%	3.24%	-1.26%	4.94%	-0.96%	8.30%	-0.29%	-6.71%	0.00%	1.14%	0.66%	-1.53%	3.08%	-0.99%	-0.99%	2.20%
42	-0.84%	-2.66%	-2.10%	-3.17%	-2.42%	3.57%	6.20%	0.00%	-4.02%	3.17%	-1.74%	-4.26%	0.98%	-1.21%	-2.88%	-5.54%	-2.40%	0.00%	-2.62%	-5.57%	7.75%	-8.21%	-2.01%	-2.01%	0.28%
43	-2.46%	-1.64%	-0.71%	3.55%	-4.26%	-6.90%	-2.87%	-3.02%	-1.47%	2.56%	-5.67%	-6.67%	-5.05%	-6.63%	-5.26%	-3.09%	-1.75%	-1.85%	-3.85%	1.39%	-5.04%	-1.63%	-6.83%	-6.83%	1.68%
44	-2.91%	-7.78%	0.36%	1.06%	1.85%	-3.40%	-2.27%	-3.36%	-3.83%	-4.00%	-4.89%	-1.90%	-0.61%	0.53%	-5.21%	-1.91%	-4.29%	-3.14%	3.60%	-4.11%	-3.03%	-4.96%	-4.76%	-4.76%	0.73%
45	-1.73%	-3.61%	-6.09%	2.35%	-5.45%	-7.99%	-0.40%	0.99%	-1.11%	-10.42%	0.40%	-8.74%	-1.44%	0.00%	1.83%	-7.79%	-1.87%	-1.95%	-0.77%	-1.79%	-4.69%	0.00%	-3.46%	-3.46%	-3.28%
46	0.48%	-1.25%	-1.53%	-4.34%	0.38%	0.35%	-0.61%	-3.19%	-1.57%	6.98%	-1.57%	-0.53%	-1.88%	-4.19%	0.72%	3.52%	-0.38%	0.66%	7.00%	0.73%	0.82%	-0.87%	-0.80%	-0.80%	1.69%
47	-1.13%	-2.53%	-5.04%	-44.53%	-5.75%	-1.38%	3.87%	1.52%	-3.41%	1.09%	-1.60%	-2.67%	-0.64%	-1.64%	-2.14%	2.04%	-1.53%	-1.32%	-1.82%	-2.53%	5.69%	0.88%	2.01%	2.01%	-0.83%
48	3.77%	0.00%	7.35%	10.58%	7.32%	7.72%	0.98%	0.75%	1.41%	0.00%	1.22%	6.04%	5.14%	1.11%	0.73%	-2.33%	3.88%	-1.33%	1.11%	1.11%	9.23%	0.87%	1.97%	1.97%	4.39%
49	-0.79%	6.49%	-5.70%	12.17%	-0.38%	-3.58%	-0.49%	-0.25%	-3.25%	-2.69%	-3.21%	-4.15%	0.81%	8.52%	6.52%	-1.37%	-8.96%	2.03%	-1.10%	1.83%	30.28%	0.86%	-2.32%	-2.32%	0.63%
50	-4.65%	-3.05%	-7.26%	-1.16%	-13.31%	-6.08%	-4.98%	-3.98%	-2.64%	-1.66%	-5.81%	-2.70%	-5.86%	-10.38%	0.68%	-11.76%	-4.92%	-5.30%	-1.48%	-6.83%	-12.97%	-2.56%	-6.72%	-6.72%	-8.71%
51	0.75%	0.00%	-1.30%	-0.39%	-1.75%	0.72%	1.23%	1.55%	0.99%	5.62%	2.20%	1.67%	2.15%	1.13%	2.70%	6.27%	10.78%	-2.10%	3.01%	1.16%	-4.97%	0.00%	0.42%	0.42%	-1.07%

Figure 1. Actual Return Results

Table. 3 Selected Stock Results IDX Quality 30

Stock Code	Company Name
ACES	Ace Hardware Indonesia Tbk.
ADRO	Adaro Energy Indonesia Tbk.
BBCA	Bank Central Asia Tbk.
BFIN	BFI Finance Indonesia Tbk.
MYOR	Mayor Indah Tbk.
PTBA	Bukit Asam Tbk.
SCMA	Surya Citra Media Tbk.
SIDO	Sido Muncul Herbal and Pharmaceutical Industry Tbk.
UNTR	United Tractors Tbk.

Standard deviation is used to assess the level of risk of realized returns and is calculated based on the expectation of positive returns, with the results of the standard deviation calculation presented in Table 4.

Table 4. Standard Deviation Calculation

Stock Code	Standard Deviation
ACES	4,72%
ADRO	7,56%
BBCA	2,26%
BFIN	18,23%
MYOR	3,25%
PTBA	4,25%
SCMA	7,00%
SIDO	3,87%
UNTR	3,39%

The calculation results show that the stock with the highest standard deviation is BFIN at 18.23%, while the lowest is BBCA at 2.26%. Covariance, which measures the relationship between the movements of two stocks, indicates whether stock prices tend to move in the same direction (positive value) or in opposite directions (negative value), and in the Markowitz Model it is used to calculate overall portfolio risk, with the covariance calculation results presented in Table 5.

Table 5. Results of Covariance Calculation Between Two Stocks

CODE	ACES	ADRO	BBCA	BFIN	MYOR	PTBA	SCMA	SIDO	UNTR
ACES	0,00223	0,00024	0,00019	-0,00064	0,00027	0,00068	0,00077	0,00053	0,00023
ADRO	0,00024	0,00571	-0,00005	0,00086	-0,00002	0,00110	0,00033	-0,00002	0,00060
BBCA	0,00019	-0,00005	0,00051	0,00011	0,00009	0,00031	0,00036	0,00018	0,00023
BFIN	-0,00064	0,00086	0,00011	0,03322	-0,00067	-0,00014	0,00103	-0,00044	0,00190
MYOR	0,00027	-0,00002	-0,00006	-0,00067	0,00106	-0,00006	-0,00038	-0,00009	0,00014
PTBA	0,00068	0,00110	0,00031	-0,00014	-0,00006	0,00181	0,00018	0,00035	0,00062
SCMA	0,00077	0,00033	0,00018	0,00103	-0,00038	0,00018	0,00490	0,00015	0,00030
SIDO	0,00053	-0,00002	0,00018	-0,00044	-0,00009	0,00035	0,00015	0,00150	0,00013
UNTR	0,00023	0,00060	0,00023	0,00190	0,00014	0,00062	0,00030	0,00013	0,00115

Based on Table 5, several stock pairs show negative covariance values, including ACES with BFIN; ADRO with BBCA, MYOR, and SIDO; BBCA with ADRO; BFIN with ACES, MYOR, PTBA, and SIDO; MYOR with ADRO, BBCA, BFIN, PTBA, SCMA, and SIDO; as well as PTBA with BFIN and MYOR. These negative values indicate that the stock movements occur in opposite directions, while stock pairs with positive covariance values demonstrate movements in the same direction.

Correlation describes the relationship between two stocks, which can be either positive or negative, where positive values indicate movements in the same direction and negative values indicate opposite movements. The correlation coefficient ranges from -1 to +1, with relationships considered strong when the value is greater than 0.5 or less than -0.5, and weak when the value is below 0.5. This concept is widely used in portfolio diversification strategies to manage investment risk, and the correlation calculation results are presented in Table 6.

Table 6. Correlation Calculation Results

CODE	ACES	ADRO	BBCA	BFIN	MYOR	PTBA	SCMA	SIDO	UNTR
ACES	1,00	0,07	0,18	-0,07	0,18	0,34	0,23	0,29	0,14
ADRO	0,07	1,00	-0,03	0,06	-0,01	0,34	0,06	-0,01	0,23
BBCA	0,18	-0,03	1,00	0,03	0,12	0,32	0,23	0,21	0,30
BFIN	-0,07	0,06	0,03	1,00	-0,11	-0,02	0,08	-0,06	0,31
MYOR	0,18	-0,01	0,12	-0,11	1,00	-0,04	-0,17	-0,07	0,13
PTBA	0,34	0,34	0,32	-0,02	-0,04	1,00	0,06	0,21	0,43
SCMA	0,23	0,06	0,23	0,08	-0,17	0,06	1,00	0,05	0,13
SIDO	0,29	-0,01	0,21	-0,06	-0,07	0,21	0,05	1,00	0,10
UNTR	0,14	0,23	0,30	0,31	0,13	0,43	0,13	0,10	1,00

Based on Table 6, each stock paired with itself—such as ACES with ACES, ADRO with ADRO, BBCA with BBCA, BFIN with BFIN, MYOR with MYOR, PTBA with PTBA, SCMA with SCMA, SIDO with SIDO, and UNTR with UNTR—has a correlation value of 1, indicating a perfectly strong relationship. Meanwhile, several stock pairs show negative correlation values,

including ACES with BFIN; ADRO with BBCA, MYOR, and SIDO; BBCA with ADRO; BFIN with ACES, MYOR, PTBA, and SIDO; MYOR with ADRO, BFIN, PTBA, SCMA, and SIDO; SCMA with MYOR; and SIDO with BFIN and MYOR, which indicates that their price movements occur in opposite directions.

The optimal portfolio formation using the Markowitz Model requires three main components: the return estimation model, covariances, and portfolio constraints. Expected returns are modeled based on analysts' revenue forecasts, revisions to those estimates, and the direction and magnitude of those revisions (Guerard, 2023). In this study, data processing was conducted using the Solver tool in Microsoft Excel by setting the portfolio standard deviation as the objective to be minimized, while applying constraints that the sum of asset weights equals one and that each weight is greater than or equal to zero.

Based on Table 7, the optimal portfolio formation results in eight stock combinations. The largest fund allocation was found in BBCA shares at 42.85%, while the smallest fund allocation occurred in BFIN shares at 0.94%. ACES shares have a weight of 0.00% which means that the stock is not optimal so it will not be continued for the evaluation of Jensen Alpha. Furthermore, if the investor allocates the proportion of his funds according to Table 3, the potential for obtaining an expected *return* is 0.19% and the risk is 1.65%.

Table 7. Formation of the Markowitz Portfolio at IDX Quality 30

Stock Code	Return Expectations	Weight
ACES	0,30%	0,00%
ADRO	0,49%	4,14%
BBCA	0,11%	42,85%
BFIN	0,73%	0,94%
MYOR	0,24%	28,05%
PTBA	0,23%	1,59%
SCMA	0,02%	4,14%
SIDO	0,23%	13,86%
UNTR	0,28%	4,42%
Total Weight		100,00%
Portfolio *Return* Expectations		0,19%
Portfolio Variances		0,03%
Standard Deviation (Risk)		1,65%

3.3. Evaluation of Jensen Alpha

Jensen (1968) evaluated portfolio performance through α *(alpha),* which is an interception of the regression between *the portfolio's* expected return and *the expected return* calculated based on the CAPM model. Value (alpha) indicates the extent of the expected α*return* from the portfolio in relation to the investor's ability to obtain *a risk-adjusted return* above the market average. The greater the positive *alpha* value, the more it shows the ability of investors to predict returns (Jogiyanto, 2009) in (Suharto, 2012). The results of the Jensen Alpha Evaluation are given in Table 8.

Table 8. Jensen Alpha Evaluation

Stock	Return	JCI Return	Risk Free Rate	Beta	Standard Weekly Deviation of Stocks	Annualized Risk Stocks	JCI Weekly Standard Deviation	Annualized Risk JCI	Return SML	Alfa SML	Return CML	Alpha CML
ADRO	6,72%	-3,25%	1,41%	78,25%	7,56%	54,48%	1,79%	12,94%	-2,24%	8,96%	-18,19%	24,92%
BBCA	4,26%	-3,25%	1,41%	77,10%	2,26%	16,26%	1,79%	12,94%	-2,18%	6,44%	-4,44%	8,70%
BFIN	-21,99%	-3,25%	1,41%	158,56%	18,23%	131,43%	1,79%	12,94%	-5,97%	-16,02%	-45,88%	23,89%
MYOR	10,04%	-3,25%	1,41%	24,48%	3,25%	23,43%	1,79%	12,94%	0,27%	9,77%	-7,02%	17,06%
PTBA	9,02%	-3,25%	1,41%	78,75%	4,25%	30,66%	1,79%	12,94%	-2,26%	11,28%	-9,62%	18,64%
SCMA	-9,41%	-3,25%	1,41%	115,97%	7,00%	50,47%	1,79%	12,94%	-3,99%	-5,42%	-16,75%	7,34%
SIDO	8,57%	-3,25%	1,41%	47,15%	3,87%	27,88%	1,79%	12,94%	-0,79%	9,36%	-8,62%	17,20%
UNTR	12,27%	-3,25%	1,41%	86,62%	3,39%	24,42%	1,79%	12,94%	-2,62%	14,89%	-7,38%	19,64%

Based on Table 8, the results of Jensen Alpha's evaluation use two approaches, *Security Market Line* (SML) and *Capital Market Line* (CML) for each IDX Quality 30 member stock. This evaluation aims to measure the performance of the stock after adjusting for risk, as well as assess whether the stock provides   a higher or lower return than expected based on the market model. In Alpha SML, UNTR was the highest at 14.89% which showed better than expectations, which means that it was able to outperform the market. Meanwhile, the lowest at BFIN was -16.02, which means that the performance of this stock is below market expectations. Furthermore, ADRO's largest Alpha CML of 24.92% indicates that this stock also outperforms the market based on standard deviation, not just beta, while SCMA's lowest of 7.34% shows its performance is lower than other stocks after adjusting for total risk.

Table 9. Results of Evaluation of Jensen Portfolio with Security Market Line

Portfolio Return	Risk Free Rate	Beta Portfolio	JCI Return	Jensen Portfolio
6,20%	1,41%	61,06%	-3,25%	7,63%

Based on Table 9, the Portfolio Gender Evaluation shows a   portfolio *return* value of 7.63%, with a *risk-free rate* of 1.41%. Meanwhile, the market return (JCI) was negative, which was -3.25%, and   the beta of the portfolio formed was 61.06%, indicating that the portfolio has a high sensitivity to market fluctuations. This *positive* and large alpha value indicates that the portfolio formed has successfully exceeded market *return* expectations after adjusting for its systematic risk *(beta)*. In declining market conditions (negative JCI returns), the portfolio continues to generate *significant positive returns*. This shows that the strategy of selecting stocks in the portfolio is effective and is able to generate abnormal returns, i.e. returns above the market average with a certain risk.

Table 10. Jensen Portfolio Results with CML Approach

Portfolio Return	Return CML	Jensen Portfolio
6,20%	-7,43%	13,62%

Based on Table 10, the portfolio return of 6.20% with the CML approach shows a performance that exceeds market expectations. Meanwhile, the return of the Capital Market Line (CML) of -7.43% indicates a potential *negative return* at the same level of risk due to bearish market conditions. The difference between the two resulted in a Jensen Alpha of 13.62%, which shows that the portfolio has superior performance compared to *its benchmarks.*

3.4.   Treynor Ratio Evaluation

The Treynor Ratio is an investment performance evaluation method developed by Jack L. Treynor. This method assesses how much of the return exceeds the risk-free level earned for each unit of market risk (systematic risk) that the investor bears. Unlike other measures that use total

risk, Treynor uses systematic risk. The greater the value of the Treynor ratio, the better the performance of the portfolio in providing returns relative to the market risks taken (Tadjini, *et.al.,* 2021). The results of the Treynor Ratio Evaluation are given in Table 11.

Table 11. Treynor Ratio Evaluation Results

Stock	Return	Risk Free Rate	Beta	Treynor
ADRO	6,72%	1,41%	78,25%	0,07
BBCA	4,26%	1,41%	77,10%	0,04
BFIN	-21,99%	1,41%	158,56%	-0,15
MYOR	10,04%	1,41%	24,48%	0,35
PTBA	9,02%	1,41%	78,75%	0,10
SCMA	-9,41%	1,41%	115,97%	-0,09
SIDO	8,57%	1,41%	47,15%	0,15
UNTR	12,27%	1,41%	86,62%	0,13

Based on Table 11, the performance evaluation of the Treynor Ratio shows that MYOR shares have the highest ratio of 0.35 which shows that the performance is very good, on the other hand, BBCA shares have the lowest ratio value which is still positive at 0.04. Meanwhile, BFIN and SCMA shares have negative ratio values of -0.15 and -0.09, respectively, indicating that the performance is poor because it is unable to provide returns comparable to the market risks incurred.

Table 12. Treynor Ratio Portfolio Evaluation Results

Portfolio Return Expectations	Risk Free Rate	Beta Portfolio	Treynor Portfolio Results
0,19%	1,41%	666,89%	-0,0018

Based on Table 12, the Treynor Portfolio Yield ratio of -0.0018 means that this performance has not been able to provide a return on the market risk taken. The Markowitz model *(Mean-Variance)* in maximizing expected *returns* at a certain level of risk and the Treynor Ratio method of assessing portfolio performance by considering systematic risk elements. This is interrelated through the concept of risk, where an efficient portfolio formed with the Markowitz model can be evaluated for its performance using the Treynor Ratio. Therefore, the two complement each other in the management and analysis of investment portfolios.

3.5. Evaluation Analysis of Jensen Alfa and Treynor Ratio

Based on the results of the evaluation using the Jensen Alpha and Treynor Ratio methods, the two evaluations complement each other. Jensen Alpha with its SML and CML approach emphasizes abnormal *returns* relative to market performance expectations. The results show that some stocks such as UNTR and ADRO have high positive alphas that indicate outperform against

the market, while BFIN stocks with the SML approach produce negative alphas, which means *underperform*. The Jensen Portfolio evaluation gives a positive alpha value indicating that the portfolio is able to generate returns that are higher than market performance expectations despite *bearish* market conditions. The Treynor Ratio measures expectations based on systematic (*beta)* risk. The results show that MYOR shares are 0.35 so that its performance is relatively good in generating *returns* on market risk. Meanwhile, stocks such as BFIN and SCMA showed negative results. This shows similarities in the findings based on the Jensen Alpha Evaluation.

The Jensen Alpha and Treynor Ratio evaluations both measure risk-based performance, but with different focuses. The Jensen Alpha assesses the difference between *actual returns* and *expected returns, while the Treynor Ratio assesses the efficiency* of returns against market risk. Consistency is seen in BFIN stocks, which both show poor performance in both methods. However, there is a difference in UNTR stock, which occupies a superior position according to Jensen Alpha but does not occupy the highest position in the Treynor Ratio. This shows that UNTR has a relatively high α (alpha) value, so its performance is considered better than expectations based on systematic risk (β). This means that even taking into account market risk, UNTR is able to provide *a fairly good excess return*.

4.   Conclusion

Based on the Markowitz Model calculations, eight stock combinations were selected to form the optimal portfolio, consisting of ADRO (4.14%), BBCA (42.85%), BFIN (0.94%), MYOR (28.05%), SIDO (13.86%), and UNTR (4.42%). The resulting portfolio demonstrates an expected return of 0.19% with a relatively low risk level of 1.65%, indicating that diversification based on the Markowitz approach is effective in achieving a balanced trade-off between return and risk.

The performance evaluation using Jensen's Alpha shows that UNTR and ADRO stocks provide the best performance. UNTR records an alpha value of 14.89% based on the SML approach, while ADRO achieves an alpha value of 24.92% using the CML approach, indicating that both stocks outperform market expectations. Conversely, BFIN exhibits the lowest performance with an alpha value of –16.02% based on the SML approach. The overall portfolio also demonstrates positive performance, with Jensen's Alpha values of 7.63% (SML) and 13.62% (CML), confirming that the portfolio is capable of generating returns above market expectations at the same level of risk.

The Markowitz Model plays a crucial role in forming an efficient portfolio by simultaneously considering risk and return, while Jensen's Alpha, as a development of CAPM, evaluates portfolio performance through alpha values that reflect the portfolio's ability to outperform or underperform the market. A positive alpha indicates superior performance, whereas a negative alpha reflects weaker performance. These two models complement each other in the context of investment risk management, making their application highly relevant for assessing and managing the IDX Quality 30 stock portfolio, particularly under capital market conditions characterized by significant volatility and decline.

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