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Cross-Sectoral Portfolio Optimization in Emerging Markets: Value at Risk Assessment of Indonesian Consumer and Financial Stocks

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Abstract

This study examines the comparative risk profiles of single-asset investments versus portfolio strategies using two prominent Indonesian companies: PT. Mayora Indah and PT. Sinar Mas Multiartha. Employing a quantitative approach with Monte Carlo simulation and Value at Risk (VaR) methodology, the research analyzed daily stock returns over a one-year period (January-December 2023). Results reveal that despite similar historical volatility levels between the individual stocks (standard deviations of 2.65% and 2.88%), their correlation coefficient was notably low (0.13), creating significant diversification opportunities. Monte Carlo simulations generated 1,000 potential return scenarios for robust risk assessment, finding that at the 95% confidence level, maximum expected losses on a Rp 100 million investment were Rp 4.78 million for PT. Mayora Indah and Rp 4.58 million for PT. Sinar Mas Multiartha individually. However, a portfolio combining both stocks (60% PT. Mayora Indah, 40% PT. Sinar Mas Multiartha) reduced this potential loss to Rp 2.90 million—representing approximately 37% risk reduction compared to either single-asset investment. This substantial risk mitigation was consistent across all confidence levels (99%, 95%, and 90%). The portfolio also demonstrated improved return characteristics in simulation (0.39% expected return) compared to historical data (0.09%), while maintaining similar risk levels. These findings provide empirical support for the practical value of diversification strategies in the Indonesian equity market, highlighting how even limited diversification across two stocks from different economic sectors can yield substantial improvements in risk-adjusted investment outcomes.

Keywords: Portfolio optimization; Value at Risk; diversification; Monte Carlo simulation; risk management; Indonesian equities.

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1. Introduction

Investment decision-making in financial markets involves navigating the fundamental tradeoff between risk and return. Modern portfolio theory, pioneered by Markowitz, has provided investors with analytical frameworks to optimize this tradeoff through diversification and strategic asset allocation (Campbell et al., 2001). In today's dynamic financial landscape, characterized by increased market volatility and information accessibility, understanding the risk-return dynamics of investment portfolios has become increasingly crucial for investors seeking to preserve capital while achieving growth objectives.

The comparative analysis of single-asset investments versus portfolio strategies represents a cornerstone of investment theory. While single-asset investments may offer targeted exposure to specific market opportunities, portfolio approaches provide risk mitigation through diversification effects. As noted by Chen and Huang (2009), portfolio optimization with appropriate consideration of return rates and associated risks can significantly enhance investment performance across various market conditions. This study explores this relationship by examining the risk-return profiles of two prominent Indonesian companies—PT. Mayora Indah and PT. Sinar Mas Multiartha—both individually and within a portfolio context.

The concept of Value at Risk (VaR) has emerged as a critical risk management tool, offering a probabilistic measure of potential investment losses under adverse market conditions. Campbell et al. (2001) define VaR as a statistical technique

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that quantifies the maximum potential loss an investment might experience over a specific time horizon at a given confidence level. For corporate stocks characterized by varying volatility patterns and business models, VaR analysis provides particularly valuable insights for quantifying downside risk exposure, allowing investors to make more informed allocation decisions based on their risk tolerance.

The food and beverage sector, represented in this study by PT. Mayora Indah, has demonstrated resilience during economic uncertainties, as basic consumption patterns typically maintain relatively stable demand even during downturns. As emphasized by Yan et al. (2024), companies with stable revenue streams often display distinct risk-return characteristics that can contribute significantly to portfolio diversification. Conversely, the financial services sector, represented by PT. Sinar Mas Multiartha, typically exhibits different performance drivers and cyclical patterns, creating potentially valuable diversification opportunities when combined with consumer staples stocks.

Indonesia's economic landscape has undergone significant transformation in recent years, presenting both challenges and opportunities for domestic equity investors. The country's expanding middle class, digital transformation, and infrastructural development have created favorable conditions for corporate growth across multiple sectors. However, global economic uncertainties, exchange rate fluctuations, and geopolitical tensions continue to influence market volatility. In this context, robust analytical approaches for assessing potential investment risks become increasingly valuable for both institutional and retail investors operating in Indonesian markets.

Monte Carlo simulation techniques have revolutionized risk assessment methodologies by enabling the generation of numerous potential return scenarios based on historical data patterns. Sharma and Shekhawat (2022) demonstrate how these simulation approaches can enhance portfolio optimization by providing more comprehensive representations of possible outcomes than deterministic models. For Indonesian equities with their unique market characteristics and volatility patterns, Monte Carlo simulations offer particularly valuable insights into potential loss distributions under various market conditions.

The integration of traditional financial theory with modern computational methods represents a significant advancement in investment analysis. As Li and Xu (2024) observe, combining established financial principles with data-driven approaches enables more robust investment strategies that can adapt to evolving market conditions. This hybrid methodology is especially relevant when analyzing stocks from different sectors with distinct risk factors and return drivers, as is the case with the consumer goods and financial services stocks examined in this study.

Risk perception and quantification play crucial roles in investment decision-making. Blavatskyy (2022) presents the expected return-expected loss framework as an intuitive approach for investors concerned primarily with downside risk. This perspective aligns well with the behavioral tendencies of many investors who exhibit asymmetric sensitivity to gains and losses. By quantifying potential losses through VaR analysis, this study provides actionable insights that correspond to how many investors intuitively evaluate investment opportunities.

Sector diversification represents a fundamental risk management strategy in portfolio construction. Tu and Li (2024) emphasize the importance of considering sectoral return predictability in portfolio selection decisions. The combination of consumer goods and financial services stocks examined in this study exemplifies this approach, potentially capturing diversification benefits from sectors with different economic sensitivities and growth drivers. Understanding the quantitative risk-return implications of such combinations provides valuable guidance for sector allocation decisions.

Corporate performance metrics and financial fundamentals continue to drive long-term stock performance despite short-term market fluctuations. Rajyaguru (2023) emphasizes the importance of multinational approaches in assessing portfolio risk and return characteristics. For Indonesian companies operating in an increasingly global context, such as PT. Mayora Indah with its international export markets, understanding these multinational dimensions becomes increasingly relevant for comprehensive risk assessment.

The relationship between market efficiency and return predictability remains a subject of ongoing research. McLean and Pontiff (2015) examine how academic research on return predictability influences market behavior, potentially diminishing predictive power as strategies become widely recognized. In emerging markets like Indonesia, where information asymmetries may be more pronounced than in developed markets, opportunities for identifying mispriced assets may persist longer, highlighting the value of systematic analysis of historical return patterns for forward-looking investment decisions.

Transaction costs represent an important practical consideration in portfolio implementation. Yu et al. (2020)

demonstrate how these costs can significantly impact realized returns, particularly in strategies requiring frequent rebalancing. For Indonesian equity investors, especially those with more modest investment amounts, cost-efficient execution strategies become especially important to preserve expected returns. VaR analysis that incorporates realistic transaction cost assumptions provides more accurate assessments of potential investment outcomes.

The increasing accessibility of investment platforms has democratized market participation, allowing more retail investors to engage in equity markets. However, this expanded participation also increases the importance of robust risk assessment tools that can be understood and applied by investors with varying levels of financial sophistication. As noted by Doeswijk et al. (2019), providing clear historical context for market returns helps investors develop realistic expectations about potential investment outcomes, an objective that VaR analysis can help achieve through its probabilistic quantification of potential losses.

Portfolio optimization techniques continue to evolve with advancements in computational capabilities. Marcondes (2019) presents a framework for portfolio selection that incorporates multiple criteria beyond simple return maximization, including various risk dimensions. This multi-criteria approach aligns with how sophisticated investors evaluate potential investments, considering not just expected returns but also downside risk, liquidity, and other factors that influence overall investment suitability.

The time-varying nature of asset correlations presents challenges for portfolio construction. Asset relationships that appear stable during normal market conditions may change dramatically during market stress periods, potentially undermining diversification benefits when they are most needed. Neděla et al. (2024) emphasize the importance of dynamic scenario generation in portfolio optimization to account for these changing correlation structures. By examining potential loss scenarios through VaR analysis, investors can better understand how portfolio components might behave collectively under adverse conditions.

Economic cycles influence sector performance patterns, creating opportunities for tactical asset allocation based on anticipated economic conditions. Cakici and Zaremba (2024) examine the drivers of stock returns across different countries, highlighting the importance of both global and local factors. For Indonesian stocks, understanding these cyclical patterns and their relationship to broader economic conditions provides valuable context for interpreting VaR results and making informed allocation decisions between consumer staples and financial sector investments.

Risk perception varies significantly among investors based on their financial circumstances, investment horizons, and psychological profiles. What represents an acceptable level of risk for one investor may be intolerable for another. By quantifying potential losses at different confidence levels through VaR analysis, this study provides a framework that can be adapted to different risk tolerance profiles, allowing investors to select allocation strategies aligned with their personal risk preferences.

The integration of risk assessment into the investment decision process represents a cornerstone of prudent financial management. Fard et al. (2014) present a risk-return based model for measuring portfolio management performance that emphasizes the importance of considering both dimensions simultaneously rather than focusing exclusively on returns. This balanced perspective is particularly relevant in emerging markets like Indonesia, where higher growth potential often comes with increased volatility and risk considerations.

Technological advancements have transformed data availability and analytical capabilities, allowing more sophisticated risk assessment methodologies to be applied even by smaller investment operations. Yilin et al. (2021) showcase how machine learning approaches can enhance portfolio optimization by identifying complex patterns in market data. While the present study employs more traditional Monte Carlo methods, it exemplifies how computational techniques can provide insights that would be difficult to obtain through purely intuitive approaches.

The evaluation of different VaR methodologies represents an active area of financial research. Parametric VaR calculations based on normal distribution assumptions may underestimate tail risks in markets characterized by fat-tailed return distributions. However, as noted by Fornell et al. (2009), parametric approaches still provide valuable insights when interpreted with appropriate consideration of their limitations. The comparative nature of this study, examining relative VaR between single-asset and portfolio investments, helps mitigate some of these methodological concerns by focusing on relative rather than absolute risk quantification.

The educational value of investment analysis extends beyond immediate decision support to developing broader financial literacy and risk awareness. By demonstrating how systematic analysis can quantify potential investment risks,

studies such as this one contribute to improving investors' understanding of risk-return relationships, potentially leading to more thoughtful investment decisions aligned with long-term financial objectives rather than short-term performance chasing.

This study contributes to the literature on portfolio optimization and risk management in several ways. First, it provides empirical evidence on the risk-reduction benefits of portfolio diversification in the specific context of Indonesian equities from different sectors. Second, it demonstrates the practical application of VaR methodology for comparing investment alternatives, translating abstract risk concepts into concrete monetary values that can guide allocation decisions. Third, it illustrates how Monte Carlo simulation techniques can enhance risk assessment by generating a more comprehensive view of potential investment outcomes than would be available from historical data alone.

By examining PT. Mayora Indah and PT. Sinar Mas Multiartha—companies representing different sectors of the Indonesian economy—this research provides insights into sector-specific risk characteristics while demonstrating how diversification across sectors can modify portfolio risk profiles. The analysis of single-asset versus portfolio investment approaches offers practical guidance for investors seeking to optimize their risk-return positions through strategic asset allocation decisions informed by rigorous quantitative analysis.

2. Methods

This study employs a quantitative approach to analyze and compare the risk profiles of single-asset investments versus portfolio investments using two Indonesian publicly listed companies. The research design incorporates statistical analysis of historical stock data, Monte Carlo simulation techniques, and Value at Risk calculations to provide a comprehensive assessment of potential investment risks.

2.1. Research Design

The research follows a descriptive quantitative methodology that focuses on comparing risk outcomes between different investment approaches. As described by Zhu et al. (2022), this type of analysis enables the identification of statistical patterns in financial data that can inform investment decision-making. The comparative nature of the study allows for direct evaluation of the risk-reduction benefits derived from portfolio diversification versus single-asset approaches.

2.2. Data Collection

Historical stock price data for PT. Mayora Indah and PT. Sinar Mas Multiartha was collected from the Investing.com financial portal, covering the period from January 1, 2023, to December 31, 2023. The dataset consists of 106 daily closing price observations for each stock. This one-year timeframe provides a sufficiently robust sample for statistical analysis while reflecting recent market conditions, as recommended by Fornell et al. (2009) for portfolio return significance evaluation.

2.3. Return Calculation

Daily returns for each stock were calculated using the discrete return formula:

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

where R_t represents the return on day *t*, and P_t and $P_{\{t-1\}}$ represent the closing prices on days *t* and $t-1$, respectively. This approach aligns with standard financial analysis practices described by Mech (1993) for calculating portfolio return characteristics.

2.4. Portfolio Construction

A two-asset portfolio was constructed with weighted allocations of 60% to PT. Mayora Indah and 40% to PT. Sinar Mas Multiartha. Portfolio returns were calculated as the weighted average of individual stock returns:

$$R_p = w_1 \times R_1 + w_2 \times R_2$$

where R_p represents the portfolio return, w_1 and w_2 are the respective asset weights, and R_1 and R_2 are the individual asset returns. This approach follows the portfolio construction methodology outlined by Chen and Huang (2009).

2.5. Monte Carlo Simulation

To enhance the robustness of the risk assessment, Monte Carlo simulation was employed to generate 1,000 potential return scenarios based on the historical return parameters of each stock and the constructed portfolio. The simulation utilized the inverse normal distribution function:

$$R_{sim} = NORM.INV\big(RAND(), E(R), \sigma(R)\big)$$

where R_{sim} represents the simulated return, $E(R)$ is the expected return, and $\sigma(R)$ is the standard deviation of returns. This methodology aligns with the approach recommended by Sharma and Shekhawat (2022) for generating comprehensive return scenarios beyond observed historical data.

2.6. Value at Risk Calculation

Value at Risk (VaR) was calculated to quantify the potential losses for both single-asset investments and the portfolio at multiple confidence levels (99%, 95%, and 90%). Following Campbell et al. (2001), the parametric VaR formula was applied:

$$VaR_\alpha = E(R) - (\sigma(R) \times Z_\alpha)$$

where VaR_α represents the Value at Risk at confidence level $1 - \alpha$, $E(R)$ is the expected return, $\sigma(R)$ is the standard deviation, and Z_α is the Z-score corresponding to the confidence level from the standard normal distribution.

For practical interpretation, the percentage VaR values were converted to monetary terms by applying them to a standardized investment amount of Rp 100,000,000. This approach provides more concrete risk measures that can directly inform investment decision-making, as suggested by Mencía (2009).

2.7. Comparative Analysis

The final step involved comparing the VaR results between single-asset investments and the portfolio investment to quantify the risk-reduction benefits of diversification. This comparative assessment follows the multi-criteria evaluation framework described by Marcondes (2019), which emphasizes the importance of considering multiple dimensions of investment performance beyond simple return maximization.

3. Result and Discussions

3.1. Descriptive Statistics of Individual Stock Returns

The analysis begins with an examination of the return characteristics for PT. Mayora Indah and PT. Sinar Mas Multiartha over the one-year period from January 1, 2023, to December 31, 2023. Table 1 presents the summary statistics for the daily returns of both stocks.

Table 1. Descriptive Statistics of Daily Stock Returns

Statistic	PT. Mayora Indah	PT. Sinar Mas Multiartha
Number of Observations	106	106
Expected Return (%)	0.04	0.18
Standard Deviation (%)	2.65	2.88
Minimum Return (%)	-8.77	-11.72
Maximum Return (%)	9.09	16.63
Skewness	0.241	1.437
Kurtosis	5.125	13.964

The descriptive statistics reveal notable differences between the two stocks. PT. Sinar Mas Multiartha exhibits a higher expected daily return (0.18%) compared to PT. Mayora Indah (0.04%), indicating potentially superior performance during the analyzed period. However, this higher return comes with slightly greater volatility, as evidenced by the higher standard deviation (2.88% versus 2.65%). This observation aligns with the fundamental risk-return tradeoff noted by Fard et al. (2014), where higher returns are typically associated with increased risk.

The distribution characteristics of the two stocks also differ substantially. PT. Sinar Mas Multiartha displays strong positive skewness (1.437) and high kurtosis (13.964), indicating a return distribution with an extended right tail and significantly higher probability of extreme outcomes than would be expected under a normal distribution. In contrast, PT. Mayora Indah shows more modest positive skewness (0.241) and kurtosis (5.125), suggesting a more symmetrical return distribution. These findings support Schuhmacher et al.'s (2021) observations regarding the prevalence of non-normal return distributions in financial markets, particularly the leptokurtic (heavy-tailed) nature of many stock returns.

The considerable difference in maximum returns (16.63% for PT. Sinar Mas Multiartha versus 9.09% for PT. Mayora Indah) further illustrates the contrasting risk-return profiles of these stocks. PT. Sinar Mas Multiartha experienced both larger gains and larger losses than PT. Mayora Indah, consistent with its financial services sector profile, which typically exhibits greater sensitivity to market conditions than the consumer staples sector represented by PT. Mayora Indah.

3.2. Monte Carlo Simulation Results for Individual Stocks

To enhance the robustness of the risk assessment, Monte Carlo simulation was employed to generate 1,000 potential return scenarios for each stock based on their historical parameters. Table 2 presents the summary statistics of these simulated returns.

Table 2. Monte Carlo Simulation Results for Individual Stocks

Statistic	PT. Mayora Indah (Original)	PT. Mayora Indah (Simulated)	PT. Sinar Mas Multiartha (Original)	PT. Sinar Mas Multiartha (Simulated)
Expected Return (%)	0.04	0.10	0.18	0.05
Standard Deviation (%)	2.65	2.68	2.88	3.27

The simulated returns show some deviation from the original historical parameters, with PT. Mayora Indah exhibiting a higher expected return in the simulation (0.10% versus 0.04%), while PT. Sinar Mas Multiartha shows a lower expected return (0.05% versus 0.18%). The standard deviation of PT. Sinar Mas Multiartha increased more substantially in the simulation (3.27% versus 2.88%) compared to PT. Mayora Indah (2.68% versus 2.65%). These variations highlight the importance of simulation techniques in capturing a broader range of potential outcomes than relying solely on historical data, as emphasized by Neděla et al. (2024).

The higher variability in the PT. Sinar Mas Multiartha simulation results may reflect the more extreme return distribution characteristics observed in the historical data. As noted by Sharma and Shekhawat (2022), Monte Carlo simulations can reveal potential risk scenarios that might not be immediately apparent from historical statistics alone, particularly for assets with non-normal return distributions.

3.3. Value at Risk Analysis for Individual Stocks

Using the simulated return distributions, Value at Risk (VaR) was calculated for both stocks at multiple confidence levels, as presented in Table 3.

Table 3. Value at Risk Analysis for Individual Stocks

Confidence Level	PT. Mayora Indah		PT. Sinar Mas Multiartha	
	VaR (%)	VaR (Rp 100M)	VaR (%)	VaR (Rp 100M)
99% (α = 1%)	-6.67	-6,671,061	-6.57	-6,566,237
95% (α = 5%)	-4.78	-4,779,951	-4.58	-4,583,032
90% (α = 10%)	-3.77	-3,771,808	-3.53	-3,525,793

The VaR analysis reveals that despite the differences in return distributions, both stocks exhibit similar downside risk at various confidence levels. At the 99% confidence level, PT. Mayora Indah shows a slightly higher maximum expected loss (-6.67% or approximately Rp 6.67 million on a Rp 100 million investment) compared to PT. Sinar Mas Multiartha (-6.57% or approximately Rp 6.57 million). This pattern persists at the 95% and 90% confidence levels, with PT. Mayora Indah consistently showing marginally higher potential losses.

These findings might seem counterintuitive given the higher volatility of PT. Sinar Mas Multiartha. However, as Blavatskyy (2022) explains, VaR calculations incorporate both the volatility and expected return components. The slightly higher expected return in the simulated distribution for PT. Mayora Indah (0.10% versus 0.05%) was not sufficient to offset its volatility in terms of downside risk protection. These results demonstrate the importance of considering both return and risk characteristics in investment decision-making, rather than focusing exclusively on volatility measures.

3.4. Portfolio Return Analysis

A two-asset portfolio was constructed with allocations of 60% to PT. Mayora Indah and 40% to PT. Sinar Mas Multiartha. Table 4 presents the key characteristics of the portfolio return distribution.

Table 4. Portfolio Return Characteristics

Statistic	Portfolio	PT. Mayora Indah	PT. Sinar Mas Multiartha
Expected Return (%)	0.09	0.04	0.18
Variance (%)	0.04	0.07	0.08
Standard Deviation (%)	2.05	2.65	2.88
Covariance		0.01	
Correlation		0.13	

The portfolio exhibits an expected return of 0.09%, which falls between the expected returns of the individual assets but is closer to PT. Mayora Indah's return, reflecting its higher weighting in the portfolio. Most notably, the portfolio standard deviation (2.05%) is substantially lower than that of either individual asset (2.65% for PT. Mayora Indah and 2.88% for PT. Sinar Mas Multiartha). This significant risk reduction demonstrates the diversification benefit achieved through combining assets with less than perfect correlation, as explained by Markowitz's portfolio theory and empirically supported by Chen and Huang (2009).

The relatively low correlation coefficient between the two stocks (0.13) explains the substantial risk reduction achieved in the portfolio. This low correlation suggests that the stocks respond differently to market conditions, likely due to their different sector characteristics. As Yan et al. (2024) note, combining assets from different economic sectors often provides superior diversification benefits compared to within-sector diversification due to lower inter-sector correlations.

3.5. Monte Carlo Simulation Results for Portfolio

Monte Carlo simulation was applied to the portfolio using the same methodology employed for individual stocks. Table 5 presents the summary statistics of the simulated portfolio returns.

Table 5. Monte Carlo Simulation Results for Portfolio

Statistic	Portfolio (Original)	Portfolio (Simulated)
Expected Return (%)	0.09	0.39
Standard Deviation (%)	2.05	1.98

The portfolio simulation results show a notably higher expected return (0.39%) compared to the original historical portfolio return (0.09%), while maintaining a similar level of risk (standard deviation of 1.98% versus 2.05%). This favorable shift in the simulated risk-return profile illustrates the potential benefits of the portfolio approach. As highlighted by Tu and Li (2024), robust portfolio selection can enhance expected returns while maintaining or reducing risk levels through optimal asset combination.

The improved return characteristics in the simulation, without a corresponding increase in risk, suggest that the portfolio construction may have captured synergistic effects between the two stocks that were not fully evident in the historical data alone. This finding aligns with Sharma and Shekhawat's (2022) observation that simulation techniques can reveal emergent portfolio properties that might not be immediately apparent from historical summary statistics.

3.6. Value at Risk Analysis for Portfolio

The Value at Risk for the portfolio was calculated using the simulated return distribution, as presented in Table 6.

Table 6. Portfolio Value at Risk Analysis

Confidence Level	Portfolio VaR (%)	Portfolio VaR (Rp 100M)
99% (α = 1%)	-4.19	-4,194,457
95% (α = 5%)	-2.90	-2,901,196
90% (α = 10%)	-2.21	-2,211,763

The portfolio VaR values demonstrate a substantial reduction in downside risk compared to either individual stock. At the 99% confidence level, the portfolio VaR (-4.19% or approximately Rp 4.19 million on a Rp 100 million investment) is considerably lower than the VaR for PT. Mayora Indah (-6.67% or Rp 6.67 million) and PT. Sinar Mas Multiartha (-6.57% or Rp 6.57 million). This pattern is consistent across all confidence levels, with the portfolio consistently showing significantly lower potential losses.

The risk reduction is particularly notable at the 95% confidence level, where the portfolio VaR (-2.90% or Rp 2.90 million) represents a reduction of approximately 39% compared to PT. Mayora Indah (-4.78% or Rp 4.78 million) and 37% compared to PT. Sinar Mas Multiartha (-4.58% or Rp 4.58 million). This substantial risk mitigation illustrates the practical benefit of portfolio diversification in terms of downside protection, as theorized by Campbell et al. (2001) in their work on optimal portfolio selection within a Value at Risk framework.

3.7. Comparative Analysis of Single-Asset versus Portfolio Investment

Table 7 presents a direct comparison of the Value at Risk for single-asset investments versus the portfolio approach across different confidence levels.

Table 7. Comparison of Value at Risk: Single-Asset versus Portfolio

Confidence Level	PT. Mayora Indah (Rp 100M)	PT. Sinar Mas Multiartha (Rp 100M)	Portfolio (Rp 100M)	Risk Reduction (%)
99% (α = 1%)	-6,671,061	-6,566,237	-4,194,457	36.5
95% (α = 5%)	-4,779,951	-4,583,032	-2,901,196	36.7
90% (α = 10%)	-3,771,808	-3,525,793	-2,211,763	37.3

The comparative analysis reveals a consistent pattern of substantial risk reduction across all confidence levels when employing the portfolio approach rather than single-asset investments. The portfolio provides an average risk reduction of approximately 37% compared to the lower-risk individual stock (PT. Sinar Mas Multiartha) and slightly higher compared to PT. Mayora Indah.

This significant risk reduction illustrates the powerful effect of diversification, even with just two assets, when those assets exhibit low correlation. As Marcondes (2019) suggests, portfolio selection strategies that consider return-risk evaluation can substantially improve investment outcomes compared to single-asset approaches. The empirical results from this study provide strong support for this theoretical position.

The consistent risk reduction across different confidence levels indicates that the diversification benefit is robust to varying degrees of risk aversion. Whether an investor is highly risk-averse (focusing on the 99% confidence level) or more risk-tolerant (focusing on the 90% confidence level), the portfolio approach provides substantial downside protection compared to single-asset investments.

3.8. Implications for Investment Strategy

The findings from this analysis have several important implications for investment strategy, particularly for investors operating in the Indonesian equity market:

Diversification Benefits: Even limited diversification across just two stocks from different sectors can provide substantial risk reduction. The approximately 37% reduction in potential losses achieved through the portfolio approach highlights the practical value of diversification as a risk management tool.

Sector Allocation: The low correlation between PT. Mayora Indah (consumer goods) and PT. Sinar Mas Multiartha (financial services) suggests that cross-sector diversification may be particularly effective in the Indonesian market. As noted by Cakici and Zaremba (2024), sector allocation decisions can significantly influence overall portfolio risk characteristics.

Risk-Adjusted Performance: While PT. Sinar Mas Multiartha offered a higher historical expected return, the portfolio approach provided a more favorable risk-adjusted performance profile. This demonstrates the importance of considering risk-adjusted metrics rather than focusing exclusively on raw returns, as emphasized by Fard et al. (2014).

Value of VaR Analysis: The Value at Risk framework provides an intuitive and practical approach for quantifying potential investment losses. By expressing risk in monetary terms, VaR makes abstract statistical concepts more accessible and actionable for investors, supporting informed decision-making.

The empirical results support the theoretical position that optimal portfolio construction can significantly enhance investment outcomes through effective risk management. As Yu et al. (2020) observe, portfolio approaches that incorporate return forecasting and risk assessment can outperform simpler investment strategies, particularly in volatile market environments.

4. Conclusions

This study examined the risk-return characteristics of single-asset investments in PT. Mayora Indah and PT. Sinar Mas Multiartha compared to a portfolio approach combining both stocks. The analysis employed Monte Carlo simulation and Value at Risk (VaR) methodology to quantify potential investment losses across different confidence levels.

The empirical findings provide strong evidence supporting the value of portfolio diversification as a risk management strategy, even when limited to just two stocks from different sectors of the Indonesian economy. The key conclusions from this analysis are: (a) the portfolio approach demonstrated a consistent and significant reduction in downside risk compared to single-asset investments. At the 95% confidence level, the portfolio VaR (-2.90% or Rp 2.90 million on a Rp 100 million investment) represented approximately 37% less risk than either individual stock investment, (b) while PT. Sinar Mas Multiartha offered higher historical returns than PT. Mayora Indah, it also exhibited greater volatility and extreme return behavior. The portfolio construction captured a portion of the higher returns while substantially reducing overall risk, resulting in a more efficient risk-return profile, (c) the low correlation (0.13) between consumer goods (PT. Mayora Indah) and financial services (PT. Sinar Mas Multiartha) stocks contributed significantly to the diversification benefits observed in the portfolio. This finding highlights the value of cross-sector diversification in the Indonesian equity market, (d) the VaR methodology provided an intuitive and practical approach for quantifying investment risk, translating statistical measures into concrete monetary values that can directly inform investment decision-making.

These findings have important implications for individual and institutional investors operating in the Indonesian equity market. Rather than concentrating investments in single stocks, even when those stocks show favorable historical performance, investors can potentially achieve superior risk-adjusted outcomes through disciplined portfolio construction that considers both return expectations and correlation structures.

For future research, expanding the asset universe to include additional stocks and asset classes could provide further insights into optimal diversification strategies in the Indonesian market. Additionally, exploring alternative VaR methodologies and optimization techniques for portfolio weight determination could enhance the precision and robustness of the risk assessment framework.

Overall, this study demonstrates that even modest diversification efforts can yield substantial risk reduction benefits while maintaining return potential. By quantifying these benefits in monetary terms, the research provides practical

guidance for investors seeking to balance growth objectives with prudent risk management in their investment strategies.

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