Diversification of Jakarta Islamic Index (JII) Stock Optimal Portfolio for the Period 2018-2023

Khairul Alim(1)*, Bayun Matsaany(2), Anisa Rahmawati(3)

[1]Program Studi Matematika, Jurusan MIPA, Fakultas Sains dan Teknologi, Universitas Jambi

Jl. Jambi – Muara Bulian No.KM. 15, Mendalo Darat, Jambi

[2]Program Studi S1 Terapan Teknologi Rekayasa Manufaktur, Jurusan Teknik Mesin, Politeknik Negeri Jakarta

Jl. Prof. DR. G.A. Siwabessy, Kampus Universitas Indonesia Depok, Jawa Barat

[3]Program Studi Manajemen Logistik Industri Elektronika, Politeknik APP Jakarta

Jl. Timbul No.34, RT.6/RW.5, Cipedak, Kec. Jagakarsa, Kota Jakarta Selatan

e-mail: khairulalim@unja.ac.id(1)*, bayun.matsaany@mesin.pnj.ac.id(2), anisarara07@gmail.com(3)

ABSTRAK

Investasi adalah tindakan menempatkan dana pada suatu aset dengan tujuan meraih keuntungan di masa depan melalui perubahan harga aset atau capital gain. Di Indonesia, investasi saham, terutama melalui Bursa Efek Indonesia (BEI), menjadi pilihan masyarakat. BEI memiliki berbagai indeks, termasuk Jakarta Islamic Index (JII), yang menarik perhatian. JII terdiri dari saham-saham perusahaan yang menerapkan prinsip syariah. Dalam kegiatan investasi, analisis yang cermat sangat penting untuk menghindari kesalahan dalam pemilihan saham. Diversifikasi adalah strategi dengan menyebarkan investasi pada beberapa saham, yang bertujuan untuk memaksimalkan keuntungan dan meminimalkan risiko. Meskipun cara termudah bagi investor untuk berinvestasi di pasar saham adalah dengan membeli satu jenis saham terbaik, namun memiliki hanya satu jenis saham dapat menjadi berisiko jika harga saham tersebut turun. Penelitian ini membandingkan hasil investasi antara portofolio tunggal dan diversifikasi dengan dua atau tiga saham, dengan pemilihan saham berdasarkan indeks Sharpe, Treynor, dan Jensen. Penelitian ini menganalisis harga penutupan saham dalam indeks JII dari Maret 2018 hingga Februari 2023. Hasil penelitian menunjukkan bahwa melakukan diversifikasi beberapa saham dapat mengurangi risiko investasi, meskipun mengurangi potensi keuntungan.
Kata kunci: Investasi, Saham, Syariah, Diversifikasi

ABSTRACT

Investment is placing funds into an asset to gain profits in the future through changes in asset prices or capital gains. In Indonesia, stock investment, primarily through the Indonesia Stock Exchange (BEI), is popular among the public. BEI offers various indices, including the Jakarta Islamic Index (JII), which has garnered significant attention. JII comprises stocks of companies that adhere to Sharia principles. In investment, careful analysis is crucial to avoid errors in stock selection. Diversification is a strategy that involves spreading investments across several stocks, aiming to maximize profits while minimizing risks. While the easiest way for investors to enter the stock market is by purchasing the best-performing single stock, relying solely on one stock can be risky if its price drops. This research compares investment outcomes between single-stock and diversified portfolios of two or three stocks, selected based on the Sharpe, Treynor, and Jensen indices. The research analyzes the closing stock prices within the JII index from March 2018 to February 2023. The study results show that diversifying investments across multiple stocks can reduce investment risks, even though it may reduce profit potential.
Keywords: *Investment; Stocks; Sharia, Diversification*

INTRODUCTION

Investment is an important activity to gain future profits by placing current funds. This profit is known as capital gain or cash income [1]. A subcategory that is now increasingly popular is sharia-based investment [2], which involves trading shares on the Sharia capital market. OJK data shows an increase in sharia shares from 375 in 2017 to 552 in 2022 [3]. Fighting inflation and achieving profits are the two main reasons investing is essential. When investing, it is important to consider market conditions, the economy, and the company's financial performance [4]. Analysis of company performance on the Indonesian Stock Exchange (BEI) is crucial in investing in the capital market. BEI creates an index known as the Composite Stock Price Index (IHSG). IHSG is used to see the performance of all shares listed on the IDX [5]. The IDX also divides shares into various indices, such as the Jakarta Islamic Index (JII), which follows sharia principles [6].

Benchmarking different investment methods is essential to identify the most effective strategies in different market conditions [7]. This study uses the Sharpe, Treynor, and Jensen indices to create portfolios with one, two, and three stocks [8]. This approach is interesting because it explains how diversification and stock selection based on different metrics can affect investment results. The risks arising in shares come from the volatility of price movements. Volatility can appear in various types of assets and prices of goods [9]. One way to control this emerging risk is to diversify. Diversification is a way of investing in various assets, an essential strategy for controlling profits and risks [10]. Diversification aims to reduce dependence on one particular asset or type of risk, thereby achieving a balance of risk and return. The advantage of diversification is achieving higher long-term returns and lower risk than relying on just one type of asset or stock [11].

This research aims to look at differences in Sharia stock portfolio management, focusing on the impact of diversification on profits and risks. Through comparisons between portfolios consisting of various numbers of shares, this study will reveal the effectiveness of diversification in optimizing returns and reducing risk. This is important to see better Islamic investment strategies and make more informed investment decisions.

Our previous study focused on forming an optimal portfolio for JII shares from March 2018 to February 2023, involving only three shares [11]. This study will compare portfolios of one, two, and three stocks. Thus, this research will provide new insights into the impact of diversification in Islamic investments and reveal differences in the profits and risks associated with the various investment strategies implemented.

METHOD

Portfolio Performance Measurement

The performance of a stock portfolio can be determined through the Sharpe, Treynor, and Jensen Index approaches. These three methods use historical data to project future profits and risks, and the results generated from each method can vary [12]. Therefore, in evaluating the performance of a portfolio, it is necessary to consider the investment objectives and the nature of the portfolio owned.

Sharpe Index

The Sharpe Index compares the investment return minus the return of a risk-free asset, and then the return is normalized based on the level of risk in the investment. Better stock performance is reflected in a higher index value. The Sharpe Index not only considers the rate of return on investment but also considers the risks involved. By measuring a stock's success not just based on profit alone, this index provides a more comprehensive view of investment performance by considering the level of risk that may occur. Therefore, the Sharpe Index provides a solid foundation for evaluating and selecting stocks that produce an optimal balance between return and risk, a crucial factor in investment decision-making. The calculation of the Sharpe Index is based on a specific mathematical formula [13].

$$S_i = \frac{\bar{R}_i - \bar{R}}{\sigma_i} \tag{1}$$

S_i : Sharpe index
$\bar{R}_i$: average return of stock-i
σ_i : standard deviation of the return of stock-i
$\bar{R}$: average return of the risk-free interest rate

Treynor Index

The Treynor Index is a tool for evaluating the performance of an investment by considering risk. This index is measured by calculating the ratio of profits generated for each risk that arises. Good stock performance is reflected in a high index value. The Treynor Index provides a more detailed perspective on investment performance by incorporating risk factors into its analysis. By assessing the return ratio obtained per level of risk, this index helps investors understand the extent to which a stock provides relative profit compared to the risk taken [14].

$$T = \frac{\bar{R}_i - \bar{R}}{\beta_i} \tag{2}$$

T_i : Treynor index
$\bar{R}_i$: average return of stock-i
$\bar{R}$: average return of the risk-free interest rate
β_i : beta coefficient for stock-i

Jensen Index

The third approach uses the Jensen Index, often referred to as Jensen's Alpha. The Jensen ratio is used to assess the extent to which an investment manager can generate above-average results. The Jensen's Alpha index measures how efficiently a manager can manage investments and achieve results that exceed market expectations. Jensen's Alpha index offers a unique perspective in evaluating investment performance, as it considers the final results and assesses the manager's ability to optimize returns relative to the level of risk taken. In this way, the index provides a more comprehensive picture of the manager's contribution to investment performance. Using the Jensen's Alpha index, investors can identify whether an investment manager can create added value or fall below market expectations. Therefore, the Jensen index becomes a valuable tool in evaluating and

selecting investments that yield optimal results. The calculation of the Jensen Index follows a specific mathematical formula [15].

$$\alpha_i = (\bar{R}_i - \bar{R}) - [\beta_i(\bar{R}_M - \bar{R})] \quad (3)$$

α_i : Indeks Jensen
$\bar{R}_i$: average return of stock-i
$\bar{R}$: average return of the risk-free interest rate
β_i : beta coefficient for stock-i
$\bar{R}_M$: average market profit

If the Jensen's alpha value shows a positive number, it indicates that the investment performance has an advantage in terms of return. Conversely, the investment performance is considered neutral if the value is zero. However, if Jensen's alpha value is negative, the investment is deemed to have suboptimal performance. In evaluating investment performance, the Treynor and Jensen index methods utilize a beta coefficient, which is calculated using a mathematical formula:

$$\beta = \frac{\sigma_{i,M}}{\sigma_M^2} = \frac{[n\sum(R_M.R_i] - [\sum R_M \sum R_i]}{n(\sum {R_M}^2) - (\sum R_M)^2} \quad (4)$$

β : beta coefficient
$\sigma_{i,M}$: covariance between the return of stock-i and the return of the market portfolio
σ_M^2 : variance of market
n : number of data samples
R_M : market return
R_i : return of stock-i

The beta coefficient is vital in assessing how much an investment moves in line with market movements. Using beta helps understand the level of risk involved in an investment and the extent to which the investment is defensive or aggressive towards market fluctuations. Market conditions can be inferred from the beta value, which follows.

Table 1. Beta value

Indicator	Explanation
$\beta < 1$	Stocks have a lower risk compared to the market
$\beta = 1$	Stocks have the same risk as the market
$\beta > 1$	Stocks are considered to have a higher risk compared to the market

Selection of the Best Stocks

By evaluating the previous indices, each of the 30 stocks included in the JII index will be given a score ranging from 1 to 30. The highest score, 30, is awarded to the top-ranked stock from each index analysis, while the lowest score, 1, is given to the last-ranked stock in each analysis. The highest cumulative score from all indices determines the best stock. This assessment process allows for identifying stocks that excel not just in one aspect but also in evaluating their overall

performance through different criteria. The scores reflect the extent to which a stock meets specific parameters considered necessary in the index analysis.

Formation of the Best Portfolio

An optimal portfolio is formed by minimizing variance, which is a measure of risk. As a result, the formed portfolio will have the smallest risk. The profit of a portfolio is the weighted average of the expected profit of each stock, and is expressed as follows:

$$E(r_p) = \sum_{i=1}^{n} w_i \cdot E(r_i) \tag{5}$$

$E(r_p)$: expected return of a portfolio
w_i : proportion of stock-i
$E(r_i)$: expected return of the stock

The importance of low variance in the search for an optimal portfolio emphasizes efforts to reduce risk as far as possible. Thus, minimizing variance through intelligent weighting composition of different assets becomes vital in forming a portfolio that performs well overall and has an acceptable level of risk. Since the risk of a portfolio refers to the variance of its constituent stocks, the variance of two stocks is expressed as follows:

$$\sigma_p^2 = w_x^2\sigma_x^2 + w_y^2\sigma_y^2 + 2w_x w_y \rho_{xy}\sigma_x\sigma_y \tag{6}$$

and the variance of three stocks is expressed as

$$\sigma_p^2 = w_x^2\sigma_x^2 + w_y^2\sigma_y^2 + w_z^2\sigma_z^2 + 2w_x w_y \rho_{xy}\sigma_x\sigma_y + 2w_x w_z \rho_{xz}\sigma_x\sigma_z + 2w_y w_z \rho_{yz}\sigma_y\sigma_z \tag{7}$$

σ_p^2 : portfolio variance
w_i : weight of stock-i in the portfolio
σ_i : standard deviation of the returns of stock-i
ρ_{ij} : correlation of the returns of stocks i and j
where $i, j = x, y, z$.

RESULT AND DISCUSSION

This study used JII stock data from March 2018 to February 2023. The JII stock data consists of 30 types of stocks categorized under Sharia-based management. The stock prices used are the daily closing prices of each stock. As a comparison in the data analysis, the Jakarta Composite Index (IHSG) is used as the market portfolio, and Bank Indonesia's interest rate (BI rate) is used as the risk-free rate. By assigning scores in the analysis of the Sharpe, Treynor, and Jensen indices, a comprehensive understanding of each stock's relative performance and potential risks is expected to be gained. After scoring each index for the JII stocks, the top three stocks are identified, as shown in Table 2.

Table 2. Total score of the top three stocks

Stock code	Score			Total
	Sharpe	Treynor	Jensen	
MDKA	30	29	30	89
HRUM	29	28	28	85
BRIS	28	24	29	81

Table 2 shows that the selected stocks are the best performers in terms of the Sharpe and Jensen indices. BRIS, which is not the top performer in the Treynor index, can still be selected. We combine all three indices, so the selection is not based solely on one index. Next, we calculate the average returns and standard deviations of the three selected stocks, as shown in Table 3.

Tabel 3. Deskripsi saham MDKA, HRUM, BRIS

Stock code	Expected return	Standard deviation
MDKA	0.045941	0.128475
HRUM	0.036321	0.206434
BRIS	0.039199	0.227145

From this, MDKA ranked first and has the highest average returns with the lowest risk. Next in line are HRUM and BRIS, with lower returns and higher risks. Furthermore, to determine the weight of each stock in each portfolio, it is necessary to establish the correlation of returns between these three stocks, as indicated in Table 4.

Table 4. Correlation table of MDKA, HRUM, BRIS

	MDKA	HRUM	BRIS
MDKA	1		
HRUM	0.000540	1	
BRIS	0.323047	0.248750	1

The highest correlation between the stock BRIS and the other two stocks is observed. Meanwhile, MDKA and HRUM have a relatively low correlation. In forming a portfolio with only one stock, MDKA, with the highest combined score, the expected returns and risks can be seen in Table 5.

Table 5. Single stock portfolio of MDKA

Parameter	Value
w_x	1.000000
$E(r_p)$ (per month)	0.045940
$E(r_p)$ (per year)	0.551291
σ_p^2	0.0165057
σ_p	0.1284745

The parameters in Table 3 and Table 4 are used to determine the weights in portfolios with two or three stocks. A portfolio with a single stock, with a 100% allocation to MDKA, yields an expected return of 4.5% per month (55.12% per year) with a risk level (standard deviation) of 12.84%.

The optimal portfolio composition for two or three stocks in the JII can be calculated by minimizing the variance function in Equations (6) and (7). Furthermore, the expected return of the portfolio is determined by Equation (5).

Table 6. Portfolio of two stocks MDKA and HRUM

Parameter	Value
w_x	0.724924
w_y	0.275077
$E(r_p)$ (per monht)	0.043294
$E(r_p)$ (per year)	0.519536
σ_p^2	0.012114
σ_p	0.110063

Table 7. Three-stock portfolio of MDKA, HRUM, and BRIS

Parameter	Value
w_x	0.691715
w_y	0.265528
w_z	0.042757
$E(r_p)$ (per month)	0.043098
$E(r_p)$ (per year)	0.517179
σ_p^2	0.011824
σ_p	0.108739

Table 6 shows the composition of the two selected stocks, MDKA and HRUM. By diversifying the portfolio, a portfolio using the two selected stocks, MDKA at 72.49% and HRUM at 27.51%, is obtained, providing an expected return of 4.32% per month (51.95% per year) with a risk level (standard deviation) of 11%. Then, Table 7 displays the composition of the three selected stocks: MDKA, HRUM, and BRIS. The portfolio with the top three stocks, MDKA at 69.17%, HRUM at 26.55%, and BRIS at 4.28%, yields an expected return of 4.3% per month or 51.72% per year with a portfolio risk (standard deviation) of 10.87%. A comparison of the returns and risks of these three types of investments can be seen in Figure 1. Increasing the number of stocks in the portfolio will decrease the level of returns, but this also leads to a reduction in the level of risk.

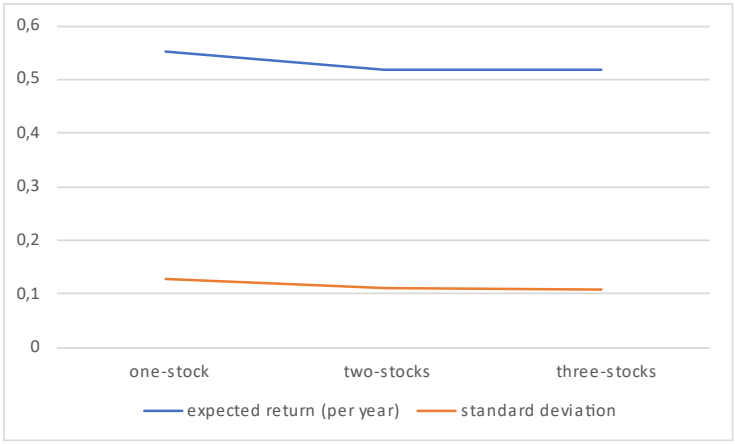

Figure 1. Comparison of single investment and diversification

CONCLUSION

This research aims to compare the expected profits and measured risks obtained from various types of investments. The focus of our research is on investments that diversify portfolios. We consider portfolios with one, two, and three different stocks. Our research results show that diversification significantly impacts the returns and risk levels that can be obtained. By separating our investments into several different stocks, we can control the risk that may arise from one of the lower-risk stocks. This diversification can be an essential strategy for investors, especially in the Islamic stock market.

This research can also be developed further by combining portfolios from various stock sectors so that other sectors can offset the risks associated with one sector. This can increase the effectiveness of diversification strategies and provide a better understanding of managing risk in Islamic stock investments. The findings of this research can be a valuable guide for investors interested in developing their portfolios efficiently in the context of the Islamic stock market.

REFERENCE

[1] L. Siti Aminah, "The Effect of Current Ratio, Net Profit Margin, And Return on Assets on Stock Return," *Journal of Management, Accounting, General Finance and International Economic Issues*, vol. 1, no. 1, pp. 1–9, Dec. 2021, doi: 10.55047/marginal.v1i1.8.

[2] N. Rahmawati, *Manajemen Investasi Syariah*. Mataram: Institut Agama Islam Negeri (IAIN) Mataram, 2015.

[3] Otoritas Jasa Keuangan, "Statistik Saham Syariah - Desember 2022," Dec. 2022.

[4] E. Pardiansyah, "Investasi dalam Perspektif Ekonomi Islam: Pendekatan Teoritis dan Empiris," *Economica: Jurnal Ekonomi Islam*, vol. 8, no. 2, pp. 337–373, Oct. 2017, doi: 10.21580/economica.2017.8.2.1920.

[5] N. latifa Hadi and A. Indrasetianingsih, "FORECASTING INDEKS HARGA SAHAM GABUNGAN (IHSG) DENGAN MENGGUNAKAN METODE ARIMA," *J Statistika: Jurnal Ilmiah Teori dan Aplikasi Statistika*, vol. 6, no. 1, Jul. 2014, doi: 10.36456/jstat.vol6.no1.a302.

[6] S. Febrianti, "Analisis Perbandingan Kinerja Indeks Saham Syariah dengan Indeks Saham Konvensional Periode 2015-2017 (Studi Kasus pada JII dan LQ45)," 2018. [Online]. Available: www.syariah.ojk.go.id

[7] Z. Bodie, A. Kane, and A. J. Marcus, *Investments and Portfolio Management*, 9th ed. New York: McGraw-Hill, 2010.

[8] A. Sodiqin, "Kinerja Portfolio dengan Metode Sharpe, Jensen dan Treynor pada Saham Industri Tekstil di Bursa Efek Indonesia," *Jurnal Manajemen Bisnis Krisnadwipayana*, vol. 8, no. 1, Apr. 2020, doi: 10.35137/jmbk.v8i1.382.

[9] N. Septiana, Primadina Hasanah, and Annisa Rahmita Soemarsono, "Analisis Volatilitas Harga Saham Sekor Minyak dan Gas di Indonesia pada Masa Pandemi Covid-19 dengan Metode ARIMA-GARCH," *J Statistika*, vol. 14, no. 2, pp. 99–109, Jan. 2022, doi: 10.36456/jstat.vol14.no2.a4497.

[10] R. Setiawan, O. R. Putri, and A. C. Sukmawati, "Diversifikasi Portofolio Kredit, Risiko dan Return Bank," *Jurnal Akuntansi*, vol. 15, no. 1, pp. 189–199, May 2023, doi: 10.28932/jam.v15i1.6376.

[11] K. Alim, A. Rahmawati, and B. Matsaany, "Formation of Optimal Portfolio on JII Stock using Sharpe, Treynor, and Jensen Indices during the Period of 2018-2023," *Jurnal Matematika, Statistika dan Komputasi*, vol. 19, no. 3, pp. 593–601, May 2023, doi: 10.20956/j.v19i3.26354.

[12] W. Wihardi and A. Lutfi, "Pembentukan Portfolio Optimal Untuk Berinvestasi pada Saham Perusahaan Perbankan di Bursa Efek Indonesia dengan Metode Sharpe, Treynor dan Jensen Periode 2013-2017," *Jurnal Manajemen Bisnis dan Kewirausahaan*, vol. 4, no. 3, p. 74, May 2020, doi: 10.24912/jmbk.v4i3.7920.

[13] A. Priyanti, I. Nurhayati, R. S. Amind, and D. R. J. Manager, "Analisis Evaluasi Kinerja Portofolio Saham dengan Metode Sharpe," *2 Mei*, vol. 4, no. 2, pp. 174–181, 2021, [Online]. Available: http://ejournal.uika-bogor.ac.id/index.php/MANAGER

[14] S. Aeni, S. Siti, R. Handayani, and R. Hidayat, "Evaluasi Kinerja Investasi Portofolio dengan Menggunakan Model Treynor (Studi Pada Perusahaan Food & Beverages Yang Listing Di BEI Periode 2013)," *Jurnal Administrasi Bisnis (JAB)|Vol*, vol. 23, no. 1, 2015.

[15] S. Syam, A. Rauf, and C. I. Musa, "Analisis Pembentukan Portofolio Optimal dengan Single Index Model untuk Proyeksi Investasi pada Saham Index LQ45 di Bursa," *Jurnal Ilmu Manajemen Retail (JIMAT)*, vol. 2, no. 2, 2021, [Online]. Available: https://doi.org/