Al-Intaj
Jurnal Ekonomi dan Perbankan Syariah

Published by UIN Fatmawati Sukarno Bengkulu
pISSN 2476-8774 | eISSN 2661-688X
Vol. 11 No. 2 September 2025 | Pages 318-336
https://ejournal.uinfasbengkulu.ac.id/index.php/Al-Intaj/index

Evaluation of Revenue Volatility Risk in Financing Assets of Islamic Banks in Indonesia: Variance and Standard Deviation Approach

Darma Taujiharrahman[1*], Bambang Kismojo[2], Elsa Puspita[3], Muhammad Miftah Kharmain[4]
[1,2,3]Universitas Diponegoro, Indonesia
[4]Islamic University of Madinah
Email: darmarahman@lecturer.undip.ac.id, kismojobambang@gmail.com, elsapuspita432@gmail.com, 421027903@stu.iu.edu.sa

ABSTRACT

Purpose: *This study aims to measure the risk associated with the financing assets of Islamic banks in Indonesia by examining the volatility of income generated, both at the level of individual assets and within a portfolio context..*

Design/methodology: *This research adopts a quantitative approach through descriptive statistical methods. The analysis utilizes variance and standard deviation formulas to process historical data obtained from the official statistics of Islamic banking in Indonesia over the period 2015-2024.*

Findings: *The findings indicate that portfolio diversification can reduce risk levels in Islamic bank financing assets. However, a high degree of correlation among financing instruments suggests that the diversification strategy may not be fully effective. This highlights the importance of asset selection and correlation analysis in constructing resilient Islamic finance portfolios.*

Practical implications: *Periodic and empirical risk assessments are crucial for evaluating strategic vision within a risk management framework. This study reveals that diversification practices in Islamic banks in Indonesia are executed by considering risk-return deviation, particularly through high musyarakah allocations with low deviation rates. Equity-based financing demonstrates a safer deviation rate than fixed-based financing such as murabahah, istishna, and ijarah thereby offering an alternative allocation to secure portfolios.*

Originality/Value: *This study contributes to the literature by offering an empirical evaluation of income volatility risks in Islamic banking financing assets. It critically assesses the implementation of diversification strategies, providing insights into their effectiveness and alignment with the foundational goals of Sharia-based financial risk management.*

Keywords: Islamic banking, portfolio risk, income volatility, variance, standard deviation, diversification strategy

Received: 25/06/2025 | Accepted: 24/08/2025 | Published: 14/09/2025

A. INTRODUCTION

Risk and return become trade off phenomena that are natural in all business and investment processes. Ibn Khaldun in Muqaddimah explains the importance of diversification in making investment allocations by considering the rate of risk and return that is fundamentally attached to an investment asset (Khaldun, 1967). Islamic banks as intermediary institutions are mandated to allocate surplus financial resources to deficit parties, which in the study of qowaid ushul is an operational form of extracting the meaning of "*majazi*" in the At-Taubah 103 verse, namely taking material benefits from surplus parties to provide capital injections to deficit parties (Dawudi, 2010). In practice, Islamic banks carry out business processes that are vulnerable to fraud risk due to the underlying rules of the Islamic contract regarding the mechanism for sharing business results based on profit and loss sharing (Sutrisno et al., 2023). (Waemustafa & Sukri, 2015) explained that the main reason for the emergence of this risk is financing products and allocation to high-risk sectors. Al-Suyuthi, (1983) explained in a review

of fiqh rules, that everything that brings harm must be eliminated and everything that invites doubt must be confirmed in order to reach the level of confidence so that it is closer to certainty.

Strategic steps in achieving the goal of Islamic banks as the driving force of the people's economy that is not only business-oriented but also spreads maslahat and sustainable financial benefits are carried out by eliminating the practice of *ribawi*, *gharar* and speculative activities (*maisir*) (Yusoff et al., 2023). This decision opens opportunities for Islamic banks to present product diversification which is a competitive advantage with conventional banks, including through cooperation-based products such as *musyarakah* and *mudharabah*, as well as sale-based products such as *murabahah*, *istishna*, and *ijarah*. *Musharakah* and *mudharabah* products have equity-based characteristics making them suitable for long-term financing for companies and businesses, while sale-based financing has debt-based characteristics making it suitable for use in financing current capital. This diversification makes Islamic banks not only as capital suppliers for current asset needs but also in fixed asset needs for debtor companies.

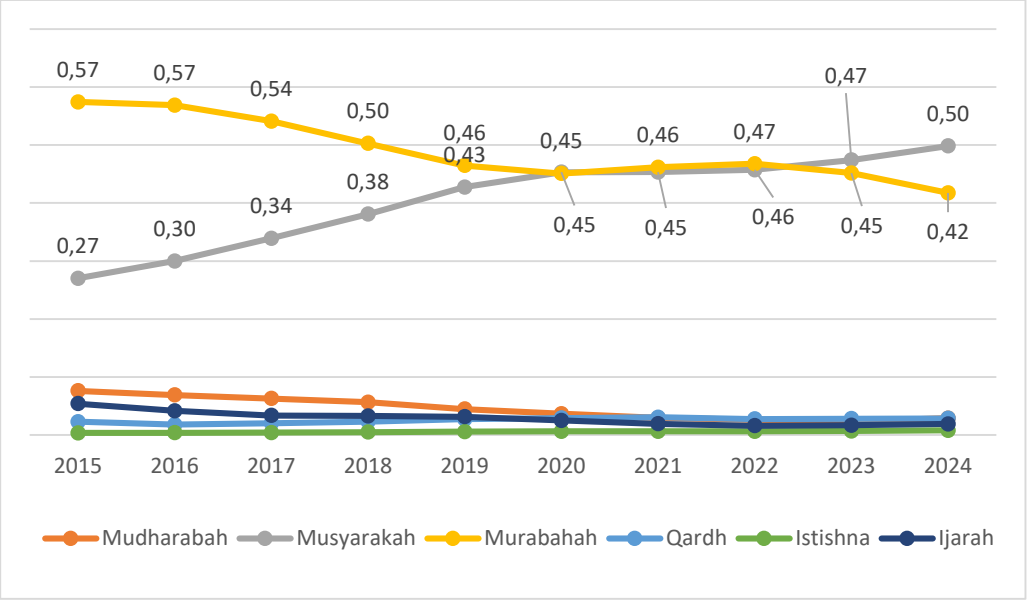
Table 1. Total Financing Allocation of Islamic Banks (*in billion rupiah*)

Year	*Musya*	*Mudhar*	*Murab*	*Qardh*	*Istishna*	*Ijarah*	*Total*
2015	60.817	15.698	122.118	3.951	770	10.635	213.989
2016	78.511	16.241	139.575	4.731	878	9.151	249.087
2017	101.576	18.114	150.388	6.349	1.189	9.233	286.849
2018	129.653	16.920	154.852	7.674	1.609	10.597	321.305
2019	157.520	14.972	160.687	10.572	2.097	10.589	356.437
2020	174.936	12.883	174.323	11.872	2.364	8.635	385.013
2021	187.493	10.739	190.900	11.920	2.496	6.908	410.456
2022	223.713	11.984	233.058	13.438	3.013	7.956	493.162
2023	278.251	13.979	248.609	15.866	3.915	9.642	570.262
2024	316.049	18.305	256.060	18.835	5.365	12.133	626.747

Source: Statistic of Islamic Bank, 2025

In the last 10 years, Islamic banks in Indonesia have recorded rapid growth in financing assets in their six leading products with an average of 13 percent per year with total financing reaching 600 trillion rupiah in 2024. This growth only experienced a slowdown in 2019 and 2020 which was thought to be the impact of the crisis due to the COVID-19 outbreak. From the total allocation of financing, Islamic banks are able to collect a return ratio of up to 11 percent per year on each asset. Markowitz, (1952) in the portfolio model explains the advantages of allocating investments that are not focused on one asset can reduce the risk of return. Adopting the thought of Ibn Khaldun who in 1377 AD explained that the allocation of investment and the like must be based on the consideration of macro factors that participate in binding the sustainability of the process, both in terms of society and banking institutions (Khaldun, 1967). Islamic banks embody Ibn Khaldun's opinion through the operation of diversified financing products in order to adjust to the needs of current conditions, on the other hand this strategy also offers risk mitigation of volatile returns.

Figure 1. Asset Weight in Financing Portfolio of Islamic Banks (in percent)



Source: Statistic of Islamic Bank, 2025

In the current business process, there are two products that dominate the portion of Islamic bank financing allocation in Indonesia, *musyarakah* products for equity-based financing and *murabahah* for debt-based financing. In 2015 *murabahah* still dominated the portion up to 57 percent but by the end of 2023 to 2024, equity-based musyarakah had a higher portion than *murabahah.* Sari et al., (2024) explained in the value at risk study that equity-based financing products have a tendency to have a higher deviation risk than debt-based. This is certainly not in line with the history of financing that occurred in Islamic banks in Indonesia, which slowly shifted the portion of financing by increasing the types of equity-based financing through *musyarakah* products, becoming a unique phenomenon that can be studied. This portion switching can be a form of risk mitigation strategy carried out on a sharia compliment basis through a diversification approach with financial products designed with sharia principals, which means that both superior products in both debt-based and equity-based approaches are in line with the mission of the sharia principal which does not need to be debated on the quality of its performance (Baej & Worthington, 2014; Yusoff et al., 2023).

Previous research has measured the financing risk of Islamic banks based on default or credit risk issues due to the loss and profit-sharing basis which is considered to have a high risk with the potential for fraud and moral hazard inherent (How et al., 2005; Sutrisno et al., 2023; Waemustafa & Sukri, 2015). Various recommendations presented in the development of strategies are recognized as being able to maintain NPF in Islamic banks in Indonesia, which in the last 3 years has only reached 2% for all types of financing and 2% for profit-sharing-based financing, which is often considered to have a higher potential for fraud. In another view, Grira et al., (2019) explained that the risks faced by Islamic banks in general are not only in the problem of potential fraud and defaults that are higher than conventional due to products that are not fixed returns, but also in the aspect of the cost of equity which is considered to be very high considering the requirement to do risk sharing when the business is in a state of loss and profit sharing which makes banks unable to achieve high profits. This opinion is not in line with the growth of Islamic bank assets which continues to increase from year to year.

To respond to some previous research results on potential risk in Islamic banks, Sari et al., (2024) conducted a value at risk approach to measure deviation-based risk return from historical financing data of Islamic banks in Indonesia. However, the research conducted is only limited to *mudharabah, murabahah* and *musyarakah* products, not covering the entire Islamic bank financing portfolio that is consistently allocated such as *qardh, istishna* and *ijarah*. The variety of financing products that are not limited to *musyarakah* and *murabahah* templates alone is an added value for Islamic banks in carrying out their business operations so that it becomes very necessary to be involved in the financing portfolio of Islamic banks. Ismail, (1996) in the concept of fiqh rules explains that to build empirical statements it is necessary to test to eliminate doubts in it "*Al-akhdzu bil yaqin wa thorhu 'an syakki wa syubhat*". On this basis, the research will analyzes the impact of the diversification strategy of six financing products (*mudharabah, musyarakah, murabahah, qardh, istishna', ijarah*) on the Value-at-Risk of Indonesian Islamic banking portfolios. The results of this study aim to provide a risk assessment of the strategy and financing management of Islamic banks in Indonesia in order to provide recommendations on products that have the best risk return and portfolio strategies that can be done in Islamic banks. Moreover, it contributes to the advancement of an Islamic bank portfolio risk management model by establishing an empirical measurement framework to validate the efficacy of Islamic-based financial business models.

B. LITERATURE REVIEW

1. Role of Islamic Bank in Financing

Islamic banking functions as an intermediary institution whose task is to collect and distribute public funds. Islamic banks can collect public funds in the form of deposits, demand deposits, or other similar contracts based on *wadiah* contracts and not contrary to sharia principles. Meanwhile, in carrying out the function of channeling funds to the community, Islamic banks can do so by financing based on *murabahah*, *musyarakah*, *mudharabah*, *salam*, *istishna*, *ijarah*, or other contracts that are equivalent and not contrary to sharia (Pebruary & Isnaini Hani'ah, 2024). Not only in economic growth, financing by Islamic banks is also a profit-oriented business process for the sustainability of the Company (Firdayati & Canggih, 2020). This is reflected in the Indonesian Islamic financial development report which shows that the increase in financing is directly proportional to the growth of Islamic bank assets (OJK, 2024a).

The business process of Islamic bank intermediation in the funding or lending function is carried out in practices that are permitted in Islam, which in this case are legitimized through the fatwas of the National Sharia Council. For example, the *mudharabah* will be explained in fatwa 115/DSN-MUI/IX/2017 which can be implemented in the form of funding through a *muthlaqah* approach or as lending through a *muqayyadah* approach (MUI, 2017b). Or the *musyarakah mutanaqishah* contract and *murabahah* sale and purchase as the largest lending product in the Islamic banking industry which is explained in fatwa 73/DSN-MUI/XI/2008 and 111/DSN-MUI/IX/2017 (MUI, 2008, 2017a). Islamic banking does a lot of financing in the real sector, such as MSMEs, infrastructure, and other productive sectors compared to its allocation to the financial sector (OJK, 2024b). Islamic banking has an important role in improving social welfare. Islamic banking also supports long-term projects and contributes to sustainable economic growth (Junaidi, 2024). This is supported by financing product models that are varied and adaptive for use in various project needs.

In the implementation of the Islamic banking business in Indonesia, the government through the National Sharia Council issues fatwas and technicalities related to financing products that can be done, and also provides various policies to maintain the financial health of Islamic banks. For example, the establishment of POJK Number 21 of 2014 concerning the Obligation to Provide Minimum Capital for Islamic Commercial Banks. Maughfiroh, (2020) emphasized the importance of minimum core capital growth that encourages the formation of large-scale Islamic banks. Through this policy, it is expected to increase capital productivity and more efficient and less risky business implementation. The government is also preparing a legal basis that can accelerate the licensing of bank products and business activities in order to develop highly competitive Islamic financial product innovations. Technology integration in financial products is needed to expand reach and reduce operational costs. More intensive education and literacy efforts are needed to increase public understanding of the principles of Islamic banking and its products (Herawati & Mukhsin, 2025). Through these steps, it is expected that the investment climate in Islamic banking can improve, the financing capacity of the real sector will increase, and Islamic finance can contribute significantly to inclusive economic growth.

2. Diverse Sharia-compliant financing portfolios in Islamic bank

Investment is an asset development activity carried out in accordance with Islamic principles, which is free from elements of usury, gharar, and maysir, either directly or indirectly. The purpose of this investment is to gain profit from the assets that have been invested. In the context of Islamic banking, investment is carried out through an intermediation mechanism, namely by allocating funds from surplus parties to deficit parties for productive activities (Lewis, 2014). The profits obtained are then distributed to the owners of funds who deposit them in Islamic banks. This process is carried out by emphasizing the selection of halal assets and projects and upholding the principles of justice and risk sharing (Dayyesi et al., 2023; Sapuan et al., 2015). The existence of various Islamic investment instruments allows investors to form a diversified portfolio, but still in line with the provisions of sharia law.

As explained earlier, the implications of the application of sharia that has been outlined in the DSN-MUI fatwa make Islamic banks in Indonesia have a variety of diverse products that can be used in financing projects whether they are profit-loss sharing or not. Some of the products include *mudharabah* and *musyarakah* which fall into the profit-loss sharing category, then *murabahah, ijarah* and *istishna* which use a fixed income approach as well as social-based financing practiced in *qardh*. *Mudharabah* is a contract in which one party provides capital and the other party provides expertise to manage a business, with profits shared according to the agreement of both parties which is widely implemented in the form of financial instruments (Rusby et al., 2016). *Musyarakah* is a form of cooperation in which all parties contribute capital, with losses in accordance with the capital contribution provided, which is widely implemented in business ventures and home financing products (Jaffar et al., 2012). Both products use a partnership approach in which each party contributes capital either in the form of money or other types of capital. Profits or losses from the business process are shared by each party according to the portion that has been agreed upon at the beginning of the contract.

Meanwhile, financing that does not use the profit-loss sharing approach includes murabahah sale and purchase, ijarah and istishna. Murabahah sale and purchase takes profit in the form of an agreed margin, where the bank sells the goods to the customer at a price that includes the cost and profit margin, which is widely practiced in trade financing (Miah &

Suzuki, 2018). Ijarah, which is a lease contract between the customer and the bank for a certain period of time, takes profit from the rental fee for the benefits received, not from the transfer of ownership rights (Alkhan, 2020). Furthermore, istishna' is an order contract for goods that are produced or made in advance, where the bank acts as the financier of the production process of goods according to the specifications determined by the customer. After the goods are produced, the bank hands them over to the customer and receives payment according to the agreement. It is commonly used in construction projects, manufacturing, and procurement of specialty goods. The three financing schemes reflect the flexibility of Islamic banking products in adjusting to the needs of the real sector, while maintaining compliance with sharia principles, especially in avoiding elements of usury, *gharar*, and *maysir* (Al-Feel, 2019).

3. Risks in Islamic bank financing portfolio

Islamic banking investment portfolios face various risks and deviations that influenced by the principles and structure of Islamic finance. Islamic banks have more complex risks because they are required to comply with sharia principles in all their business activities (Nurfadhilah et al., 2023). The risks involved in the business activities of Islamic banks as referred to in Article 5 of the Financial Services Authority Regulation No. 65/POJK.03/2016 concerning the Implementation of Risk Management for Islamic Commercial Banks and Islamic Business Units, include credit risk, market risk, liquidity risk, operational risk, legal risk, reputation risk, strategic risk, compliance risk, yield risk, and investment risk (OJK, 2016).

Yield risk in banking finance pertains to the potential variability in returns encountered by banks due to fluctuations in interest rates, market conditions, and other financial factors. Islamic banks address this risk by adhering to Sharia-compliant financial principles and models, such as profit and loss sharing and the prohibition of interest rate fluctuations in response to market changes. The adoption of profit and loss sharing mitigates yield risk for financial institutions, as returns are directly linked to the performance of the underlying asset or business (Danlami et al., 2023). By prohibiting fluctuating interest rates, returns become variable and contingent on actual business outcomes, thereby aligning the interests of both parties and reducing the risk of yield fluctuations (Yusoff et al., 2023).

Operational risk and sharia compliance risk are two other types of risk in Islamic banking that are interrelated and cannot be separated. Islamic bank operations must be carried out in accordance with the principles and provisions of applicable Islamic law, which includes all business processes, from fund raising, financing distribution, feasibility analysis, financing settlement, to the overall management and management of the company. The need to comply with sharia provisions causes the operational structure of Islamic banks to be more complex than conventional banks, which has an impact on high operational costs. These costs include the procurement and operationalization of the Sharia Supervisory Board, the implementation of internal sharia audits, as well as education and training programs for employees to have an adequate understanding of various sharia contracts such as *Murabahah*, *Ijarah*, and *Musyarakah* (Mukhibad et al., 2024). The high variable costs have the potential to create revenue uncertainty, especially when revenue realization is not in line with initial financial projections. These mismatches increase exposure to operational risk, which can compromise the bank's financial stability if not managed effectively.

4. Deviations measurement for Islamic Bank Portfolio.

In an effort to anticipate risks, especially those potentially arising from the operational activities of companies that are the parent or main source of income for Islamic banks, a

systematic and continuous evaluation mechanism is needed. One important approach in this regard is to assess financing, a core banking product. This assessment serves not only as a financial performance monitoring tool but also as a risk profiling instrument that can identify potential losses early on. Through this process, Islamic banks can obtain a more comprehensive picture of the parent company's financial stability and its impact on the bank's business continuity.

A model that can be used in assessing Islamic bank portfolios is the parametric variance-covariance model, a Value at Risk approach. In a portfolio context, variance-covariance measurements can assess the quality of asset allocation, including in the context of financing in Islamic banks (Grechuk & Zabarankin, 2014; Yuen & Yang, 2012). This model has not been widely used to assess risk in Islamic bank financing portfolios, but it is relevant to the Islamic financial system, particularly the diverse characteristics of financing, both equity-based financing such as musharaka and mudharabah, and debt-based financing such as murabahah and ijarah, which can apply diversified asset allocation. The diversity of financing structures in Islamic banks demands an adaptive and accurate portfolio management approach, where the standard deviation approach can describe risk conditions, particularly in terms of return volatility (Chen et al., 2018; Estrada, 2004) .

By utilizing dynamic data, variance can be adapted to provide a more efficient and responsive risk evaluation to market fluctuations in the form of individual assets or portfolios (Dombrovskii & Andrienko, 2020). Chu et al., (2011) explained that this approach can also be used to minimize the probability of portfolio performance being below a certain benchmark so that the manager can determine the minimum level of risk he wants to take in managing a large portfolio such as that of an Islamic bank. Deviation measures play an important role in portfolio management which makes it possible for Islamic banks, to adjust their investment strategies to risk preferences and dynamic market conditions, resulting in more resilient and highly resilient portfolios.

C. METHOD

The method used in this study is quantitative with a descriptive and analytical statistical approach. The aim is to explain the level of investment risk in Islamic bank financing assets in Indonesia. The objects analyzed are historical Islamic financing data based on the type of contract, obtained from the official statistical publications of the Financial Services Authority (OJK) and Bank Indonesia for the period 2015 to 2024. The types of financing assets studied include financing with *musyarakah, mudharabah, qardh, murabahah, ijarah,* and *istishna* contracts. Risk measurement is done in two stages. The first stage is a risk analysis for each asset type individually (single asset risk), which is calculated using the variance and standard deviation of the returns generated by each asset in the portfolio. These two metrics are used to measure the extent to which each asset fluctuates or is volatile relative to its average value (Cox Jr., 2008).

$$\sigma^2 = \frac{1}{n}\sum_{t=1}^{n}(R_i - E(R))^2 \quad \ldots (1)$$

$$\sigma = \sqrt{\sigma^2} \quad \ldots (2)$$

The second stage is the analysis of portfolio risk, which is the combination of several types of Islamic financing to form a hypothetical portfolio. This analysis uses the *Modern Portfolio Theory* (MPT) approach developed by Markowitz, by considering the correlation between asset types to calculate the total portfolio risk through the combined standard deviation (Lam et al., 2013). This model is relevant in the context of financing risk management in Islamic banks, which requires optimal asset allocation while still complying with sharia principles.

The measurement of R_i or return from assets in year i is obtained by comparing the total financing allocation for each product with the resulting return. Data for each product are processed every quarter for ten years at Islamic Commercial Banks and Islamic Business Units in Indonesia. $E(R_i)$ or expected return is obtained from the average R_i for each product obtained

$$E(R_i) = \frac{1}{n}\sum_{t=1}^{n} R_i \quad \ldots (3)$$

$$E(R_p) = \sum_{k=0}^{n} w_i \times E(R_i) \quad \ldots (4)$$

each year, as explained in Equation (3). $E(R_p)$ explains the expected return from the portfolio obtained annually as measured by w_i or the weight of each asset in the portfolio with $E(R_i)$ in each year (4). This value describes the estimated return that can be generated simultaneously from all assets in the portfolio.

$$\sigma_p^2 = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i \times w_j \times \mathrm{Cov}(R_{i,}R_j) \quad \ldots (5)$$

$$\sigma_p = \sqrt{\sigma^2} \quad \ldots (6)$$

The application of this model in portfolio measurement offers the advantage of assessing the diversification strategies inherent in Islamic financial business processes, specifically as implemented by Islamic banks for risk mitigation or the optimization of expected returns. This model primarily focuses on analyzing historical data that reflects capital market activities in stocks and similar instruments, rendering it potentially unsuitable for use in PLS-based asset measurement (Lleo & Maclean, 2024). Nevertheless, employing this model to evaluate Islamic banks' asset allocation for financing purposes is not entirely inappropriate, given the similar nature of the business, as corroborated by the research conducted by (Sari et al., 2024).

D. RESULT AND DISCUSSION

1. Average Return of Sharia Banking Asset

The results of processing financial data provided to the Financial Services Authority of the Republic of Indonesia through Islamic banking statistics containing BUS (Sharia Business Bank) and UUS (Sharia Business Unit) data explain the average return on assets in the financing portfolio of Islamic banks in Indonesia ranging from *mudharabah, musyarakah, murabahah, qardh, istishna* and *ijarah*. Each portfolio asset is provided in monthly form. The average return shows that apart from *qardh* financing, all assets show a negative trend or decline from 2015 - 2024 with a note on *mudharabah* assets experiencing the deepest decline, namely 7.34% in 2015 to 3.54% in 2024, directly proportional to the portion of financing which also decreased from 0.8% per year to 0.3%. This phenomenon can assume the existence of risk profiling of Islamic banks in *mudharabah,* which is more avoided in terms of uncertain returns, potential defaults, or also from the response to market demand. This is because *mudharabah* products are *mutalqoh* or absolute, so banks are not obliged to intervene in business processes and more complex control mechanisms on customer performance, resulting in the potential for higher operational costs (Amalia et al., 2019; Sari et al., 2024). In terms of credit risk, *mudharabah* with profit-loss sharing has a vulnerability to fraud and manipulation in terms of bookkeeping so that it will affect the risk of returning capital, even so some opinions explain that *mudharabah* has the suitability to be allocated in financing micro to medium level businesses (Kachkar, 2022; Ridwan & Poespowidjojo, 2017; Warninda et al., 2019).

Table 2. Average Return of Financing Assets

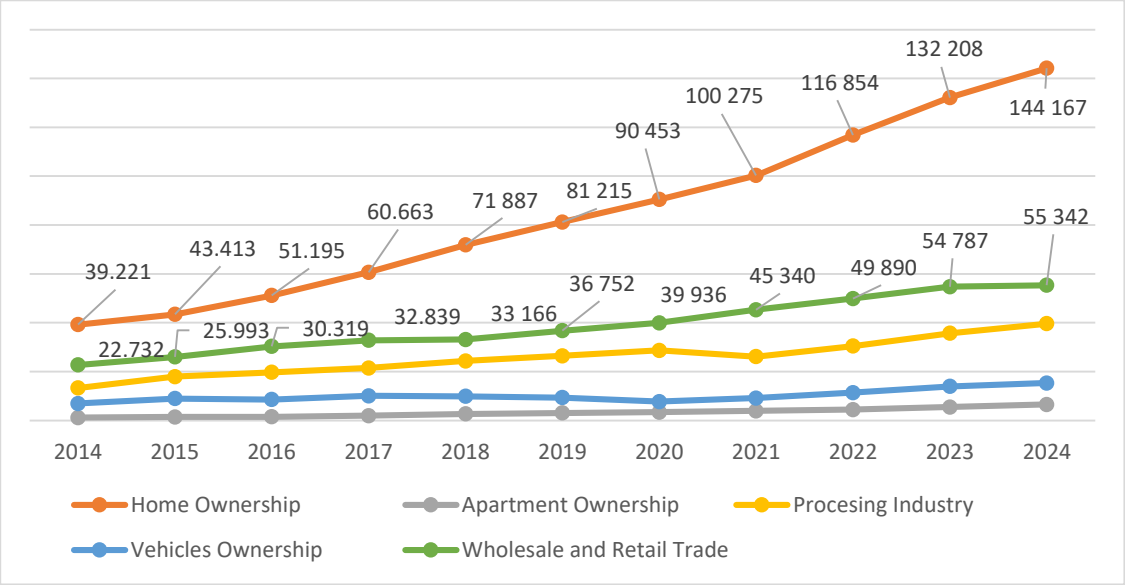
Year	*Mudharabah*	*Musyarakah*	*Murabahah*	*Qardh*	*Istishna*	*Ijarah*
2015	7,34	6,03	8,19	4,62	7,77	6,86
2016	7,31	5,05	7,70	5,84	7,67	8,08
2017	6,69	5,09	8,02	5,59	6,65	7,49
2018	6,23	4,77	8,13	5,38	6,20	6,68
2019	5,97	4,93	8,36	4,26	6,01	7,37
2020	5,89	4,82	7,58	5,84	5,61	6,94
2021	5,62	4,52	7,41	4,98	5,89	6,04
2022	4,25	4,10	6,85	4,68	6,11	5,18
2023	3,99	4,31	7,06	4,88	5,86	5,25
2024	3,54	4,64	6,84	4,97	4,89	4,74

Source: Data Processed, 2025

If you look at the table, *musyarakah* is the product that offers the lowest return in the period 2015 to 2024. Even so, the proportion of its allocation continues to increase and even exceeds the portion of *murabahah* which contributes to providing returns above 5 percent per year. This phenomenon is certainly a particular concern regarding the shift of Islamic banks' flagship product from *murabahah* with a fixed income basis because it is debt-based financing to *musyarakah* with a variable income basis because it is operated with an equity-based financing approach. Even so, the volatility of returns provided by *musyarakah* products is the lowest compared to other products, as evidenced by the measurement of its standard deviation which is stable at the level of 2.11 to 2.85 percent even though it continues to experience significant growth in the proportion of allocations, in contrast to *murabahah* products which are consistently above 3 percent even though they have reduced the proportion of allocations. This study can be an empirical reason for the shifting events that occur in the leading products

of Islamic banks in Indonesia. Financing on the basis of *musyarakah* has a flexible character and is able to be an innovative solution to the limitations of other financing models and is applicable to be implemented in products for the needs of home financing, asset acquisition and investment products (Asyiqin & Alfurqon, 2024; Jaffar et al., 2012, 2017).

Figure 2. *Musyarakah* Product Allocation



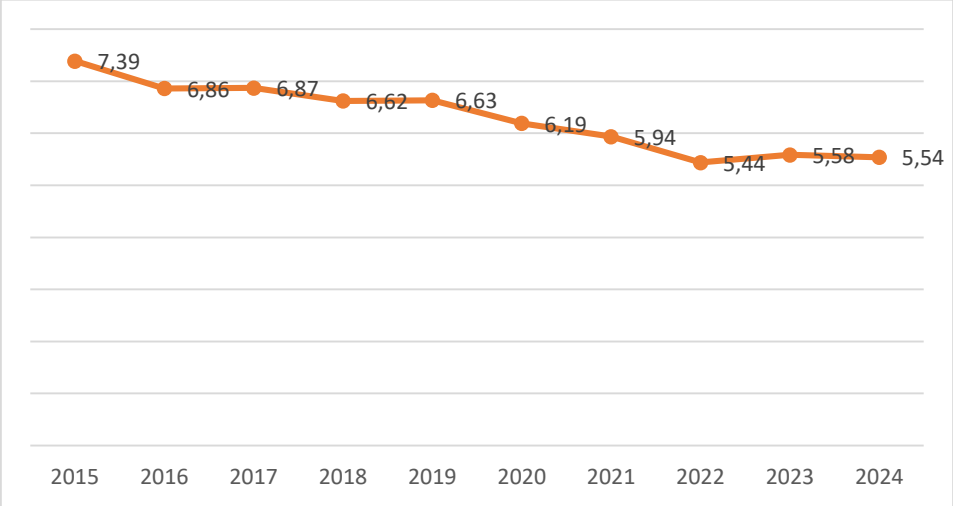
Source: Data Processed, 2025

The graph illustrates that *musyarakah* financing, especially for home ownership products, has a growth of 14 percent on average per year with a high allocation value of 144 trillion rupiah. This product dominates the portion of financing allocated by Islamic banks in Indonesia compared to other financing products both in terms of business financing and buying and selling. The low NPF in the range of 2 to 3 percent is also an important assessment of the quality of this financing product. *Musyarakah* is a partnership-based contract where all parties involved share profits and losses according to a pre-agreed ratio. Musyarakah emphasizes equity participation, meaning that both the bank and the client contribute capital and share ownership of the venture (Jaffar et al., 2017). *Musyarakah* involves sharing both profits and losses, which aligns with Islamic principles of fairness and justice (Miah & Suzuki, 2018). It can be used for various types of financing, including long-term projects and housing loans (Akhmadi, 2019). In terms of credit risk mitigation, *musyarakah* through the DSN MUI fatwa no 159 and 160 of 2024 concerning *ijarah al-mal al-musytarak* and sale and purchase of *al-mal al-musytarak* provides derivation on the handling or execution of problem assets during the contract process. This approach is considered to make it easier for Islamic banks to handle non-performing loans compared to *murabaha* because the ownership rights to the assets are shared by both parties.

Murabahah as a financing product with fixed based income is a product that contributes the highest average return compared to other products in the range of 6.84 to 8.36 percent per year. In terms of proportion, *murabahah* products also dominate the total financing channeled by Islamic banks in Indonesia from 2015 to 2022 even though it eventually shifted to *musyarakah* products. At first, *murabahah* products were widely used in asset purchase

transactions, both consumptive and productive, including the purchase of houses, industrial machinery, agricultural technology and gold. Over time, the *murabahah* mechanism is considered risky because it completely transfers ownership of the asset to the customer, so banks are required to apply collateral to the second asset or what is commonly referred to as a double contract (Janbek & Bancel, 2024). In addition, the handling of assets in non-performing financing is also more complex because banks do not have full rights in taking action against these non-performing assets (Hidayah & Meylianingrum, 2023). Such operations also require customers to have a high down payment, making *murabaha* offerings not as attractive as *musyarakah* products applied in *musyarakah mutanaqisah* products (Asyiqin & Alfurqon, 2024)

Figure 3 . Expected Return of Financing Portfolio (in percent %)

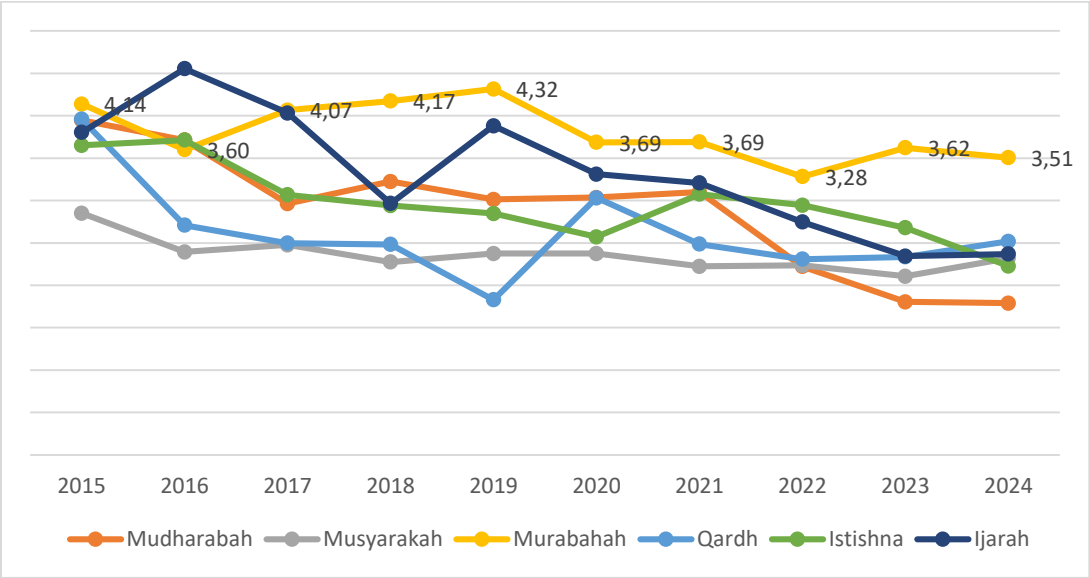


Source: Data Processed, 2025

2. Standard Deviation of Financing Assets

If we assume that the alpha value for standard deviation is 5 percent, it can be concluded that all assets are in a safe return deviation condition and only in a few years in fixed-based income products that are close to the alpha value, namely *murabahah* in 2015, 2017 to 2019 and *ijarah* in 2016 and 2017. *Musyarakah* has a stable standard deviation at the level of 2.11 to 2.85 percent with a portion of the financing allocation that continues to grow every year. In 2023 and 2024 *mudharabah* reached the lowest standard deviation level of 1.81 and 1.79 percent which was also followed by a decrease in the portion of the financing asset. If we focus on the financing portion of each asset, it can be seen that assets such as *mudharabah, qardh, istishna* and *ijarah* with an allocation of not more than 10 percent reach a relatively high standard deviation value of close to 4 percent.

Figure 4. Standard Deviation of Financing Assets



Source: Data Processed, 2025

Given that return is the main determinant in determining the level of standard deviation of the financing portfolio in banks, if you look at the position of banks with their core business which is an instrument driving the economy, it can be concluded that macroeconomic conditions are inseparable in determining this factor. Some macroeconomic factors that affect standard deviation include interest rates from conventional glasses, economic growth, GDP and inflation (Iqbal et al., 2024; Yamashita & Yoshiba, 2015). This explains that if the macro and global economic conditions are stable, the risk of bank financing in terms of returns will also reach stability, as explained by Khaldun, (1967) that industrial power will form and grow stable if the economic conditions in the country are also stable, namely in terms of supply and demand. In this case, it can be explained that a slowdown in economic growth can reduce the quality of Islamic bank portfolio returns.

In the period 2015 to 2024, Indonesia's economic growth in the GDP indicator stagnated an average of 5 percent per year, this data shows that the Indonesian economy shows a slowdown which is also reflected in the decline in the expected portfolio return of Islamic banks from 6.80 to 4.94 percent per year even though the total financing is always increasing (BPS, 2025). Although small if examined in terms of its deviation in the assumption of alpha 5 percent, the continued decline in returns will jeopardize the stability of the Islamic bank industry in Indonesia. To suppress the occurrence of a sustained decline in the return ratio in the Islamic bank sector, then in the value at risk approach the alpha value must be adjusted to provide a more conservative risk measurement. A more conservative strategy implies using a higher confidence level (lower alpha value. This means that the VaR estimate will be higher, reflecting a more cautious approach to potential losses. For example, using a 99% confidence level (alpha = 0.01) is more conservative than using a 95% confidence level (alpha = 0.05) (Aven, 2016; Roveto et al., 2020). To provide an overview of the level of confidence that reaches the high to moderate category, an alpha value of 0.025 is used as explained in the methodology section.

Table 3. Standard Deviation of Financing Assets (in percent %)

Year	*Mudhar*	*Musyar*	*Muraba*	*Qardh*	*Istishna*	*Ijarah*
2015	3,95*	2,85*	4,14*	3,96*	3,65*	3,80*

2016	3,71*	2,39*	3,60*	2,71*	3,71*	4,56*
2017	2,96*	2,48**	4,07*	2,50*	3,07*	4,03*
2018	3,22*	2,27**	4,17*	2,48**	2,94*	2,97*
2019	3,01*	2,37**	4,32*	1,83**	2,85*	3,88*
2020	3,03*	2,37**	3,69*	3,03*	2,57*	3,31*
2021	3,10*	2,22**	3,69*	2,49**	3,07*	3,21*
2022	2,22**	2,24**	3,28*	2,31**	2,94*	2,75*
2023	1,81**	2,11**	3,62*	2,34**	2,68*	2,34**
2024	1,79**	2,32**	3,51*	2,52*	2,23**	2,37**

**alpha = 0.025; * alpha = 0.05

Source: Data Processed, 2025

In the assessment of standard deviation through alpha 0.025 which explains the level of confidence of 97.5 percent or categorized as moderate to high, it shows that many Islamic bank financing assets are in the risky indication. Especially in the murabahah contract, which in its operational approach is carried out with debt-based and has implications for fixed income, provides a standard deviation value close to alpha 0.05, which means it has high return volatility. Meanwhile, *musyarakah*, whose operations are carried out with an equity-based approach and provide variable income, has a standard deviation that is consistently below 0.025 in 8 years. Several other products with low financing portions have standard deviations that vary from 1.79 percent to 4.56 percent including *mudharabah, qardh, ijarah* and *istishna*. This series of deviation values illustrates that each financing asset has a diverse risk character even though it has similarities or irisian in terms of its operations. *Musyarakah* as a product with operations that are accused of being high risk shows a low standard deviation value, meaning that the accusation is not empirically proven through the data presented. *Murabahah* as a product that is considered the most stable in its business operations has a high standard deviation beyond the moderate to high category, even its existence in terms of the portion of asset allocation has begun to be rivaled by *musyarakah* products that consistently provide innovation and improvement.

A high standard deviation value explains the potential for high return deviations, meaning that the risk inherent in the asset can be measured and classified in risky financing products. Circumstances that are close to uncertainty are often associated with *gharar* or in terms of uncertainty, which in substance is forbidden in Islamic sharia. In the context of Islamic bank business processes, uncertainty is an inherent and unavoidable problem. Uncertainty is then in the theory of assets derived implementatively in the form of risk that has the possibility to be measured so that it has implications in eliminating its *gharar* status. This explanation is formed on the definition of gharar which is a situation shrouded in uncertainty that cannot be measured or weighed (Al-Saati, 2003; Al-Suwailem, 2012). In the financial world, uncertainty has the possibility to be measured using science-based tools and models so that it becomes a risk that can be mitigated through strategic decisions. Seeing the high standard deviation value of each Islamic bank financing asset in Indonesia, collectively in asset theory can be measured in a portfolio approach so that it does not become a partial asset but is measured simultaneously. Markowitz, (1952) introduced a portfolio model that can simultaneously reduce the risk of return volatility measured in terms of standard deviation.

Table 4. Standard Deviation of Financing Portfolio

Year	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*
S.D Financing Portfolio	3,14	2,82	2,93	2,86	2,86	2,64	2,60	2,46	2,50	2,49

Source: Data Processed, 2025

Through simultaneous portfolio measurement as illustrated in the table. shows the improvement of the standard deviation of Islamic bank financing assets in Indonesia which is maintained at the level of 2.46 to 3.14 percent or within the level of confidence 96.06 to 97.64 or in the moderate to high category of risk aversion. Under simultaneous circumstances, *murabaha* assets that have high deviation values can reduce the level of risk by involving other assets that have low deviation values. With this portfolio approach, Islamic banks can provide varied products to offer to their customers and not only limit the allocation of financing to products with low-risk return. This approach also allows Islamic banks to increase the possibility of high returns by taking high risks on certain assets as explained in the rule of *al ghurm bil ghunm* or every profit taking must be accompanied by a balanced risk (Hidayat & Ahmad, 2023; Saiti & Abdullah, 2016). This is an advantage for Islamic banks compared to conventional banks because they naturally have a variety of financial products in the form of equity-based and debt-based supported by product developments from the hybrid contract approach for the purpose of innovation and risk mitigation (Jaffar et al., 2017; Jusoh & Khalid, 2013; Noor et al., 2015).

Table 5. Correlation Matrix

Correlation	Mudhar	Musyar	Muraba	Qardh	Istishna	Ijarah
Mudhar	1,00	0,93	0,92	0,88	0,95	0,97
Musyar	0,93	1,00	0,98	0,93	0,97	0,95
Muraba	0,92	0,98	1,00	0,93	0,95	0,96
Qardh	0,88	0,93	0,93	1,00	0,91	0,91
Istishna	0,95	0,97	0,95	0,91	1,00	0,95
Ijarah	0,97	0,95	0,96	0,91	0,95	1,00

Source: Data Processed, 2025

Table 6. Covariance Matrix

Covariance	Mudhar	Musyar	Muraba	Qardh	Istishna	Ijarah
Mudhar	8,22	5,65	8,87	5,98	7,47	8,71
Musyar	5,65	4,46	6,96	4,65	5,59	6,25
Muraba	8,87	6,96	11,24	7,41	8,75	10,01
Qardh	5,98	4,65	7,41	5,60	5,91	6,75
Istishna	7,47	5,59	8,75	5,91	7,47	8,15
Ijarah	8,71	6,25	10,01	6,75	8,15	9,76

Source: Data Processed, 2025.

Through matrix colleration and matix covariance in tables 5 and 6, it is illustrated that all assets in the financing portfolio of Islamic banks in Indonesia have a linear movement. It is reflected in the colleration matrix which is entirely positive and reaches a correlation value close to 1 between 0.88 to 1, which means that all assets have a perfect correlation. The strongest correlation occurs between *murabahah* and *musyarakah* which reaches 0.98, which means that the two financing products have a strong relationship and move in one direction. Likewise, the deepest covariance matrix reinforces the results of the correlation side analysis that the return of each financing portfolio asset has the same direction of movement. Measurement of matrix colleration and matrix covariance is done by measuring data accumulatively, namely from 2015 to 2024 or in 10 years. And in this vulnerability, it shows that the high variance value is in *murabahah* products, which is 11.24 percent, which means that it carries the highest deviation risk among all Islamic bank financing assets in Indonesia for 10 years.

E. CONCLUSION

In recent years, the average yield across all financing products of Islamic banks has consistently declined. Among these, Murabahah products have consistently yielded the highest average returns, ranging from 6% to 8% annually, albeit with a high degree of deviation. In contrast, Musharaka products have demonstrated the lowest yields, fluctuating between 4% and 6% per annum, with minimal deviation, thereby classifying them as low-risk returns. Mudharabah products have experienced a downward trend in returns, decreasing from 7.34% in 2015 to 3.54% in 2024, although their deviation levels have improved, suggesting that the observed correction may be attributed to the consolidation process in financing risk management. This trend is also influenced by the high risk associated with returns on capital for Mudharabah products. Istishna products have shown a moderate decline with relatively high stability, whereas Ijarah products have experienced significant fluctuations, particularly at the beginning of the period, followed by a drastic decline towards the end. Over the past decade, the volatility of risk levels in Islamic financing products has decreased. Murabahah products exhibit the highest standard deviation among financing products, indicating that higher yields are associated with increased volatility risk, as reflected in the standard deviation. Meanwhile, the standard deviation of Islamic bank financing portfolios in Indonesia has shown a downward trend, decreasing from 3.14% in 2015 to 2.49% in 2024, reflecting the success of diversification strategies in mitigating total financing risk.

However, the diversification of Islamic bank financing portfolios has not yet achieved optimal correlation. This is evidenced by the positive correlation across all financing types, with correlation values between assets ranging from 0.88 to 0.98, indicating that all assets are nearly perfectly correlated and move in the same direction. This high correlation limits the benefits of diversification, as all instruments tend to rise or fall simultaneously. A high covariance value suggests that the volatility of one financing instrument will be mirrored by volatility in others. Consequently, Islamic portfolio managers must devise specific strategies to maintain portfolio efficiency and effectively manage risk. A partial assessment of financing assets may offer an alternative strategy to mitigate highly volatile risk-returns. Dividing a portfolio into equity- and debt-based financing categories is a viable strategy for achieving effective diversification. For instance, debt-based *murabahah* financing, characterized by a high deviation rate, can be diversified with equity-based *musharakah* financing through the safer risk return it's has. While Murabahah can provide a higher rate of return, it is subject to high return fluctuations, rendering

it a relatively high-risk financing option, or *istishna* products can be diversified with *Mudharabah*.

A limitation of this study is the exclusion of systematic risk in measuring the quality of the financing portfolio. Given the high dependence of financing products on macroeconomic conditions and the high correlation between each product, incorporating macro factors could improve the estimation results. A risk-return assessment focused on historical data from Islamic bank financing allocations, both debt- and equity-based, could be developed into a more comprehensive measurement model with a different gap background. However, overall, this model fully explains all gaps and research questions.

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