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MANAGING FINANCING RISK OF ISLAMIC BANKING PRODUCTS IN INDONESIA: A VALUE AT RISK APPROACH

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Abstract

This study aims to assess the potential risk and anticipated returns of equity and debt-based financing products in Islamic banking in Indonesia, represented by the three most prevalent contracts: musharakah, mudharabah, and murabahah. Data was collected from banks' monthly financial reports published on the Indonesia Financial Service Authority (OJK) website from 2014 to 2020, resulting in 82 observations. Data analysis was conducted using the Value at Risk (VaR) method with the variance-covariance approach. Among many methods, VaR is one of the most popular techniques that yields the most comprehensive results in measuring risk and return. The findings reveal that, in general, all equity and debt-based financings yielded stable risk and returns. However, equity-based financings produced higher returns, but also generated higher risks due to their uncertain nature. The results also demonstrate that risk management in Islamic banks improved gradually during the observation period, as indicated by the average score of portfolio combinations. These findings suggest that Islamic banks should balance their product offerings between equity-based financing and debt-based financing while simultaneously strengthening risk management, especially for murabahah products in equity-based financing.

Keywords: *Risk Management; Equity-based Financing; Debt-based Financing; Value at Risk; Variance-Covariance.*

Abstrak

Penelitian ini bertujuan untuk mengukur potensi risiko dan ekspektasi pengembalian dari produk pembiayaan berbasis ekuitas dan utang pada perbankan syariah di Indonesia, yang diwakili oleh tiga akad dominan, yaitu musyarakah, mudharabah, dan murabahah. Data penelitian dikumpulkan dari laporan keuangan bulanan bank yang dipublikasikan di situs web Otoritas Jasa Keuangan (OJK) dari tahun 2014 hingga 2020, yang menghasilkan 82 observasi. Analisis data dilakukan menggunakan metode Value at Risk (VaR) dengan pendekatan varians-kovarians. Di antara banyak metode, VaR adalah

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salah satu teknik paling populer yang memberikan hasil paling komprehensif dalam mengukur risiko dan pengembalian. Temuan menunjukkan bahwa, secara umum, semua pembiayaan berbasis ekuitas dan utang menghasilkan risiko dan return yang stabil. Namun, pembiayaan berbasis ekuitas menghasilkan return yang lebih tinggi, namun pada saat yang sama menciptakan risiko yang lebih tinggi karena sifatnya yang tidak pasti. Hasil penelitian juga menunjukkan bahwa manajemen risiko di bank syariah telah membaik secara bertahap selama periode pengamatan, seperti yang ditunjukkan oleh skor rata-rata kombinasi portofolio. Temuan ini berdampak bagi bank syariah dimana mereka disarankan agar menyeimbangkan antara produk pembiayaan berbasis ekuitas ddengan pembiayaan berbasis utang. Pada saat yang sama, bank syariah juga disarankan agar memperkuat manajemen risiko, khususnya untuk produk murabahah dalam pembiayaan berbasis ekuitas.

Kata Kunci: *Manajemen Risiko; Equity-based Financing; Debt-based Financing; Value at Risk; Variance Covariance.*

مستخلص

تهدف هذه الدراسة إلى قياس المخاطر المحتملة والعائد المتوقع لمنتجات التمويل القائمة على الأسهم والديون في الخدمات المصرفية الإسلامية في إندونيسيا ، والتي تتمثل في العقود الثلاثة الأكثر شيوعًا: المسيركة والمضاربة والمرابحة. تم جمع البيانات من التقارير المالية الشهرية للبنوك المنشورة على موقع هيئة الخدمات المالية (OJK) من 2014 إلى 2020 ، مما أدى إلى 82 ملاحظة. تم إجراء تحليل البيانات باستخدام طريقة القيمة المعرضة للخطر (VaR) مع نهج التباين – التباين المشترك. من بين الطرق العديدة ، تعد القيمة المعرضة للمخاطر إحدى التقنيات الشائعة التي تحصل على النتائج الأكثر شمولاً في قياس المخاطر والعائد. تكشف النتائج ، بشكل عام ، أن جميع التمويل المستند إلى حقوق الملكية والديون يولد مخاطر وعوائد مستقرة. ومع ذلك ، فإن التمويل المستند إلى حقوق الملكية يولد عوائد أعلى ، ولكنه في نفس الوقت يخلق مخاطر أعلى بسبب طبيعته غير المؤكدة. وأظهرت النتائج أيضًا أن إدارة المخاطر في البنوك الإسلامية تتحسن تدريجيًا خلال فترة المراقبة كما يتضح من متوسط درجة اندماج المحفظة. تشير هذه النتائج إلى أنه يجب على البنوك الإسلامية موازنة منتجاتها بين التمويل المستند إلى حقوق الملكية والتمويل المستند إلى الدين مع تعزيز إدارة المخاطر ، وخاصة بالنسبة لمنتجات المرابحة في التمويل المستند إلى حقوق الملكية.

الكلمات الرئيسيّة : إدارة المخاطر؛ التمويل على أساس حقوق الملكية؛ التمويل على أساس الديون؛ القيمة المعرضة للخطر؛ الفروق التغاير.

A. Introduction

Assessing risk and measuring its potential are crucial for the business world, as these processes are used for effective decision-making. In finance studies, several measurements of financing risk exist, such as the Risk-Adjusted Return on Capital (RAROC)[1], the Standardized Approach (SA), and the Internal Ratings-Based (IRB) approach. Additionally, Basel II recommends using an internal model to produce risk measurements that fit the bank's risk profile and thus create capital efficiencies[2]. Examples of such models include

[1] Orlando B Hanselman, "Risk Adjusted Return on Capital (RAROC): The One True Metric," *Journal of Performance Management* 18, no. 3 (2005): 26.

[2] Dmitry Petrov and Michael Pomazanov, "Validation Method of Maturity Adjustment Formula for Basel II Capital Requirement," *The Journal of Risk Model Validation* 3, no. 3 (2009): 81–97. Michael Prinz, "The

CreditMetrics, CreditRisk+, the KMV Approach, the Default Mode Approach, and the Macro Simulation Approach (Portfolio View Approach)[3]. However, these methods cannot estimate the probability of losses higher than expected, nor provide reasoning for financing defaults, as they only consider the default rate as a reference in predicting losses. Therefore, a more comprehensive risk measurement method is necessary.

One recommended method is Value at Risk (VaR), a statistical risk measurement method that estimates the maximum possible loss at a certain confidence level[4]. VaR measures the changes in the price of existing assets and their effect on other assets, allowing for the measurement of the reduced risk caused by portfolio diversification[5]. The advantage of VaR is that it focuses on downside risk, which does not depend on the assumed distribution of returns and can thus be applied to all traded financial products[6]. According to Jorion[7], the adoption of a systematic approach for critically thinking about risk is the most significant advantage of VaR. Institutions that calculate their VaR are required to address their financial risk exposure and build an appropriate risk management mechanism. As a result, the technique of calculating VaR may be as important as the value itself. Therefore, an analysis using the VaR method is essential, as its findings are generated from an aggregate or comprehensive risk calculation as a whole.

In Islamic banking, financing is considered an investment due to its similar characteristics. All investments are accompanied by some degree of risk, which refers to the level of uncertainty or potential financial loss for an investment decision[8]. Thus, the investment fund can yield higher profits only if the investor accepts a higher possibility of losses. This concept is somewhat related to the original idea of the trade-off theory, where a company chooses the amount of debt finance and equity finance to use by balancing the costs

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Basel II IRB Approach and Internal Credit Risk Models," *Mathematical Finance*, 2004. Constantinos Stephanou and Juan Carlos Mendoza, "Credit Risk Measurement under Basel II: An Overview and Implementation Issues for Developing Countries," *World Bank Policy Research Working Paper*, no. 3556 (2005).

[3] Kollar Boris, Weissova Ivana, and Siekelova Anna, "Quantification of Credit Risk with the Use of CreditMetrics," *Procedia Economics and Finance* 26 (2015): 311–16.

[4] Darrell Duffie and Jun Pan, "An Overview of Value at Risk," *Journal of Derivatives* 4, no. 3 (1997): 7–49.Mandira Sarma, Susan Thomas, and Ajay Shah, "Selection of Value-at-Risk Models," *Journal of Forecasting* 22, no. 4 (2003): 337–58.

[5] Duffie and Pan, "An Overview of Value at Risk."

[6] Darryll Hendricks, "Evaluation of Value-at-Risk Models Using Historical Data," *Economic Policy Review* 2, no. 1 (1996).Ioan Trenca, Simona Mutu, and Eva Dezsi, "Advantages and Limitations of VAR Models Used in Managing Market Risk in Banks," *Finance–Challenges of the Future* 13 (2011): 32–43.

[7] Philippe Jorion, "How Informative Are Value-at-risk Disclosures?," *The Accounting Review* 77, no. 4 (2002): 911–31.

[8] Edward H Bowman, "A Risk/Return Paradox for Strategic Management," (1980).

and benefits[9]. In Islamic economics, risk cannot be eliminated, as it is embedded in all aspects of life, including business activities, and is always associated with return. The *fiqh* rules "*al-kharaj bi al-dhaman"* and "*al-ghunm bi al-ghurm*", meaning that if someone wants to get a return, one must be willing to take the risk[10]. In Islamic financial transactions, risk should be shared with collaborating parties or managed for effective decision-making [11]. Hence, Islamic economics encourages profit-loss sharing (PLS) or joint venture activities, where both returns and risks are shared accordingly [12], such as in the *mudharabah* and *musharakah* contracts.

Various studies on risk measurement of Islamic banking products using the VaR method have been carried out recently, yet they offer a different perspective from our research. For example, Danila[13] concentrated on risk estimation for mutual fund companies in Indonesia using VaR, while Izhar[14] focused only on applying the Cornish-Fisher Expansion to VaR estimation in Islamic banking. Moreover, Anita and Riris[15] merely analyzed the stock market risk of Islamic banking by comparing it with the Markowitz standard deviation method; Habibia and Rusgianto[16] and Yudiana, Hafidhuddin and Ismail[17] investigated the risk of return characteristics of Indonesian Islamic bank financing portfolios, focusing only on the estimated return volatility.

A similar study was also conducted by Nabella et al.[18], but the study focused only on conventional banking with a panel database from 2012-2018. Using a similar context and

[9] R H Litzenberger and A Kraus, "A State-Preference Model of Optimal Financial Leverage," *Journal of Finance* 28, no. 4 (1973): 911–21.

[10] Tariqullah Khan and Habib Ahmed, "Risk Management on Analysis of Issues in Islamic Financial Industry. Islamic Research and Training Institute : Islamic Depelopment Bank." Jeddah: Islamic Research and Training Institute : Islamic Depelopment Bank, (2001).

[11] A Syathir Sofyan, Salmah Said, and Muhammad Wahyuddin Abdullah, "Financing Risk Measurement with Maqashid Al-Sharia Qualitative Risk," *Share: Jurnal Ekonomi Dan Keuangan Islam* 8, no. 1 (2019): 1–30.

[12] Humayon A Dar and John R Presley, "Lack of Profit Loss Sharing in Islamic Banking: Management and Control Imbalances," *International Journal of Islamic Financial Services* 2, no. 2 (2000): 3–18.Agus Widarjono, "Maqasid Sharia Index, Banking Risk and Performance Cases in Indonesian Islamic Banks," *Asian Economic and Financial Review* 8, no. 9 (2018): 1175–84.

[13] Nevi Danila, "Estimating the Risk of Mutual Funds in Indonesia by Employing Value at Risk (VaR)," *Asian Journal of Business and Accounting* 5, no. 2 (2012).

[14] Hylmun Izhar, "Applying the Cornish-Fisher Expansion to Value-at-Risk Estimation in Islamic Banking," *Journal of Risk* 17, no. 6 (2015).

[15] Permana Sari Anita and Prasetyowati Aishah Riris, "Risiko Pasar Saham Perbankan Syariah Dengan Metode Standar Deviasi Markowitz Dan Value At Risk (Var)," *Jurnal Manajemen (Edisi Elektronik)* 12, no. 1 (2021): 113–25.

[16] Zamzam Habibia and Sulistya Rusgiantob, "Risk of Return Characteristics of Islamic Bank Financing Portfolio in Indonesia," *Jurnal Ekonomi Dan Bisnis Islam* 7, no. 1 (2021).

[17] Yudi Yudiana, Didin Hafidhuddin, and Rifki Ismal, "Pengukuran Risiko Operasional Pada Bank Syariah Indonesia (Studi Kasus Bank Syariah XYZ)," *Jurnal Aplikasi Bisnis Dan Manajemen (JABM)* 4, no. 2 (2018): 179.

[18] Rihana Sofie Nabella, Ghozali Maski, and Setyo Tri Wahyudi, "Systemic Risk Analysis Using Conditional Value at Risk (CoVaR) Model: Study of Conventional Banks in Indonesia," *Jurnal Ekonomi Dan Studi Pembangunan* 12, no. 1 (2020): 57–67.

methodology, Kaluge[19] studied 41 conventional banks in Indonesia listed on the Stock Exchange (IDX) from 2013 to 2018; however, it was limited to identifying each bank's systemic risk level and the financial linkages between banks in Indonesia. Another VaR study by Astuti and Gunarsih[20], aimed to analyze and measure the risk of banking stock portfolios, focusing on the stock portfolio of conventional banking companies in the Indonesian stock market using the Mean-VaR method based on the Markowitz approach. Similarly, Suryawati et al.[21] conducted a study to measure market risk based on Value at Risk with Monte Carlo Simulation, focusing on all banking companies, both Sharia and conventional, listed on the stock exchange.

These empirical results motivate the present study to conduct another risk measurement research using the VaR approach in Islamic banking. Although previous studies have focused their analysis on different aspects of risks, none has simultaneously explored the risks and returns of the three most dominant financings offered by Islamic banks in Indonesia: *murabahah*, *musharakah*, and *mudharabah*. This study addresses this gap by simultaneously exploring the volatility risk, return, correlation, and potential losses of these three financing types, offering a more holistic understanding of their risk-return profiles.

Moreover, the study employs the variance-covariance VaR approach, which allows for a more nuanced analysis of risk interdependence compared to traditional VaR methods. Furthermore, this study delves into the intriguing discrepancy between Islamic principles emphasizing profit-loss sharing (PLS) and the observed dominance of *murabahah*, a financing type similar to conventional credit. According to OJK, as of 2020, *murabahah* accounts for 46.10% of all financing products of Islamic banks in Indonesia, followed by *musharakah* with a 44.78% share, *mudarabah* with 3.06%, and the rest is shared among *Qardh, Ijarah, Istisna,* and other products. By analyzing all three financing instruments, including the underutilized *mudharabah*, this study sheds light on the risk-return implications of PLS adoption in the Indonesian Islamic banking context.

This study distinguishes itself from prior research through several significant aspects. Firstly, it offers a comprehensive analysis that concurrently examines *murabahah*, *musharakah*, and *mudharabah*, thereby encompassing both debt-based and equity-based

[19] David Kaluge, "How We Predict the Stability of Financial Sector: The Conditional Value at Risk Technique Approach," *KnE Social Sciences*, (2020), 328–45.

[20] Putri Endah Astuti and Tri Gunarsih, "Value-At-Risk Analysis in Risk Measurement and Formation of Optimal Portfolio in Banking Share," *JBTI: Jurnal Bisnis: Teori Dan Implementasi* 12, no. 2 (2021): 103–14.

[21] Baiq Nurul Suryawati and Lalu Unsun-Nidhal, "Value at Risk as a Measurement of Market Risk in Emerging Sharia Market: A Comparative Study Between Indexes in Indonesian Stock Exchange," *KnE Social Sciences*, (2018), 94–108.

structures. Secondly, it specifically targets the underrepresentation of Profit and Loss Sharing (PLS) models such as *mudharabah*, conducting an in-depth investigation into its risk-return profile relative to other alternatives. Lastly, it employs an advanced methodology using the variance-covariance Value at Risk (VaR) approach, which delivers a more nuanced comprehension of risk compared to simpler VaR methods.

This research carries substantial implications for various parties. It offers valuable insights into the risk-return profile of different financing options, which can greatly benefit regulators and Islamic banking institutions. Furthermore, it assists investors and other stakeholders by facilitating informed decision-making concerning risk management and diversification strategies. The rest of this paper is organized in the following manner: Section 2 provides a review of the pertinent literature, Section 3 elaborates on the research methodology, Section 4 presents the findings and discussion, Section 5 underscores the implications, and Section 6 concludes the paper with recommendations and directions for future research. This structure ensures a comprehensive and systematic presentation of the research.

B. Discussion

1. Financing Instruments in Islamic Banking

Financing is a portfolio of assets divided by the type of financing. Financing at Islamic banks consists of several *aqad* (contracts) schemes, which can be grouped as follows: 1) equity-based financing, which consists of *mudharabah* (trustee partnership), *musharakah* (joint venture), *muzara'ah* (harvest yield profit sharing), and *musaqah* (plantation management fee based on a certain portion of the yield)[22]; debt-based financing, which consists of *murabahah* (cost-plus sale), *ijarah* (leasing), *salam* (deferred delivery sale), *istisna* (partnership in manufacturing), and *qard* (benevolent loan); 3) service-based financing, consisting of *wakalah* (agency for the opening of letters of credit), *kafalah* (guarantee letter), and *hiwalah* (debt transfer).[23]

As this study focuses on the three dominant financing instruments, this section will specifically elaborate on those instruments. As previously mentioned, as of 2020, *murabahah* was still the most dominant scheme offered by Islamic banks in Indonesia, followed by

[22] Muhammad Syafi'i Antonio, *Bank Syariah: Dari Teori Ke Praktik* (Gema Insani, 2001).Oni Sahroni and Adiwarman A Karim, "Maqashid Bisnis Dan Keuangan Islam: Sintesis Fikih Dan Ekonomi," (2015).

[23] Adil Abdulsalam Ashhoob Abdulsalam, "Investment and Financial Product Development in Islamic Banking," *Int. J. of Multidisciplinary and Current Research* 9 (2021). Mondher Bellalah and Omar Masood, *Islamic Banking and Finance* (Cambridge Scholars Publishing, 2013). M Kabir Hassan and Mervyn K Lewis, *Handbook on Islam and Economic Life* Edward Elgar Publishing, (2014).

musharakah and *mudharabah*. In fiqh (Islamic jurisprudence), *murabahah* is defined as a sale of a commodity where the seller expressly mentions the cost and sells it by adding some profit[24]. In its application within Islamic financial institutions, *murabahah* is utilized as a contract to finance goods with a pre-agreed profit markup on the cost [25].

Meanwhile, *musharakah* is described as a joint venture of two or more individuals formed to conduct business, where the profit is divided based on the agreement, while the loss is shared according to contribution ratios[26]. In *musharakah*, each partner normally has the right to participate in its management [27], however, they have to agree that only one of them should be the manager. Partnerships in *musharakah* are classified based on levels of authority and obligations, contributions such as management skills or goodwill, and the like[28].

Lastly, *mudharabah* is a form of partnership where one partner (*rabbul-maal*) provides capital to another (*mudarib*) for investing in a commercial enterprise, and the profits are shared based on a predetermined ratio[29]. In the *mudharabah* contract, financial losses are borne by the *rabbul-maal* only, with the condition that the losses are not arising from misconduct or negligence of the *mudarib*. Meanwhile, the *mudarib* covers non-financial losses such as time value, opportunity costs, distress, inconvenience, damage to reputation, and others[30].

2. Financing Risk

Financing risk is associated with the risk caused by financiers' inability to fulfill obligations to Islamic finance entities. The term is similar to credit risk in conventional banking, which arises due to the failure of debtors or other parties to repay debts to

[24] Fauzan Ahmad, Ahdi Topan Sofyan, and Eko Suryaningsih, "The Concept of Murabahah (Buy and Buy) and Its Applications In The Sharia Financial Services Cooperative Pariri Lema Bariri (KJKS Paleba)," *International Journal of Social Service and Research (IJSSR)* 2, no. 1 (2022): 10–18.

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[26] Muhammad Asghar Shahzad, "Islamic House Financing through Diminishing Musharakah: A Cheaper Solution," *The Pakistan Accountant, The Institute of Chartered Accountants of Pakistan*, (2022), 48–50.

[27] Wahbah Al-Zuhaily, "Al-Fiqh Al-Islamiy Wa Adillatuhu," *Juz VII, Damsyiq: Dar Al-Fikr*, (1989).

[28] Alhabshi et al., "Appendix C Comparative Analysis of Musharakah by Bank Negara Malaysia and AAOIFI." Alhabshi et al.

[29] Ibrahim Jamiu Otuyo and Jumah Habeeblai Abiodun, "The Juristic Framework Of Mudarabah Contracts And Its Modern Practices," *Perdana: International Journal of Academic Research* 10, no. 1 (2021): 32–42.

[30] Muhamad Nafik Hadi Ryandono, Kumara Adji Kusuma, and Ari Prasetyo, "The Foundation of a Fair Mudarabah Profit Sharing Ratio: A Case Study of Islamic Banks in Indonesia," *The Journal of Asian Finance, Economics and Business* 8, no. 2 (2021): 329–37.

creditors[31]. The main components in calculating financing/credit risk are the probability of default, financing exposure, and recovery rate. To handle them, banks calculate financing/credit risk using alternative approaches, namely the Standardized Approach (SA) and the Internal Ratings-Based (IRB) approach.[32]

In the case of Islamic banking, where lending is replaced by investments and partnerships, the importance of financing risk management becomes more critical. The volatility of bank financing returns is a representation of investment risk, where total financing in Islamic banks tends to exceed total deposits[33]. The volatility of the financing results is one of the factors closely related to investment risk; thus, financing must be managed to monitor and prevent various risks and potential losses[34]. Knowing the losses provides benefits for market participants and regulators to anticipate unexpected business conditions in the future by making the right decisions[35].

The natural characteristics of Islamic financial instruments escalate the financing risks for each of the schemes. For instance, in *murabahah* transactions, the risks occur when an Islamic bank delivers an asset to a client, but the payment is deferred[36]. Furthermore, in a non-binding *murabahah*, an Islamic bank is more exposed to risk (price and market risks) as the customer could refuse the asset[37]. Meanwhile, the potential risk for *mudharabah* financing occurs where the Islamic bank agrees to be a *rabbul-maal* (principal) for an external *mudarib* (agent). The financing risks, in this case, are associated with typical principal/agent problems, and the enhanced credit risk on the amounts advanced to the *mudarib*. Naturally, it is difficult

[31] Michel Crouhy, Dan Galai, and Robert Mark, "A Comparative Analysis of Current Credit Risk Models," *Journal of Banking & Finance* 24, no. 1–2 (2000): 59–117.Duffie and Pan, "An Overview of Value at Risk." Roberto Fontana, Elisa Luciano, and Patrizia Semeraro, "Model Risk in Credit Risk," *Mathematical Finance* 31, no. 1 (2021): 176–202.

[32] Badratun Nisak and Azharsyah Ibrahim, "Analisis Manajemen Risiko Pembiayaan Musyarakah Pada Baitul Qiradh Bina Insan Mandiri Banda Aceh," *Share: Jurnal Ekonomi Dan Keuangan Islam* 3, no. 1 (2014): 41–55. Rr Yoppy Palupi Purbaningsih and Nurul Fatimah, "The Effect of Liquidity Risk and Non Performing Financing (NPF) Ratio to Commercial Sharia Bank Profitability in Indonesia," *LTA* 60, no. 80 (2014): 100.

[33] Rifki Ismal, "Volatility of the Returns and Expected Losses of Islamic Bank Financing," *International Journal of Islamic and Middle Eastern Finance and Management*, 2010. Faizul Mubarok, Abdul Hamid, and Mohammad Nur Rianto Al Arif, "Predicting Volatility of Non-Performing Financing: Lessons from Indonesian Islamic Banking Industry," *Muqtasid: Jurnal Ekonomi Dan Perbankan Syariah* 11, no. 1 (2020): 1–13.

[34] Armiadi Musa et al., "Exploring Determinants of Saving and Financing Aspects in Islamic Banks: An Insight from Indonesia," *Asian Economic and Financial Review* 12, no. 8 (2022).

[35] Gang Kou et al., "Fintech Investments in European Banks: A Hybrid IT2 Fuzzy Multidimensional Decision-Making Approach," *Financial Innovation* 7, no. 1 (2021): 39. Mubarok, Hamid, and Al Arif, "Predicting Volatility of Non-Performing Financing: Lessons from Indonesian Islamic Banking Industry."

[36] Rima Yusnita and Hendri Andi Mesta, "The Effect of Profitability, Liquidity and Financing Risk on Murabahah Financing at Islamic Commercial Banks in Indonesia (2009-2020 Period)," *Financial Management Studies* 1, no. 4 (2021): 18–28.

[37] Muftau A Ijaiya et al., "Murabaha-Related Credit Risk And Financial Performance Of Islamic Banks In Africa," *International Journal of Islamic Banking and Finance Research* 5, no. 1 (2021): 60–69.

for the bank to monitor the *mudarib*[38] or participate in the project's management. In the *musharakah* contract, Islamic banks are exposed to equity investment risk as a consequence of profit/loss-sharing investments such as shares in the stock market, private-equity investments, equity participation in specific projects, or syndication investment[39].

3. VaR Approach

VaR is among the most popular methods for measuring risk and return volatility in the banking industry, including Islamic banking. It was first adopted by major financial firms in the 1980s to measure the risks of their trading portfolios. In 1994, J.P. Morgan attempted to establish a market standard through its RiskMetrics™ system[40]. This contributed to the growth of the VaR approach. Initially, VaR was developed to overcome the shortcomings of traditional risk measures, which could not calculate the aggregate risk across trading areas or describe or quantify diversification within a bank's portfolio[41]. Thus, it was not possible to use traditional risk measures to compare the riskiness of one trading activity with another [42].

VaR is a statistical risk measure that estimates the maximum loss that may be experienced on a portfolio with a given level of confidence[43]. It calculates a value of monetary loss that may be experienced within a predetermined period[44]. The risk is assessed using statistical and simulation models designed to capture the volatility of assets in a bank's portfolio[45]. Its value is always accompanied by a probability that indicates how likely the loss

[38] Muhammad Shahrul Ifwat Ishak and Md Habibur Rahman, "Equity-Based Islamic Crowdfunding in Malaysia: A Potential Application for Mudharabah," *Qualitative Research in Financial Markets*, 2021. Zamir Iqbal and Abbas Mirakhor, *An Introduction to Islamic Finance: Theory and Practice*, vol. 687 (John Wiley & Sons, 2011).Fachru Nurul Umam, Annisa Nur Salam, and Achmad Rizal, "Determinants of Mudharabah Term Deposit: A Case of Indonesia Islamic Banks," *Journal of Economics Research and Social Sciences* 5, no. 2 (2021): 167–80.

[39] Mohamed Ali Elgari, "Credit Risk in Islamic Banking and Finance," *Islamic Economic Studies* 10, no. 2 (2003). Rifqi Muhammad and Peni Nugraheni, "The Effect of Internal Factors on the Mudharabah Financing of Indonesian Islamic Banks," *Journal of Sustainable Finance & Investment*, 2021, 1–17. Iwan Setiawan, "The Impact of Financing Risk on Islamic Banking Performance in Indonesia," *Share: Jurnal Ekonomi Dan Keuangan Islam* 10, no. 2 (2021): 208–29.

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[41] Giuseppe Brandi and Tiziana Di Matteo, "On the Statistics of Scaling Exponents and the Multiscaling Value at Risk," *The European Journal of Finance* 28, no. 13–15 (2022): 1361–82.

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[43] Best, *Implementing Value at Risk.*

[44] Jeremy Berkowitz and James O'Brien, "How Accurate Are Value-at-risk Models at Commercial Banks?," *The Journal of Finance* 57, no. 3 (2002): 1093–1111.

[45] Cormac Butler, *Mastering Value at Risk: A Step-by-Step Guide to Understanding and Applying VaR* (Financial Times/Prentice Hall, 1999). Stephen J Richards, "A Value-at-Risk Approach to Mis-Estimation Risk," *British Actuarial Journal* 26 (2021): e13.

will be less than the VaR value[46]. The VaR method consists of three calculation approaches: 1) Historical simulation, 2) variance-covariance or delta-normal, and 3) Monte Carlo or stochastic simulation[47].

The historical simulation method is a minimal atheoretical approach that produces results with relatively few assumptions about the statistical distributions of the underlying market factors[48]. To construct a distribution of potential future portfolio profits and losses, this method employs historical market rates and price changes[49]. Meanwhile, in the variance-covariance method, the basic assumption is that the underlying market factors have a multivariate normal distribution. Once the distribution of possible portfolio profits and losses has been obtained, the standard mathematical properties of the normal distribution are used to determine the loss that will be equaled or exceeded a certain percent of the time[50].

Finally, the Monte Carlo Simulation methodology is primarily similar to the historical simulation and uses a statistical distribution to adequately capture the possible changes in market factors[51]. The main difference is that rather than carrying out the simulation using the observed changes in market factors over the N periods to generate N hypothetical portfolio profits or losses, Monte Carlo chooses a statistical distribution that is believed to capture adequately or approximately the possible changes in market factors[52]. Then, a pseudo-random number generator is used to generate thousands or even 10,000 hypothetical changes in the market factors for thousands of hypothetical portfolio profits and losses where VaR is determined[53]. However, although there are three methods of calculating VaR, all of them go through a common general structure which can be summarized as[54]: (1) marking-to-market

[46] Qi Mangku Bahjatulloh, "Pengembangan Pemberdayaan Ekonomi Masyarakat Melalui Kegiatan Filantropi (Studi Kasus Lembaga Tazakka DIII Perbankan Syariah IAIN Salatiga)," *INFERENSI: Jurnal Penelitian Sosial Keagamaan* 10, no. 2 (2016): 473–94.

[47] Philippe Jorion, *Financial Risk Manager Handbook: FRM Part I/Part II* (John Wiley & Sons, 2010). Thomas J Linsmeier and Neil D Pearson, "Risk Measurement: An Introduction to Value at Risk," (1996).

[48] Woradee Jongadsayakul, "Value at Risk Estimation of the SET50 Index: Comparison between Stock Exchange of Thailand and Thailand Futures Exchange," *Journal of International Studies* 14, no. 1 (2021): 227–40.

[49] Hendricks, "Evaluation of Value-at-Risk Models Using Historical Data." Linsmeier and Pearson, "Risk Measurement: An Introduction to Value at Risk."

[50] Monica Billio and Loriana Pelizzon, "Value-at-Risk: A Multivariate Switching Regime Approach," *Journal of Empirical Finance* 7, no. 5 (2000): 531–54; David Tobjörk, "Value at Risk Estimation with Generative Adversarial Networks," 2021.

[51] Peng Li and Runhuan Feng, "Nested Monte Carlo Simulation in Financial Reporting: A Review and a New Hybrid Approach," *Scandinavian Actuarial Journal* 2021, no. 9 (2021): 744–78.

[52] Thomas J Linsmeier and Neil D Pearson, "Value at Risk," *Financial Analysts Journal* 56, no. 2 (2000): 47–67.

[53] Jose A Lopez, "Methods for Evaluating Value-at-Risk Estimates," *Economic Review-Federal Reserve Bank of San Francisco*, no. 2 (1999): 3.

[54] Keith Kuester, Stefan Mittnik, and Marc S Paolella, "Value-at-Risk Prediction: A Comparison of Alternative Strategies," *Journal of Financial Econometrics* 4, no. 1 (2006): 53–89.

the portfolio; (2) estimating the distribution of portfolio returns; and (3) computing the VaR of the portfolio[55]. Based on the above explanation, this paper utilizes the Variance-Covariance or Delta-Normal Approach to analyze the volatility of returns and expected losses of the three Islamic bank financing schemes as it best fits the nature of this study.

4. Financing Returns Profile

The assessment of the returns of three groups of Islamic bank financing suggests that *musharakah* financing received the highest returns, with an average of 1.15% each month within the observation period, followed by *murabahah* and *mudharabah* financings in second and third places with 0.56% and -1.03% of returns, respectively (Table 2). These results indicate that *musharakah* financing has high expectations for contributing to Islamic banking profitability.

During the observation period, from 2014 to 2020, the returns of those financings provided different results. *Mudharabah* financing showed negative returns throughout the observation period, generating an average percentage of -1.03%. Meanwhile, *musharakah* and *murabahah* financings generated favorable returns, but at very different ratios of 1.156% and 0.563%, respectively. However, all of them shared similar patterns in terms of a decline in the return portfolio during specific observation periods, which were in 2014, 2018, and 2020.

Many studies have found that the returns of Islamic financing products are influenced by numerous economic determinants[56]. During 2010-2015, the growth of the Indonesian economy showed unfavorable conditions, as it slipped from 6.22% in 2010 to 4.88% in 2015. The most significant decrease occurred from 2012, at 6.03%, to 2014, at 5.01% (BPS, 2016). Additionally, in the third quarter of 2017, the Indonesian Statistics Bureau (*Badan Pusat Statistik – BPS*) also recorded a downturn in domestic consumption that dropped below 5%.

[55] Jad H Bazih and Dieter Vanwalleghem, "Deriving Value or Risk? Determinants and the Impact of Emerging Market Banks' Derivative Usage," *Research in International Business and Finance* 56 (2021): 101379.

[56] Elkamiliati Elkamiliati and Azharsyah Ibrahim, "Pengaruh Bi Rate Terhadap Persentase Bagi Hasil Pembiayaan Musyarakah Pada Bank Aceh Syariah Banda Aceh," *Share: Jurnal Ekonomi Dan Keuangan Islam* 3, no. 2 (2014): 125–40.; Azharsyah Ibrahim and Abdul Jalil Salam, "A Comparative Analysis of DSN-MUI Fatwas Regarding Murabahah Contract and the Real Context Application (A Study at Islamic Banking in Aceh)," *Samarah: Jurnal Hukum Keluarga Dan Hukum Islam* 5, no. 1 (2021): 372–401.; Rusmiati Rusmiati, "Faktor-Faktor yang Mempengaruhi Pembiayaan Murabahah pada PT. Bank Syariah Mandiri di Indonesia Periode 2012-2020" (Universitas Islam Negeri Sultan Syarif Kasim Riau, 2021); Reazul Islam and Rubi Ahmad, "Applicability of Mudarabah and Musharakah as Islamic Micro-Equity Finance to Underprivileged Women in Malaysia," *The European Journal of Development Research* 32, no. 1 (2020): 176–97.

Tabel 2. Average Returns for *Murabahah, Musharakah* and *Mudharabah* Financings

Year	*Mudharabah*	*Musharakah*	*Murabahah*
2014[a]	-1.408%	1.073%	0.711%
2015	-0.452%	1.349%	0.160%
2016	-0.431%	1.102%	1.347%
2017	-0.953%	1.057%	0.326%
2018	-1.533%	0.934%	0.264%
2019	-0.098%	1.740%	0.959%
2020[b]	-2.569%	0.724%	0.318%
Average	-1.031%	1.156%	0.563%

Source: data processed (2021)

Note: [a]From June 2014; [b]Until October 2020

The detrimental effects were due to the significant increase in electricity fares and the decrease in performance in the agricultural sector. Previously, the Indonesian Government had lifted the subsidy for 18.7 million electricity users from the 900 VA group, causing its fare to increase by almost twice. Towards the end of 2017, the performance of the agricultural sector also decreased due to the instability of the global economy, affecting nearly 30% of total workers in Indonesia (BPS, 2021). Furthermore, since the first Covid-19 case was announced on 2 March 2020, the government has taken considerable proactive, preventive, and protective actions. These directly affected the economic conditions in all sectors, resulting in a contraction of growth from 5.02% in 2019 to 2.97% in 2020 (BPS, 2021).

The decline in the return portfolio during specific periods, as highlighted in Table 3, corresponds with the aforementioned events. The economic downturn and other related situations heavily suppressed the performance of actual business and trading activities, affecting the return sharing of equity-based financings (*mudharabah* and *musharakah*) and the payments of debt-based financing (*murabahah*). However, the returns of *mudharabah* financing suffered the most due to its structure, where banks bear the financial losses. In contrast, in *musharakah*, the bank only shares losses based on the contribution ratio.

An analysis of the return of equity-based financings (*musharakah* and *mudharabah*) indicates that both instruments fluctuate notably, as displayed in Figure 1. This outcome is expected, as both share similar characteristics and are categorized as contracts with inherent uncertainty. In contrast, debt-based financing (*murabahah*) exhibited relatively stable returns, although they were considerably low during the period, as shown in Figure 1. The returns from debt-based financing instruments are fixed, positive, and predetermined at the beginning of the contract agreement.

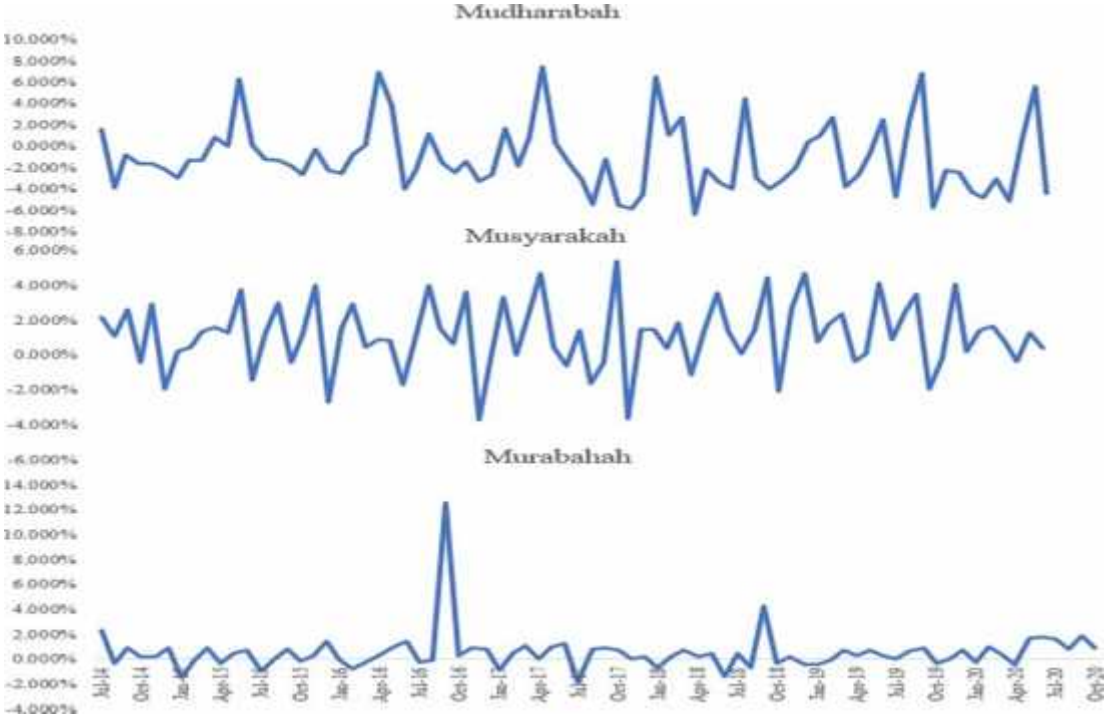

Figure 1. Fluctuation of Financing Returns of Islamic Banking
Source: processed (2021)

For portfolio financings, the average returns were 0.23%, with the highest returns recorded in September 2016 at 5.9%, and the lowest in January 2018 at -3.37%. The movement of the returns was dynamic, with significant ups and downs, as illustrated in Figure 2. Overall, the returns of all financing groups proved resilient in various economic conditions. This resilience is evidenced by the 9.16% growth in financings by the end of 2020, amidst the COVID-19 pandemic, while the conventional banking sector experienced negative growth (OJK, 2021).

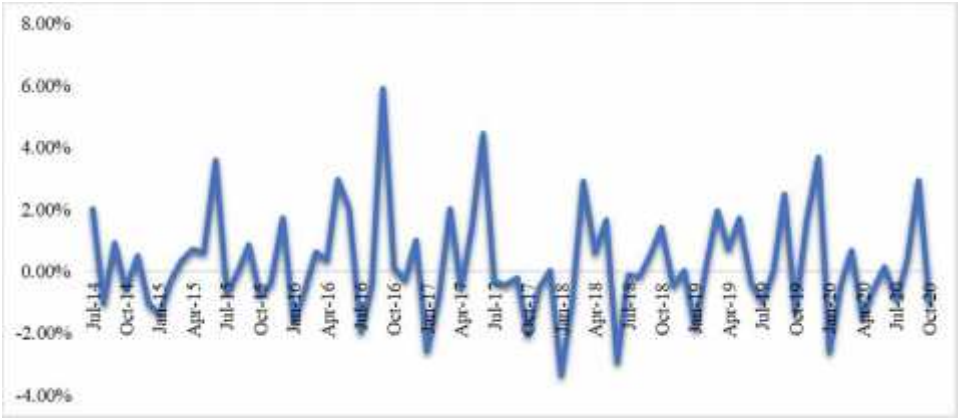

Figure 2. Portfolio Returns Fluctuation
Source: processed (2021)

5. Volatility Returns

The standard deviation values for each financing group, as indicated in Tables 3 and 4, provide insight into the level of risk associated with each type of financing. A high standard deviation value suggests increased risk, while a low value indicates decreased risk. This implies that all groups experienced varying degrees of return volatility throughout the observation period. *Mudharabah* financing exhibited the highest volatility in 2018, with the lowest occurring in 2014. Conversely, *musharakah* financing saw its peak volatility in 2017 and its lowest in 2015. *Murabahah* financing had its highest and lowest volatility percentages in 2016 and 2019, respectively. Notably, all financing groups encountered an uptick in return volatility in 2016. Specifically, *mudharabah* financing volatility rose by 0.68 points from the previous year, *musharakah* volatility increased by 0.32 points, and *murabahah* financing volatility surged by 2.77 points. The overall financing portfolio experienced an increase in volatility of 0.82 points. These findings are emphasized in the highlighted sections of the text.

Tabel 3 Standard Deviation *Murabahah, Musharakah* and *Mudharabah*

Year	*Mudharabah*	*Musharakah*	*Murabahah*
2014[a]	1.77	1.90	0.94
2015	2.41	1.61	0.83
2016	3.09	1.93	3.60
2017	3.52	2.64	0.90
2018	4.19	2.07	1.40
2019	3.36	1.95	0.45
2020[b]	3.45	1.56	0.83
Average	3,11	1,95	1,28

Source: data processed (2021)

Note: [a]From June 2014; [b]Until October 2020

When analyzing these numbers, researchers examine determinants that influence financing/credit risks in the banking industry, including economic conditions. The Annual Economic Report by Bank Indonesia (BI) revealed that in 2015, the Indonesian economy experienced slow growth due to the impact of global economic instability, such as the divergence of monetary policy, the Fed's policy for monetary normalization in the US, the Greece crisis, Yuan devaluation, and other economic factors. Consequently, the cash flow into developing countries, including Indonesia, decreased. This condition significantly impacted the overall economic situation, mainly the real sector activities that Islamic banking relies on. Additionally, the crisis reduced the quality of earning assets, resulting in a decrease in profitability due to an increase in the provision fund costs.

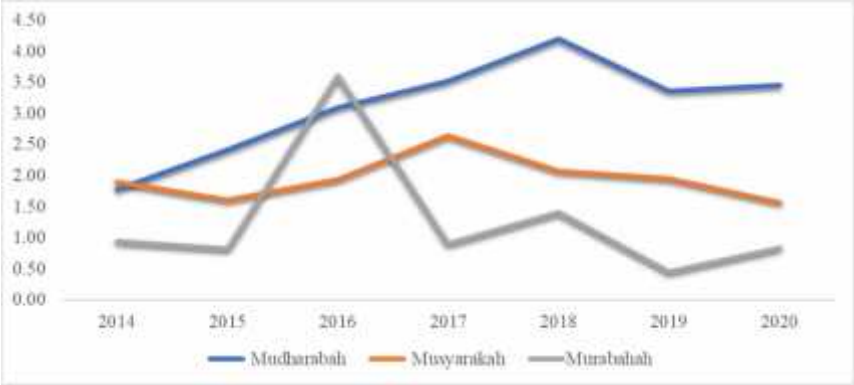

Figure 3. Volatility Fluctuation of Each Financing

The economic slowdown also impacted the business expansion in which Islamic banking has invested. These varied situations were among the reasons for the increase in financings and portfolio volatilities in 2016. On average, the volatility of *Mudharabah* and *Musharakah* financings (at 3.11% and 1.95%, respectively) were higher than that of *Murabahah* financings (1.28%). These results indicate a higher risk level for equity-based financings due to their nature as uncertainty contracts. This finding supports some previous studies, such as such as Maikabara, Maulida and Aderemi[57], Sudarsono and Shiddiqi[58], and Ishak and Rahman[59].

Table 4 Standard Deviation Portfolio

Year	2014	2015	2016	2017	2018	2019	2020
Standard deviation	1.23	1.33	2.15	1.88	1.78	1.68	1.49

Source: data processed (2021)

The total average data shows volatility fluctuation during the observation period for the portfolio combination. The level of portfolio volatility during the observation period (2014-2020) was relatively stable despite facing economic instabilities (Figure 4). This was indicated by the stability of the NPF ratio throughout the observation period (Table 11) (OJK, 2021).

[57] Abdullateef Abdulqadir Maikabara, Sri Maulida, and Abdulmajeed M Aderemi, "Debt-Based Versus Equity-Based Financing: A Comparative Analysis on Efficiency of Islamic Financial System," *Ihtifaz* 4, no. 1 (2021): 1.

[58] Heri Sudarsono[1] and Jannahar Saddam Ash Shidiqie, "Equity Financing, Debt Financing, and Financial Performance in Islamic Banks," (2021).

[59] Ishak and Rahman, "Equity-Based Islamic Crowdfunding in Malaysia: A Potential Application for Mudharabah."

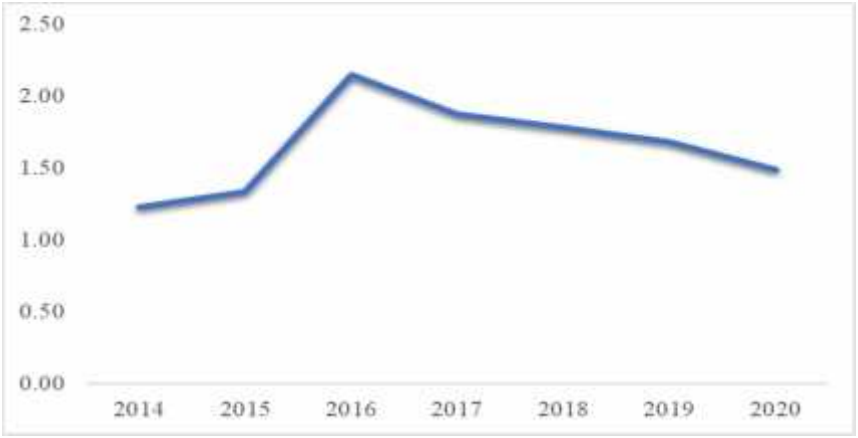

Figure 4. Volatility of Portfolio

6. Correlation Coefficient Results

Following the analysis of the volatility of returns of bank financing, this section explores the absolute relationship between financing groups in Islamic banking by computing VaR using correlation coefficients. A positive value indicates a unidirectional return between one type of financing and others. If the return on financing X increases, then financing Y will also increase. Additionally, if the coefficient number is closer to 1, the correlation is significant and vice versa. A negative relationship reflects the opposite direction of the return between one type of financing and others. If the return on financing X increases, the return on financing Y will decrease. Table 5 demonstrates the correlation coefficient of *murabahah*, *musharakah*, and *mudharabah* financings. It shows that the correlation between returns on the financing of *murabahah* and *mudharabah* contracts is positively correlated. This indicates that the returns of *murabahah*, *musharakah*, and *mudharabah* were unidirectional, which means that if the return of *murabahah* increases, then the return of *mudharabah* also increases.

Table 5. Correlation Coefficient

Year	Mudharabah Vs Musharakah	Mudharabah Vs Murabahah	Musharakah Vs Murabahah
2014[a]	0.375	0.905*	0.128
2015	0.475	0.289	0.783**
2016	0.220	0.273	0.491
2017	0.436	0.230	0.422
2018	0.145	0.102	0.174
2019	0.530	0.699**	0.638**
2020[b]	0.180	0.367	0.335
Total	0.342**	0.195	0.301**

Source: Data processed (2021)

***) Correlation is significant at the 0.01 level;*

Note: [a]From June 2014; [b]Until October 2020

Likewise, if the *murabahah* return increases, the *musharakah* return also increases, and if the *musharakah* return increases, the *mudharabah* return increases. Specifically, the table reveals that *mudharabah* and *musharakah* financings have the strongest connection compared to other correlation scenarios, as displayed by the overall correlation value (0.342). This finding is reasonable as these two contracts share similar characteristics and are categorized as equity-based financings. Several studies have found that equity-based financings (*musharakah* and *mudharabah*) were influenced by various determinants, including depositors' funds and behavior[60], cost efficiency[61], macro and microeconomic conditions[62], and others. As the level of returns for these financings relies on similar events, the changes in one financing will affect another and vice versa. Previous studies have found similar findings in terms of return ratios, such as those by Mohammeda et. Al[63], Muhammad and bin Ngah[64], and Ryandono et.al.[65]

7. VaR Results on Each Financing Schemes

Table 3 provides the standard deviation values for each financing scheme, including the financing portfolio from 2014 to 2020. These data indicate the return volatility on the financing instruments during the observation period and were utilized as the basis for VaR calculation in Tables 6, 7, 8, and 9. The currency refers to the Indonesian Rupiah (IDR).

a. Mudharabah

The calculation of VaR for the *mudharabah* financing with a 5% confidence level generated yearly values at 3.47%, 4.73%, 6.05%, 6.89%, 8.22%, 6.59%, and 6.76%. The highest value was 8.22% in 2018, while the lowest was 3.4% in 2014. The results indicate the possibility of maximum and minimum losses at the stated confidence level.

[60] Muhammad Arsalan Khan, Dodik Siswantoro, and Abid Ur Rahman, "The Obstacle Factors of Musharakah and Mudharabah Application in Pakistan," *Jurnal Akuntansi Dan Keuangan Indonesia* 17, no. 2 (2020): 5.

[61] Siti Nor Amira Mohamad et al., "Factors Affecting The Acceptance Of Equity-Based Financing: A Study Among Muslim Users Of Financing," 2021; Zahrotush Sholikhah, Bambang Agus Pramuka, and Wiwiek Rabiatul Adawiyah, "Determinant of the Equity Based Financing Volume: A Case of Islamic Banks in Indonesia," *Research Journal of Finance and Accounting* 8, no. 1 (2017): 30–39.

[62] Elkamiliati and Ibrahim, "Pengaruh Bi Rate Terhadap Persentase Bagi Hasil Pembiayaan Musyarakah Pada Bank Aceh Syariah Banda Aceh"; Islam and Ahmad, "Applicability of Mudarabah and Musharakah as Islamic Micro-Equity Finance to Underprivileged Women in Malaysia."

[63] Anas Satti Satti Mohammeda et al., "Evaluation of The Performance of Financing Formulas in Islamic Banks: Field Study Applied on the Islamic Banks Operating in Sudan," *Evaluation* 14, no. 11 (2020).

[64] Tijjani Muhammad and Besar bin Ngah, "Modeling Debt And Equity Crowdfunding Based On Murabahah, Musharakah And Mudarabah: Trust And Awareness," *Ikonomika: Jurnal Ekonomi Dan Bisnis Islam* 5, no. 2 (2020): 271–96.

[65] Ryandono, Kusuma, and Prasetyo, "The Foundation of a Fair Mudarabah Profit Sharing Ratio: A Case Study of Islamic Banks in Indonesia."

Based on these values, the potential yearly losses for *mudharabah* financing during the observation period, 2014 – 2020, were IDR2,157, IDR4,656, IDR5,704, IDR6,015, IDR5,932, IDR4,111, and IDR3,059, (in billions). The findings showed that the most significant potential loss occurred in 2017, with the possibility of losses reaching IDR6.019 billion, while the smallest possible loss was found in 2014 for about IDR2.157 billion. Overall, the potential yearly losses for *mudharabah* financing in the observation period ranged from IDR2.157 to IDR6.015 billion.

Table 6. Value Results at Risk *Mudharabah*

Year	Standard Deviation	Financing Exposure (IDR Billion)	VaR (α=5%)	VaR Nominal (IDR Billion)
2014[a]	1.77%	62108	3.47%	2,157
2015	2.41%	98483	4.73%	4,656
2016	3.09%	94209	6.05%	5,704
2017	3.52%	87304	6.89%	6,015
2018	4.19%	72175	8.22%	5,932
2019	3.36%	62398	6.59%	4,111
2020[b]	3.45%	45232	6.76%	3,059

Source: data processed (2021)
Note: [a]From June 2014; [b]Until October 2020

b. Musharakah

The VaR values for *musharakah* financings during 2014-2020 were 3.72%, 3.15%, 3.79%, 5.18%, 4.06%, 3.82%, and 3.06%, consecutively. The highest ratio was observed in 2017 at 5.18%, whereas the lowest was in 2020 at 3.06%. These results indicate the specific times and values of the largest and smallest potential losses within the observation period.

Tabel 7. Value Results at Risk *Musharakah*

Year	Standard Deviation	Financing Exposure (IDR Billion)	VaR (α=5%)	VaR Nominal (IDR Billion)
2014[a]	1.90	276,636	3.72%	10,286
2015	1.61	520,056	3.15%	16,385
2016	1.93	594,108	3.79%	22,498
2017	2.64	673,595	5.18%	34,867
2018	2.07	749,124	4.06%	30,432
2019	1.95	908,438	3.82%	34,719
2020[b]	1.56	876,017	3.06%	26,772

Source: data processed (2021)
Note: [a]From June 2014; [b]Until October 2020

Table 7 illustrates the potential losses for *musharakah* financing in IDR billions for each year within the observation period, which sequentially were IDR10,286, IDR16,385, IDR22,498, IDR34,867, IDR30,432, IDR34,719, and IDR26,772. The

largest potential losses occurred in 2017 at IDR34.867 billion, while the smallest potential loss was detected in 2014 at IDR10.286 billion. Overall, the potential losses each year during the observation period ranged from IDR10,286 to IDR34,867 billion.

c. Murabahah

Table 8 displays the VaR values for *murabahah* financing from 2014 to 2020, which are 1.84%, 1.62%, 7.05%, 1.76%, 2.74%, 0.88%, and 1.64%, respectively. The highest VaR value was observed in 2016 at 7.05%, while the lowest value was in 2019 at 0.88%. These figures show the specific times of maximum and minimum potential losses at a confidence level of 5% during the observation period.

Table 8. Value Results at Risk *Murabahah*

Year	Standard Deviation	Financing Exposure (IDR Billion)	VaR (α=5%)	VaR Nominal (IDR Billion)
2014	0.94%	632268	1.84%	11,609
2015	0.83%	1100041	1.62%	17,805
2016	3.60%	1186795	7.05%	83,671
2017	0.90%	1345921	1.76%	23,652
2018	1.40%	1389428	2.74%	38,103
2019	0.45%	1441554	0.88%	12,647
2020	0.83%	1278271	1.64%	20,905

Source: data processed (2021)
Note: [a]From June 2014; [b]Until October 2020

The calculation of VaR in IDR billions resulted in values of IDR11,609, IDR17,805, IDR83,671, IDR23,652, IDR38,103, IDR12,647, and IDR20,905, respectively. The largest potential loss at a 5% confidence level occurred in 2016, with a nominal value of IDR83.671 billion, while the smallest potential loss was in 2014, at IDR11.609 billion.

d. Portfolio

The standard deviation values for the financing portfolio VaR measurement from 2014 to 2020 were recorded at 1.23%, 1.33%, 2.15%, 1.88%, 1.78%, 1.68%, and 1.49%, respectively. The highest standard deviation value was in 2016 at 2.15%, while the lowest was in 2014 at 1.23%. These results indicate that the portfolio return volatility was the highest and lowest of all standard deviation values in these respective years.

Table 9. Value Results at Financing Risk Portfolio

Year	Standard Deviation	Financing Exposure (IDR Billion)	VaR (α=5%)	VaR Nominal (IDR Billion)
2014[a]	1.23%	971012	2.41%	23,391
2015	1.33%	1718580	2.61%	44,909

2016	2.15%	1875113	4.22%	79,129
2017	1.88%	2106819	3.68%	77,513
2018	1.78%	2210727	3.49%	77,203
2019	1.68%	2412391	3.30%	79,527
2020[b]	1.49%	2199519	2.92%	64,189

Source: data processed (2021)
Note: [a]From June 2014; [b]Until October 2020

For the financing portfolio, the VaR values during the research period were 2.41%, 2.61%, 4.22%, 3.68%, 3.49%, 3.30%, and 2.92%. The values of 4.22% in 2016 and 2.41% in 2014 indicate the maximum and minimum potential losses at a confidence level of 5%. Thus, the VaR calculation for potential loss ranges between 2.41% and 4.22%.

The potential losses in IDR billions were IDR23,391, IDR44,909, IDR79,129, IDR77,513, IDR77,203, IDR79,527, and IDR64,189. The maximum and minimum potential losses were recorded in 2016 and 2014 with nominal values of IDR79.527 billion and IDR23.391 billion, respectively. These figures suggest that the potential loss at a 5% confidence level ranged between IDR23,391 and IDR79,527 billion for the total financings each year within the observation period.

e. Result Analysis

The results from the above section indicate that, in general, all financings (*mudharabah, musharakah*, and *murabahah*) have relatively manageable potential losses during the observation period. However, equity-based financing (*mudharabah* and *musharakah*) has a notably higher risk than their debt-based counterpart (*murabahah*). Specifically, *mudharabah* generated the highest potential loss, followed by *musharakah*, with *murabahah* incurring the least. This is expected, as *mudharabah* and *musharakah* are equity-based financings that operate under contracts based on profit and loss sharing, which inherently come with greater uncertainty. Within Islamic banking in Indonesia, *mudharabah* is practiced under an agreement between an Islamic bank and a party, whereby the party mobilizes the funds of the former for business activity within Sharia guidelines. The profits are shared according to a mutually agreed ratio, while the bank bears the losses under predetermined conditions.

Meanwhile, *musharakah* is operationalized through a contract between the bank and other party(s) where the parties provide capital and manage the venture. Losses are shared based on the capital contribution, while profits are shared in an agreed percentage. Therefore, in *musharakah* and *mudharabah*, the risk of default or the

acquisition of returns tends to be more significant. This condition has previously been observed by Khan and Ahmad, who found *musharakah* to be the riskiest financing in Islamic banking, followed by *mudharabah*[66].

Table 10 VaR Comparison for *Mudharabah*, *Musharakah*, and *Murabahah* Financings

Year	Mudharabah	Musharakah	Murabahah	Portfolio
2014[a]	3.47%	3.72%	1.84%	2.41%
2015	4.73%	3.15%	1.62%	2.61%
2016	6.05%	3.79%	7.05%	4.22%
2017	6.89%	5.18%	1.76%	3.68%
2018	8.22%	4.06%	2.74%	3.49%
2019	6.59%	3.82%	0.88%	3.30%
2020[b]	6.76%	3.06%	1.64%	2.92%
Average	6.10%	3.83%	2.50%	3.23%

Source: data processed (2021)
Note: [a]From June 2014; [b]Until October 2020

The findings also reveal that *murabahah* is the most secure financing in terms of yield. Based on the VaR calculation, *murabahah* financing volatility is more stable during the observation period. It is operationalized as the sale of goods at a markup price where the bank clearly states the purchase and selling price, other costs, and the profit margin at the time of the sale agreement. However, the comparison of all financing schemes, including the portfolio, reveals that *murabahah* was less resilient to the economic crisis, as highlighted in Table 10. Data from Bank Indonesia shows that in the third quarter of 2015, Indonesia experienced the lowest economic growth since 2010 due to global financial instability. This contributed to the increase in investment risk (volatility of returns) in all financing schemes in 2016. However, a significant jump occurred in *murabahah* financing. This fact is also supported by the standard deviation value indicating high volatility returns in Table 3. In addition, *murabahah* financing also contributed to 57.59% of the overall Islamic banking Non-Performing Financing (NPF) ratio, indicating a high level of financing risk (Table 11). The analysis indicates that the potential loss at a 5% confidence level was between IDR23,391 and IDR79,527 billion for the total financings each year within the observation period. This condition is in line with the National Committee for Islamic Economics and Finance *(Komite Nasional Ekonomi dan Keuangan Syariah – KNEKS)* that revealed the increase in volatility returns during an economic crisis (KNEKS, 2020).

[66] Khan and Ahmed, "Risk Management on Analysis of Issues in Islamic Financial Industry. Islamic Research and Training Institute : Islamic Depelopment Bank."

Tabel 11. Comparison Risk Associated with NPF in All Financing Schemes (2014-2020)

Indicator	2014 (%)	2015 (%)	2016 (%)	2017 (%)	2018 (%)	2019 (%)	2020 (%)	Average (%)
Mudharabah	5.48	2.50	2.78	2.35	1.37	1.28	1.70	2.49
Musharakah	34.93	38.11	31.72	37.61	39.24	35.09	34.88	35.94
Murabahah	55.90	57.54	64.26	58.80	54.37	57.17	55.12	57.59

Source: OJK, processed (2021)

8. Research Implications

The findings of this study offer valuable insights for various stakeholders in the Islamic banking sector, including bank management, regulators, investors, and other interested parties. For Islamic bank management, the study underscores the importance of a balanced approach to financing, weighing the stability of debt-based financing against the potentially higher returns of equity-based financing. While *murabahah*, a form of debt-based financing, has shown empirical stability in its return and lower volatility, it has also been found to be more susceptible to economic downturns. On the other hand, equity-based financings like *mudharabah* and *musharakah*, despite their higher volatility, offer the prospect of higher returns. This aligns with the tradeoff theory, suggesting that higher risk may come with higher potential rewards[67]. The study's results suggest that Islamic banks should refine their risk management strategies, particularly for *mudharabah* schemes, to balance these factors effectively.

For regulators, the study provides crucial information that could inform the development of regulations tailored specifically for Islamic banking, distinct from those governing conventional banking systems. Understanding the unique risk profiles and performance characteristics of Islamic financing instruments can help regulators create a more supportive and effective regulatory framework. For investors and other stakeholders, especially those adhering to Islamic principles, can use the empirical evidence from this study to make more informed investment decisions within Islamic banking. The study reinforces previous research and offers a new reference point for assessing the risk-return profile of different Islamic financing schemes.

[67] Hengjie Ai, Murray Z Frank, and Ali Sanati, "The Trade-off Theory of Corporate Capital Structure," 2020; Yehuda Izhakian, David Yermack, and Jaime F Zender, "Ambiguity and the Tradeoff Theory of Capital Structure," *Management Science* 68, no. 6 (2022): 4090–4111; Julian U N Vogel, "Signaling and Information Asymmetry in the Context of Voluntary Disclosure, Share Repurchases, and Capital Structure Decision-Making," 2021; Wei Zhang et al., "Downside Risk and the Cross-Section of Cryptocurrency Returns," *Journal of Banking & Finance* 133 (2021): 106246.; Azharsyah Ibrahim, Ana Fitria, and M Shabri Abd Majid, "Do Distributive and Procedural Justice Matter for Job Satisfaction? The Case of State Islamic Higher Education Institutions in Indonesia," *International Journal of Management in Education* 16, no. 3 (2022).; Fetullah Battal, and Azharsyah Ibrahim, "How Does Cynicism Mediate Spiritual Leadership and Organizational Commitment? The Case of Turkish and Indonesian Universities," *Ege Academic Review* 23, no. 2 (2023).

The study's implications are not limited to the three dominant financing schemes (*mudharabah*, *musharakah*, and *murabahah)* in Islamic commercial banks but also hint at broader considerations for Islamic banking practices. It suggests that Islamic banks need to continuously evaluate their financing portfolios and risk management practices to ensure they are aligned with the dynamic nature of the market and the principles of Islamic finance. The study also highlights the need for ongoing research into Islamic banking practices, as the results may not be generalizable across different projects or types of Islamic banking with varying characteristics. Future research could expand on these findings by exploring other financing instruments and considering the impact of different economic conditions and regulatory environments on the risk and return profiles of Islamic banking products.

C. Conclusion

This study empirically measured and analyzed the potential risk and expected returns of equity and debt-based financings, as represented by the three most dominant schemes in Islamic commercial banks in Indonesia: *Musharakah*, *Mudharabah*, and *Murabahah*. Utilizing a purposive sampling method, a total of 82 observations from the 2014-2020 period were employed as samples for the study, with the Value at Risk (VaR) approach used for estimation. The findings provide empirical evidence of the stability of risk and returns for both equity and debt-based financing schemes. Specifically, while equity-based financing yielded higher returns, it also entailed higher risks, which are predictable given their uncertain nature. The results also indicate that risk management in Islamic banks has improved during the observation period, as evidenced by the average scores of portfolio combinations and the trend in Non-Performing Financing (NPF). These findings imply that Islamic banks should favor equity-based financing over debt-based financing while simultaneously strengthening risk management, especially for *Mudharabah* products in equity-based financing, to bolster resilience during economic recessions.

To address a recession, Islamic banks should take proactive measures such as identifying determinants impacting banking performance, preparing scenarios to counter the crisis’s spillover effects, and mitigating financing risk and the Capital Adequacy Ratio (CAR). This can be achieved by understanding economic factors, activating early warning systems, developing restructuring scenarios, and adjusting their Financing to Deposit Ratio (FDR) below 100 percent to increase CAR amidst the recession. Additionally, conducting stress tests on capital and liquidity adequacy ratios, optimizing portfolio management, and identifying vulnerable portfolio parts are crucial steps. Regulators should expedite crisis

response by providing concessions and incentives, harmonizing regulations, and collaborating with the industry to promote financial consolidation and sustainable commitment. Islamic banking should prioritize innovation through technological adaptation and industrial digitalization to dynamically respond to recession challenges. Furthermore, Islamic banking should develop a conducive ecosystem by synergizing with other sectors of Islamic finance, MSMEs, the halal industry, the creative industry, and the Islamic social finance sector. This approach will help anticipate infrastructure shortages and promote financial consolidation, enhancing efficiency. Lastly, regulators and banks should invest in updated technology to cater to customer responses during a crisis.

This study was limited to three financing schemes representing equity and debt-based financings in Islamic commercial banks (BUS) as determinants for measuring potential losses and expected returns of Islamic banking financings in Indonesia over the 2014-2020 period. For more comprehensive and robust empirical evidence, future studies could include additional financing schemes in their analyses and expand the scope to incorporate Islamic business units (UUS) and Islamic rural banks (BPRS). A comparative study of risk and return volatility between BUS, UUS, and BPRS, as well as between Islamic and conventional banking, would provide further insights into the nature of the relationship between risk and return within the banking industry.

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