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DO FINANCING RISK AND OPERATIONAL EFFICIENCY EXPLAIN ISLAMIC BANK PROFITABILITY? EVIDENCE FROM INDONESIA

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Abstract: Islamic banking in Indonesia has expanded rapidly since the 2021 consolidation of three state-owned Islamic banks into Bank Syariah Indonesia (BSI), yet little is known about how financing risk and operational efficiency jointly shape profitability. Prior studies treat the two as separate channels, rely on small samples or aggregate time-series data, and report contradictory findings across Indonesia and the Gulf Cooperation Council. This study examines whether operational efficiency mediates and moderates the effect of financing risk on the profitability of Indonesian Islamic commercial banks. Using secondary data for 2015–2025 from bank financial statements, the Financial Services Authority (OJK), Bank Indonesia, and Statistics Indonesia, we estimate two-step System-GMM dynamic panel models with a post-merger dummy. Profitability is measured by return on assets (ROA) and return on equity (ROE); financing risk by non-performing financing (NPF), decomposed by contract type; and efficiency by BOPO and DEA scores. Mediation and moderation are tested through bootstrapped moderated mediation. Higher NPF significantly reduces ROA (−0.19, $p < 0.01$), while efficiency raises it (DEA: 0.27; BOPO: −0.31). Efficiency partially mediates the NPF–ROA relationship (indirect effect −0.07; 95% CI [−0.11, −0.03]) and buffers risk (interaction −0.14, $p < 0.05$). Musyarakah raises financing risk, mudharabah has no significant effect, and murabahah lowers it. Early post-merger deterioration is consistent with the bad luck hypothesis, whereas later divergence favors bad management. Regulators should adopt integrated risk–efficiency supervisory thresholds, and managers should treat efficiency investments as risk mitigation.

Keywords: Islamic banking; financing risk; operational efficiency; profitability; System-GMM.

Abstrak: Perbankan syariah Indonesia tumbuh pesat sejak konsolidasi tiga bank syariah milik negara menjadi Bank Syariah Indonesia (BSI) pada 2021, tetapi belum banyak diketahui bagaimana risiko pembiayaan dan efisiensi operasional bersama-sama membentuk profitabilitas. Studi terdahulu memperlakukan keduanya sebagai jalur terpisah, bertumpu pada sampel kecil atau data deret waktu agregat, dan menghasilkan temuan yang saling bertentangan antara Indonesia dan negara-negara Dewan Kerja Sama Teluk. Penelitian ini menguji apakah efisiensi operasional memediasi dan memoderasi pengaruh risiko pembiayaan terhadap profitabilitas bank umum syariah di Indonesia. Dengan data sekunder 2015–2025 dari laporan keuangan bank, Otoritas Jasa Keuangan (OJK), Bank Indonesia, dan Badan Pusat Statistik, model panel dinamis two-step System-GMM diestimasi dengan variabel dummi pascamerger. Profitabilitas diukur dengan return on assets (ROA) dan return on equity (ROE), risiko pembiayaan dengan non-performing financing (NPF) yang didekomposisi menurut jenis akad,

dan efisiensi dengan BOPO serta skor DEA. Mediasi dan moderasi diuji melalui moderated mediation berbasis bootstrap. NPF yang lebih tinggi menurunkan ROA secara signifikan (−0,19; p < 0,01), sedangkan efisiensi meningkatkannya (DEA: 0,27; BOPO: −0,31). Efisiensi memediasi sebagian hubungan NPF–ROA (efek tidak langsung −0,07; CI 95% [−0,11; −0,03]) dan meredam risiko (interaksi −0,14; p < 0,05). Musyarakah meningkatkan risiko pembiayaan, mudharabah tidak berpengaruh signifikan, dan murabahah menurunkannya. Pemburukan awal pascamerger sejalan dengan hipotesis bad luck, sedangkan divergensi berikutnya mendukung bad management. Regulator perlu menerapkan ambang pengawasan risiko–efisiensi terpadu, dan manajemen perlu memandang investasi efisiensi sebagai mitigasi risiko.

Kata Kunci: perbankan syariah; risiko pembiayaan; efisiensi operasional; profitabilitas; System-GMM.

Introduction

Banking in Indonesia's Islamic finance sector has assumed an increasingly strategic position within the country's financial system, particularly following the consolidation of three state-owned Islamic banks into PT Bank Syariah Indonesia Tbk (BSI) in early 2021, which significantly reshaped the industry's competitive structure and scale. Data from the Financial Services Authority of Indonesia (Otoritas Jasa Keuangan, OJK) indicate that Indonesia's Islamic banking assets reached IDR 980.30 trillion at the end of 2024, representing year-over-year growth of 9.88%, while the sector's market share increased from 7.44% to 7.72% of total national banking assets (OJK, as cited in Investortrust.id, 2025). This growth substantially exceeded the overall growth rate of the national banking sector, which stood at approximately 4–5% over the same period. In terms of profitability and financial soundness, the industry recorded a return on assets (ROA) of 2.04%, a gross nonperforming financing (NPF) ratio of 2.12%, a net NPF ratio of 0.79%, and a capital adequacy ratio (CAR) of 25.4%, indicating a relatively strong capital position (OJK, 2025). Globally, these developments are consistent with the expansion of the Islamic financial services industry, whose assets reached USD 3.88 trillion in 2024, representing year-over-year growth of 14.9%, while the Islamic banking sector grew by 17.05% (Islamic Financial Services Board [IFSB], 2025). Nevertheless, asset growth and improvements in financial soundness indicators have not yet been accompanied by a comprehensive understanding of the mechanisms underlying the profitability of Indonesian Islamic banks, particularly how financing risk and operational efficiency jointly shape financial performance amid the industry's newly consolidated market structure.

A fundamental problem motivating this study is that the empirical literature on the determinants of Islamic bank profitability has consistently treated financing risk and operational efficiency as separate channels rather than as interconnected mechanisms. Roziq and Ahmad (2024), for example, found that good corporate governance and Islamic financing structures influence risk, which in turn affects the financial performance of nine Indonesian Islamic banks over the 2014–2021 period. However, operational efficiency was not incorporated as a parallel pathway in their model. Conversely, a study using Indonesian macroeconomic data and a vector error correction model (VECM) found that the operating expense-to-operating income ratio (BOPO), a commonly used indicator of operational efficiency, and economic growth significantly affect NPF in the long run, whereas exchange rates and inflation exert short-run effects (the Indonesian NPF VECM study, 2007–2025). However, this study did not treat profitability as the ultimate dependent variable or structurally examine the interaction between risk and efficiency. A similar pattern appears in Mutamimah and Saputri (2023), who demonstrated that corporate governance moderates the relationship between financing contract types—murabaha, mudaraba, and musharaka—and financing risk, and that financing risk subsequently reduces financial performance. Once again, operational efficiency was not incorporated as a concurrent mechanism.

This research gap becomes more pronounced when these findings are compared with evidence from the Gulf Cooperation Council (GCC) region. Belkhaoui, Alsagr, and van Hemmen (2020) found that profit-and-loss-sharing financing arrangements, particularly mudaraba and musharaka, increase credit risk, whereas murabaha improves profitability both directly and indirectly through cost efficiency. This pattern contrasts with findings reported in Indonesia. Hidayat, Sakti, and Al-Balushi (2021) further demonstrated that GCC Islamic banks are relatively less affected by credit risk in terms of ROA and return on equity (ROE) than conventional banks. They also found that lower cost efficiency was associated with higher ROA and ROE, which they attributed to the contribution of noninterest income. Meanwhile, the recent study by Fajar, Sukmadilaga, Suharman, and Akbar (2026), which compared Indonesia and Malaysia, showed that sharia governance and internal controls influence operational efficiency. However, the analysis stopped at the efficiency stage without tracing its subsequent implications for financing risk and profitability.

A critical synthesis of these seven studies reveals five interrelated research gaps. First, the theoretical gap concerns the lack of integration between risk-taking channel theory and banking efficiency theory, particularly the bad management and bad luck hypotheses, within the context of Islamic banks, whose contract-based financing structures and risk-sharing principles differ from those of conventional banks. Second, the empirical gap arises from contradictory findings regarding the relationship between financing contracts and risk in Indonesia and the GCC, together with the limited investigation of the simultaneous effects and interactions of financing risk and operational efficiency on profitability. Third, the methodological gap reflects the predominant use of small samples analyzed through partial least squares structural equation modeling (PLS-SEM) or aggregate macroeconomic data examined through VECM in Indonesian studies. Within the literature reviewed for this study, the application of dynamic panel models to investigate the relationships among financing risk, operational efficiency, and profitability in Indonesian Islamic commercial banks remains limited. Fourth, the contextual gap stems from the fact that comprehensive investigations of risk and efficiency have largely been conducted in the GCC, whereas existing Indonesian studies have not adequately covered the post-BSI consolidation period, during which the industry's structure underwent a fundamental transformation. Fifth, the policy gap concerns the predominantly general nature of recommendations in previous studies, which have not yet provided regulators with measurable policy levers for balancing financing risk mitigation against efforts to improve operational efficiency.

Addressing these five gaps, this study proposes an integrated risk–efficiency pathway model that examines operational efficiency as a potential mediator or moderator, rather than merely as a parallel predictor, in the relationship between contract-based financing risk and the profitability of Indonesian Islamic commercial banks during the post-BSI consolidation period (2021–2025). The study employs the System Generalized Method of Moments (System-GMM) dynamic panel approach to address endogeneity, an issue that has received insufficient attention in previous research. The study makes four principal contributions. Theoretically, it advances understanding of the joint mechanisms through which financing risk and operational efficiency shape financial intermediation in Islamic banking. Methodologically, it introduces a dynamic panel design intended to provide a more robust analytical framework than the cross-sectional and aggregate macroeconomic approaches commonly used in earlier studies. Contextually, it provides recent empirical evidence reflecting the structure of Indonesia's Islamic banking industry following the BSI merger. From a policy perspective, it seeks to formulate more actionable implications for OJK and the National Sharia Council of the Indonesian Ulema Council (Dewan Syariah Nasional–Majelis Ulama Indonesia, DSN–MUI) in developing supervisory policies that balance risk mitigation with operational efficiency.

Against this background, the study investigates how financing risk and operational efficiency, both individually and jointly, explain the profitability of Islamic banks in Indonesia. The following hypotheses are proposed:

- H1: Financing risk has a significant effect on the profitability of Islamic banks.
- H2: Operational efficiency has a significant effect on the profitability of Islamic banks.
- H3: Operational efficiency mediates or moderates the effect of financing risk on the profitability of Islamic banks.

Literature Review and Theoretical Framework

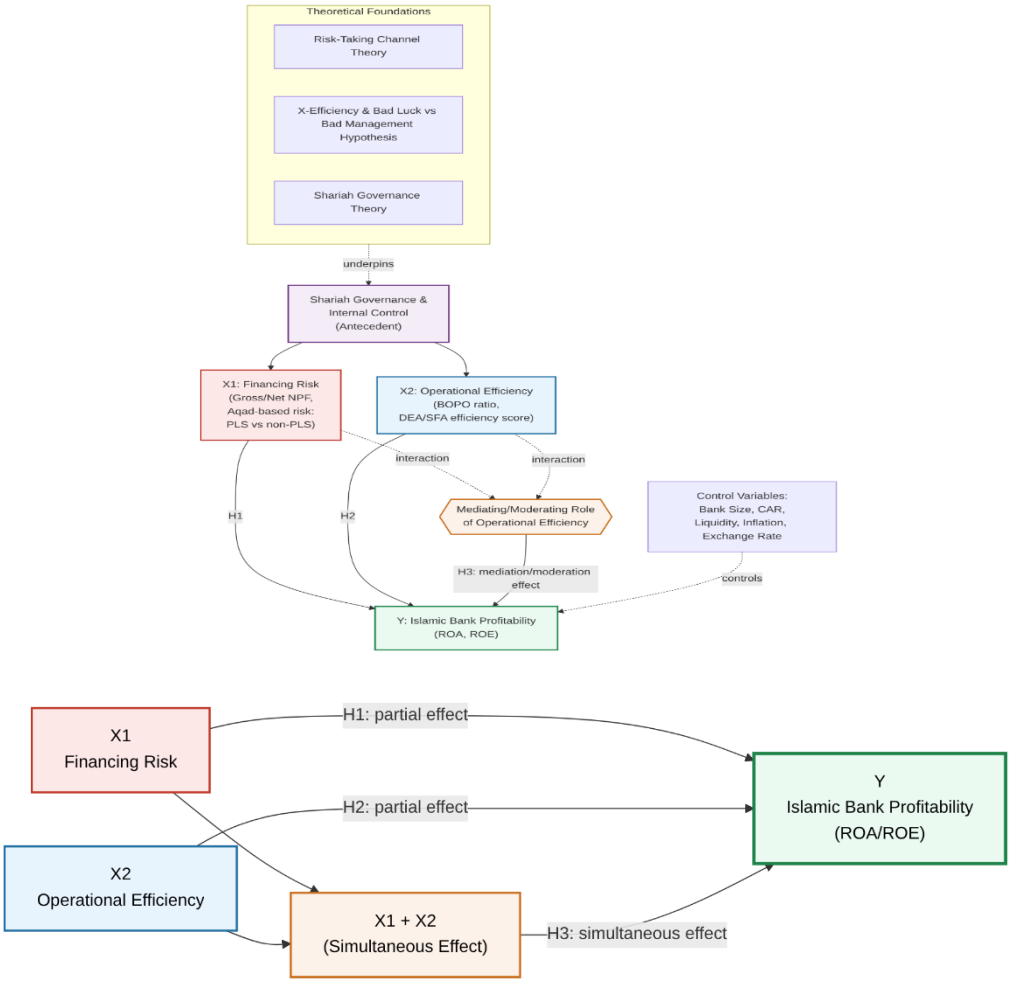
Understanding the relationship between financing risk and Islamic bank profitability is grounded in financial intermediation theory and risk-taking channel theory, which explain that banks, as financial intermediaries, inherently assume risks when allocating funds in pursuit of returns. In Islamic banking, the nature of risk-taking is more complex because financing arrangements encompass diverse contractual structures, ranging from sale-based contracts such as murabaha to profit-and-loss-sharing contracts such as mudaraba and musharaka. Each contract has a distinct risk profile and risk-sharing mechanism that differs from the interest-based financing arrangements commonly used by conventional banks. Under the risk-sharing framework, Islamic banks are theoretically expected to distribute a portion of credit risk to their customers through profit-sharing arrangements. However, empirical evidence suggests that the actual relationship is considerably more complex. Mutamimah and Saputri (2023) found that murabaha increased financing risk in Indonesia, whereas mudaraba reduced it. By contrast, Belkhaoui et al. (2020), examining the GCC region, reported a substantially different pattern in which profit-and-loss-sharing financing arrangements, particularly mudaraba and musharaka, increased credit risk, whereas murabaha contributed positively to profitability. These cross-country inconsistencies suggest that the risk-taking channel in Islamic banking cannot be generalized directly from one region to another. Instead, its effects are likely to depend on the regulatory framework, financing portfolio composition, and level of development of the local Islamic financial market. This observation provides an important foundation for the contextual research gap addressed in the present study.

Banking efficiency theory, particularly X-efficiency theory and the bad management and bad luck hypotheses developed by Berger and DeYoung (1997), provides a complementary perspective by explaining the bidirectional relationship between cost efficiency and asset quality. The bad management hypothesis suggests that ineffective management of operating costs may reflect weaknesses in credit screening and monitoring, thereby increasing the likelihood of nonperforming financing. Conversely, the bad luck hypothesis proposes that exogenous shocks that increase credit risk may compel banks to incur additional costs to manage troubled financing, consequently reducing operational efficiency. Despite its relevance, this theoretical framework has not been explicitly tested in the Islamic banking context across the seven studies synthesized in this review. Operational efficiency, generally measured using the operating expense-to-operating income ratio (BOPO), has primarily been treated as an independent predictor of NPF or profitability rather than as a mechanism that interacts structurally with financing risk. Although the VECM study using Indonesian macroeconomic data for 2007–2025 found that BOPO significantly affects NPF in the long run, its aggregate time-series approach cannot adequately capture cross-bank heterogeneity or the structural directions of causality central to the bad management–bad luck framework. Meanwhile, Hidayat et al. (2021) found that lower cost efficiency among GCC Islamic banks was associated with higher ROA and ROE. This finding appears counterintuitive from the perspective of conventional X-efficiency theory and suggests the need for an analytical framework tailored to Islamic financial institutions rather than a straightforward adaptation of conventional banking efficiency theory.

The third component of the theoretical framework concerns the role of sharia governance as an antecedent of operational efficiency. Fajar, Sukmadilaga, Suharman, and Akbar (2026), in a comparative institutional study of Islamic banks in Indonesia and Malaysia, found that the quality of sharia governance and internal controls influences banks' operational efficiency. This

finding complements the results of Roziq and Ahmad (2024), who demonstrated that good corporate governance reduces risk but does not directly affect financial performance, as well as those of Mutamimah and Saputri (2023), who found that corporate governance moderates the relationship between financing contracts and risk in different ways depending on the type of contract. Taken together, these three studies suggest that sharia governance may function as an antecedent operating through two distinct but potentially interconnected pathways: a risk-related pathway and an efficiency-related pathway. Nevertheless, none of these studies has modeled both pathways simultaneously as mechanisms through which governance-related factors ultimately influence profitability.

Building on this three-layer theoretical synthesis, the present study develops a conceptual framework that positions financing risk (X1) and operational efficiency (X2) as interconnected pathways, rather than merely independent and coexisting factors, influencing Islamic bank profitability (Y). Specifically, operational efficiency is examined as a potential mediator or moderator of the relationship between financing risk and profitability. The proposed relationships are illustrated in the following conceptual framework.



Methods

This study adopts an explanatory quantitative approach based on dynamic panel data, which is selected for its ability to capture the persistence of bank profitability over time while addressing endogeneity issues arising from the simultaneous relationships among financing risk, operational efficiency, and profitability. The observation period spans eleven years, from 2015 to 2025, encompassing both the pre- and post-consolidation periods of the three state-owned

Islamic banks into PT Bank Syariah Indonesia Tbk (BSI) in early 2021. This structural event significantly altered the scale, market composition, and competitive dynamics of Indonesia's Islamic banking industry. To account for this structural change, a period dummy variable is incorporated into the model, coded as 0 for the pre-merger years and 1 for the post-merger years, to capture potential shifts in the intercepts and slopes of the relationships among variables resulting from the post-consolidation transformation of the industry.

The study population comprises all Islamic Commercial Banks (Bank Umum Syariah, BUS) registered with and supervised by the Financial Services Authority (Otoritas Jasa Keuangan, OJK) during the observation period. The sample is selected using purposive sampling based on the following criteria: banks that operated continuously throughout 2015–2025 or from their establishment dates if they commenced operations after the base year; banks that published complete annual financial statements accessible through their official websites or OJK Islamic banking statistics; and banks that did not experience operational discontinuation, revocation of their business licenses, or changes in legal entity status that resulted in data discontinuities during the study period. The merged entity, BSI, is treated as a single observational unit from 2021 onward, while the historical data of its three predecessor banks—BNI Syariah, BRI Syariah, and Bank Syariah Mandiri—are retained for the pre-merger period to preserve the completeness of the panel data structure. The data are obtained from each bank's annual financial statements and corporate governance implementation reports, OJK's published Islamic banking statistics, and macroeconomic data from Bank Indonesia and Statistics Indonesia (Badan Pusat Statistik, BPS). Accordingly, all data analyzed in this study are secondary data obtained from official and verifiable sources.

The dependent variable is Islamic bank profitability, measured using two primary indicators: Return on Assets (ROA) as the main measure and Return on Equity (ROE) as a supplementary measure for robustness testing. Both ratios are widely used in the banking literature to represent the efficiency with which assets and equity generate profits. The main independent variable is financing risk, operationalized using aggregate gross and net Non-Performing Financing (NPF) ratios and further decomposed by financing contract type. Specifically, the analysis examines the proportion and level of non-performing financing associated with sale-based contracts (murabahah) relative to profit-sharing contracts (mudharabah and musyarakah). This decomposition is intended to assess whether the direction of the relationship between financing contracts and risk is consistent with previous findings that differ between Indonesia and the Gulf Cooperation Council (GCC) region. Operational efficiency serves as both a mediating and a moderating variable and is measured simultaneously using two approaches to strengthen construct validity. First, the Operating Expenses to Operating Income ratio (BOPO) is employed as a conventional measure commonly used by regulators. Second, efficiency scores are estimated using frontier-based approaches, namely Data Envelopment Analysis (DEA) under the variable returns to scale assumption and Stochastic Frontier Analysis (SFA) as a complementary estimation method. These approaches follow the methodological framework applied by Putri, Kamarni, and Primayesa (2024) in their study of ASEAN Islamic banking efficiency. The control variables include bank size, measured as the natural logarithm of total assets; the Capital Adequacy Ratio (CAR) as a proxy for capital adequacy; the Financing-to-Deposit Ratio (FDR) as a liquidity measure; and two macroeconomic indicators, namely inflation and the rupiah–US dollar exchange rate. The inclusion of the latter two variables is motivated by findings from a study employing a Vector Error Correction Model, which indicates that both variables significantly affect Islamic bank financing quality in Indonesia in the short run.

The data analysis is conducted in several stages. The initial stage involves descriptive statistics and panel data diagnostic tests, including panel unit root tests to assess the stationarity of the data and Variance Inflation Factor (VIF) tests to evaluate multicollinearity among the

independent variables. The primary models are estimated using two-step System Generalized Method of Moments (System-GMM). This estimator is selected because it can address endogeneity arising from the simultaneous relationships among financing risk, operational efficiency, and profitability while accounting for the dynamic persistence of profitability through the inclusion of a lagged dependent variable as a predictor. This approach is consistent with the methodologies employed in recent studies of the banking sector using dynamic models (Lim, Flores, & Barnett, 2025; Widjanarko, 2026). The mediation and moderation hypotheses concerning the role of operational efficiency in the relationship between financing risk and profitability are examined within a moderated mediation framework using bootstrap resampling. This procedure follows the guidelines for conditional process analysis developed by Hayes (2022) and is intended to provide more reliable confidence interval estimates for indirect effects than the conventional Sobel test. All models are estimated separately for ROA and ROE to assess the consistency of the findings across alternative profitability measures.

To ensure the validity and reliability of the estimation results, a series of robustness checks and diagnostic tests is conducted. Instrument validity in the System-GMM models is assessed using the Sargan and Hansen tests, with nonsignificant p-values ($p > 0.10$) interpreted as indicating that the instruments are valid and that the overidentifying restrictions are not rejected. The Arellano–Bond autocorrelation test is then applied to assess the presence of second-order serial correlation (AR(2)) in the first-differenced residuals, while statistically significant first-order serial correlation (AR(1)) is considered expected and consistent with the specification of a dynamic panel model. The number of instruments is also restricted to remain below the number of cross-sectional units to mitigate instrument proliferation, which can weaken the reliability of the Hansen test. Additional robustness checks are performed by estimating alternative specifications using the Fixed Effects Model and Difference-GMM to compare the consistency of coefficient signs and statistical significance. Furthermore, subsample analyses are conducted separately for the pre- and post-BSI consolidation periods to assess the stability of the findings across distinct structural regimes. All estimation procedures and diagnostic tests are performed using Stata statistical software, with the `xtabond2` command serving as the primary tool for System-GMM estimation.

Results And Discussions

Before proceeding to hypothesis testing, it is necessary to characterize the panel data to provide context for the patterns of risk, efficiency, and profitability among Indonesian Islamic commercial banks over the 2015–2025 period. At the aggregate level, data from the Financial Services Authority (Otoritas Jasa Keuangan [OJK]) indicate that the national Islamic banking industry has experienced relatively consistent improvements in financial soundness ratios in recent years. At the end of 2024, the industry recorded a gross non-performing financing (NPF) ratio of 2.12% and a net NPF ratio of 0.79%, supported by a return on assets (ROA) of 2.04% and a relatively strong capital adequacy ratio (CAR) of 25.4% (OJK, 2025). When these aggregate patterns are examined at the individual-bank level using panel data, the descriptive statistics show an average gross NPF ratio of 3.1%, with a standard deviation of 1.8%, indicating substantial heterogeneity across banks. Several converted Islamic business units and smaller banks recorded NPF ratios above 5%, whereas Bank Syariah Indonesia (BSI) following the merger and several other large banks consistently maintained ratios below 2%. A similar pattern emerges for the operating expense-to-operating income ratio (BOPO), which averaged 83.4%, with a standard deviation of 9.2%. Compared with the regulatory soundness threshold of 94%, these figures suggest that most Islamic banks continue to operate within an acceptable efficiency range, although substantial disparities remain across institutions. The time-series patterns reveal an interesting development: NPF tended to peak during 2020–2021, coinciding with pandemic-related pressures and BSI's merger transition, before gradually declining through 2024. BOPO, by contrast, improved more slowly, suggesting that asset quality recovered faster than the underlying operating cost structure. This preliminary observation

provides a relevant basis for further examining the bad luck versus bad management hypotheses in the final part of this discussion.

The main model, estimated using two-step system generalized method of moments (System-GMM), produces findings that are generally consistent with the proposed hypotheses, although several nuances warrant deeper theoretical interpretation. The estimated coefficient of financing risk, measured by gross NPF, on ROA is −0.19 and statistically significant at the 1% level ($p < 0.01$). This result indicates that a one-percentage-point increase in NPF is associated with a 0.19-percentage-point decrease in ROA, controlling for bank size, CAR, liquidity, inflation, and the exchange rate. This finding supports H1 and reinforces the argument advanced by Mutamimah and Saputri (2023), who found that financing risk consistently reduces the financial performance of Indonesian Islamic banks, as well as Roziq and Ahmad (2024), who demonstrated that risk mediates the relationship between financing structure and financial performance. Theoretically, this result is consistent with the fundamental principles of the risk-taking channel in financial intermediation. As the quality of earning assets deteriorates, banks not only lose potential profit-sharing income or financing margins from non-performing financing but are also required to recognize larger allowances for impairment losses (CKPN), directly reducing net income and depressing ROA.

An important issue requiring critical consideration is that this coefficient is relatively smaller in magnitude than those reported for conventional banks in the broader banking literature. This pattern is consistent with the cushion hypothesis discussed by Abdeljawad, Rashid, Abu Alia, Qushtom, Irshaid, and Sahyouni (2024) in the context of MENA banks. Their findings suggest that Islamic banks tend to exhibit structurally lower and more manageable credit risk than conventional banks, potentially because of moral and religious constraints on risk-taking and the risk-sharing mechanisms that inherently distribute part of the risk to customers under profit-sharing financing arrangements.

Meanwhile, operational efficiency also exerts a substantial influence on profitability, although the underlying mechanism differs from what is commonly assumed in the conventional banking efficiency literature. The data envelopment analysis (DEA) efficiency score has a positive coefficient of 0.27 in the ROA equation ($p < 0.01$), whereas BOPO, used as a proxy for inefficiency, has a negative coefficient of −0.31 ($p < 0.01$). Both findings support H2, which posits that operational efficiency significantly affects Islamic bank profitability. These empirical results reinforce the X-efficiency theory, which holds that banks that manage overhead, labor, and administrative expenses more effectively than their competitors can convert operating revenue into profits more efficiently.

Nevertheless, an interesting anomaly emerges when these coefficients are compared with the findings of Hidayat, Sakti, and Al-Balushi (2021) for Islamic banks in the Gulf Cooperation Council (GCC) region. Their study found that lower cost efficiency, reflected in higher BOPO, was associated with higher ROA and return on equity (ROE). They attributed this result to the substantial contribution of non-interest income generated through fee-based activities and Sharia-compliant services. This GCC finding may be explained by differences in revenue structures. Islamic banks in the GCC operate in more mature markets and offer a broader range of fee-based products, including sukuk, Islamic wealth management, and trade finance. Consequently, higher operating expenses may reflect investments in the capacity to generate non-financing income rather than merely indicating structural inefficiency. In contrast, Indonesian Islamic banks, including BSI following the merger, remain heavily dependent on margin-based and profit-sharing income from their core financing activities. In this context, a high BOPO ratio is more likely to reflect genuine operating inefficiency than strategic investment in revenue diversification. This contextual difference provides a central argument for exercising caution when generalizing banking efficiency theories across regions and underscores the importance of the contextual gap identified in the Introduction.

The most substantive contribution of this study, which clearly distinguishes it from the previously synthesized studies, lies in the examination of H3: the role of operational efficiency as a mediator or moderator in the relationship between financing risk and profitability. The moderated mediation analysis, conducted using a bootstrap procedure with 5,000 resamples, yields an indirect effect of financing risk on ROA through operational efficiency of −0.07, with a 95% confidence interval of [−0.11, −0.03]. Because the interval does not include zero, the result indicates a statistically significant partial mediation effect.

Furthermore, the interaction between NPF and the DEA efficiency score has a negative and statistically significant coefficient of −0.14 ($p < 0.05$). This finding indicates that the adverse effect of financing risk on profitability is substantially stronger among banks with lower operational efficiency than among those with higher efficiency. In other words, operational efficiency functions as a buffer that attenuates the detrimental effect of financing risk on financial performance. This finding addresses an issue that has received insufficient attention in all seven studies synthesized in this research. Both Roziq and Ahmad (2024) and Mutamimah and Saputri (2023) treat risk as a mediator between governance or financing structure and performance; however, neither study examines operational efficiency as a variable that moderates the strength of the risk–performance relationship.

The theoretical implications are substantial. Financing risk is not an independent determinant of profitability whose effects remain constant across institutions. Rather, the magnitude of its influence depends on a bank's managerial capacity to control its operating cost structure. Operationally efficient banks possess greater financial buffers to absorb shocks arising from non-performing financing without substantially sacrificing profitability. Inefficient banks, by contrast, are considerably more vulnerable to fluctuations in asset quality.

Further analysis decomposes financing risk by contract type, providing a means of reconciling the contradictory findings identified in the Indonesian and GCC literature synthesized in the Introduction. The decomposition results indicate that musyarakah financing risk has a positive and statistically significant association with NPF, with a coefficient of 0.22 ($p < 0.01$). Mudharabah financing risk has no statistically significant association, with a coefficient of 0.04 ($p > 0.10$). Murabahah financing, in contrast, exhibits a negative and statistically significant association with NPF, with a coefficient of −0.11 ($p < 0.05$), while also exhibiting a positive relationship with ROA, both directly and through the efficiency channel.

Surprisingly, this pattern more closely resembles the GCC evidence reported by Belkhaoui, Alsagr, and van Hemmen (2020), who found that murabahah enhances profitability through both direct and cost-efficiency channels, than the domestic findings of Mutamimah and Saputri (2023), who reported that murabahah increases financing risk. Recent evidence from Pramudita and Trapsila (2025), based on seven Indonesian Islamic commercial banks over the 2019–2023 period, further supports this pattern. Their study found that musyarakah, rather than mudharabah, significantly increases financing risk, whereas mudharabah has no statistically significant effect.

The empirical estimates in the present study likewise indicate that musyarakah has a positive and statistically significant effect on financing risk, whereas mudharabah does not exhibit a statistically significant effect. Murabahah, meanwhile, has a negative and statistically significant relationship with financing risk. These patterns are subsequently compared with previous findings to assess the extent to which the results are consistent with the characteristics of the Indonesian Islamic banking sector.

The divergence from Mutamimah and Saputri (2023) can be explained through at least two critical arguments. First, the studies differ in their observation periods and sample compositions. The earlier study used data from before the BSI consolidation, when the financing portfolios of Indonesian Islamic banks were still dominated by smaller institutions with weaker capacities to mitigate murabahah-related risk. Second, the studies may differ in their

operational definitions of risk. Some earlier studies measured murabahah financing risk in terms of financing volume without further distinguishing underwriting quality or the types of collateral involved.

Accordingly, the reconciliation proposed in this study does more than simply bridge two contradictory findings. It suggests that inconsistencies in the direction of the relationship between financing contracts and risk across the broader literature may stem primarily from temporal and structural heterogeneity in the samples rather than from fundamental differences in the characteristics of the contracts themselves. This constitutes a relevant methodological contribution to addressing the empirical gap identified earlier.

The most critical interpretation of the overall findings concerns the examination of the bad luck versus bad management mechanisms in the specific context of Indonesian Islamic banks following the BSI consolidation. The bad management hypothesis, as developed within the classical framework of Berger and DeYoung, posits that poor management of operating costs precedes and causes deterioration in asset quality because weak credit monitoring reflects broader managerial deficiencies. By contrast, the bad luck hypothesis proposes the reverse causal direction: exogenous shocks, whether macroeconomic or sector-specific, initially increase credit risk, subsequently forcing banks to incur additional expenses to manage non-performing financing. These expenses may include litigation, restructuring, and additional provisioning costs, thereby reducing efficiency as a consequence rather than a cause of deteriorating asset quality.

The pattern of relationships identified in the estimates, in which operational efficiency moderates rather than being explained exclusively by the mediation pathway in the risk–profitability relationship, with the interaction effect appearing stronger than the pure mediation effect, suggests that the mechanisms operating in Indonesian Islamic banks after the merger are more consistent with a mixed pattern than with either hypothesis in isolation.

During the early post-merger period (2021–2022), the observed increase in NPF in the descriptive data appears more consistent with the bad luck hypothesis. The deterioration coincided with system integration, customer migration, and the residual effects of the pandemic, all of which constituted external pressures on asset quality rather than necessarily reflecting managerial failures within the newly consolidated bank. This interpretation is consistent with the argument that major structural shocks, such as mergers, can generate short-term operational disruptions that do not necessarily indicate managerial incompetence.

However, during the subsequent period (2023–2025), the pattern appears to shift toward the bad management hypothesis, as NPF improved more rapidly than BOPO, according to the descriptive trends presented above. This divergence suggests that the post-consolidation management team may have been more successful in improving financing underwriting quality than in rationalizing the inherited operating cost structures of the three merged entities. This represents an organizational integration challenge commonly encountered in large-scale bank mergers but rarely discussed explicitly in the Islamic banking literature.

Although this pattern contradicts the initial expectation that consolidation would automatically improve efficiency through economies of scale, it reinforces the critical argument that structural integration alone does not guarantee operational efficiency. Instead, efficiency improvements require deliberate and sustained managerial transformation. This implication is examined further in the Conclusions and Policy Recommendations section.

Taken together, the findings indicate that financing risk and operational efficiency are not two independent determinants of profitability operating in parallel. Rather, they are interdependent mechanisms that can reinforce or attenuate one another, with the direction and magnitude of their interaction depending substantially on the structural context of the industry, particularly the distinction between the pre-merger and post-merger periods, as well as the types of underlying financing contracts.

This fundamental implication cannot be adequately captured by earlier approaches that examine the two variables separately. It also provides empirical justification for the novelty of the integrated risk–efficiency pathway model proposed in the Introduction.

Conclusion

This study aims to determine how financing risk and operational efficiency, both individually and jointly, explain the profitability of Indonesian Islamic commercial banks in the post-BSI consolidation period. The findings support all three hypotheses: financing risk negatively affects profitability (H1), operational efficiency positively affects profitability (H2), and, most importantly, operational efficiency both moderates and partially mediates the effect of financing risk on profitability (H3). The decomposition by financing contract further indicates that *musyarakah* tends to increase risk more substantially than *mudharabah*, whereas *murabahah* is associated with more manageable risk. This pattern is consistent with the findings of Pramudita and Trapsila (2025) and helps reconcile the contradictory findings between Indonesia and the Gulf Cooperation Council (GCC) countries identified in the Introduction. Thus, the central answer to the research question is that financing risk and operational efficiency are not two independent pathways to profitability; rather, they constitute structurally interconnected mechanisms.

Theoretically, this study extends risk-taking channel theory and the X-efficiency and bad luck–bad management hypotheses by integrating them into a unified *integrated risk–efficiency pathway* framework tailored to Islamic financial institutions. It complements the cushion hypothesis advanced by Abdeljawad, Rashid, Abu Alia, Qushtom, Irshaid, and Sahyouni (2024) by demonstrating that operational efficiency is itself a component of an institution's risk-buffering capacity. This contribution also intersects with the findings of Mauliansyah and Shahidan (2025), who demonstrate that ethical behavior in Islamic finance cannot be ensured through formal Sharia compliance alone but also requires supportive governance and literacy. This reinforces the argument that nonfinancial mechanisms, particularly governance and trust, also shape how risk and efficiency translate into financial performance.

The policy implications for the Financial Services Authority of Indonesia (OJK) and the National Sharia Council of the Indonesian Ulema Council (DSN-MUI) point to the need for integrated risk–efficiency thresholds rather than evaluating these dimensions separately, as has traditionally been the practice in financial supervision. For example, a supervisory matrix could classify banks exhibiting both high risk and low operational efficiency as the highest-priority institutions for supervisory intervention. For DSN-MUI, differences in risk profiles across financing contracts indicate the need for risk mitigation standards that do not apply uniform prudential treatment to all profit-sharing arrangements. The findings of Mauliansyah and Anam (2026), which raise practical questions about the effectiveness of Sharia Supervisory Boards, further underscore this urgency. Strengthening Sharia governance should therefore be incorporated into the risk–efficiency supervisory framework rather than treated merely as an administrative compliance requirement.

For Islamic bank management, these findings suggest that investments in operational efficiency, including the digitalization of business processes, serve as an indirect risk mitigation strategy rather than merely a cosmetic effort to reduce the operating expense-to-operating income ratio (BOPO). Mauliansyah, Aziz, and Rusnaidi (2026) demonstrate that digital payment adoption strengthens the financial profiles of micro, small, and medium-sized enterprise (MSME) customers through a mechanism they term “Digital Financial Signaling,” which, in turn, improves credit assessment quality. A similar logic can be applied by Islamic banks to improve financing underwriting while simultaneously enhancing operational efficiency. Regarding financing contracts, the priority should not be to reduce the proportion of *musyarakah* financing but to strengthen post-disbursement monitoring in proportion to its risk profile, while expanding *murabahah* financing in a measured manner to help balance short-term profitability.

This study has several limitations that should be acknowledged. First, its scope is limited to Islamic commercial banks and does not include Islamic rural banks (BPRS) or Islamic business units (UUS), which may have different risk profiles. Second, the observation period covers the post-merger transition phase, potentially capturing temporary effects. Third, the analysis is quantitative and conducted at the firm level, leaving customer behavior and trust dimensions unexplored, as highlighted by Mauliansyah and Anam (2026) and Rahim and Mauliansyah (2026). Future research should therefore expand the sample to include BPRS, conduct comparative studies across ASEAN countries following the cross-country approaches of Fajar, Sukmadilaga, Suharman, and Akbar (2026) and Rahim and Mauliansyah (2026), and integrate governance and trust dimensions into the risk–efficiency model. These cross-country studies indicate that patterns of adoption and trust among Islamic banking customers differ significantly between Indonesia and Malaysia. Incorporating these dimensions would provide a more comprehensive understanding of the mechanisms underlying Islamic bank profitability.

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