Determinant of profitability Islamic banks

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Abstract
Purpose – This study empirically investigates the key determinants of profitability among Islamic banks (ISBs) in Indonesia. The analysis incorporates several critical variables: bank size, liquidity, tangible assets, non-debt tax shields, growth, and bank age. **Method** – The sample comprises 65 financial statements and annual reports from 13 Islamic banks operating in Indonesia from 2019–2022. Data were analyzed using LISREL, employing structural equation modelling to examine the relationships among variables. The empirical findings indicate that bank size exerts a positive and statistically significant effect on profitability. Likewise, both asset structure and bank age are positively associated with improved financial performance. Conversely, bank growth and the financing-to-deposit ratio (FDR) exhibit negative but statistically insignificant effects, suggesting these variables have only a marginal influence on profitability within the context of this model. **Findings** – The results imply that fluctuations in FDR, whether upward or downward, do not directly contribute to meaningful changes in earnings. Instead, other internal factors appear to play a more substantial role in shaping the profitability of ISBs. **Implications** – Consistent with signaling theory, enhancing profitability may serve as strategic signals to investors, indicating sound management quality and promising prospects. This perceived strength encourages greater investor confidence, increasing third-party funds and capital inflows, thereby expanding financing capacity and revenue generation within Islamic banks.
Keywords: Islamic banks, financing to deposit ratio, profitability, total assets.

Introduction

Islamic banks (ISBs) primarily mobilize public funds through deposit and financing products and services based on sharia principles (Faizi 2024; Hidayatullah et al. 2024). The primary source of profitability for ISBs comes from distributing funds to the public through financing agreements that comply with Sharia principles. Consequently, the effectiveness of the ISB intermediation function in channeling financing has significant implications for economic and financial stability (Safiullah 2021; Banna et al. 2022; Ledhem 2022; Raouf and Ahmed 2022). The primary challenges faced by ISBs in enhancing their profitability include a high FDR and liquidity risk, relatively high operational costs, heavy reliance on Murabaha-based income, financing risk and asset quality concerns, competition from conventional banks and other financial institutions, and a lack of product and income diversification particularly in investment and fee-based income products (Mrad et al. 2024). These factors contribute to suboptimal profitability. Given these challenges, this study examines several determinants of ISBs' profitability in Indonesia: bank size, asset tangibility, ISB growth, liquidity, non-debt tax shields (NDTS), and ISB age. However, the impact of these variables on ISBs' profitability remains ambiguous in literature.

Previous studies by Mahmuda and Muktadir-Al-Mukit (2023); Sobol, Dopierała, and Wysiński (2023) stated that bank size positively affects ISBs' profitability. Empirical evidence

suggests that larger ISBs have stronger reputations and greater public recognition, attracting more customers. A larger ISB size also enhances public trust, improves deposit stability, and mitigates the risk of bank runs. However, findings on the relationship between bank size and profitability remain inconclusive. Research conducted by Parmankulova et al. (2022); Azad, Azmat, and Hayat (2023) found that bank size negatively affects ISBs' profitability. Empirical evidence indicates that excessively large ISBs may experience a decline in operational efficiency due to increased bureaucratic complexity and high managerial costs. Moreover, larger organizational structures often lead to slower decision-making processes, making it more challenging for banks to adapt to customer needs and market changes.

Previous studies have yielded conflicting conclusions regarding the impact of tangible assets on ISBs' profitability. Several studies, including those by Ahmeti and Iseni (2022); Camisón, Clemente, and Camisón-Haba (2022); Okobo, Ugwoke, and Akpan (2022), have found that tangible assets positively influence ISBs' profitability. Conversely, other research, such as the studies conducted by Asutay and Ubaidillah (2024); Septiani et al. (2021), has reported a negative relationship between tangible assets and profitability. Furthermore, some studies indicate that increased asset size does not always correspond to higher profitability. The relationship between ISBs' growth and profitability has been widely studied, with many researchers, including Abbas et al. (2023); Belkhaoui (2023), finding a positive correlation. The rationale behind these findings is that ISBs' growth leads to an increase in the number of customers and the amount of funds collected, which can be optimized through Sharia-compliant financing to generate profits. Additionally, expanding ISBs often offer a more diverse range of financial products, such as Murabaha, Mudaraba, and Ijarah financing, which can enhance profit margins. However, contradictory findings have also been reported. Studies by Singh (2021); Saif-Alyousfi (2022) stated that ISBs' growth negatively affects profitability. This suggests that the expansion of ISBs often requires substantial investment in infrastructure, human resources, and technology. Due to the inherently more complex business model of Islamic banking characterized by Sharia contracts such as Murabaha, Mudaraba, and Ijarah, operational costs tend to be higher, putting pressure on profitability.

In this study, ISB liquidity is proxied by the FDR. A higher level of financing disbursement increases the potential revenue generated from profit-sharing margins or Murabaha-based profits. However, an excessively high FDR exceeding 100% can pose liquidity risks, necessitating a careful balance between financing and available funds to maintain financial stability (Permana 2023). Contrasting findings have been reported by Musa, Matemilola, and Bany-Ariffin (2021); Jedidia and Salah (2022), who found a negative relationship between FDR and ISBs' profitability. When FDR is high, ISBs may need to offer more attractive returns to depositors to sustain deposit inflows, thereby increasing the cost of funds and narrowing profit margins. Although a high FDR indicates that a bank is actively providing financing, an excessively high ratio can lead to liquidity challenges, an increased risk of NPF, and higher funding costs, negatively impacting ISBs' profitability.

NDTS refers to tax benefits obtained by a company without relying on debt. In the context of ISBs, NDTS is a significant concept, as income from investments in specific sukuk (depending on tax regulations in Indonesia) may receive special tax treatment, thereby legally reducing the tax burden. By optimizing NDTS, ISBs can lower their tax liabilities without resorting to interest-bearing debt, ensuring financial sustainability and compliance with sharia principles. The positive impact of NDTS on ISBs' profitability has been supported by studies conducted by Badarin and Abanda (2024) ; Ramachandran et al. (2024). ISBs that effectively utilize NDTS can reduce operational costs and enhance profit margins, ultimately improving their profitability compared to competitors that do not optimize this tax strategy. However, conflicting empirical findings have been presented by Guizani (2021). Since ISBs generally avoid interest-based debt, NDTS derived from depreciation may be one of the few significant sources of tax reduction. Nevertheless, an excessively high NDTS may

indicate an overreliance on non-productive fixed assets, negatively impacting profitability. A high NDTS could suggest that a substantial portion of a bank's assets are allocated to non-revenue-generating investments, such as buildings or physical infrastructure, rather than higher-return assets, such as sharia-compliant financing.

Bank age refers to the length of time a bank has operated since its establishment. The longer an ISB operates, the more experience it gains in managing risks and adjusting business strategies. Older banks also tend to have a stronger and more loyal customer base. Additionally, well-established banks often enjoy a better reputation and greater trust from customers and investors. Previous studies supporting the positive influence of ISBs' age on profitability include those conducted by Muhammad and Nugraheni (2021); Mukhibad et al. (2024). Conversely, contradictory findings have been reported by Li, Padmanabhan, and Huang (2024), which suggest that younger ISBs typically require more time to reach their break-even point. This is because they are still making substantial investments in infrastructure, technology, and product development, leading to high initial operational costs. Moreover, with a relatively small customer base, their revenue generation remains suboptimal in the early stages. Due to the inconsistency of previous research results, this opens a gap for further research. There is still an opportunity for further research on this issue, highlighting the urgency of this study in empirically examining the impact of ISB size, asset tangibility, ISB growth, FDR, non-debt tax shields, and ISB age on the profitability of ISBs in Indonesia. The novelty of this research lies in its focus on profitability, an area that remains underexplored within the context of ISBs. Given the limited existing literature on the determinants of profitability in ISBs, this study addresses a critical gap and is, therefore, both timely and necessary. Therefore, this study is considered both timely and essential.

This study aims to empirically examine the determinants of ISB profitability, specifically bank size, asset tangibility, bank growth, liquidity, NDTS, and bank age and assess their impact on ISB profitability in Indonesia. Several factors justify the necessity of this research. First, studies on ISBs in Indonesia remain limited, despite ISBs holding total assets of IDR 539.919 billion in 2023. Additionally, ISBs' financing disbursement grew by 9.31% year-on-year (YoY), surpassing the projected national bank credit growth of 8.18% YoY. In terms of monitoring, supervision, risk management, and bankruptcy costs, ISBs operate under a distinct framework compared to conventional banks. Second, ISBs possess unique institutional characteristics that require further investigation. Third, empirical data from 13 ISBs will provide valuable insights into the institutional structure and operational dynamics of ISBs.

Literature review

Signaling theory

The signaling theory, first introduced by Spence (1973), explains how individuals or organizations with privileged information (*insiders*) can convey signals to external parties (*outsiders*) to mitigate information asymmetry. Fundamentally, the theory assumes an information imbalance between two parties characterizes markets. To address this issue, the more informed party transmits signals that enable the less informed party to make more accurate decisions. In the context of ISBs, signaling theory is utilized to understand how banks communicate their profitability and financial soundness to investors and depositors. According to this theory, an effective signal must possess several key attributes. Observability: the signal must be perceivable by depositors and investors. Costliness: the signal must entail significant costs, ensuring that only genuinely stable and profitable banks can afford to issue it. Honesty, the signal must be accurate and not misleading to stakeholders. Fit (relevance): The signal must be aligned with the objectives of ISBs when communicating with their clientele.

One crucial signaling mechanism in ISBs is certification and regulatory compliance. Compliance with Shariah principles is critical for investors and depositors (Susbiyani, Halim, and Animah 2023). In the Islamic banking system, adherence to sharia principles is not merely a regulatory obligation but also an essential indicator of credibility, stability, and commitment to Islamic values. This compliance plays a significant role in reducing information asymmetry in Islamic financial markets, fostering greater trust among stakeholders and enhancing the overall transparency of the sector.

ISBs operate based on shariah, establishing fundamental principles governing financing and investment activities (Grira and Labidi 2021). The Organization of Islamic Conference (OIC) defines an ISB as a financial institution whose statutes, rules, and procedures expressly state its commitment to the Principles of Islam and ban the receipt and payment of interest on any of its operations (Alam et al. 2021). ISB is also commonly referred to as Interest-Free Banking. This system is founded on two core principles: mutual transaction fairness and alignment with actual economic realities (Noh, Azelan, and Zulkepli 2024). In ISBs, riba is the return derived from loans or debts, which is strictly prohibited. The term riba, as mentioned in the Holy Quran, is commonly translated into English as "usury" or "interest." Riba means "increment" or "excess," but its fundamental essence refers to unjust gains or profiteering, which are forbidden in Islam. Consequently, some academic discussions attempt to distinguish between interest and riba. However, according to most of the available literature and Islamic schools of thought, there is no substantive difference between the two, and both are prohibited in Islam. Additionally, financial transactions must avoid gharar (uncertainty), which encompasses any element that could result in unjust enrichment or the exploitation of one party in a contract (Zain et al. 2024). Another prohibited activity in ISBs is gambling or games of chance (Noh, Azelan, and Zulkepli 2024).

Profitability

Profitability is the ability of a bank to generate profit from its operational activities. It reflects how effectively and efficiently the bank manages its assets, liabilities, and capital to generate profit (Ozili and Ndah 2024). Profitability is one of which measures how efficiently a bank generates profit from its total assets (Gržeta, Žiković, and Žiković 2023). Profitability reflects a bank's ability to generate earnings from its operational activities (Mehzabin et al. 2023). Within the framework of signal theory, high profitability serves as a positive signal to the market, indicating that the bank is efficiently managed and holds strong financial prospects. This, in turn, can enhance investor confidence and increase the institution's attractiveness in the financial marketplace (Roosmawarni, Fatihudin, and Mauliddah 2023).

Bank Size

Bank size usually refers to how big or small a bank is regarding its finances and operations (Mkhaiber and Werner 2021). Total assets are the most used indicator for measuring bank size. The larger the total assets, the greater the size of the bank (Zhao et al. 2022). Bank size serves as a signal of operational capacity, risk diversification, and market influence. Larger banks indicate greater market power and long-term trust from customers and investors (Olmo, Saiz, and Azofra 2021). From the perspective of signal theory, a large bank conveys a perception of stability and resilience in the face of economic fluctuations. In the context of ISB, bank size also reflects the institution's ability to diversify risk and foster greater customer confidence. Larger banks are frequently perceived as more stable and better equipped to manage financial uncertainties, further enhancing their credibility in the eyes of stakeholders.

Tangibility

Asset tangibility measures the extent to which a company's assets are tangible, namely assets that have a physical form and can be touched (Agustina, Luppianti, and Muchtar 2022). Tangible assets such as buildings, land, and equipment serve as collateral that can be leveraged to fulfil a bank's obligations during periods of financial distress (Vengesai 2023). More tangibility indicates that the bank possesses substantial physical assets, which may be liquidated or pledged, when necessary, thereby reducing perceived risk (Le, Nguyen, and Vo 2024). From the signal theory standpoint, such assets convey a credible signal to external stakeholders, particularly investors and creditors, by reflecting financial soundness and a reduced probability of default. Within ISB, institutions with a considerable share of tangible assets, such as real estate holdings and asset-backed financing, tend to exhibit greater financial resilience. These assets provide security and are strategic indicators of the bank's ability to endure volatile or adverse market conditions (Flori et al. 2021).

Bank growth

Bank growth generally refers to the growth in performance or size of a bank over time (Shair et al. 2021). This can be seen from various aspects, depending on the context. ISB growth typically refers to increased assets, profits, financing, or other financial indicators that reflect the bank's expansion and performance (Abasimel 2023). The growth rate of ISB reflects its capacity for business expansion and its effectiveness in capitalizing on emerging market opportunities (Ghroubi 2025). Within the framework of signal theory, a high growth rate functions as a credible and favorable signal to external stakeholders, suggesting that the bank is executing sound strategic initiatives and is progressing along a sustainable developmental path. Moreover, rapid growth indicates managerial competence and adaptability in responding to dynamic and competitive market environments. In this regard, growth should be viewed not merely as a financial metric but as a strategic signal reinforcing stakeholder confidence in the bank's long-term viability and market positioning (Shabir et al. 2024).

Liquidity

Liquidity represents a bank's capacity to fulfil its short-term obligations while sustaining operational continuity during periods of financial stress (Guzel 2021). From the perspective of signal theory, high liquidity functions as a credible and favorable signal to external stakeholders, reflecting prudent financial management and the institution's preparedness to navigate liquidity pressures (Janabi 2024). In the context of ISBs, which adhere to principles such as risk-sharing and the prohibition of interest (riba), maintaining adequate liquidity is especially critical. It signifies the bank's ability to manage cash flow efficiently within the boundaries of sharia-compliant financial instruments. Accordingly, strong liquidity positions enhance perceptions of financial soundness and strengthen stakeholder confidence in the bank's resilience and governance integrity (Chiaramonte et al. 2022).

Non-debt tax shields (NDTS)

NDTS is total annual depreciation and investment tax credit on earnings before interest, taxes and depreciation (Saba 2024). NDTS, such as depreciation and amortization, reduce a bank's tax burden without incurring additional debt (Ali, Rangone, and Farooq 2022). From the standpoint of signal theory, the optimal use of NDTS serves as an informative signal to external stakeholders, indicating efficient tax planning and sound financial management. For ISBs operating under Shariah principles that prohibit interest-based financing, reliance on non-debt mechanisms such as NDTS becomes particularly relevant. The strategic use of NDTS reflects the bank's ability to enhance profitability while adhering to

Islamic financial ethics. This signals to investors and regulators that the bank can maintain a healthy capital structure and implement financially prudent, sharia-compliant strategies (Addou et al. 2024).

Bank age

Bank age is how long a bank has been established or operating. Bank age is often associated with financial stability (Isayas 2022). The longer a bank has been established, the more likely it has gone through many economic cycles. Building reputation and trust of customers and investors (Miranda-Agrippino and Rey 2022). Showing that the bank has good risk management. Banks that have been operating for a long time are considered more trustworthy because they have proven to be able to survive (Nguyen, Chiu, and Le 2021). This can have an impact on the ease of getting new customers, the ability to attract investors and the performance of the bank's shares in the capital market. Younger banks are considered higher risk because they do not have a long track record. Bank age is one of the factors in the credit scoring model and banking risk assessment (Doko, Kalajdziski, and Mishkovski 2021).

Hypothesis development

Larger banking institutions generally attain higher operational efficiency by distributing fixed costs across a wider volume of transactions. As the operational scale increases, the cost per service unit decreases, leading to enhanced profitability. Therefore, bank size reflects an institution's ability to manage resources effectively, adapt to market conditions, and withstand economic shocks that contribute significantly to bank stability and performance (Gržeta, Žiković, and Žiković 2023). According to signaling theory, a bank's size is a reliable signal to the market regarding its operational resilience, governance quality, and financial soundness. Larger banks are often viewed as more professionally managed, structurally robust, and better equipped to absorb market uncertainties. This perception fosters investor confidence and enhances institutional credibility in the financial sector. In the context of Islamic banking, the profitability of ISBs has broader implications. Beyond supporting macroeconomic development, ISBs contribute to social progress by expanding financial inclusion, creating employment opportunities, and increasing investor returns. Over time, the expansion of bank size also plays a key role in promoting national welfare and economic growth. Empirical evidence from Banna et al. (2022) supports these claims, indicating that larger Islamic financial institutions exhibit greater resilience and stability, particularly during financial crises. This underscores the importance of institutional scale as a determinant of profitability and sustainability in the Islamic banking sector. Then studies by Mahmuda and Muktadir-Al-Mukit (2023); Sobol, Dopierała, and Wysiński (2023) stated that bank size positively affects ISBs' profitability. Based on this theoretical and empirical foundation, the first hypothesis proposed in this study is:

H_1: bank size has a positive effect on the profitability of ISBs in Indonesia.

Corporate assets are commonly categorized into tangible and intangible assets. Firms with a higher proportion of tangible assets often demonstrate enhanced profitability due to their improved operational capacity. In line with the pecking order theory, tangible assets can serve as collateral, allowing firms to secure external financing at lower costs, thereby supporting profitability. However, empirical studies offer mixed results regarding the impact of tangibility on the profitability of ISBs. For example, Ahmeti and Iseni (2022); Camisón, Clemente, and Camisón-Haba (2022); Okobo, Ugwoke, and Akpan (2022); Zancan, Canassa, and Valle (2023) found a positive relationship between tangible assets and the profitability of banks and insurance firms. Similarly, Tchuigoua (2015) also identified a positive association, though the effect was context-dependent. In Islamic finance, tangible assets are particularly valuable, as they can support asset-backed financing methods such as Ijarah and Murabaha (Abasimel 2023). These forms of financing require physical assets, positioning ISBs with greater tangibility to serve customers more effectively and manage risks prudently. From the

signaling theory perspective, many tangible assets signal financial strength and operational stability, this could be a signal to the market. For ISBs, such assets reduce information asymmetry for stakeholders by indicating a solid asset base and long-term sustainability. As a result, banks with significant tangible assets are often viewed as more credible and trustworthy, which is especially vital in the ISB sector, where transparency and ethical governance are emphasized. Based on the above considerations, the following hypothesis is proposed:

H_2: asset tangibility has a positive effect on the profitability of ISBs in Indonesia.

ISBs that experience expansion tend to demonstrate improved financial performance. As these institutions grow, their capacity to extend customer financing rises accordingly. Financing instruments commonly offered by ISBs such as Murabaha, Ijarah, and Musharaka are known to yield higher returns, and an increased volume of financing activities is typically associated with greater profit potential. Bank growth is also reflected in asset expansion, including establishing new branches, advancements in digital banking infrastructure, and extending service delivery networks (Iwedi 2024). Adopting digital solutions such as mobile banking and Islamic financial technology contributes to operational efficiency and enables ISBs to capitalize on economies of scale. As a result, transaction costs decline, leading to higher net earnings. Concurrently, increased asset size and digital capabilities contribute to lower operating expenses relative to operating income, thereby improving overall profitability margins. Additionally, expanding ISBs are more likely to attract third-party funds from the public through Islamic savings accounts, current accounts, and time deposits, further enhancing their financial performance. From the signaling theory viewpoint, institutional growth is a credible indicator of financial health, managerial competence, and long-term sustainability. Market participants interpret bank expansion as a signal of strategic strength and operational reliability, which enhances stakeholder confidence. This increased trust supports capital mobilization and strengthens the bank's profitability. Recent studies increasingly support the positive influence of bank growth on profitability (Abbas et al. 2023; Belkhaoui 2023). Therefore, the following hypothesis is proposed:

H_3: bank growth has a positive effect on the profitability of ISBs in Indonesia.

In ISBs, liquidity commonly measured by the FDR is a critical indicator of how effectively third-party funds are utilized in financing activities. FDR represents the proportion of customer deposits allocated for financing instead of being retained as liquid reserves or invested in non-financing assets. A low FDR indicates underutilization of funds, potentially leading to diminished returns from margin-based or profit-sharing contracts. Conversely, an excessively high FDR may signal an aggressive financing strategy, which could elevate liquidity risk in the event of mass fund withdrawals by depositors. An optimal FDR typically falls between 80% and 92%, balancing maintaining adequate liquidity and achieving higher profitability. While like liquidity ratios in conventional banking, FDR in ISBs adheres to sharia principles, which prohibit interest (riba) and emphasize asset-backed, risk-sharing financial transactions. Effective liquidity management within this framework must align with ethical and religious standards. From the signalling theory perspective, maintaining an optimal FDR signals financial prudence, operational discipline, and strategic competence. It reduces information asymmetry for stakeholders and enhances the market perception of the bank's ability to manage funds responsibly, thus reinforcing its credibility and attracting further deposits and investment. Empirical evidence from Permana (2023) confirms that a well-managed, high FDR contributes positively to ISBs' profitability by enabling more efficient deployment of funds into sharia-compliant investment avenues and minimizing idle liquidity. Based on the above considerations, the following hypothesis is proposed:

H_4: bank liquidity has a positive effect on the profitability of ISBs in Indonesia.

NDTS refers to tax reductions that firms or banks can achieve through mechanisms other than debt financing, such as depreciation, amortization, and other fiscal incentives. In

the context of ISBs, which are prohibited from engaging in interest-based transactions due to the fundamental prohibition of riba, non-debt tax shields play a critical role in managing tax liabilities and enhancing profitability. Unlike conventional banks, ISBs cannot benefit from tax deductions related to interest payments. Consequently, non-debt tax shields are a primary alternative for minimizing taxable income and improving after-tax earnings (Saba 2024). For instance, depreciation and amortization of fixed assets such as buildings, banking infrastructure, and technology can reduce taxable income without violating sharia principles. This mechanism allows ISBs to maintain financial efficiency while adhering to religious compliance. From the signaling theory perspective, a robust utilization of non-debt tax shields signals effective financial planning, operational efficiency, and long-term asset management. This reduces information asymmetry, assuring stakeholders of the bank's fiscal prudence and adherence to ethical financial practices, reinforcing market confidence. Empirical studies such as those conducted by Badarin and Abanda (2024); Ramachandran et al. (2024) state that NDTS positively affects ISBs' profitability. ISBs that effectively utilize NDTS can reduce operational costs and enhance profit margins, ultimately improving their profitability compared to competitors that do not optimize this tax strategy. Therefore, the following hypothesis is proposed:

H_5: NDTS has a positive effect on the profitability of ISBs in Indonesia.

The age of a bank is a critical determinant of profitability in ISB institutions, with older banks typically benefiting from extensive experience in navigating risk, particularly within the parameters of sharia-compliant financial frameworks. These frameworks demand adherence to specific contractual structures and ethical guidelines. Greater institutional maturity often enhances a bank's capacity for effective risk mitigation, contributing to long-term financial resilience and sustained earnings. Additionally, longstanding ISBs tend to build stronger reputations, increasing customer confidence and attracting a broader base of third-party funds, including Islamic savings and deposit instruments. According to signaling theory, the longevity of a bank can act as a strong market signal, symbolizing organizational strength, consistent governance, and proven performance across different economic cycles. Such signaling reduces informational asymmetries, enhancing stakeholder trust in the bank's long-term viability. Older ISBs may be perceived as more reliable and profitable institutions within the financial sector. As these institutions evolve, they often realize operational benefits through automation, cost efficiencies, and structural optimization. By contrast, newly established ISBs may still incur high fixed infrastructure, technology, and workforce development costs. Studies conducted by Muhammad and Nugraheni (2021); Mukhibad et al. (2024) stated that ISBs' age has positive influence of on profitability. stated that ISBs' age positively influences profitability. Based on the above considerations, the following hypothesis is proposed:

H_6: bank age is positively associated with the profitability of ISBs in Indonesia.

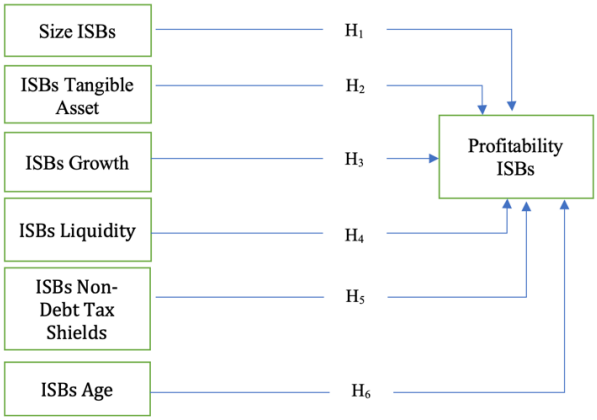

Figure 1 conceptual model

Method

This quantitative study employs panel data covering 2019 to 2022, utilizing accurate statistical observations to enhance degrees of freedom and reduce multicollinearity. The generalized least squares (GLS) regression model is applied to address issues of heteroskedasticity and cross-sectional heterogeneity. The dataset was obtained from the official website of the Indonesia Stock Exchange (IDX), yielding 65 usable observations from 13 ISBs (Table 1). Furthermore, the data meets the requirements for multivariate normality, and tests confirm the absence of multicollinearity, indicating no significant correlations among the independent variables. Statistical tools for processing data using LISREL. This study has one dependent variable and six independent variables, which can be seen in Table 2.

$$Pro_{it} = \alpha + \beta_1 BSI_{it} + \beta_2 TAN_{it} + \beta_3 GRO_{it} + \beta_4 FDR_{it} + \beta_6 NDTS_{it} + \beta_5 BAG_{it} + \varepsilon_{it} \ldots\ldots (1)$$

Table 1 list of samples

Nu	Bank name	Annual report 2019-2022
1.	PT. Bank Syariah Indonesia Tbk	Completed
2.	PT. Bank BCA Syariah Tbk.	Completed
3.	PT. Bank Muamalat Indonesia, Tbk	Completed
4.	PT. Bank Mega Tbk.	Completed
5.	PT. Panin Dubai Syariah, Tbk	Completed
6.	PT. Bank Victoria International Tbk	Completed
7.	PT. Bank KB Bukopin Tbk	Completed
8.	PT. BTPN Syariah, Tbk	Completed
9.	PT. Bank Aladin Syariah Tbk	Completed
10.	PT. Bank Pembangunan Daerah Aceh	Completed
11.	PT. Bank Riau Kepri Syariah	Completed
12.	PT. Bank NTB Syariah	Completed
13.	PT. Bank BJB Syariah Tbk	Completed

Source: secondary data (processed, 2025)

Table 2 definitions of variables

Variables		Measurement	Scale
Dependent	Profitability ISBs (PRO)	$ROA = \frac{Net\ Profit}{Total\ Asset}\ x\ 100\%$	Ratio
Independent	Size ISBs (BSI)	Ln Total Assets	Ratio
	Asset tangibility (TAN)	$FATA = \frac{\text{Fixed assets}}{\text{Total assetss}}$	Ratio
	ISBs growth (GRO)	$Asset\ Growth = \frac{\text{Total Assets in Year t} - \text{Total Assets in Year t} - 1}{\text{Total Assets in Year t} - 1}\ x$	Ratio
	Liquidity (FDR)	$FDR = \frac{\text{Total Financing}}{\text{Total third} - \text{party funds}} x100\%$	Ratio
	Non-debt tax shields (NDTS)	$NDTS = \frac{\text{Depreciation Cost} + \text{Amortization}}{\text{Total Assets}}$	Ratio
	ISBs age (BAG)	The number of years since the date of establishment of the bank used as the data	Ratio

Results and discussion

Descriptive statistics

Table 3 provides an overview of the operational dynamics of the variables determining the profitability of ISBs in this study, including ISB size, asset tangibility, ISB growth, liquidity, NDTS, and ISB age. This section aims to explain these findings by offering a structured interpretation of the impact and interactions between these variables within the framework of ISBs.

Table 3 descriptive statistics

Variables	Obs.	Mean	Std. Dev.	Variance	Kurtosis	Min.	Max.
PRO	65	0.5489	0.3201	0.0935	0.778	0.00539	0.912
BSI	65	2697.31	2.3276	4.9258	0.672	21.1145	110390.8
TAN	65	0.978	0.0044	0.00011	0.975	0.559	0.9
GRO	65	0.0369	0.0128	0.4354	0.452	-0.176	10.2501
FDR	65	0.0151	0.1507	0.0198	0.454	0.04257	0.9933
NDTS	65	0.00022	0.0023	0.001045	0.547	0.0000173	0.0154
BAG	65	15.11567	12.188	13.25984	0.595	2.275	33.7

Source: secondary data (processed, 2025)

The average profitability value is 0.5489, indicating that external sources finance 54.89% of ISBs' total assets. According to statistical data, most sampled banks are small and in the development phase, suggesting that ISBs rely more on debt to finance their investment activities. The average bank size, measured as the total accounting value of ISBs, is 26.9731 billion IDR. The average asset tangibility value is 0.978, signifying that tangible assets constitute 97.8% of total assets. The exceptionally high asset tangibility ratio can be attributed to most ISBs holding substantial tangible assets, thereby reducing creditors' bankruptcy costs. Furthermore, the average bank growth value is 0.0369, indicating that the annual change in total assets is only 3.69%. This finding suggests that ISBs have the capacity for expansion, offering more credit options to serve the market. The average FDR is 0.0151, implying that only 1.51% of ISBs' total assets are liquid. This can be attributed to the predominance of small ISBs and the financial crisis induced by the Covid-19 pandemic, which necessitated extensive policy easing. The average non-debt tax shield is 0.00022, meaning that only 0.0024% of total assets are subject to depreciation. This low percentage may be related to the relatively simple allocation of ISBs' funds for financing fixed assets, suggesting that depreciation is not an effective source of profitability. Finally, ISBs are in the early stages of growth, as evidenced by the average bank age of 15.5587 years.

Goodness of fit model measurement

To ensure that the data were normally distributed and that there was no multicollinearity, various tests were conducted to evaluate the model's Goodness of Fit using the following indices: Chi-Square and probability, goodness of fit index (GFI), adjusted goodness of fit index (AGFI), root mean square error of approximation (RMSEA), expected cross-validation index (ECVI), Akaike's information criterion (AIC), consistent AIC (CAIC), and the fit index. The goodness of fit model measurement assesses how well a statistical model aligns with the observed data. It evaluates whether the model's assumptions are valid for the data, particularly in normality. A model fits the data well if the residuals (the differences between the observed and predicted values) are approximately normally distributed. The residuals must follow a normal distribution for a model to be considered normal. The residuals (errors) of the model must be normally distributed for this condition to be met. The

chi-square goodness of fit test assesses how well the model fits by comparing the observed data with the expected frequencies. A model fits the data well if the chi-square statistics are non-significant (i.e., the p-value exceeds the significance level, such as 0.05), indicating no significant difference between the observed and expected values.

Hypothesis result

Maximum likelihood was the most popular estimation method in the SEM studies and the data was analyzed using LISREL to produce valid, efficient, and reliable parameter estimates, if the data fulfilled the multivariate normality and the sample size used was 100 to 200. Table 4 shows the path diagram created with the LISREL illustrating the unstandardized estimated value of the relationships between variables. The number of observation samples in this study was 120, and the data had met the requirements of multicollinearity, which required no correlation between the independent variables. The following mathematical equations are derived from the SEM equation presented in equation 1:

$$PRO = 0.72 + 3.26 \times BSI + 2.99 \times TANG - 1.83 \times GRO - 2.43 \times FDR + -1.79 \times NDTS + 1.98 \times BAG + \varepsilon_{it} \text{.....(1)}$$

Table 4 hypothesis result

Hypothesis	Estimate	Coefficient	t-value	p-value
H_1: BSI → PRO	0.10	0.05	3.26	0,021
H_2: TAN → PRO	0.01	0.08	2.99	0,003
H_3: GRO → PRO	-0.001	-0.02	-1.83	0,008
H_4: FDR → PRO	-0.001	-0.06	-2.43	0,014
H_5: NDTS → PRO	-0.09	-0.22	-1.79	0,034
H_6: BAG → PRO	0.39	0.02	1.98	0,042
R^2				0.45

Source: secondary data (processed, 2025)

Table 4 shows the results of the first hypothesis test, which indicates a positive coefficient of 0.05, a t-value of 3.26, which exceeds the critical threshold of 1.96 at a 5% significance level, and p-value 0.021 < 0.05. These findings provide strong empirical evidence that bank size positively affects the profitability of ISBs in Indonesia (H_1 Accepted). Furthermore, the second hypothesis test results indicate a positive coefficient of 0.08 with a t-value of 2.99, which exceeds the critical threshold of 1.96 at a 5% significance level, and p-value 0.003 < 0.05. This finding confirms that asset tangibility positively affects the profitability of ISBs in Indonesia (H_2 Accepted). The results of the third hypothesis test indicate a negative coefficient of -0.02 with a t-value of -1.83, which falls below the critical threshold of 1.96 at a 5% significance level, and p-value 0.008 < 0.05. These findings suggest that bank growth has a negative effect on the profitability of ISBs in Indonesia (H_3 rejected). Furthermore, the fourth hypothesis test results indicate a negative coefficient of -0.06 with a t-value of -2.43, which falls below the 1.96 threshold at a 5% significance level, and p-value 0.014 < 0.05. This finding confirms that the FDR has a negative effect on the profitability of ISBs in Indonesia, thereby supporting the hypothesis that higher FDR levels may hinder profitability in the sector (H_4 rejected). Furthermore, the fifth hypothesis test results indicate a negative coefficient of -0.22, a t-value of -1.79, which falls below the critical threshold of 1.96 at a 5% significance level, and p-value 0.034 < 0.05. These findings confirm that non-debt tax shields have a negative effect on the profitability of ISBs in Indonesia. (H_5 rejected). The results of the sixth hypothesis test indicate a positive coefficient of 0.02, a t-value of 1.98, which exceeds the 1.96 threshold at a 5% significance level, and p-value 0.042 < 0.05. This finding suggests that bank age positively affects the profitability of ISBs in Indonesia (H_6 Accepted).

Banks size and profitability

This study finds that bank size has a positive effect on the profitability of ISBs in Indonesia; this finding aligns with prior research conducted by Mahmuda and Muktadir-Al-Mukit (2023); Sobol, Dopierała, and Wysiński (2023). Larger ISBs are logically positioned to manage risk, optimize operational efficiency, and enhance market trust, all of which contribute to superior financial performance. The existing literature on ISBs suggests that economies of scale allow larger banks to reduce per-unit costs, diversify financing portfolios, and increase their competitiveness in the global financial landscape. The positive outcome of this study is attributable to the significant competitive advantages enjoyed by larger ISBs, particularly in terms of operational efficiency, risk management, portfolio diversification, and resource accessibility. These factors collectively enhance the ability of Indonesian ISBs to manage costs and revenues more effectively and to respond more adaptively to market dynamics. Furthermore, larger ISBs possess a greater capacity for innovation and product line expansion (Mallouli and Sassi 2022), enabling them to develop more competitive offerings in retail and corporate segments (Budiantoro et al. 2024). This innovation fosters new business opportunities and accelerates revenue growth, enhancing profitability. Consistent with signaling theory, a larger bank size may signal financial stability, managerial competence, and strong long-term prospects. Such signals reinforce investor and customer confidence by suggesting enhanced risk management, innovation capabilities, operational resilience, and institutional credibility, ultimately positioning large ISBs as secure and attractive investment destinations. Larger ISBs tend to be more profitable; management will be encouraged to increase the size of assets through network expansion, product innovation, or mergers and acquisitions. Large ISBs can lower the cost per service unit due to economies of scale, so efficiency increases, and management must maximize operational efficiency as assets grow.

Tangibility and profitability

This study identifies a positive correlation between tangible assets and the profitability of ISBs in Indonesia. These results align with earlier research by Ahmeti and Iseni (2022); Camisón, Clemente, and Camisón-Haba (2022); Okobo, Ugwoke, and Akpan (2022); Zancan, Canassa, and Valle (2023). The empirical evidence suggests that tangible resources such as office buildings, technological infrastructure, vehicles, and other physical facilities play a critical role in boosting financial performance while complying with Islamic finance principles. Integrating up-to-date banking technologies, such as mobile applications, ATMs, and digital platforms, enhances operational efficiency and service effectiveness (Joshi and Garg 2021). Additionally, strategically positioned branches increase customer outreach and accessibility. The observed profitability can be attributed to the productive use of tangible assets, which support fee-based revenues through contracts like Wakala, Murabaha, and Ijarah. A well-established physical presence strengthens an institutional image and builds client trust (Ghorbanzadeh and Sharbatiyan 2024). To Islamic transactions (muamalah) principles, tangible assets must be identified, ethically managed, and not used in activities involving riba or other prohibited elements (Alhejaili 2025). They should also align with the objectives of maqasid al-sharia, contributing to wider societal welfare. Under signaling theory, a strong tangible asset base communicates financial strength and long-term commitment to stakeholders. It enhances credibility, mitigates risk concerns, and increases investor confidence, ultimately supporting higher funding inflows and sustainable growth. ISB must invest in physical assets and consider increasing investment in tangible assets. This can improve operational efficiency, customer trust, and service quality. ISB is based on values and trust, and the existence of physical assets can increase the bank's perception of stability and professionalism. Increasing investment in tangible assets is the right strategy to increase market penetration and bring services closer to the community.

Bank growth and profitability

The findings of this study indicate a negative association between bank growth and the short-term profitability of ISBs, in line with prior research by Singh (2021); Saif-Alyousfi (2022). This outcome may be attributed to the complexities associated with managing operational efficiency, cost structures, and risk exposures during periods of expansion (Wang, Zhao, and Huchzermeier 2021). These challenges are often more pronounced in ISBs due to the additional operational requirements and compliance obligations tied to sharia principles. Rapid growth may hinder a bank's ability to maintain efficiency, especially in the early phases of expansion when significant investments are made in infrastructure, human capital, and technology (Prentice, Wang, and Loureiro 2019). During this transitional phase, such investments may not immediately translate into revenue gains, thereby exerting downward pressure on short-term profitability (Suhartanto et al. 2019). Moreover, aggressive expansion often drives up operating expenses, including staffing, training, marketing, and the maintenance of new branches or services, eroding profit margins until economies of scale are achieved. From the signaling theory perspective, growth is generally perceived as a positive market signal, reflecting future potential, competitiveness, and institutional capacity. However, when expansion fails to deliver corresponding financial returns, the signal may be interpreted as ambiguous or negative. Investors may perceive such growth as inefficient, poorly managed, or indicative of heightened credit risk from indiscriminate financing. Consequently, unbalanced growth without profit realization may weaken investor confidence, suggesting managerial inefficiency or an unsustainable long-term business model. The implication is that operational efficiency needs to be evaluated; growth may cause costs to increase more than the revenue generated. Rapid expansion can make risk management lose. Banks can be too aggressive in financing without a thorough feasibility analysis. Despite growth, banks do not offer competitive products or products that meet market needs.

Liquidity and profitability

This study identifies a negative relationship between liquidity and the profitability of ISBs in Indonesia, aligning with the findings of Musa, Matemilola, and Bany-Ariffin (2021); Jedidia and Salah (2022); Abbas et al. (2023). The results suggest that maintaining excessively high levels of liquidity may not always be optimal for ISBs. When banks hold large proportions of highly liquid assets such as cash and cash equivalents, they forgo potentially higher returns from productive, sharia-compliant financing instruments like Murabaha and Ijarah. As these liquid assets typically generate lower yields, over-liquidity can reduce earnings potential and result in idle funds that do not contribute meaningfully to profitability. From a managerial perspective, excess liquidity implies suboptimal asset allocation, potentially hindering investment opportunities and weakening the bank's competitive positioning over time (Chen, Wang, and Jia 2023). While liquidity is essential for operational stability and adherence to the sharia principle, excessively conservative liquidity management, particularly in the short term, can limit the bank's income-generating capacity (Eltweri et al. 2024). Within the framework of signaling theory, liquidity levels may act as informative signals to the market. When a bank maintains high liquidity but exhibits weak profitability, investors may interpret this as a sign of inefficiency or an overly cautious risk posture. Such a signal could reflect concerns about limited managerial initiative or strategic conservatism, potentially undermining investor confidence. Empirical evidence supports this interpretation. Jedidia and Salah (2022), examining banks across the MENA region, revealed a nonlinear association wherein liquidity negatively impacted profitability below a certain loan-to-asset ratio threshold. These findings underscore that while liquidity is vital for resilience, excessive liquidity may serve as a negative signal, suggesting either a lack of viable investment avenues or risk-averse strategies. Thus, ISBs must strike a careful balance between maintaining sufficient liquidity to meet short-term obligations and allocating assets

to enhance returns. Achieving this equilibrium is essential for financial performance, sustaining market confidence, and sending strong, positive signals to stakeholders. ISBs need to make inefficiencies in asset management, as banks may hold too many unproductive funds. ISBs must balance maintaining liquidity for short-term needs and optimizing financing to increase profitability.

Non-debt tax shields and profitability

This study's findings indicate that NDTS negatively affects the profitability of ISBs. This outcome is primarily attributed to the adverse implications of high depreciation expenses, reduced asset efficiency, and expansion and investment capacity constraints. These findings are consistent with prior studies by Guizani (2021). The implication of this relationship suggests that ISBs must adopt a strategic balance between utilizing NDTS and implementing optimal financing mechanisms to sustain competitiveness and profitability. This balance is particularly critical in the Islamic banking context, where adherence to sharia principles precludes reliance on interest-based leverage, which in conventional banking could otherwise be a tool for boosting returns through increased lending activities (Bashir and Gorton 2023). ISBs often invest substantially in tangible and intangible assets to foster long-term growth. However, an overreliance on asset-based tax shields may reduce asset turnover ratios, implying that these assets generate relatively lower revenue than their book value. This inefficiency, in turn, adversely impacts the bank's profitability. From the signaling theory perspective, a high NDTS ratio may transmit negative signals to the market. Stakeholders may interpret this as indicating a conservative or inefficient operational strategy with limited engagement in productive, revenue-generating financing activities. Such perceptions can undermine investor confidence and reduce the bank's appeal in capital markets. In sum, the negative association between NDTS and ISB profitability highlights the trade-off between tax efficiency and the effective utilization of assets. ISBs must ensure that tax-related benefits do not come at the cost of asset productivity while remaining aligned with sharia-compliant finance's ethical and economic distribution goals.

Bank age and profitability

The findings of this study reveal a positive relationship between bank age and the profitability of ISBs, supporting the conclusions of previous research by Muhammad and Nugraheni (2021); Mukhibad et al. (2024). This correlation suggests that older ISBs perform better financially than their newer counterparts. One explanation is that banks with a more extended operational history have developed more robust customer relationships, enjoyed stronger reputations, and benefit from greater operational efficiency (Bueno et al. 2024). Over time, these banks refine their strategies, learn from past experiences, and build systems that enable them to respond more effectively to market changes and regulatory requirements. In contrast, younger ISBs often rely on innovation and aggressive tactics to capture market share and attract new customers. While these strategies can yield short-term gains, they may come with higher risks and less predictability. Older ISBs, on the other hand, are better positioned to manage risks through their accumulated experience and proven practices. They typically adopt more sustainable business models and are more adept at maintaining compliance with sharia principles over the long term (Habib 2023). These factors contribute to their enhanced ability to attract and retain customers, investors, and third-party funds, which can be channeled into profitable financing activities. From a theoretical perspective, signaling theory helps explain why bank age is positively associated with profitability. In this context, the age of an ISB serves as a signal of credibility and reliability to stakeholders. First, a more extended operational history indicates institutional stability and the capacity to endure through various economic and regulatory cycles. This is especially important in Islamic banking, where ethical governance and financial prudence are highly valued. Second, an established track record

suggests that the bank is managed by competent leadership and operates under sound governance structures. Moreover, when potential investors and depositors lack complete information about a bank, age can serve as a proxy for trustworthiness and performance. Older ISBs have a performance history that stakeholders can evaluate, which reduces uncertainty and helps inform decision-making. This perception of lower risk makes it easier for mature banks to attract capital, whether in customer deposits or external investments. These financial inflows, in turn, improve their ability to generate profits. Finally, mature ISBs tend to have better market access and more favorable relationships with regulators and financial institutions. These advantages further enhance their competitiveness and profitability. The study supports the view that older ISBs are generally more profitable due to strategic maturity, established reputations, and the trust they command in the market. This insight is valuable for investors, regulators, and bank managers aiming to understand the drivers of financial performance within the Islamic banking sector.

Conclusions

The study reveals that bank size, asset tangibility, and bank age positively influence profitability, while bank growth and the financing-to-deposit ratio negatively impact. This trend reflects that, during the study period, ISBs allocated substantial financing, resulting in high FDRs. However, this did not significantly enhance profitability. The positive correlation between bank age and profitability is especially relevant in transitional economies, where ISBs' accumulated experience improves risk management, financing strategies, and operational efficiency. Older ISBs benefit from stronger public trust and customer loyalty, contributing to better profit margins. Mature ISBs reduce operational inefficiencies and manage risks more effectively, enhancing financial performance. In contrast, bank growth negatively affects profitability due to the high costs incurred during expansion phases. As ISBs grow, they often invest in new branches, recruit staff and upgrade technology. These efforts, though essential for long-term development, initially increase costs. If revenue growth fails to keep pace, profitability may decline. Additionally, rapid expansion may lead ISBs to focus on financing volume over quality, potentially increasing NPF and reducing returns. The study also highlights the importance of asset tangibility in supporting profitability. Tangible assets such as buildings, equipment, and other physical resources indicate financial strength and stability. ISBs with substantial tangible assets are better positioned to secure lower-cost funding, boosting profitability. These assets also facilitate the implementation of asset-backed financing models like Murabaha, Ijarah, and Musharaka Mutanaqisah. Physical collateral increases financing quality, enhances stakeholder trust, and generates more consistent income streams.

From a managerial perspective, several implications emerge. First, ISBs should prioritize sustainable growth by increasing third-party fund collection and exploring Sharia-compliant funding alternatives. Offering higher returns to depositors should be avoided, as it raises funding costs and reduces margins. Second, ISBs in the growth phase must manage competition strategically, ensuring profitability without compromising stability. Competing with conventional and other ISBs should be balanced with long-term financial health. Despite its insights, the study has certain limitations. The analysis focuses solely on ISBs in Indonesia, which may limit the generalizability of the findings to ISBs in different regulatory or economic environments. The study also uses a limited set of variables. Future research should explore additional factors influencing profitability, such as managerial efficiency, ownership structure, innovation, and macroeconomic indicators like inflation and GDP growth. Furthermore, challenges in obtaining consistent financial data pose risks of bias. The study relies exclusively on quantitative methods, missing qualitative insights that could offer a richer understanding of how bank age affects profitability. Future studies could benefit from integrating both approaches to provide a more holistic analysis.

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