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Research Paper

Revisiting the Nexus among Bank Specific Factors, Macroeconomic Factors, and Islamic Banking Performance: Three Measurement Models

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ABSTRACT

Much of the research on Islamic banking performance relies on conventional metrics rather than Islamic metrics, warranting further exploration. This study provides an empirical analysis of bank-specific and macroeconomic factors on Islamic banking performance from 2016 to 2024 using three measurement models. Monthly data were processed using the ARDL approach and revealed that capital adequacy influences Islamic banking performance in the short term, but has no effect in the long term. Liquidity has an effect only in the long term. Financing Outstanding has a negative effect in the short and long term, while diversification has an effect in the short term but no effect in the long term. Bank size affects performance in the short term, but not in the long term, while macroeconomic factors show an inconsistent relationship. In the IPR model, inflation and exchange rates have no impact in either the short or long term. However, in the ROA and NOM models, these factors affect the long term, but not the short term. This study suggests that banks need to pay attention to financing and exchange rate risks, including the implementation of a strong risk-management system.

Introduction

Islamic banking has grown significantly in recent decades, driven by increasing global demand for Islamic-compliant products (Saleem & Ashfaque, 2020). To increase its share in the domestic market and compete with global banks, especially in Indonesia, Islamic banking must enhance its performance (Retnasih, 2023). As the country with the second largest Muslim population in the world, the Indonesian government aims to position Indonesia as the global centre of Islamic finance and economy. To achieve this, Islamic finance in Indonesia must demonstrate resilience, stability, and strong performance (Nugroho et al., 2022). The performance of financial institutions is part of the financial sector, which is closely related to the country's economic sector. Improvements in banking performance encourage financial stability, increase public confidence in the banking system, and encourage economic progress (Zeqiraj et al. 2021). Islamic banking aims to address the risks associated with academic financial transactions (Hassan & Aliyu, 2018). Several previous studies have revealed that Islamic banks, as competitors to conventional banks, support a country's resilience to external shocks due to the global financial crisis, such as in 2008 (Berger et al., 2019). They serve as alternative strategies and models for dealing with global financial crises.

However, in 2019, Islamic banking assets in Indonesia comprised only 5.85% of the total national banking assets, falling short of expectations. Despite its strong performance, Islamic banking faces several challenges, including issues with planning, management strategies, performance improvement, economic fluctuations, monetary and fiscal policies, attracting more deposits, and competition in the market (Abdullahi & Yusuf, 2022). In a sensitive and competitive market, banking performance suffers from issues such as frozen customer deposits, disrupted lending relationships, and reduced credit lines (Quoc Trung, 2021). However, Islamic banks are more efficient, profitable, and have better credit quality than conventional banks (Ibrahim, 2020).

To mitigate challenges, it is important to pay attention to the relevant internal or external factors that determine bank performance. Capital adequacy is an internal factor that can influence Islamic banking performance, with empirical findings indicating a positive relationship, although this relationship remains ambiguous (Quoc Trung, 2021). Other research shows no significant effect of capital adequacy on banking performance (Abdullahi & Yusuf, 2022; Rahman & Santoso, 2019). Second, the outstanding risk caused by borrowers failing to fulfil contractual obligations is the most challenging factor affecting banking performance (Hunjra et al., 2022). Empirical research shows a negative relationship between outstanding risk and bank performance (Abou Elseoud et al., 2020; Raza et al., 2022). Third, liquidity risk, when a bank cannot fulfil its current obligations, shows a negative relationship with bank performance, although some studies present inconsistent results (Raza et al., 2022). However, Ben Jedidia and Salah (2022) report no relationship between liquidity and bank performance. Fourth, the literature reports mixed results regarding the relationship between diversification and banking performance. Empirical findings by Duan et al. (2018) and Mostak Ahamed (2017) suggest that diversification can enhance bank performance, whereas Francis et al. (2018) and Adesina (2021) argue that it may actually reduce banking performance. Finally, banks with large assets are expected to perform well, as the size of a bank is positively correlated with its performance (Abdelmoneim & Elghazaly, 2021; Ben Abdallah & Bahloul, 2023; Saleem & Ashfaque, 2020; Zaiane & Moussa,

2021). Other studies show a negative relationship between bank size and performance (Abou Elseoud et al., 2020; Ben Jedidia & Salah, 2022; Bekhet et al., 2021).

In addition to bank-specific factors, macroeconomic factors can also determine Islamic banking performance. A high inflation rate leads to high operational costs, which can reduce profits. Banda (2021) shows that inflation has a negative effect on bank performance. However, other studies show that inflation has no effect on banking performance (Retnasih, 2023). In addition, apart from inflation, we understand the relationship between exchange rate changes and banking performance. Exchange rate fluctuations significantly affect banking performance, affecting the ability to make operational and investment decisions that enhance profitability and stability, potentially distorting profit figures, and misleading assessments of a bank's financial health (Keshtgar et al., 2020). However, this remains a contemporary issue, with critical implications for banking profitability yet to be fully examined (Elhussein & Osman, 2019).

A company's performance or success can be measured by comparing output to input; the greater the income relative to expenditure, the better the bank's performance (Lee & Roh, 2020). The use of traditional measurement tools in Islamic banks has been criticised by academics, who argue that it is inappropriate, given the differing characteristics of Islamic and conventional banks (Rosmanidar et al., 2021). Traditional performance measurement tools are inadequate for capturing Islamic compliance parameters, and may exacerbate social perception issues, prompting the application of various alternative measurement methods in Islamic banking. Most studies examining Islamic banking performance use conventional measurements rather than Islamic-based ones (Mohammed & Muhammed, 2017). For example, previous studies (Abdullahi & Yusuf, 2022; Ali, 2021; Bekhet et al., 2021; Belkhaoui et al., 2020; Ben Jedidia & Salah, 2022; Gupta & Mahakud, 2020; Ibrahim, 2020; Rahman & Santoso, 2019; Raza et al., 2022; Mashamba & Chikutuma, 2023; Retnasih, 2023; Saleem & Ashfaque, 2020) employed general measures such as Return on Assets (ROA) and Return on Equity (ROE). Some studies (Quoc Trung, 2021; Rosmanidar et al., 2021) employed the CAMELS ratio, while Nugroho et al. (2022) utilised the Islamic Performance Ratio (IPR).

Given these gaps, it is essential to empirically re-examine how bank-specific factors and macroeconomic conditions in Indonesia influence bank performance by utilising both Islamic and conventional approaches. Therefore, this study employed various bank performance measurements, as suggested by Abou Elseoud et al. (2020), to enhance and enrich the research findings by incorporating multiple performance metrics. We incorporate the Islamic Performance Ratio as a new measure and include additional bank performance metrics beyond ROA and ROE, as recommended by Quoc Trung (2021), along with Net Operating Margin (NOM). However, ROA remains the most widely used and validated bank performance measure in various studies. Additionally, this study utilises the ARDL approach, whereas most studies rely on panel regression and OLS methods. Furthermore, we incorporated a dummy variable to analyze the effects of the 2018 regulatory changes related to capital adequacy ratio (CAR) and financing to deposit ratio (FDR), segmenting the data into periods before and after the implementation of the new regulations.

This study analysed the impact of bank-specific and macroeconomic factors on Islamic banking performance in Indonesia by examining both short- and long-term impacts across different dimensions. Referring to the growing empirical literature, this research provides an update by empirically evaluating the overall financial performance of Islamic banking.

This study contributes to expanding the academic literature on Islamic banking performance and its measurement methodologies. Moreover, it serves as a valuable resource for regulators, particularly governments, in formulating policies and directions for financial institutions, particularly Islamic banking, to drive economic growth.

Hypotheses Development

In 2018, the Indonesian Financial Services Authority (OJK) issued POJK No. 21/POJK.03/2018, mandating minimum capital requirements in response to the global financial crisis of 2008, the rapid growth of the Islamic finance industry, and the increasing complexity of Islamic financial products. This regulation aims to strengthen risk management practices as part of the ongoing efforts to enhance the resilience and stability of Islamic banks. Capital adequacy refers to the amount of capital required to absorb the potential risks faced by banks. Capital Adequacy Ratio (CAR) is a ratio that describes a bank's ability to prepare funds for the development of its business and anticipate the risk of losing funds as a result of bank operations (Rahman & Santoso, 2019). This ratio indicates whether the bank has sufficient capital to bear unforeseen losses in the future (Mashamba & Chikutuma, 2023). A high CAR indicates that a bank can effectively absorb operational losses. Abbas et al. (2019) find a positive relationship between capital adequacy and financial performance in Asia and the United States. Therefore, the hypothesis proposed in this study is as follows:

H_1: CAR has a positive effect on Islamic banking performance.

In 2018, OJK introduced a regulation that emphasized improved risk management related to FDR. POJK No. 21/POJK.03/2018 includes changes and adjustments to liquidity ratios, including the financing to deposit ratio (FDR). Consequently, it is important to understand how Islamic banks manage their liquidity to comply with new FDR requirements, and whether these changes affect financial stability. Liquidity is a bank's ability to quickly and efficiently convert its financial assets into cash to meet its financial obligations (Quoc Trung, 2021). The size of a loan influences the liquidity risk faced by a bank relative to its savings. An increase in this ratio indicates a liquidity problem for banks. It can be measured using FDR, which is a ratio that describes a bank's ability to pay off savings withdrawals by relying on loans granted as a source of liquidity. A high level of liquidity is estimated to have the best correlation with bank performance (Ghaemi Asl et al., 2022). Conversely, a lower FDR indicates that the bank struggles to maintain liquidity, as evidenced by decreased effectiveness in loan distribution (Rahman et al., 2023). Research by Raza et al. (2022) reveals that liquidity has a negative impact on Turkish bank performance. The hypotheses tested in this study is as follows:

H_2: FDR has a negative effect on Islamic banking performance.

Problematic financing assesses the level of outstanding bank loans. Problematic financing refers to loans that are at risk of default, potentially increasing a bank's credit risk exposure (Dang & Nguyen, 2022). This can negatively impact a bank's profitability and overall financial stability through increased provisioning for loan losses. This risk arises from borrowers' failure to repay their loans or fulfil their contractual obligations (Dang & Nguyen, 2022). A small proportion of non-performing financing (NPF) will result in a low level of risk from financing guaranteed by the bank (Rahman & Santoso, 2019). Large-scale financing issues can lead to a decline in a bank's operational efficiency, so a low NPF

indicates that the bank is performing well. Hunjra et al. (2022) show that financing risk has a negative impact on bank performance. Thus, the hypothesis is as follows:
H3: NPF has a negative effect on Islamic banking performance.

Banks should diversify their assets to better meet customer demands as they help maintain a balance between loans and required savings (Hunjra et al., 2022). Diversification can be measured using non-interest income (Mashamba & Chikutuma, 2023). In a highly competitive environment, banks can enhance their performance by boosting revenue from non-interest activities, such as service fees, commissions, and transaction fees. Yüksel et al. (2018) argue that there is a positive relationship between noninterest income and bank profits. Mashamba and Chikutuma (2023) reveal that income diversification has a positive impact on banking performance in Zimbabwe. The following hypothesis is tested:
H4: Diversification has a positive effect on Islamic banking performance.

Bank size indicates that large banks experience greater profit, productivity, and growth (Hunjra et al., 2022). Larger banks have the potential to achieve better performance than smaller banks (Kismawadi, 2023). Larger banks benefit from substantial loan volumes, economies of scale, and diversification, resulting in lower funding costs, and consequently, higher profits (Gupta & Mahakud, 2020). Saleem and Ashfaque (2020) showed that bank size has a positive effect on banking performance in Malaysia and Pakistan. The hypothesis formulated is as follows:
H5: Bank Size has a positive effect on Islamic banking performance.

Inflation refers to the overall increase in the prices of goods and services over time. The relationship between inflation and bank performance is uncertain because it largely depends on the bank's ability to accurately predict inflation and adjust interest rates accordingly (Mashamba & Chikutuma, 2023). Price increases can directly and indirectly impact bank performance by raising the costs of inputs, such as labour, equipment, and facilities, thereby reducing profits. Research by Ben Jedidia and Salah (2022) show that inflation has a negative effect on banking performance. Thus, the following hypothesis is proposed:
H6: Inflation has a negative effect on Islamic banking performance.

Exchange rate volatility directly impacts banking performance and profitability while indirectly affecting customer behavior, banking risk, and overall performance (Keshtgar et al., 2020). Exchange rates can boost banking by increasing demand for domestic commodities via cheaper exports, but volatility introduces transaction and conversion risks that ultimately reduce profitability (Hussain et al., 2024). A previous study confirmed a negative relationship between exchange rate fluctuations and banking performance (Elhussein & Osman, 2019). The hypothesis of this study is as follows:
H7: Exchange rates have a negative effect on Islamic banking performance.

Method

Research Design

To achieve the research objective, this study employed quantitative methods involving time-series data analysis of Islamic banking in Indonesia from January 2016 to February 2024. The method used was Autoregressive Distributed Lag (ARDL) analysis was

performed. The data in this study were derived from the Financial Services Authority (OJK), Bank Indonesia, and the Ministry of Trade of the Republic of Indonesia.

Sample Selection and Data Sources

The sample for this research consists of Indonesian Islamic banks. The collected data pertained to the research period under study. This research differs by using the Islamic Performance Ratio (IPR), a rarely used tool. For clarity, Table 1 lists the measurement variables in this study.

Table 1. Variable Measurement

Variable	Definition	Measurement	Notation	Source
Dependent	Islamic Performance Ratio (IPR)	Average (PSR + EDR) PSR = Profit Sharing Ratio EDR = Equitable Distribution Ratio	IPR	Financial Services Authority (OJK)
	Return On Asset	Ratio of net income to average total assets	ROA	
	Net Operational Margin	Ratio of net operational income to average earning assets	NOM	
Bank specific Factors	Capital Adequacy	Ratio of equity to total assets	CAR	Financial Services Authority (OJK)
	Financing Outstanding	Non-performing financing to total outstanding	NPF	
	Diversification	Ratio of non-operational income tototal income	NONI	
	Size	Natural Logarithms of Total Assets	SIZE	
	Dummy	Categorized the data into two groups: (0) for the period before2018, and (1) for the year 2018 andonwards	DUM	
Macroeconomic Factors	Inflation	Consumer Price Index	INF	Bank Indonesia
	Exchange rate	Exchange Rate (US$)	EXC	Ministry of Trade of the Republic of Indonesia

Data Analysis

This study examines the determinants of Islamic banking performance using the econometric approach adopted by Gyimah et al. (2021) and Ben Mimoun (2019) in their studies of financial institution performance. The general model used in this study is formulated as follows:

$$Bank\ Performance = f(bank\ spesific\ factors + Macroeconomic\ factor) \ldots\ldots\ldots.(1)$$

The ARDL method offers several advantages. It allows research with small samples, estimates long-term and short-term component models simultaneously, eliminates autocorrelation problems, distinguishes between exogenous and endogenous variables, avoids pre-testing problems that are implicitly seen in cointegration analysis of long-term relationships, and is suitable for use with stationary variables at different levels, namely $I(0)$ and $I(1)$ (Bella et al., 2022).

The ARDL method was employed in this study for several reasons. First, understanding both the long- and short-term effects is crucial for providing comprehensive insights into regulators and bank management in formulating effective policies. Second, in economic and financial research, variables are often non-stationary, and forcing all variables to be stationary can eliminate essential information about long-term trends. Third, understanding these dynamics is vital for bank managers and regulators to make informed decisions about when and how to intervene and manage expectations regarding policy impact. Fourth, in Islamic banking, where regulations and policies can have complex effects, model specification errors can lead to incorrect conclusions and ineffective decisions. The ARDL approach helps to ensure that the results obtained are more reliable and can be trusted for decision-making purposes (Nkoro & Uko, 2016).

The autoregressive distributed lag (ARDL) model is expressed as follows:

$$Y_t = \sum_{j=1}^{p} \lambda_j Y_{t-j} + \sum_{j=1}^{q} \delta_j X_{t-j} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(2)$$

Where X_{t-j} is KX1 of the explanatory variables, and Y_{t-j} is the dependent variable. In our model, we incorporated a dummy variable to assess whether the 2018 regulation had a positive impact on Islamic banking. We categorized the data into two groups: (0) before 2018, and (1) 2018 onwards. We consider three models linking the determinants of Islamic banking performance. The first model in this study can be expressed as follows:

Model 1 (Islamic performance ratio)

$$\Delta IPR_t = \alpha_0 \sum_{i=1}^{p} \alpha_{1i} \Delta IPR_{t-i} + \sum_{i=1}^{q2} \alpha_{2i} \Delta CAR_{t-i} + \sum_{i=1}^{q3} \alpha_{3i} FDR_{t-i} + \sum_{i=1}^{q4} \alpha_{4i} NPF_{t-i} + \sum_{i=1}^{q5} \alpha_5 \Delta NONI_{t-i} + \sum_{i-1}^{q6} \alpha_6 \Delta SIZE_{t-i} + \sum_{i-1}^{q7} \alpha_7 \Delta INF_{t-i} + \sum_{i-1}^{q8} \alpha_8 \Delta EXC_{t-i} + \beta_1 IPR_{t-i} + \beta_2 CAR_{t-i} + \beta_3 FDR_{t-i} + \beta_4 NPF_{t-i} + \beta_5 NONI_{t-i} + \beta_6 SIZE_{t-i} + \beta_7 INF_{t-i} + \beta_8 EXC_{t-i} + V_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

Model 2 (Return on asset)

$$\Delta ROA_t = \alpha_0 \sum_{i=1}^{p} \alpha_{1i} \Delta ROA_{t-i} + \sum_{i=1}^{q2} \alpha_{2i} \Delta CAR_{t-i} + \sum_{i=1}^{q3} \alpha_{3i} \Delta FDR_{t-i} + \sum_{i=1}^{q4} \alpha_{4i} NPF_{t-i} + \sum_{i=1}^{q5} \alpha_5 \Delta NONI_{t-i} + \sum_{i-1}^{q6} \alpha_6 \Delta SIZE_{t-i} + \sum_{i-1}^{q7} \alpha_7 \Delta INF_{t-i} + \sum_{i-1}^{q8} \alpha_8 \Delta EXC_{t-i} + \beta_1 ROA_{t-i} + \beta_2 CAR_{t-i} + \beta_3 FDR_{t-i} + \beta_4 NPF_{t-i} + \beta_5 NONI_{t-i} + \beta_6 SIZE_{t-i} + \beta_7 INF_{t-i} + \beta_8 EXC_{t-i} + V_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4)$$

Model 3 (Net operating margin)

$$\Delta NOM_t = \alpha_0 \sum_{i=1}^{p} \alpha_{1i} \Delta NOM_{t-i} + \sum_{i=1}^{q2} \alpha_{2i} \Delta CAR_{t-i} + \sum_{i=1}^{q3} \alpha_{3i} \Delta FDR_{t-i} + \sum_{i=1}^{q4} \alpha_{4i} NPF_{t-i} + \sum_{i=1}^{q5} \alpha_5 \Delta NONI_{t-i} + \sum_{i-1}^{q6} \alpha_6 \Delta SIZE_{t-i} + \sum_{i-1}^{q7} \alpha_7 \Delta INF_{t-i} + \sum_{i-1}^{q8} \alpha_8 \Delta EXC_{t-i} + \beta_1 NOM_{t-i} + \beta_2 CAR_{t-i} + \beta_3 FDR_{t-i} + \beta_4 NPF_{t-i} + \beta_5 NONI_{t-i} + \beta_6 SIZE_{t-i} + \beta_7 INF_{t-i} + \beta_8 EXC_{t-i} + V_{1t} \quad (5)$$

Where the mathematical triangle notation (Δ) denotes the first difference operator and $V1t$ is the white noise interference term. After establishing the cointegration relationship, the ARDL approach (p, q1, q2, q3, …) can be presented using an error correction model (ECM) as follows:

$$\Delta Y_t = \alpha_0 \sum_{i=1}^{p} \alpha_{1i} \Delta Y_{t-i} + \sum_{i=1}^{q2} \alpha_{2i} \Delta CAR_{t-i} + \sum_{i=1}^{q3} \alpha_{3i} \Delta FDR_{t-i} + \sum_{i=1}^{q4} \alpha_{4i} NPF_{t-i} + \sum_{i=1}^{q5} \alpha_5 \Delta NONI_{t-i} + \sum_{i-1}^{q6} \alpha_6 \Delta SIZE_{t-i} + \sum_{i-1}^{q7} \alpha_7 \Delta INF_{t-i} + \sum_{i-1}^{q8} \alpha_8 \Delta EXC_{t-i} + \theta ECT_{t-i} + \varepsilon_{t-1} \quad (6)$$

Where θ represents the speed of the model adjustment parameters, and ECT denotes the error correction term. Y denotes the three dependent variables used in thisstudy; we label them as "Y" to make them more concise. The sign of the coefficient was estimated to be negative and statistically significant, confirming the existence of a cointegration relationship. The ARDL model uses a general probability estimation method, whose lag length is obtained from various information criteria, such as AIC and SBIC.

To eliminate bias in the results, we conducted robustness tests to assess reliability as a measure of consistency and validation. This was used to test the accuracy of the proposed model between the forecasting and actual results. The robustness test relevant to this research method uses the stability of the CUSUM and CUSUMQ models (Calal et al., 2023).

Results

Table 2 presents descriptive data from this research. IPR averages at 19.03, indicating relatively low variability in performance. ROA has a mean value of 1.48%, reflecting a modest return on profitability. NOM averages 1.74%, suggesting moderate variation. CAR has a mean of 20.84%, indicating moderate variability in the capital adequacy of the banks. FDR averages 79.32%, showing moderate variability in the financing of deposits. NPF has an average of 3.59%, indicating variability in financing quality. Non- Operational income (NONI) has a low mean of 0.0093 reflecting minimal diversification. Size averages 367,513.4, indicating considerable variability in bank size. INF had an average of 3.12%, reflecting moderate variability. The exchange rate (EXC) averages at 14,308.65 IDR/USD indicating relatively stable exchange rate fluctuations.

Table 2. Descriptive Statistics

Variable	Mean	Std. Dev.
IPR	19.02776	1.204875
ROA	1.484663	0.506755
NOM	1.740424	0.702697
CAR	20.84117	3.500435

Variable	Mean	Std. Dev.
FDR	79.31642	4.327109
NPF	3.593014	1.033195
NONI	0.009252	0.007092
SIZE	367513.4	106589.6
INF	3.122143	1.089916
EXC	14308.65	754.8974

The first step in analyzing time-series data using the ARDL model is to ensure that no variables are integrated at order two I(2) or higher. Table 3 presents the results of the augmented Dickey-Fuller and Phillips-Perron unit root tests in the form of levels and first differences. The test results were stationary at this level except for NONI. However, all the variables are stationary at the first level. Therefore, this complies with the requirements of the ARDL model.

Table 3. Unit Root Test Result

Variable	ADF		PP	
	Level	First Difference	Level	First Difference
IPR	0.210340	-10.14329***	0.242105	-10.13748***
ROA	-1.617719	-11.43363***	-1.520378	-11.42746***
NOM	-1.292038	-12.19474***	-1.154617	-12.17376***
CAR	-1.129792	-10.19575***	-1.113667	-10.19575***
FDR	-2.142808	-10.95765***	-2.142808	-10.94873***
NPF	-2.173620	-5.970092***	-1.147322	-13.46705***
NONI	-8.015229***	-11.20330***	-8.179258***	-35.36652***
SIZE	-0.773790	-6.447903***	-0.384557	-13.01875***
INF	-2.691119	-3.580787***	-2.178673	-9.379938***
EXC	-2.081882	-11.25861***	-1.746435	-16.85965***

Note: *, **, ***, denote significant at 10%, 5%, and 1%

Table 4 presents the results of the bound test. The results show that the F-count was greater than the lower and upper limits, even at the lowest significance level. Thus, the null hypothesis of no cointegration was rejected. There is a long-run cointegration relationship between the variables used in this study and the three models. These results justify the use of the long-term ARDL model estimation.

Table 4. Bound test Cointegration

F-statistic	K	Significant Level	Critical Bounds	
			Lower Bound *I*(0)	Upper Bound *I*(1)
(IPR) 8.665154	8	1%	2.62	3.77
(ROA) 6.514431	8	1%	2.62	3.77
(NOM) 6.359615	8	1%	2.62	3.77

Model stability was tested using cumulative sum (CUSUM) and cumulative sum of squares (CUSUMQ) tests. The results in Figures 1, 2, and 3 show that the graph does not cross the line boundary. This shows that the models in this study are correct, unbiased, stable, and capable of being used as policy recommendations.

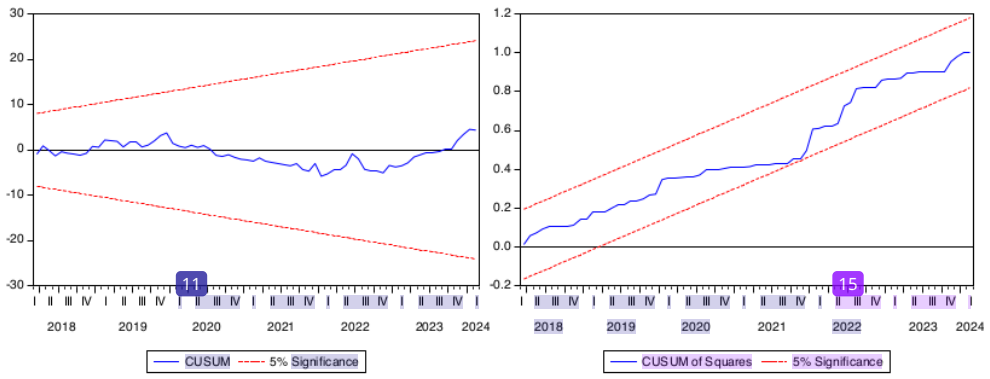

Figure 1. Stability Test for IPR

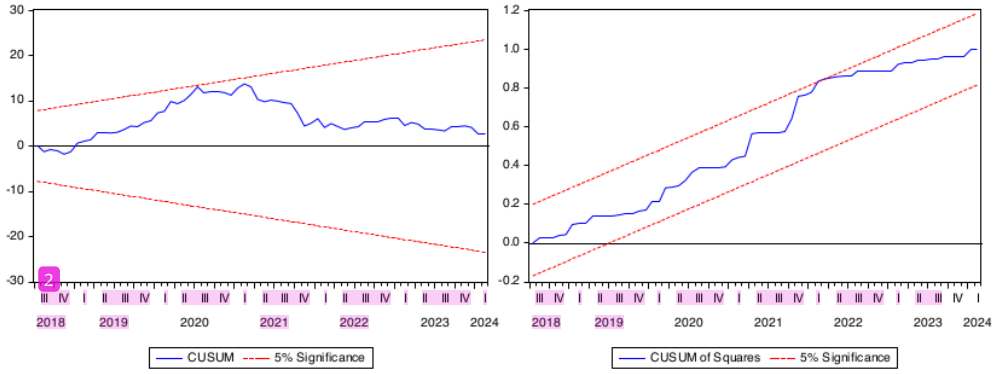

Figure 2. Stability Test for ROA

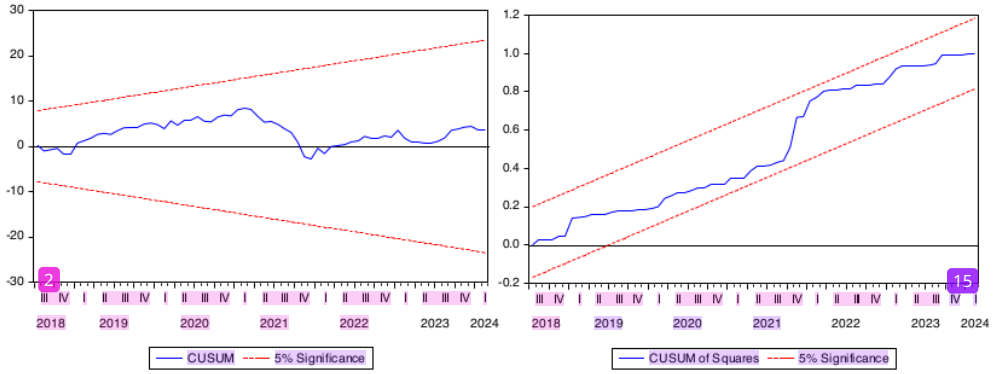

Figure 3. Stability Test for NOM

Table 5 shows the short-term test results in the IPR model, where CAR, NPF, and bank size in the previous period have positive effects on Islamic banking performance. Meanwhile, FDR and NPF in the previous period had a negative effect on Islamic banking performance. The findings for the ROA model show that CAR, NPF, and EXC in the previous period have positive effects on Islamic banking performance. Meanwhile, only NPF had a negative effect on Islamic banking performance. In the NOM model, EXC and

DUMMY in the previous period have a positive influence on Islamic banking performance. For NPF, NONI, SIZE, and SIZE in the previous period have a negative effect on Islamic banking performance. These findings imply that there is ambiguity in the relationship between bank-specific and macroeconomic factors, and Islamic banking performance in Indonesia.

Table 5. Short-run and Long-run Estimation Results

Variables	Short-Run Estimation		
	Coeff. IPR	**Coeff. ROA**	**Coeff. NOM**
CAR	0.015318	0.030888	0.012783
CAR (-1)	0.005700	-0.007729	-0.021449
CAR (-2)	0.095194**	0.056977***	0.050079*
FDR	0.019765	-0.011161	-0.008321
FDR (-1)	-0.017878		
FDR (-2)	-0.063767**		
NPF	-0.130406	-0.181639**	-0.252334***
NPF (-1)	0.257034*	0.189695***	0.142559
NPF (-2)	0.208645	0.159107**	
NPF (-3)	0.398426**		
NONI	1.540771	-3.751386	-12.60904***
SIZE	-3.469508*	-1.564993*	-2.248582**
SIZE (-1)	-1.920451		-0.525059
SIZE (-2)	-3.021805		-1.945330**
SIZE (-3)	3.674069**		
INF	-0.033192	0.035949*	0.068885
EXC	5.56E-05	-5.34E-05	-9.35E-05*
EXC (-1)		0.000167***	0.000219***
EXC (-2)		7.26E-05	0.000101*
EXC (-3)		5.09E-05	6.81E-05
DUM	-0.492093	-0.046395	0.412566***
DUM (-1)	0.546892		
CointEq(-1)	-0.957852***	-0.594517***	-0.775597***
Variables	**Long-run Estimation**		
	Coeff. IPR	**Coeff. ROA**	**Coeff. NOM**
CAR	-0.026114	0.041950	0.063595**
FDR	0.174422***	0.009646	0.024259***
NPF	-0.969696*	-0.317931***	-0.221639***
NONI	23.77337	-13.71461	-24.85386***
SIZE	1.501830	0.516588	1.605769***
INF	-0.063730	0.054245**	0.136383***
EXC	0.000237	-0.000444***	-0.000432***
DUM	0.803048	0.607644***	0.531934***
C	-13.38619	0.255907	-15.59199***

Note: *, **, ***, denote significant at 10%, 5%, and 1%

The analysis of the long-term results is also presented in Table 5. Only FDR has a significant positive effect on Islamic banking performance in the IPR model. In the ROA models, NPF and EXC have a significant negative effect on Islamic banking performance. Meanwhile, in NOM models, CAR, FDR, SIZE, EXC, and DUM have significant positive effects on Islamic banking performance. NPF, NONI, and EXC have negative and significant effects on Islamic banking performance. These results are in accordance with our hypothesis that outstanding financing consistently reduces banking performance. Likewise, the exchange rate worsens banking performance in the long term. Our study provides evidence that bank-specific and macroeconomic factors are related to banking performance.

Discussion

This study supports previous research on the determinants of banking performance (Ben Jedidia & Salah, 2022; Elhussein & Osman, 2019; Hunjra et al., 2022). In the IPR, ROA, and NOM models, capital adequacy has no effect in the long term, but has a positive effect in the short term. These results prove that capital adequacy can improve Islamic banking performance under short-term policy. This advantage can result in increased performance in Islamic banking. In addition, if capital adequacy ratio is high, the bank will be able to absorb losses resulting from its operational activities (Abbas et al., 2019). Higher capital adequacy serves as a safety cushion to absorb shocks, allowing banks to approve financing at lower margins and expand the scope of their work by opening branches or completing business units (Rahman & Santoso, 2019; Spaseska et al., 2022). This result is supported by Ajayi et al. (2019), who find that banks with more capital are considered safer.

Based on our research data, the average CAR for Islamic banking in Indonesia is 20.84%, with a peak ratio of 26.28%. Although this generally suggests healthy capital adequacy, it is not fully optimal, leading to a limited impact on long-term bank performance. One reason CAR might not significantly influence long-term performance is that Islamic banking operates under Sharia principles, which prohibit interest (*riba*) and emphasize risk-sharing. Most Islamic banking products are based on profit- and loss-sharing, making these banks more resilient to risk fluctuations and reducing their reliance on CAR for stability (Ashraf, 2021). In this model, risks are more evenly distributed between the bank and the customer, diminishing CAR's influence on performance compared to conventional banking (Sutrisno & Widarjono, 2018).

However, a notable finding emerged when comparing the periods before and after implementation of POJK No. 21/POJK.03/2018, mandating minimum capital requirements and risk management practices for Islamic banks. The results show significant differences in the post-regulation ROA and NOM models. This regulation strengthened Islamic banks' resilience to risk and positively affected their performance. Therefore, it is crucial for Islamic banks to maintain robust funding and financing sources, while ensuring a stable, secure, and profitable banking system. Continuous monitoring and maintaining appropriate capital adequacy levels are essential to prepare for economic uncertainties, such as the 2008 financial crisis and the COVID-19 pandemic (Minarni et al., 2023).

Liquidity levels, as measured by IPR, ROA, and NOM models, show no short-term effect but have a significant positive effect in the long term. The average FDR of Islamic banks in Indonesia during the study period was 79.32%, with a maximum of 89.32%, which is below the Bank Indonesia target range of 80% to 100%. This indicates that Islamic banks operated with a relatively low FDR, suggesting greater efficiency in channeling deposits

into financing. This efficiency enables banks to better utilize their funds to generate revenue through financing activities, thereby improving their financial performance (Minarni et al., 2023).

These findings are consistent with empirical studies such as those by Masood and Ashraf (2021), who found that Islamic banks with higher FDR tend to have better profitability. Additionally, a higher FDR indicates that a bank is successfully expanding its market share by providing more financing to its customers. Hosen and Muhari (2018) also find that Islamic banks with higher FDR often experience faster growth in assets and market share, ultimately boosting financial performance. Similar to capital adequacy, our study observed the impact of the POJK No. 21/POJK.03/2018 regulatory changes in FDR, which marked a critical transition with the introduction of stricter liquidity ratios for Islamic banks. The results indicate significant improvements in the ROA and NOM models, highlighting the positive effect of these regulations on Islamic banks' performance.

NPF has a negative effect on Islamic banking performance in both the short and long terms. Financing risk can cause a decline in Islamic banking performance. Banks must take steps to reduce the amount of problematic financing because of its negative impact on banking performance in the short and long term (Abel et al., 2023). Poor financing risk management raises the provision for financing losses, thereby reducing profitability and negatively impacting banking performance (Abou Elseoud et al., 2020).

Corroborating previous studies (Mehmood et al., 2019), diversification appears to reduce Islamic banking performance in the IPR, ROA, and NOM models in the short term but not in the long term. This evidence shows that Islamic banking performance is more dependent on traditional activities (loans or deposits), with a higher share of operating income (Ben Salem & Ben Abdelkader, 2023). This may occur because, as Islamic banking business segments become more diverse, their performance tends to become less optimal. Companies with many business segments may struggle to control performance and profitability, potentially missing high-return investments, while new segments may take longer to generate profits (Adella & Dillak, 2023).

Bank size negatively influences Islamic banking performance. The inverse relationship between size and Islamic banking performance may imply that banks are unable to benefit from economies of scale because of high operational costs in the short term (Djalilov & Piesse, 2016). Increasing bank size can lead to higher levels of marketing, operational and asymmetric information, and bureaucratic costs (Tan, 2016). In line with Gupta and Mahakud (2020), bank size can cause Islamic banking performance to decline.

Inflation seems to improve the performance of Islamic banking in the long term, confirming a previous study conducted by Tërstena et al. (2023). There is a threshold inflation rate below which inflation has a positive influence on financial performance; however, if it exceeds this threshold, the influence becomes negative (Khan et al., 2006). The argument that inflation is positively related is that the average inflation in the research period was relatively low at 3.12%. A small increase in inflation is not dangerous to the development performance of the Islamic banking sector. When the inflation rate does not exceed the threshold, inflation can benefit banks (Umar, 2014).

The exchange rate effect in the short term increases Islamic banking performance, but decreases it in the long term. Positive exchange rate arguments can determine the return on real investments. A stable exchange rate fosters a stable business environment, whereas a currency decline reduces purchasing power and investment returns. This decline in

investment affects banking activities (Kusuma & Rahman, 2018). Therefore, the results of this study are in accordance with the previous literature, which states that the exchange rate has a significant effect on banking performance, regardless of whether the effect is positive or negative. Exchange rate fluctuations can cause significant profits or losses, distorting profit results and potentially misrepresenting the financial position of Islamic banks (Keshtgar et al., 2020).

Thus, Islamic banking in Indonesia remains moderate and cannot be considered to perform very well. This study concludes that Islamic banking performance in Indonesia is influenced by several key factors. Capital adequacy is beneficial in the short term, allowing banks to absorb shocks effectively, while liquidity significantly impacts bank performance. A major challenge is financing risk, which consistently hampers performance in both the short and long term, indicating the need for robust risk management systems. Diversification negatively affects short-term bank performance because of reliance on traditional income sources, although it has no long-term impact. Similarly, although large banks incur high operational costs that can harm short-term performance, they may not provide long-term benefits.

Inflation can positively impact long-term efficiency if kept within a manageable range, while exchange rates have a mixed effect—beneficial in the short term but detrimental in the long term because of profit and loss fluctuations. While certain factors, such as capital adequacy and inflation, provide benefits, persistent issues, such as financing risk, short-term challenges with diversification, and bank size, indicate areas needing improvement. To enhance performance, Islamic banks in Indonesia must focus on strategic risk management and operational efficiency.

Conclusion

This study suggests that IPR can effectively measure the performance of Islamic banking. According to the results, problematic financing is still the main factor that explains the worsening performance of Islamic banking. Therefore, the government, as a stakeholder, must implement a robust financing risk-management system and employ reliable personnel who act honestly in the bank's interests. Additionally, banks should consider inflation and exchange rates when formulating long- and short-term strategies, such as repaying debt early to capitalise on favourable exchange rate movements. Diversification can worsen Islamic banking performance because more diverse banking products often lead to lower future returns.

Future research could consider using panel data with an unbiased approach, such as a dynamic panel. This may help confirm or improve the results of this study. We recommend using the IPR variable by including the zakat ratio to measure IPR. Finally, further research should consider including control variables, as external factors like changes in economic conditions and the banking environment can influence Islamic banking performance.

Authors' Declaration

The authors made substantial contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation and discussion of results. The authors read and approved the final manuscript.

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Revisiting the Nexus among Bank Specific Factors, Macroeconomic Factors, and Islamic Banking Performance: Three Measurement Models

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