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Do we need large Islamic rural banks?

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ABSTRACT

This study aims to examine the non-linear impact of bank size on the profitability of Islamic rural banks (IRBs). Our study selected 90 banks situated on the Java Island. The study period spans 2018-2021, with quarterly data. Our study employs a dynamic panel regression using the GMM method. The results indicate that assets positively affect profitability. More importantly, the impact of an asset on profitability is inverted. In addition, these findings suggest that strong bank fundamentals, derived from high efficiency and high CAR, positively impact profitability. Several policy implications can be drawn from our findings. First, each bank must have a minimum of assets to achieve high profitability, around 187 billion. Second, to increase their profitability, Islamic rural banks must have adequate capital and a high operating efficiency.

Introduction

Islamic Banks in Indonesia consist of Islamic Commercial Banks and Islamic Rural Banks (Trinugroho et al., 2021). Currently, as many as 175 Islamic rural banks are operating throughout Indonesia, with total assets of IDR 23.177 trillion in 2023. The focus of IRB financing is channelled to micro, small, and medium enterprises (MSMEs), where MSMEs are the business sector that dominates the Indonesian economy (Risfandy & Pratiwi, 2022). The existence of Islamic rural banks is therefore crucial for the Indonesian economy. Hence, Islamic rural banks must continue to improve their performance so that they can continue to support the development of MSMEs and the Indonesian economy.

One of the important aspects of measuring Islamic rural banks' performance is profitability. The level of bank profitability, including Islamic rural banks, is usually measured by return on assets (Trinugroho et al., 2018). Return on Assets (ROA) is the ratio used to calculate profitability. ROA is a key parameter used to analyze the ability of an Islamic rural bank to achieve overall profitability, measured from its assets. The higher this ratio, the better the performance of IRBs and the higher the level of profitability (Widarjono et al., 2020); (Widarjono & Anto, 2020).

Several studies have examined the profitability of Islamic rural banks (IRBs). Trinugroho et al. (2018) showed that competition and financing diversification affect profitability. Widarjono and Anto, (2020) suggested that strong market power and bank fundamentals increase profitability. Sudarsono et al. (2021) found that third-party funds and financing drive profitability. Risfandy and Pratiwi (2022) documented that income diversification negatively influences profitability. Lubis et al. (2023) indicated that strong bank fundamentals boosted profitability during the COVID-19 pandemic. Hidayah and Karimah (2023) showed that the type of financing in Islamic banks affects profitability. Jusuf and Widarjono (2024) suggested that funding liquidity reduces profitability.

One of the fundamental factors of a bank that is important in influencing the IRB's profitability is its assets. The assets of an IRB indicate the size of the IRB's business scale. Research suggests that assets have a positive impact on profits. This means that the larger IRB can increase profitability since it can operate efficiently due to economies of scale (Ibrahim et al., 2017; Sudarsono et al., 2021). The

question that arises is whether the influence of these assets is linear, given that the scale of IRBs' operations is limited to the regional area at the district level. The increase in assets does actually reduce IRBs' profitability due to inefficiencies, considering the limited business area.

This study aims to analyze the influence of assets on the profitability of IRBs using a non-linear approach. The non-linear influence of assets on profitability seeks to determine the optimal level of assets in supporting the profitability of IRBs, considering the limited business area of IRBs. There are several contributions from the research. First, previous studies have analyzed the linear influence of assets on profitability (Trinugroho et al., 2018; Widarjono and Anto, 2020). This study analyzes the non-linear influence of assets on the profitability of IRBs. Second, this study uses a dynamic panel regression approach while most previous studies use a static panel approach in evaluating the profitability of IRBs (Risfandy & Pratiwi, 2022; Hidayah & Karimah, 2023; . Jusuf & Widarjono, 2024). The dynamic model is more appropriate than the static model because the profitability in the banking sector is permanent (Khattak et al., 2022).

Literature Review

Many empirical studies have investigated the determinants of the profitability of IRBs. Trinugroho et al. (2018) examined the profitability of Islamic rural banks measured by margins. Islamic rural banks were investigated, with 151 banks in the period 2021 to 2015, with quarterly data. The results show that banks with large market power, as measured by the Lerner index, have a positive effect on profitability. Income diversification has a negative effect on profits. Based on the type of financing, higher profitability is obtained from Islamic rural banks that distribute more profit-and-loss sharing financing.

Widarjono and Anto (2020) examined the influence of market structure, bank internal factors, and macroeconomic conditions on the profitability of Islamic rural banks. This study took the case of IRBs in Central Java and Yogyakarta Provinces in the period 2013Q1-2018Q4. The results of the study show that profitability is influenced by market share, whereas market concentration is not related to profitability. In addition, the efficiency and financing have a positive effect on profitability. The findings of this study support the theory of Relative Market Power (MRP) and fail to explain the theory of Structure Conduct Performance (SCP).

Sudarsono et al. (2021) examined both internal and external factors that determine the profitability of IRBs. They selected 82 IRBs using monthly data spanning from 2012 to 2018. The findings indicate that funding and financing positively influence the profitability of IRBs. Nevertheless, the bank size and bank stability negatively affect the profitability of IRBs. Meanwhile, the inflation rate negatively affects the profitability of IRBs.

Another study of Risfandy and Pratiwi (2022) examined the influence of internal factors and income diversification on IRBs' profitability during COVID-19. IRBs were studied by 164 banks in the Q4 2020-Q3 2021 period. The results of their research indicate that income diversification negatively influences the profitability of IRBs, implying that IRBs focus on their financing, instead of many investment activities. Assets positively affect profitability, while the CIR and COVID-19 are negatively associated with the profitability of IRBs.

Furthermore, Lubis et al. (2023) examined the determination of the profitability of IRBs during the COVID-19 period. The study took a sample of 134 Islamic rural banks in the 2020Q2-2022Q1 period. This study analyzed the influence of internal variables of banks and external variables. The results documented that the Financing Deposit Ratio (FDR) has a positive effect on profitability, but operating inefficiencies and high Non-performing financing (NPF) have a negative effect on profitability. Meanwhile, bank capital, gross regional domestic product (GRDP), and inflation have no effect on IRBs' profits.

Hidayah and Karimah (2023) examined the influence of the type of financing on the profitability of IRBs. The types of financing are categorized as Profit and Loss Sharing (PLS) financing and Non-PLS financing. A sample of 6 Islamic rural banks was selected for the period 2011-2020 with quarterly data. The results showed that Mudharabah, Musharakah, and Murabahah financing had a positive effect on profits, but Murabahah financing had the greatest effect on profitability. In addition, non-performing financing measured by NPF decreases the effect of PLS financing on profitability, while NPF increases the effect of non-PLS financing on profitability.

Moreover, another study analyzed the impact of bank stability and funding liquidity risk on the profitability of IRBs (Putri & Widarjono, 2023). Their study selected 83 banks, spanning from 2017

to 2021, and using quarterly data. The findings indicate that bank stability and funding risk positively influence the profitability of IRBs. CAR is positively related to profitability, but assets, NPF, and CIR are negatively associated with profitability. An interesting result is that only large Islamic rural banks benefit from funding risk in increasing profitability.

Jusuf and Widarjono (2024) examined the influence of funding liquidity risk on the profitability of IRBs located on the island of Sumatra. The study analyzed 41 IRBs with quarterly data, spanning from 2019: Q1 to 2023: Q4, with unbalanced panel data. The results of the study suggest that funding liquidity risks reduce the profitability of IRBs. In addition, a strong bank's fundamentals can increase IRB profitability. Importantly, large IRBs encounter lower risks related to the effect of funding liquidity risk on profitability than small IRBs.

Methods

Estimation Method

This research aims to explore the role of bank size and other control variables, both specific bank variables and macro variables, on IRBs' profitability. This study uses a dynamic panel regression model. Two primary considerations are for employing it in this study. Firstly, the dynamic panel regression can address the issue of endogeneity (Widarjono et al., 2025). Secondly, the bank's profitability is not temporary but permanent, which causes dynamic panel regression to be more applicable than static panel regression (Khattak et al., 2022). Following some previous studies (Yanikkaya et al., 2018; Rizvi et al., 2020) the dynamic panel regression equation in this study can be written as follows:

$$ROA_{it} = \theta_0 + \theta_1 ROA_{it-1} + \theta_2 Lasset_{it} + \theta_3 CAR_{it} + \theta_4 FDR_{it} + \theta_5 CIR_{it} + \theta_6 NPF_{it} + \theta_7 Owner_{it} + \theta_8 LGRDP_{it} + \theta_9 COVID_{it} + e_{it} \quad (1)$$

ROA represents return on assets. Asset refers to total assets, CAR stands for capital adequacy ratio, FDR represents the financing deposit ratio, CIR denotes the cost-to-income ratio, NPF signifies non-performing financing, Owner indicates the ownership of the IRB. GRDP is the gross domestic product. COVID refers to the COVID-19 pandemic that began in the second quarter of 2020.

Furthermore, to analyze the non-linear or quadratic influence of assets on the profitability of IRBs, this study follows previous research from Ibrahim et al., (2017). The dynamic panel regression model can be written as follows:

$$ROA_{it} = \theta_0 + \theta_1 ROA_{it-1} + \theta_2 Lasset_{it} + \theta_3 Lasset_{it}^2 + \theta_4 CAR_{it} + \theta_5 FDR_{it} + \theta_6 CIR_{it} + \theta_7 NPF_{it} + \theta_8 Owner_{it} + \theta_9 LGRDP_{it} + \theta_{10} COVID_{it} + e_{it} \quad (2)$$

The quadratic variable of the asset shows the non-linear influence of assets on IRB's profitability. From equation (2), the optimal level of assets driving the IRB's profit rate can be calculated. The calculation of the optimal level of assets is to take the first derivative of equation (2) with respect to assets. The calculation is as follows:

$$\frac{\partial \mathrm{ROA}}{\partial \mathrm{Lassset}} = \theta_2 + 2\theta_3 Lasset = 0 \quad (3)$$

Variable measurement

The dependent variable of this study is profitability. The profitability used in this study is return on assets (ROA). ROA, which measures profitability relative to total assets, better reflects a bank's ability to manage assets to generate profitability than return on earnings (ROE) (Risfandy & Pratiwi, 2022; Jusuf & Widarjono, 2024). Independent variables comprise bank-specific variables as well as macroeconomic variables. The bank-specific variables include the size of the bank, the bank's capital, the bank's financing, financing risk, and operational efficiency. The total assets represent the IRB size (Misanam & Widarjono, 2023). The capital adequacy ratio (CAR) is a proxy of IRB's capital (Sutrisno, 2018). IRB's financing is proxied by the financing-to-deposit ratio (FDR) (Sutrisno & Widarjono, 2022). The cost-to-revenue ratio (CIR) represents operational efficiency (Meslier et al., 2020). The financing risk is measured by Non-Performing Financing (NPF), which is the financing defaults divided by total financing (Sunarsih et al., 2022). The owner is the owner of IRBs, which are owned by the local

government or the private sector. This owner is a dummy variable where the value is 1 for BPRS owned by the local government and 0 for non-local government.

Gross Regional Domestic Product (2012=100) and COVID are proxies of macroeconomic variables. The COVID-19 pandemic is a dummy variable. COVID-19 started in the second quarter of 2020. Accordingly, it is 1 during COVID-19 and otherwise is 0. Their measurements of all variables and hypotheses are presented in Table 1.

Table 1. Definition of variables and hypotheses

Variable	Measurement	hypotheses
Dependent variable		
ROA	Income before tax divided by total assets	
Independent variable		
Asset	Total assets	-/+
CAR	Equity divided by risk-weighted assets.	+
FDR	Total financing divided by total deposits	+/-
CIR	Total operating costs divided by total operating income	-
NPF	Bad financing divided by total financing	-
Owner	IRB owned by local governments	+
GRDP	Gross domestic regional bruto at the provincial level	+
COVID	Pandemic COVID-19	-

Data

This study uses panel data. A sample of 90 IRBs on the island of Java is selected. The research period spans from 2018 to 2021, using quarterly data. The data set is 1440 observations. The data of every IRB is obtained from the balance sheet and income statements filed with the Financial Services Authority. Data of GRDP is extracted from the Central Statistics Agency.

Estimation Method

The ROA(-1), which represents the previous profitability, is included as one of the independent variables in equations (1) and (2), so that the two equations are dynamic panel regression since ROA(-1) is a lag of the dependent variable. Employing the fixed effect method in a static panel results in a correlation between the error and ROA(-1). The exogeneity assumption does not hold because the correlation between the errors and ROA(-1) exists. As a result, the fixed effect method (FEM) cannot be used because it will not generate an unbiased estimator. To address inconsistent estimators and the endogeneity problem, a General Method of Moments using instrumental variables is required in dynamic panel regression.

The General Method of Moments (GMM) is commonly used to estimate equations (1) and (2). Two methods of the GMM are widely employed, consisting of the difference GMM (Arellano & Bond, 1991) as well as system GMM (Arellano & Bover, 1995). This study used the system GMM, which resulted in a robust estimator than the difference GMM (Blundell & Bond, 1998).Further, two tests are required to ensure the validity of the system GMM. First, for checking instrument validity, we employ the Hansen test. Second, for testing for the existence of autocorrelation, this study utilizes the Arellano-Bond (AR) test.

Results and Discussion

Summary Statistics

Table 2 describes the overview of the variables. The ROA, on average, was 1.20 but varies among IRBs because of a high standard deviation of 5.10%. In this condition, ROA clearly describes the profitability and stability of the Islamic rural bank with the total assets owned on average of IDR 83,038 billion. The average CAR is 28.2%, and the maximum value of CAR is 138.00%. For this reason, Islamic rural banks can accommodate the risk of losses incurred, as it exceeds the minimum CAR by 15%. The average NPF was 10.2% with a minimum NPF of 0% and a maximum NPF of 354.19%. However, the NPF is higher than the maximum NPF by 5%. Furthermore, the average FDR was 95.8% with the minimum FDR of 1.3% and the maximum FDR of 773%. The high FDR indicates that Islamic rural banking effectively

distributes financing to its customers. The average CIR value was 63.3% with a minimum value of 0.1% and a maximum of 354%.

Table 2. Summary statistics

Variable	Mean	Std. dev.	Min	Max
ROA	0.012	0.051	-0.464	0.618
Asset	83.038	94.593	2.140	629.503
CAR	0.282	0.187	0.027	1.138
FDR	0.958	0.379	0.013	7.730
CIR	0.633	0.465	0.001	4.506
NPF	0.102	0.135	0	3.542
Owner	0.156	0.363	0	1
GRDP	393.666	188.974	31.206	634.802
COVID	0.438	0.496	0	1

Sources: authors' calculation

Table 3 indicates the correlation among the independent variables. The highest correlation occurred between CIR and COVID, with a correlation coefficient of 0.542. Overall, the coefficients of correlation are low, which causes no multicollinearity problems. Thus, it is free from the problem of multicollinearity, so our regression coefficients are a robust estimator.

Table 3. Correlation

	ROA	Lasset	CAR	FDR	CIR	NPF	Owner	LGRDP
ROA	1.000							
Lasset	0.218	1.000						
CAR	0.035	-0.217	1.000					
FDR	-0.026	0.008	0.088	1.000				
CIR	-0.257	-0.004	0.104	-0.003	1.000			
NPF	-0.242	-0.112	-0.021	0.020	0.124	1.000		
Owner	-0.021	-0.126	0.018	0.006	0.035	-0.016	1.000	
LGRDP	-0.021	-0.083	0.056	0.043	0.021	0.015	0.084	1.000
COVID	-0.021	0.149	0.168	-0.061	0.542	-0.123	0.000	0.025

Sources: authors' calculation

Baseline Regression Results

To estimate equations (1) and (2), we used the two-step system Generalized Method of Moments. The results of the Linear estimation, as shown in equation (1), are presented in Table 4. Model 1 presents a model without macroeconomic variables, Model 2 does not include COVID-19, and Model 3 indicates full models. We estimate our results using three models to ensure consistency, both with and without macroeconomic conditions.

The discussion initiates a validity test for the two-step system, Generalized Method of Moments, before evaluating the effect of the independent variable. First, based on the Hansen test, the null hypothesis is not rejected. Second, the instruments are fewer than those of Islamic rural banks. These results suggest that instrument variable proliferation does not exist in models 1, 2, and 3. According to these findings, the validity of the instrument variables is confirmed for all models. Third, our study failed to reject the null hypothesis following the AR(2) test, which implies that autocorrelation issues do not exist in models 1, 2, and 3. Fourth, ROA(-1), as the profitability of the previous quarter, positively affects the current profitability of all models. These results imply that profitability is not temporary but permanent, making dynamic panel regression a valid method, rather than static panel regression. The existing empirical research supports our results (Rizvi et al., 2020).

The next stage involves checking the hypothesis test by examining the impact of each independent variable on the profitability of IRB. The asset coefficient is positive and has a significant effect on models 1, 2, and 3. The CAR coefficient has a positive and significant impact on all models. The FDR coefficient has a negative value but is insignificant in all three models. The CIR coefficient is negative and significant, and the findings are the same for models 1, 2, and 3. The NPF coefficient is negative, but it has an insignificant effect in all three models. The owner is negative but insignificant

on all models. The Gross Regional Domestic Product Coefficient (GDP) is positive but insignificant in models 2 and 3. COVID-19 is positive and significant in Model 3.

Table 4. Linear results

Variable	(1)	(2)	(3)
ROA(-1)	0.4736***	0.4738***	0.5040***
	(0.0190)	(0.0189)	(0.0195)
Lasset	0.0041***	0.0041***	0.0034***
	(0.0009)	(0.0009)	(0.0008)
CAR	0.0154***	0.0152***	0.0112***
	(0.0029)	(0.0029)	(0.0028)
FDR	-0.0018	-0.0020	-0.0023
	(0.0021)	(0.0021)	(0.0020)
CIR	-0.0173***	-0.0173***	-0.0207***
	(0.0025)	(0.0025)	(0.0036)
NPF	-0.0273	-0.0273	-0.0235
	(0.0228)	(0.0228)	(0.0216)
Owner	-0.0015	-0.0016	-0.0015
	(0.0015)	(0.0015)	(0.0015)
LGRDP	-	0.0008	0.0009
	-	(0.0008)	(0.0008)
COVID	-	-	0.0053**
	-	-	(0.0024)
Cons	-0.0528***	-0.0635***	-0.0513***
	(0.0156)	(0.0194)	(0.0181)
Observations	1440	1440	1440
Instruments	22	23	24
No. banks	90	90	90
Diagnostic tests			
Hansen test	0.606	0.611	0.558
AR (1) test	0.025	0.025	0.024
AR (2) test	0.342	0.342	0.334

Note: *, **, and *** indicate rejecting H_0 at α=10%, α=5%, and α=1%, respectively

This study found that total assets have a positive effect on the profitability of IRBs. Total assets represent the size of the Islamic rural bank. Having larger assets helps IRB operate efficiently because large IRBs generate a lower cost of production due to economies of scale. Efficiency enables banks to offer their products at cheaper prices, which can increase their profitability. This suggests strongly that a bank with high assets boosts its profitability. These findings are confirmed by previous studies that indicate that assets have a positive relationship with the profitability of IRBs (Widarjono & Anto, 2020).

Our study found that CAR positively affects the profitability of IRBs. CAR is an essential aspect because bank capital serves as a source of financing and helps anticipate losses in Islamic rural banks. A bank with a high CAR can disburse more financing and can better manage its funding and cover losses effectively. These findings indicate that high profitability is positively associated with banks with high CAR. This study confirms the previous research, which indicates that banks with high CAR drive high profitability (Sudarsono et al., 2021)

Our results found that FDR does not affect the profitability of IRBs. FDR represents how Islamic rural banks disburse their financing well, which is an essential factor in channelling funds in Islamic rural banks. The bank with high FDR suggests that banks can disburse huge financing to generate high revenue. However, our study indicates that the profitability of IRBs is not related to FDR. The plausible reasons are that IRBs have low efficiency and face high financing risk (Wastuti et al., 2025). Study of Putri and Widarjono (2023) is also in line with our results.

Our results indicated that CIR negatively influences the profitability of IRBs. CIR represents the efficiency of Islamic rural banks. If the bank revenue surpasses the costs, it indicates that the bank faces high operating efficiency because of low CIR. Our results suggest that IRBs run their operations efficiently, leading to low spending and increasing their profitability. Our results confirm the existing empirical studies that CIR negatively affects the profitability of IRBs (Lubis et al., 2023).

In our study, we found that NPF has no impact on the profitability of IRBs. Non-performing financing characterizes the financing risk of Islamic rural banks (Sutrisno et al., 2023). Low NPF supports high profitability due to low funding impairment. Our study indicates that NPF does not affect the profitability of the IRB. The financing rate of IRBs exceeds the maximum rate of 5%, but they can manage and monitor it effectively, as most financing comes from non-equity-based financing, such as Murabahah. The results support previous studies, indicating that NPF has no effect on the profitability of IRBs (Hidayah & Karimah, 2023).

Some IBRs belong to local governments. The local government establishes IRBs with two objectives, namely to increase local income and to encourage regional economic development. Ownership (Owner) is negative but not significant. These findings suggest that the district government's ownership of IRBs has not driven their profitability, primarily because most are relatively new entrants in the Islamic rural bank market, lacking significant experience (Sudarsono et al., 2024).

Profitability of IRBs is greatly affected by sound macroeconomic conditions as well. Our findings show that Gross Regional Domestic Product does not influence profitability. The primary reason is that regional economic growth was below 2% and even negative due to the impact of the COVID-19 pandemic. The findings confirm the previous empirical research, indicating that the profitability of IRBs is not associated with Gross Regional Domestic Product (Risfandy & Pratiwi, 2022).

Our findings documented that COVID-19 positively influences the profitability of IRB. Some reasons support these findings. First, there is a financing restructuring policy during COVID-19. Second, one of the advantages of products from Islamic banks is profit and loss sharing (PLS) financing, such as Mudharabah and Musyarakah. MSMEs prefer PLS financing because it allows them to repay their financing more easily, as they are not burdened with fixed costs during the COVID-19 pandemic (Risfandy, 2018). This suggests that PLS financing, as the core of IRB, can offer alternative financing during the COVID-19 pandemic and support profitability.

Non-Linear Results

For the next step, following Ibrahim et al., (2017), we use the square shape of assets ($Laset^2$) to illustrate the possible non-linear relationship between assets and profitability. The results of the non-linear relationship are presented in Table 5. Just like in the linear influence model, there are three models, namely a model without macroeconomic variables (model 4), a model with GRDP but without a COVID-19 variable (model 5), and a full model, namely a model with internal bank variables and macro variables (model 6). The Hansen and AR (2) test fails to reject the null hypothesis for all models. In addition, the number of banks exceeds the instruments. Therefore, the GMM method of the two-step system has been accurately defined. Furthermore, the lag of the dependent variable is positive and significant in all models, implying that profitability in Islamic Rural Banks is persistent, which leads to the dynamic model being a fixed model for analyzing the non-linear influence of assets on IRB profits.

Table 5. Non-linear results

Variable	(4)	(5)	(6)
ROA(-1)	0.4713***	0.4712***	0.5002***
	(0.0194)	(0.0194)	(0.0199)
Lasset	0.0487*	0.0568*	0.0530*
	(0.0347)	(0.0362)	(0.0347)
$Lasset^2$	-0.0013*	-0.0015*	-0.0014*
	(0.0010)	(0.0010)	(0.0010)
CAR	0.0145***	0.0139***	0.0102***
	(0.0033)	(0.0033)	(0.0032)
FDR	-0.0025	-0.0028	-0.0032
	(0.0023)	(0.0023)	(0.0023)
CIR	-0.0171***	-0.0171***	-0.0203***
	(0.0027)	(0.0028)	(0.0037)
NPF	-0.0284	-0.0283	-0.0247
	(0.0228)	(0.0228)	(0.0216)
Owner	-0.0019	-0.0021	-0.0019
	(0.0016)	(0.0017)	(0.0016)
LGRDP	-	0.0013	0.0013**
	-	(0.0008)*	(0.0008)

Variable	(4)	(5)	(6)
COVID	-	-	0.0051**
	-	-	(0.0024)
Cons	-0.4499	-0.5379	-0.4974
	(0.3148)	(0.3311)	(0.3171)
Observations	1440	1440	1440
Instruments	23	24	25
No. banks	90	90	90
Diagnostic test			
Hansen	0.609	0.614	0.553
AR (1)	0.025	0.025	0.024
AR (2)	0.339	0.337	0.33

Note: *, **, and *** indicate rejecting H_0 at α=10%, α=5%, and α=1%, respectively

It starts with assets as the primary independent variable in this study. The coefficients of the asset and its square are positive and negative for all models, respectively. The results provide strong evidence for a non-linear relationship between assets and profitability, following the inverse U-shaped effect of assets on profitability. That is, asset financing initially increases profitability, but once it reaches a certain point, the asset decreases profitability. These findings confirm the hypothesis of too big to fail, meaning that large IRBs face a high probability of default. A reasonable reason is that the IRB's area of operation is limited to the district area. With a limited area of operation, a large IRB cannot operate efficiently, which in turn lowers profitability.

Switching to the control variable, the findings remain consistent, similar to those of the linear model. Profitability is positively associated with CAR. Low operational efficiency is negatively related to the bank's profitability. The natural logarithm of Gross Regional Domestic Product (GDP) has a positive effect on bank profitability. Finally, COVID-19 has had a positive impact on bank profitability. FDR was negative but not significant. NPF is negative but not significant. The owner is also negative but not significant.

Our study confirms the existence of the asset's curvilinear impact on profitability. The impact of assets on profitability is inverted U-shaped. To calculate the optimal asset value, our study takes a partial derivative of profitability with respect to assets based on model (6) as follows:

$$\frac{\partial \text{ROA}}{\partial \text{Lassset}} = 0.0530 + 2(-0.0014)Lasset = 0 \quad (4)$$

Based on equation (4), the optimum value of assets that boost profitability is reached when total assets reach around IRD 187.33 billion.

Robustness Test

We carried out robustness tests to check the consistency of our results. This study employs a static panel regression with robust standard errors to solve the heteroskedasticity problem. The results are presented in Table 6. The results remain unchanged and consistent with the results of dynamic panel regression. We focus on our assets as pivotal independent variables. The coefficient of assets is positive and significant, and the coefficient of squared assets ($Lasset^2$) is negatively significant, suggesting that the relationship between assets and profitability is an inverted U impact. These findings confirm previous results using dynamic panel regression. Several control variables also affect the profitability of IRBs. CAR is positively associated with profitability. FDR negatively affects profitability. CIR has a negative impact on profitability. NPF, on the other hand, has a negative effect on profitability. GRDP has a positive impact on profitability

Table 6. Robustness test

Variable	(6)	(7)	(8)
Lasset	0.1859***	0.1948***	0.1934***
	(0.0427)	(0.0432)	(0.0433)
$Lasset^2$	-0.0049***	-0.0052***	-0.0051***
	(0.0012)	(0.0012)	(0.0012)
CAR	0.0276***	0.0273***	0.0250***
	(0.0087)	(0.0087)	(0.0095)

Variable	(6)	(7)	(8)
FDR	-0.0062*	-0.0065**	-0.0059*
	(0.0032)	(0.0033)	(0.0031)
CIR	-0.0269***	-0.0270***	-0.0303***
	(0.0062)	(0.0062)	(0.0081)
NPF	-0.0695**	-0.0696**	-0.0661**
	(0.0354)	(0.0354)	(0.0348)
Owner	0.0013	0.0009	0.0010
	(0.0028)	(0.0028)	(0.0029)
LGRDP	-	0.0017***	0.0016**
	-	(0.0008)	(0.0007)
COVID	-	-	0.0057
	-	-	(0.0045)
Cons	-1.7101***	-1.8102***	-1.7933***
	(0.3923)	(0.3974)	(0.3982)
R-squared	0.1769	0.1777	0.1796
No. banks	90	90	90
Observations	1440	1440	1440

Note: *, **, and *** indicate rejecting H_0 at α=10%, α=5%, and α=1%, respectively

Conclusions

This study analyzes the influence of assets and several control variables on IRB's profitability. This study uses both linear and non-linear approaches to examine the relationship between assets and profitability. The findings have answered the purpose of this study. The results show that assets have a positive effect on profitability, meaning that a large IRB is beneficial than a small IRB. More importantly, the impact of an asset on profitability follows an inverted U shape, indicating an optimum scale of operation for IRB. Based on findings, each IRB must have a maximum asset of IDR 187 billion to have the highest performance associated with profitability. In addition, these findings suggest that the bank's strong fundamentals are essential. Banks with high CAR and high efficiency are beneficial to support profitability. Also, managing the impaired financing well is vital to boosting the profitability of IRBs.

The results of these findings are beneficial for the Indonesian Financial Service Authority and the IRB. Some policy implications can be drawn from our findings. First, each IRB must have a minimum of assets to achieve high profitability. The results indicate that IRB assets are expected to reach approximately IDR 187 billion. For this reason, the OJK must encourage IRBs to increase their assets. Second, IRBs must have sufficient capital and a high level of efficiency to increase their profitability.

Our study has several limitations. First, the limitations of this study are still within the island of Java, so further study is needed for IRBs outside the island of Java and throughout Indonesia. Second, the research period has not shown the latest data conditions after the COVID pandemic. For further research, it is necessary to include the period after the COVID pandemic with the latest data so that it can describe the current conditions. Third, this study does not include competition in determining the profitability of IRBs.

References

Arellano, M., & Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *The Review of Economic Studies*, *58*(2), 277–279. https://doi.org/10.2307/2297968

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, *68*(1), 29–51. https://doi.org/10.1016/0304-4076(94)01642-D

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, *87*(1), 115–143. https://doi.org/10.1016/S0304-4076(98)00009-8

Hidayah, N., & Karimah, N. A. (2023). Are Sharia Financing Schemes Profitable? the Case of Islamic Rural Banks in Indonesia. *EL DINAR: Jurnal Keuangan Dan Perbankan Syariah*, *11*(1), 58–76. https://doi.org/10.18860/ed.v11i1.19561

Ibrahim, M. H., Aun, S., & Rizvi, R. (2017). Do we need bigger Islamic banks ? An assessment of bank stability. *Journal of Multinational Financial Management*, *40*, 77–91. https://doi.org/10.1016/j.mulfin.2017.05.002

Jusuf, N., & Widarjono, A. (2024). Funding Liquidity risk, Bank-Specific Variables and Profitability of Islamic Rural Banks. *Iqtishaduna: Jurnal Ilmiah Ekonomi Kita*, *13*(2), 434–450. https://doi.org/10.46367/iqtishaduna.v13i2.2227

Khattak, M. A., Ali, M., Khan, N. A., & Ahmad, F. (2022). the Adjusted Market Power, Competition, and Performance: Islamic Vs Conventional Banks. *Journal of Islamic Monetary Economics and Finance*, *8*(4), 577–598. https://doi.org/10.21098/jimf.v8i4.1532

Lubis, D., Anjani, D. A., & Nursyamsiah, T. (2023). Determinants of the Profitability of Islamic Rural Banks during Covid-19 in Indonesia. *Journal of Islamic Economics and Finance Studies*, *4*(1), 48–65.

Meslier, C., Risfandy, T., & Tarazi, A. (2020). Islamic banks' equity financing, Shariah supervisory board, and banking environments. *Pacific Basin Finance Journal*, *62*(4), 101354. https://doi.org/10.1016/j.pacfin.2020.101354

Misanam, M., & Widarjono, A. (2023). Market Concentration, Bank Characteristics, Macroeconomic Conditions, and Indonesian Islamic Bank Financing. *Muqtasid: Jurnal Ekonomi Dan Perbankan Syariah*, *14*(2), 165–184. https://doi.org/10.18326/muqtasid.v14i2.165-184

Putri, D. W. E. P., & Widarjono, A. (2023). Effect of Stability and Funding Risk on Shariah Rural Bank's Profitability. *Jurnal Ekonomi Syariah Teori Dan Terapan*, *10*(6), 620–631. https://doi.org/10.20473/vol10iss20236pp620-631

Risfandy, T. (2018). Equity Financing and Islamic Banks' Profitability: Evidence from the Biggest Muslim Country. *Jurnal Keuangan Dan Perbankan*, *22*(3), 496–505. https://doi.org/10.26905/jkdp.v22i3.2150

Risfandy, T., & Pratiwi, D. I. (2022). The Performance of Indonesian Islamic Rural Banks During Covid-19 Outbreak: the Role of Diversification. *Journal of Islamic Monetary Economics and Finance*, *8*(3), 455–470. https://doi.org/10.21098/jimf.v8i3.1564

Rizvi, S. A. R., Narayan, P. K., Sakti, A., & Syarifuddin, F. (2020). Role of Islamic banks in Indonesian banking industry: an empirical exploration. *Pacific Basin Finance Journal*, *62*(4), 101117. https://doi.org/10.1016/j.pacfin.2019.02.002

Sudarsono, H., Afriadi, F., & Suciningtias, S. A. (2021). Do stability and size affect the profitability of Islamic rural bank in Indonesia? *Jurnal Ekonomi & Keuangan Islam*, *7*(2), 161–174. https://doi.org/10.20885/jeki.vol7.iss2.art5

Sudarsono, H., Sholihin, M., & Susamto, A. A. (2024). Bank ownership and credit risk: an empirical study of Indonesian Islamic local banks. *Journal of Islamic Accounting and Business Research*. https://doi.org/10.1108/JIABR-02-2023-0069

Sunarsih, Al Hashfi, R. U., Munawaroh, U., & Suhari, E. (2022). Nexus of Risk and Stability in Islamic Banks During the Pandemic: Evidence From Indonesia. *Journal of Islamic Monetary Economics and Finance*, *8*(4), 599–614. https://doi.org/10.21098/jimf.v8i4.1444

Sutrisno, Mr. (2018). Factors determinant of bank capital buffer: empirical study on islamic rural banking in Indonesia. *Advance in Social Science, Education, Humanities Research*, *186*(Insyma), 84–87. https://doi.org/10.2991/insyma-18.2018.21

Sutrisno, S., & Widarjono, A. (2022). Is Profit – Loss- Sharing Financing Matter for Islamic Bank ' s Profitability ? The Indonesian Case. *Risks*, *10*(11), 1–13. https://doi.org/https://doi.org/10.3390/risks10110207

Sutrisno, S., Widarjono, A., & Mohamad, M. (2023). Does Financing Diversification Improve Bank Risk? Evidence From Indonesian Islamic Rural Banks. *International Journal of Economics and Finance Studies*, *15*(4), 103–124. https://doi.org/10.34109/ijefs.202315406

Trinugroho, I., Risfandy, T., & Ariefianto, M. D. (2018). Competition , diversification , and bank margins : Evidence from Indonesian Islamic rural banks. *Borsa Istanbul Review*, *18*(4), 349–358. https://doi.org/10.1016/j.bir.2018.07.006

Trinugroho, I., Santoso, W., Irawanto, R., & Pamungkas, P. (2021). Is spin-off policy an effective way to improve performance of Islamic banks? Evidence from Indonesia. *Research in International Business and Finance*, *56*(2). https://doi.org/10.1016/j.ribaf.2020.101352

Wastuti, W., Husin, H. A., & Fitrijanto, A. (2025). The Determinants of Islamic Rural Banks' Efficiency in Indonesia. *International Journal of Islamic Economics and Finance (IJIEF)*, *8*(1), 58–81. https://doi.org/10.18196/ijief.v7i2.21491

Widarjono, A., Alam, M. M., Rafik, A., Afandi, A., & Sidiq, S. (2025). Nexus between competition, concentration and bank risk-taking in Indonesian Islamic banking. *International Journal of Islamic and Middle Eastern Finance and Management*, *18*(3), 672–690. https://doi.org/10.1108/IMEFM-02-2024-0099

Widarjono, A., & Anto, M. B. H. (2020). Does market structure matter for Islamic rural banks' profitability? *Jurnal Keuangan Dan Perbankan*, *24*(4), 393–406. https://doi.org/10.26905/jkdp.v24i4.4810

Widarjono, A., Mifrahi, M. N., & Perdana, A. R. A. (2020). Determinants of Indonesian Islamic Rural Banks' Profitability: Collusive or Non-Collusive Behavior? *Journal of Asian Finance, Economics and Business*, *7*(11), 657–668. https://doi.org/10.13106/jafeb.2020.vol7.no11.657

Yanikkaya, H., Gümüş, N., & Pabuçcu, Y. U. (2018). How profitability differs between conventional and Islamic banks: A dynamic panel data approach. *Pacific Basin Finance Journal*, *48*(February), 99–111. https://doi.org/10.1016/j.pacfin.2018.01.006