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Determinants of non-performing financing of Islamic rural banks in Indonesia

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ABSTRACT

This study analyzes the determinants of Non-Performing Financing (NPF) in Islamic Rural Banks (IRBs) in Indonesia by considering internal, external, and market competition factors. Internal variables include bank size (LAsset), Capital Adequacy Ratio (CAR), Cost to Income Ratio (CIR), and Financing to Deposit Ratio (FDR), while external variables include Gross Regional Domestic Product (GDP) and the impact of the COVID-19 pandemic. The Lerner Index is used as an indicator of market competition. Panel data from 154 IRBs for the 2019-2023 period was analyzed using a static panel. The results showed that the size of banks, CAR, CIR, and FDR had a significant influence on NPF, while the influence of market competition and macroeconomic conditions varied between Java and outside Java. These findings provide implications for IRB management in managing financing risks, for regulators in establishing policies that are responsive to different regional conditions, and enriching the empirical literature related to micro-Islamic banking. Further research is suggested to explore additional variables such as management quality, financing strategies, and local socio-economic factors to understand financing risk variations in more depth.

Introduction

The Islamic banking sector in Indonesia has an important role in supporting financial inclusion and national economic development, especially through the existence of Islamic Rural Banks (IRBs) that operate at the regional level. IRB focuses on financing micro, small, and medium enterprises (MSMEs) that are often underserved by Islamic commercial banks. However, IRB's performance is often faced with relatively high financing risks, reflected in a higher Non-Performing Financing (NPF) ratio compared to Conventional Rural Banks (CRBs), as its competitor (Sutrisno et al., 2023) The high NPF is a fundamental problem because it has a direct impact on the profitability, stability, and sustainability of the Islamic banking system at the MSME level, which is the dominant sector in the Indonesian economy. Recent evidence further indicates that financing-related risks significantly undermine the stability of IRBs, emphasizing that financing quality remains a critical issue in sustaining micro-Islamic banking institutions (Putri et al., 2025)

The dynamics of NPF in IRBs are not only determined by internal factors, such as operational efficiency and capital structure, but also by external factors, such as macroeconomic conditions and the intensity of competition in financial markets (Trinugroho et al., 2018) One of the variables that is interesting to analyze is the Lerner Index as a proxy for the level of market competition. According to the classic literature Structure-Conduct-Performance (SCP), a high level of competition can improve efficiency and lower the risk of problematic financing(Widarjono et al., 2025) However, the Quiet Life Hypothesis theory states that when the market becomes less competitive, banks can enjoy a "quiet life" so that they tend to be less aggressive in disbursing financing and are able to control NPF risks. Thus, the relationship between competition and financing risk is still an interesting empirical debate, especially in the context of Islamic banking, which has different operational principles from conventional banks.

In addition to competition, bank size is also an important determinant that can affect IRB's ability to bear financing risks. Banks with large assets typically have broader financing diversification as well as better managerial and technological capabilities to manage risk (Hendri et al., 2025). On the other hand, the Capital Adequacy Ratio (CAR) describes the strength of IRB's capital in absorbing potential losses, while the Cost to Income Ratio (CIR) reflects the bank's operational efficiency. These two variables play a role in determining the level of financial health of the bank, which ultimately affects the risk of financing (Zaidanin & Zaidanin, 2021)

The liquidity factor, represented by the Financing to Deposit Ratio (FDR), also has the potential to affect the NPF rate. High liquidity indicates the bank's ability to channel funds to the public, but at the same time, it can increase financing risk if expansion is carried out without considering the quality of the debtor (Jin et al., 2019) Meanwhile, regional economic conditions, as measured through Gross Regional Domestic Product (GDP), are external factors that also determine the ability of debtors to meet financing obligations. A decline in economic activity in the regions can worsen the quality of financing, especially in the MSME sector, which is the main focus of IRBs.

The COVID-19 pandemic is an important factor that cannot be ignored in the analysis of IRB NPF. The global health crisis has caused an economic slowdown, a decline in household income, and disruption of micro business activities, which directly impact the increased risk of non-performing financing. Several studies have found that the pandemic has worsened the quality performance of Islamic banking assets, although the impact varies between bank types and operational regions.

Although many studies have discussed the factors that affect NPFs in Islamic banking, most of the focus is still on Sharia Commercial Banks (SCB) or Sharia Business Units (SBU), not on IRB. Among them is Jaurihal (2024). In fact, the market structure and operational characteristics of IRB that are small-scale and operate locally can cause different dynamics compared to SCB or SBU.

Thus, this study provides several important contributions to the literature, particularly in the context of micro-Islamic banking in Indonesia. First, this study specifically analyzes the determinants of NPF in IRB in Indonesia by including the Lerner Index as an indicator of the level of market competition that does not yet exist. Second, this study integrates internal (asset, CAR, CIR, FDR) and external factors (GDP and COVID-19) comprehensively to explain the variation in NPF in IRBs, thereby providing a more complete picture of the sources of financing risks. Third, this research contributes to enriching the empirical literature on micro-Islamic banking in Indonesia, as well as providing policy input for regulators and IRB management in maintaining the stability and resilience of the sharia-based financial system at the regional level.

Literature Review

Financing risk is one of the most crucial issues in the operational sustainability of SRBs, a micro-Islamic financial institution that plays a strategic role in community economic empowerment. Unlike large-scale Islamic banks, IRB operates at the local level with a main focus on financing the MSME sector that is vulnerable to economic fluctuations. This makes IRB much more exposed to the risk of default, which is reflected in the level of Non-Performing Financing (NPF), which is consistently higher than Sharia Commercial Banks (SCB) and Sharia Business Units (SBU). A number of studies, including Surepno et al. (2023) and Muzaki and Sumawidjaja (2024), confirm that the high NPF in IRB is not just a cyclical phenomenon, but is a structural challenge that continues to recur in line with the characteristics of MSME financing, limited portfolio diversification, and simpler managerial capacity. This condition makes the study of the NPF determinants in IRB even more important to be studied in more depth.

In the context of research on Non-Performing Financing (NPF) at the Sharia People's Economic Bank (IRB), the latest literature shows that both internal and external factors have a significant effect on financing risk. For example, a study by Aprilian and Sudarmawan (2025) on 139 IRBs in Indonesia for the period 2015-2024 found that the Capital Adequacy Ratio (CAR) significantly lowered the NPF, while the Financing to Deposit Ratio (FDR) ratio had no significant effect in their model (Aprilian & Sudarmawan, 2025)

These findings are important because they show that, although liquidity (FDR) is often considered a factor for financing expansion, in the IRB sample, the study did not support that FDR directly increased NPF. This indicates that IRB may implement risk selection or liquidity management that is quite good despite the high proportion of financing.

In addition, studies examining the COVID-19 pandemic period show different dynamics. Kadir et al. (2022) investigated the factors that drive NPF in Islamic Rural Banks in Indonesia, especially during COVID-19, using panel data of 128 Islamic IRBs in 2020. They reported that regional economic growth (measured by GRDP) significantly lowered NPF, but FDR had a significant positive effect on NPF in the period, while the ratio of OER operating inefficiencies, while positive, was insignificant. These findings suggest that external pressures, such as economic contraction during the pandemic, reinforce financing risks and that high liquidity (FDR) can be a double-edged sword: supporting the disbursement of financing, but also increasing credit risk when debtors face economic difficulties.

On the internal banking side, Lutfiana and Andraeny (2023) analyzed the internal determinants of NPF in the 2021–2023 period using quarterly panel data from IRB financial statements. They used the variables FDR, ROA, CAR, bank size (total assets), and CIR, and found that FDR and bank size had a negative and significant influence on NPF, while CIR had a significant positive effect. Interestingly, in this study, the CAR was not significant, indicating that the role of capital in the context of IRB may be less dominant or that the variability of CAR between IRBs during the period is relatively low.

From a macro-economic perspective and financing diversification, Aiyubbi et al. (2022) used the ARDL model to analyze the influence of financing diversification (sectoral), CAR, operational efficiency, and macro variables such as domestic output and inflation on IRB NPF. The results show that financing diversification actually increases NPF in the long run, while increased CAR and inflation are also associated with increased NPF. It is important to note that these results challenge the conventional assumption that portfolio diversification always lowers risk, and underscore that imprudent diversification can actually increase risk exposure.

Furthermore, in the analysis of the bibliometric literature, Syarifah and Rosman (2024) highlighted the trend of NPF research in Islamic Rural Banks (IRB) in Indonesia from 2020 to 2024. They identified six main themes of NPF research and highlighted the need for further research, especially on variables such as operational efficiency, competition, and capital. This bibliometric study supports the relevance and urgency of examining the internal and external determinants of NPF in the context of modern IRB, particularly in the wake of the pandemic.

Meanwhile, a longer study, but still in the actual empirical approach Widarjono and Rudatin (2021) used data up to 2018 and the NARDL model to show that bank characteristics (such as income diversification) and macro variables have an asymmetric effect on NPF. They found that increased diversified income lowered NPF, but domestic output had a different effect on the up and down phases of the economy. Although the study period slightly exceeded the 5-year mark, these results still provide an important theoretical basis for understanding how IRB faces risks in the long term.

Finally, Rahmi et al (2024) analyzed the determinants of NPF in Islamic banking in Southeast Asia, including Indonesia, in a quantitative study. They found that bank size, CAR, diversification, and Return on Asset (ROA) were significant variables affecting NPF, while FDR and inflation were insignificant in some country samples. These findings are particularly relevant for IRB's research as they confirm that size and capital remain key factors in financing risk in regional Islamic banks.

Literature review shows that IRB NPF is influenced by a combination of internal and external factors. CAR variables , operational efficiency, bank size, liquidity, financing diversification, and regional economic conditions have proven to have a significant role in explaining financing risk. However, a number of research results show inconsistencies, especially in the FDR and CAR variables, so further analysis is needed considering the economic context, the study period, and market dynamics. In addition, the latest literature shows that research on the influence of market competition, for example, measured by the Lerner Index on IRB NPF, is still very limited. Thus, this study aims to analyze the determinants of NPF in IRB in Indonesia by including the Lerner Index as an indicator of the level of market competition. Then this study integrates internal (asset, CAR, CIR, FDR) and external factors (GDP and COVID-19) comprehensively to explain the variation of NPF in IRB, so as to provide a more complete picture of the sources of financing risk. Furthermore, this research contributes to enriching the empirical literature on micro-Islamic banking in Indonesia, as well as providing policy input for regulators and IRB management in maintaining the stability and resilience of the sharia-based financial system at the regional level.

This study uses various fundamental indicators of banks and external factors to explain the determinants of Non-Performing Financing (NPF) in IRB in Indonesia. The Lerner Index is used to

measure market competition, while the size of a bank is represented by a log of total assets. CAR and CIR describe the strength of the bank's capital and operational efficiency. FDR describes the level of liquidity disbursement, GDP reflects regional macroeconomic conditions, and COVID-19 dummies are used to capture external shocks. All of these variables were chosen because in the previous literature, it was proven to affect the risk of Islamic bank financing (Berger & DeYoung, 1997a; Hossain et al., 2025)

Market competition affects the behavior of financing distribution and IRB risk monitoring. Banks with high competition can reduce the tightness of supervision so as to increase the potential for non-performing financing, but can also increase stability through additional income (Chaffai & Coccorese, 2023).

H_1: The Lerner Index has a significant effect on NPF.

Larger banks have better capacity in portfolio diversification and risk management, so NPFs tend to be lower (Hossain et al., 2025). The size of the bank also reflects stronger operational stability and governance. Therefore, LAsset is thought to have a negative effect on NPF.

H_2: LAsset has a negative effect on NPF.

Higher CAR increases IRB' ability to absorb the risk of non-performing financing. Banks with strong capital are better able to maintain asset quality and risk management discipline (Berger & DeYoung, 1997b; Dinç, 2017; El-Ansary et al., 2019) Therefore, CAR is expected to lower the NPF level.

H_3: CAR has a negative effect on NPF.

High CIR indicates operational inefficiencies and weak financing monitoring. Inefficient banks tend to experience higher NPF accumulation (Fang et al., 2025) Therefore, CIR is estimated to have a positive effect on NPF.

H_4: CIR has a positive effect on NPF.

High FDR indicates the encouragement of banks to channel more funds, but it can increase credit risk if the selection is not strict (Safarda et al., 2023; Peykani et al., 2025; Andi et al., 2024). Liquidity pressures can also weaken the quality of financing. Therefore, FDR is estimated to have a significant effect on NPF.

H_5: FDR has a significant effect on NPF.

High GDP reflects a strong regional economy, thereby increasing the ability of MSMEs to pay. Good economic growth lowers credit risk and strengthens asset quality (Salas et al., 2024). Thus, GDP is estimated to have a negative effect on NPF.

H_6: GDP has a negative effect on NPF.

The COVID-19 pandemic has reduced the income of MSMEs and increased the risk of default. The financing monitoring process is also disrupted, so that NPF tends to increase (Goodell, 2020) Therefore, COVID-19 is expected to have a positive effect on NPF.

H_7: COVID-19 has a positive effect on NPF.

Methodology

Data

This study employs quantitative research using secondary data. The data are obtained from two main sources. First, financial data of Islamic Rural Banks (IRBs) are collected from the quarterly financial statements of each IRB compiled and published by the Indonesian Financial Services Authority or Otoritas Jasa Keuangan (OJK). Second, Gross Regional Domestic Product (GRDP) data are obtained from the Central Statistics Agency of Indonesia or Badan Pusat Statistik (BPS). The dataset is structured as panel data, combining cross-sectional and time-series dimensions, with 154 IRBs in Indonesia as the cross-sectional units and a quarterly observation period from 2015 to 2023. The panel data are unbalanced, comprising a total of 5,491 observations.

Empirical Method

This study analyzes the influence of market competition, bank fundamentals and macroeconomic conditions on IRB bad-performing financing in Indonesia. Non-performing financing is measured by Non-performing Financing (NPF). The Lerner index measures market competition. The bank's fundamentals consist of assets, capital adequacy ratio (CAR), cost-to-income ratio (CIR) and Financing deposit ratio (FDR). Macroeconomic conditions are gross regional domestic product and Covid 19. The panel data regression analysis method can be written in the following equations:

$$NPF_{it} = \beta_0 + \beta_1 Lerner_{it} + \beta_2 Lasset_{it} + \beta_3 CAR_{it} + \beta_4 CIR_{it} + \beta_4 FDR + \beta_4 LGRDP_{it} + \beta_4 COVID_{it} + e_{it} \quad (1)$$

Assets and GDP in the form of natural logarithms

Economic activities in Indonesia are still focused on the island of Java. This condition causes the performance of IRB to differ between IRB on the island of Java and IRB located outside the island of Java. For this reason, this study analyzed the determinants of NPF between the IRB on the island of Java and outside the island of Java

Variable Measurement

The dependent variable is NPF. NPF is the ratio of bad financing divided by total financing (Aprilian & Sudarmawan, 2025). The Lerner index is the price difference above its cost (Al-Azzam & Parmeter, 2021). The Lerner index is calculated using the following formula:

$$\text{Lerner} = \frac{(P-MC)}{P} \quad (2)$$

where P is the output price, and MC is the marginal cost. The operating income per asset is used to calculate the output price. MC is calculated through the translog cost function approach. The translog cost function is as follows:

$$\text{LTC}_{\text{it}} = \beta_0 + \sum_{m=1}^{2} \beta_1 \text{Lv}_{\text{m,it}} + 0.5 \sum_{m=1}^{2} \sum_{n=1}^{2} \rho_{\text{mn}} \text{Lv}_{\text{m,it}} \text{Lv}_{\text{n,it}} + \sigma_1 \text{LTA}_{\text{it}} + 0.5\sigma_2 (\text{LTA}_{\text{it}})^2 + \sum_{m=1}^{2} \sigma_{2m} \text{LTA}_{\text{it}} \text{LV}_{\text{m,it}} + \epsilon_{\text{it}} \quad (3)$$

Total cost (TC) is the total cost. TA is the total assets. V1 is the ratio of deposit payments to total deposits. V2 is the ratio of other costs to fixed assets. L represents the natural logarithm. MC is obtained from equation (3) through partial derivatives of the total assets as follows:

$$\text{MC}_{\text{it}} = \frac{\text{TC}_{\text{it}}}{\text{LAsset}_{\text{it}}} \left(\sigma_1 + \sigma_2 \text{LAsset}_{\text{it}} + \sum_{k=1}^{2} \sigma_{2k} \text{Lv}_{\text{k,it}}\right) \quad (4)$$

A near-zero Lerner value indicates a competitive market, while a higher value indicates greater market strength

CAR is calculated by the ratio of capital to assets (Patty, 2018) CIR is the ratio of costs to revenue (Anggraini et al., 2025) FDR is the ratio of Financing divided by total deposits (Ramadhani et al., 2023) GDP is the gross regional domestic product of constant prices in 2010. COVID is a COVID pandemic and is a dummy variable. The value is 1 for the second quarter of 2020 through the fourth quarter of 2021.

Estimation Method

In the estimation of the panel data regression analysis, there are three existing models, namely the common effect (CE) model, the fixed effect (FE) model, and the random effect (RE) model. From the three models, the best was selected. This selection of the best model aims to determine which model is more suitable based on the existing data. There are three tests, namely the F test, the Lagrange Multiplier test and the Hausman test. The F test is used to determine which model is best between the FE and CE models. The Lagrange Multiplier (LM) test is used to determine which model is best between the RE and CE models. The Hausman test is used to determine which model is best between the FE and RE models.

After generating an estimate, the next step is to determine the three types of tests, namely the determination coefficient (R2), the model feasibility test with the F test, and the significance test of independent variables with the t-test. The feasibility test of the model with the F test aims to test the influence of independent variables on dependent variables simultaneously. The significance test of

independent variables in the t-test assesses the extent to which each independent variable influences the dependent variable.

Results and Discussion

Summary of Statistics

Table 1 is a summary of statistics showing the characteristics of IRB data distribution during the study period. The NPF variable has an average of 0.0972 with a standard deviation of 0.1011, indicating that most IRBs have relatively low non-performing financing rates, although there are some outliers with NPFs of up to 1.04. The Lerner index shows an average of 0.4113 with a high variation (SD 1.1644) and an extreme range (-16.80 to 23.26), reflecting a large difference in the level of market strength between banks. The average asset size of IRB is 84.51 billion with large variations (SD 151.23), indicating the heterogeneity of bank size in the sample. CAR and CIR averaged 18.34% and 35.83%, respectively, showing differences in efficiency and capital between banks. FDR averaged 0.9518, indicating that most of the third-party funds were channelled into financing, while the average GDP of 192.95 (constant 2010 prices) showed considerable regional economic variation. The COVID variable has an average of 0.0856, indicating that a small percentage of observations are in the pandemic period (Q2 2020–Q4 2021).

Table 1. Summary statistics

Variable	Mean	Std. dev.	Min	Max
NPF	0.0972	0.1011	0.0000	1.0409
Lerner	0.4113	1.1644	-16.8034	23.2649
Asset	84.5070	151.2329	0.9546	1911.0000
CAR	0.1834	0.2070	0.0178	6.1038
CIR	0.3583	0.4303	0.0003	25.9377
FDR	0.9518	0.5192	0.0000	9.9999
GRDP	192.9516	152.3525	4.9223	524.6860
COVID	0.0856	0.2798	0.0000	1.0000

Table 2 is a correlation matrix that shows the linear relationship between the research variables. NPF has a moderate negative correlation with LAsset (-0.2367), suggesting that larger banks tend to have lower NPFs, in line with portfolio diversification theory and risk management capacity. The correlation of NPF with CAR is positive (0.2835). This shows that IRB with large capital tends to have higher NPF, because banks provide wider financing. The correlation of NPF with CIR, FDR, PDRB, Lerner, and COVID was relatively low (0.0735; 0.0649; -0.0409; 0.0199; -0.0455), indicating a weak linear relationship and the potential influence of other external and internal factors. Correlations between independent variables are generally low to moderate, e.g. LAsset and CAR (-0.4961), indicating the absence of serious multicollinearity problems. These results provide an initial basis that internal and external variables can be further analyzed using a panel regression model.

Table 2. Correlatiton

	NPF	Lerner	Lasset	CAR	CIR	FDR	LGRDP	COVID
NPF	1							
Lerner	0.0199	1						
Lasset	-0.2367	-0.1593	1					
CAR	0.2835	0.1812	-0.4961	1				
CIR	0.0735	-0.1112	0.0907	-0.0172	1			
FDR	0.0649	-0.0001	-0.0124	0.0594	0.0111	1		
LGRDP	-0.0409	-0.0063	0.1350	-0.0996	0.0009	-0.0616	1	
COVID	-0.0455	-0.0020	0.0332	-0.0213	0.0370	0.0191	0.0038	1

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

Results of The Basic Model

Table 3 presents the results of estimating all IRBs using the static panel method using NPF as a dependent variable. Based on the F, LM and Hausman tests, the best method in Table 3 is fixed effect

(FE). The results of the estimation show that several internal and external variables significantly affect financing risk. The Lerner coefficient of -0.0045 (p<0.01) shows that the increasing competition in the IRB market has an effect on the decline in NPF. These findings support the initial hypothesis that banks with a larger market share have more stable revenues, allow for more effective financing supervision and reduce the risk of default (Berger et al., 2009; Turk Ariss, 2010).

Table 3. All Islamic Rural Banks

	Common effect		Fixed effect		Random effect	
Variable	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob
Lerner	-0.0028**	0.0140	-0.0045***	0.0000	-0.0042***	0.0000
Lasset	-0.0123***	0.0000	-0.0545***	0.0000	-0.0332***	0.0000
CAR	0.1063***	0.0000	0.0521***	0.0000	0.0721***	0.0000
CIR	0.0205***	0.0000	0.0128***	0.0000	0.0135***	0.0000
FDR	0.0098***	0.0000	0.0114***	0.0000	0.0108***	0.0000
LGRDP	0.0002	0.8390	0.0894***	0.0000	0.0044	0.2050
COVID	-0.0146***	0.0020	-0.0084**	0.0320	-0.0111***	0.0050
Cons.	0.2768***	0.0000	-0.0114	0.9350	0.6011***	0.0000
R-squared	0.1056		0.1033		0.1177	
Banks	154		154		154	
Obs.	5491		5491		5491	
F	15.72***					
LM	6797.83***					
Hausman	83.32***					

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

Bank size (LAsset) shows a coefficient of -0.0045 (p<0.01), which confirms that larger banks tend to have lower NPFs. This is in line with the theory that large banks have better risk management capacity and more diversified portfolios, thus being able to reduce the risk of non-performing financing (Hossain et al., 2025; Meero, 2025). Meanwhile, the CAR shows a coefficient of 0.0521 (p<0.01), which indicates that banks with high capital tend to experience an increase in NPF. This may reflect a more aggressive financing expansion strategy in banks with strong capital, which has the potential to increase credit risk (Berger & DeYoung, 1997;Wardani & Yahya, 2024). Operational inefficiency (CIR) had a significant positive effect on NPF with a coefficient of 0.0128 (p<0.01). This is in line with the hypothesis that less efficient banks face weak internal supervision, thus potentially increasing the amount of non-performing financing (Fang et al., 2025). High liquidity, measured by FDR, also showed a significant positive influence on NPF (0.0114; p<0.01). These findings confirm that financing expansion without strict risk selection can increase the risk of default (Wasiuzzaman & Gunasegavan, 2013; Imbierowicz & Rauch, 2014).

Interestingly, the GDP provided a positive coefficient of 0.0894 (p<0.01), contrary to the initial prediction that regional economic growth would lower the NPF. This indicates the existence of regional heterogeneity and possible other external factors that affect the quality of financing (Louzis et al., 2012). Finally, the COVID-19 dummy variable showed a significant negative coefficient (-0.0084; p<0.05), in contrast to the initial expectation that the pandemic increased NPF. These findings may reflect the effectiveness of IRB mitigation measures or liquidity support during the pandemic period, so as to be able to maintain asset quality (Goodell, 2020)

IRBs Java vs Outside Java

Based on the F, LM and Hausman tests, the best method is fixed effect (FE) for the island of Java. Table 4 presents the results of IRB estimates in Java Island with NPF as a dependent variable. Based on the F, LM, and Hausman tests, the best method used is fixed effect (FE). The results of the estimation show that several internal and external variables have a significant effect on financing risk.

The Lerner coefficient of -0.0052 (p<0.01) indicates that increased market competition has the effect of lowering NPFs, supporting the hypothesis that banks with a larger market share have stable revenues and more effective financing supervision (Saputro & Safuan, 2024) .

Table 4. IRBs Java

	Common Effect		Fixed Effect		Random Effect	
Variable	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob
Lerner	-0.0038***	0.0010	-0.0052***	0.0000	-0.0048***	0.0000
Lasset	-0.0163***	0.0000	-0.0763***	0.0000	-0.0364***	0.0000
CAR	0.0850***	0.0000	-0.0119	0.3230	0.0260**	0.0250
CIR	0.0604***	0.0000	0.0547***	0.0000	0.0558***	0.0000
FDR	0.0099***	0.0030	0.0157***	0.0000	0.0147***	0.0000
LGRDP	-0.0007	0.6980	0.2050***	0.0000	0.0083	0.1030
COVID	-0.0095*	0.0760	-0.0020	0.6660	-0.0070	0.1300
Cons.	0.3527***	0.0000	-1.0998***	0.0000	0.6045	0.0000
R-squared	0.1179		0.1364		0.1225	
Banks.	97		97		97	
Obs.	3476		3476		3476	
F	15.22***					
LM	3402.08***					
Hausman	131.94***					

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

The bank size (LAsset) shows a coefficient of -0.0763 ($p<0.01$), confirming that larger banks tend to have lower NPFs. These findings are in line with (Misman & Bhatti, 2020) which states that large banks have more diversified risk management capacity and portfolios, thus being able to reduce the risk of non-performing financing. The CAR shows a coefficient of -0.0119 ($p>0.05$), indicating an insignificant influence on NPFs in Java, likely because large banks tend to have more cautious risk management strategies, so that capital does not have a direct impact on the level of non-performing financing (Yulianti et al., 2018) The CIR has a significant positive coefficient of 0.0547 ($p<0.01$), indicating that less efficient banks face weak internal supervision, thereby increasing the risk of non-performing financing (Tan & Floros, 2013) Liquidity (FDR) also had a significant positive effect of 0.0157 ($p<0.01$), confirming that the disbursement of financing without strict risk selection increases the risk of default (Peykani et al., 2025; Safarda et al., 2023)

The GDP has a significant positive coefficient of 0.2050 ($p<0.01$), contrary to the hypothesis that regional economic growth lowers the NPF. This indicates the existence of regional heterogeneity or other external factors that affect the quality of financing (Szarowska, 2018; Salas et al., 2024) The COVID-19 dummy variable was insignificant (-0.0020; $p>0.05$), indicating that the pandemic did not significantly affect NPF on the island of Java, possibly due to the effectiveness of IRB mitigation measures and liquidity support (Plikas et al., 2024)

Table 5. IRBs Outside Java

	Common Effect		Fixed Effect		Random Effect	
Variable	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob
Lerner	0.0020***	0.4960	-0.0008	0.7730	-0.0006	0.8410
Lasset	-0.0127***	0.0000	-0.0322***	0.0000	-0.0269***	0.0000
CAR	0.1026***	0.0000	0.1103***	0.0000	0.1120***	0.0000
CIR	0.0105***	0.0050	0.0044	0.1680	0.0049	0.1280
FDR	0.0078**	0.0340	0.0066*	0.0690	0.0062*	0.0830
LGRDP	-0.0246***	0.0000	-0.0211	0.3390	-0.0265***	0.0060
COVID	-0.0213***	0.0090	-0.0153**	0.0220	-0.0163**	0.0150
Cons.	0.5425***	0.0000	0.8431***	0.0000	0.8084***	0.0000
R-squared	0.1567		0.1324		0.2055	
Banks	57		57		57	
Obs.	1993		1993		1993	
F	18.10***					
LM	3330.98**					
Hausman	12.78*					

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

Based on the F, LM and Hausman tests, the best method is fixed effect (FE) for IRB outside Java. Table 5 presents the results of IRB estimates outside Java Island with NPF as a dependent variable. Based

on the F, LM, and Hausman tests, the best method used is fixed effect (FE). The results of the estimation show that several internal and external variables have a significant influence on financing risk. The Lerner coefficient of -0.0008 (p>0.05) indicates that market competition does not have a significant effect on NPF outside Java. This may reflect the characteristics of smaller and more dispersed markets, so that IRB's market power does not determine the behavior of financing risks (Berger et al., 2009; Syahyunan et al., 2017)

The bank size (LAsset) shows a coefficient of -0.0322 (p<0.01), confirming that larger banks have lower NPFs. These findings are consistent with the literature that large banks have better risk management and portfolio diversification capacities so that they are able to reduce the risk of non-performing financing (Kamila et al., 2024) On the capital side, CAR has a coefficient of 0.1103 (p<0.01), indicating that high capital remains associated with an increase in NPF. This phenomenon could indicate an aggressive financing expansion strategy by banks with large capital, which has the potential to increase credit risk (Mahestika & Fitriati, 2023) CIR has a coefficient of 0.0044 (p>0.05), indicating a non-significant influence on NPF. This is different from the hypothesis, possibly because IRB operations outside Java tend to be simpler so that the influence of internal efficiency on NPF is less visible (Bagiana et al., 2024) Liquidity (FDR) had a significant positive effect at the level of 10% (0.0066; p<0.1), indicating that high disbursement of funds without strict risk selection can increase the risk of default, in line with previous findings (Ahmad Ramadani, 2025)

The GDP has a negative coefficient of -0.0211 (p>0.05), in contrast to the results in Java, but not significant, indicating that regional economic conditions outside Java have a limited influence on the NPF. The COVID-19 dummy variable has a significant negative coefficient of -0.0153 (p<0.05), indicating that despite the pandemic, asset quality is relatively maintained, likely due to bank mitigation measures and liquidity support (Riani, 2021; Ahmed & Abedin, 2021).

Conclusion

Based on the results of the analysis of the data panel, this study found several significant determinants of the level of financing risk (NPF) in IRB in Indonesia. In general, market competition, bank size, capital, operational efficiency, liquidity, regional economic conditions, and the COVID-19 pandemic have different influences on NPF, depending on the bank's operational area.

In general, the increase in market competition (Lerner Index) of IRB and the size of banks have an effect on lowering NPF, confirming that banks that are larger and have a more stable market share are able to manage financing risks more effectively. Meanwhile, high capital (CAR), operational inefficiencies (CIR), and liquidity expansion (FDR) have a positive effect on NPF, suggesting that financing expansion strategies or internal inefficiencies can increase the risk of default. Regional economic growth (GDP) has a positive influence, different from initial predictions, showing regional heterogeneity, while the COVID-19 pandemic has surprisingly negatively affected the NPF, likely due to IRB mitigation measures and liquidity support.

Analysis by region shows that in Java, market competition and bank size have a significant effect on lowering NPF, while CAR is not significant. Operational efficiency (CIR) and FDR remain positively impacted by financing risk. GDP exerts a significant positive influence, showing the heterogeneity of the local economy, and COVID-19 is insignificant, indicating the effectiveness of mitigation in the region. Outside of Java, market competition has no significant effect on NPF, likely due to the characteristics of smaller and more dispersed markets. Bank size remains a significant negative influence, confirming the risk management capacity of large banks. CAR had a significant positive effect, whereas CIR was insignificant, suggesting that internal efficiency had a lesser impact on NPF in this region. Liquidity (FDR) remained positive, GDP was insignificant, and COVID-19 had a significant negative impact on NPF, indicating that asset quality was relatively maintained thanks to mitigation measures and liquidity support.

The results of the study emphasized the importance of managing bank size, operational efficiency, and liquidity for IRB management to reduce the risk of non-performing financing, while regulators need to pay attention to differences in conditions between regions and support mitigation measures during crises. These findings also enrich the empirical literature on the determinants of NPF in Islamic micro banks in Indonesia. Further research is suggested to explore additional variables such as management quality, financing strategies, and local socio-economic factors to understand financing

risk variations in more depth. However, this study has several limitations. The analysis relies on secondary data from publicly available financial reports, which may involve differences in reporting quality across IRBs. In addition, the use of a static panel data approach may not fully capture the dynamic behavior of non-performing financing over time. The scope of explanatory variables is also limited, as factors such as management quality, governance practices, and borrower characteristics are not included due to data availability and funding constraints. Furthermore, although regional differences are considered, more detailed regional and institutional heterogeneity is not fully captured.

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