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Nexus between risk and bank stability in the Indonesian Islamic Rural Bank

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Abstract

Purpose – This study examines the relationship between bank risk and stability in the case of the Islamic Rural Bank (IRB) of Indonesia.

Methodology – This study analyzes 154 Islamic Rural Banks (IRBs) from 2015 to 2023 using quarterly data. It employs a static panel data regression with unbalanced data. The final regression model was selected using the F-test, LM test, and Hausman test to compare the common, fixed, and random effect methods.

Findings – Liquidity and financing risks have a negative relationship with IRB stability. The negative impact of financing risk on IRB stability decreased during Covid-19. The negative effects of liquidity risk on IRBs' stability of IRBs increased for IRBs on Java. In contrast, the negative impact of financing risk on stability decreased for IRB located in and outside Java.

Implications – First, IRB must effectively manage their liquidity risk to maintain bank stability. Second, IRBs must reduce non-performing financing (NPF) to encourage bank stability. Third, banks' operational and capital efficiencies must be improved.

Originality – This study aims to fill the existing research gap by analyzing the effect of liquidity and financing risks on the stability of the Islamic Rural Bank as a small Islamic bank. Furthermore, this study includes the Covid-19 variable as a moderating variable that affects the effect of liquidity and financing risks on IRB stability.

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Introduction

The relationship between risk and stability of Islamic banks raises various complex issues that have garnered significant attention in recent research. Islamic banks face two risks, comprising liquidity and financing (Chazi et al., 2024; Fakhrunnas, 2023; Rizwan et al., 2022; Sunarsih et al., 2022). The liquidity risk arises from a bank's inability to meet its financial obligations without incurring unacceptable losses, which can affect the stability of Islamic banks. Financing risk is the inability of Islamic banks to manage their financing, resulting in non-performing financing (NPF)(Muhammad et al., 2020).

The Covid-19 pandemic has affected the stability of Islamic banks. Prior to the pandemic, liquidity risk was consistently found to have a negative impact on stability. This is because of their unique financial structure and Shariah-compliant operations, which limit the use of conventional

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liquidity management tools (Mikou et al., 2024; Sunarsih et al., 2022). An increase or decrease in liquidity risk hurts Islamic banks'stability in Indonesia. In the short term, fluctuations in liquidity risk negatively impact financial stability. However, in the long term, the rise in liquidity risk significantly negatively affects stability. This occurred during the Covid-19 pandemic (Fakhrunnas, 2023). After Covid-19, there was a fundamental negative relationship between liquidity risk and stability in Islamic banks. Liquidity risk continues to pose a significant threat to bank stability during a pandemic (Sunarsih et al., 2022). Despite their negative impact, Islamic banks are less sensitive to this condition (Rizwan et al., 2022). Islamic banks experience increased liquidity risk (Chazi et al. 2024). Islamic banks are more resilient than conventional banks are. This is attributed to their good capital structures and risk management practices (Ghenimi et al., 2024).

Economic uncertainty, as measured by the World Uncertainty Index, has a positive and significant effect on liquidity risk in the short and long terms. This suggests that during periods of economic uncertainty such as a crisis or pandemic, liquidity risk in Islamic banks tends to increase, thereby affecting financial stability. Macroeconomic factors, such as GDP growth and inflation, also play a role, with inflation hurting liquidity risk and indirectly affecting financial stability (Anis & Hamdi, 2022).

Indonesia has 14 Islamic Commercial Banks (ICB) and 19 Islamic Business Units (IBU). The total assets of Islamic Commercial Banks until February 2024 were IDR 646,361 billion, and Islamic Business Units were IDR 285,755 billion. Indonesia also has 174 Islamic Rural Banks that are spread across Java and Java. The total assets owned by Sharia Rural Banks are IDR 24,645,945 million. Although IRB have more banks than ICB and IBU, the total assets are still much lower. IRB are essential for collecting and distributing funds to small and medium-sized enterprises (Muhammad et al., 2020).

Several studies have discussed the relationship between the risk and stability of Islamic commercial banks (Chazi et al., 2024; Ding et al., 2025; Fakhrunnas, 2023; Rizwan et al., 2022; Sunarsih et al., 2022). However, no previous research has specifically analyzed the effect of liquidity risk and financing risk on the stability of small-scale Islamic banks, such as IRB. Therefore, this study aimed to fill this research gap. This study contributes to the literature in several ways. First, this paper examines the impact of liquidity risk and financing risk on stability in the context of IRB for small Islamic banks. Second, this paper includes Covid-19 as a moderating variable that affects the effect of liquidity and financing risks on IRB stability. Third, this study also compares the impact of liquidity risk and financing risk on stability based on IRB location for both the IRB in Java and outside Java.

Literature Review

Several studies have found that liquidity risk can affect bank stability (Al-Wesabi & Yusof, 2019). Jusuf & Widarjono, 2024; Omran et al, 2025; Smaoui et al., 2020; Sunarsih et al., 2022) . The benefit of managing liquidity risk is that it can increase the resilience and sustainability of financial stability during crises. Islamic banks have shown greater resilience during financial crises compared to conventional banks have. This resilience is partly due to their business model, which limits exposure to high-risk financial instruments and practices, such as interest-based transactions (Al-Wesabi & Yusof, 2019). Effective liquidity risk management is critical to the sustainability and resilience of Islamic banks. These banks can meet their financial obligations by maintaining adequate liquidity, which is essential to maintaining customer confidence and operational stability (Wati & Fasa, 2024). Islamic banks have shown resilience during financial crises, such as the 2008 global financial crisis, due to their unique liquidity management practices aligned with the Shariah principles (AbdulGaniyy & AbdulKareem, 2020).

Research on Islamic banks'stability has been widely conducted. Sunarsih et al. (2022) conducted a study of 14 Islamic banks in Indonesia from 2017 to 2020. The variables used were credit and liquidity risk. The findings indicate that credit and liquidity risks have a negative relationship with the stability of Islamic banks. Widarjono et al. (2022) conducted a study of 142 Islamic rural banks in Indonesia from 2013 to 2018. The variables used were Return on Assets (ROA), funding liquidity risk, and macroeconomics. The findings indicate that funding liquidity risk

increases Islamic commercial banks' asset risk. The most significant asset risk is that of large Islamic rural banks. Small Islamic commercial banks face higher non-performing financing than large ones.

Hassan et al. (2019) conducted a study of 51 Islamic and conventional banks in the Organization of Islamic Cooperation from 2007 to 2015. The results show that credit and liquidity risks have a negative relationship. A negative relationship exists between liquidity risk and stability in Islamic banks (Ikhwan & Riani, 2023). Islamic Banks have better risk management than Conventional Banks. During the Covid-19 pandemic, Islamic banks in Malaysia and Indonesia have maintained their efficiency. The Islamic banks in Malaysia have the highest efficiency and stability.

Widarjono et al. (2023) researched 31 Islamic banks in Indonesia from 2015 to 2020. The findings indicate that banks with high risk-sharing financing had low bank margins. Low bank margins through risk-sharing financing are more prominent among Islamic bank subsidiaries. This type of financing is more in line with Sharia principles, and can reduce financial intermediation costs, making it a strategic focus for Islamic banks. Addury and Ramadhani (2024) conducted research on 90 IRBs in Java from 2011 to 2021. The findings showed that profit margin financing had a negative impact on the financial stability of IRBs through credit risk relationships compared to profit-sharing financing.

Hypotheses

Financing to deposit ratio and bank stability

FDR is used to measure liquidity risk by comparing the amount of financing with the amount of public funds. The greater the FDR, the more funds that are distributed to the public. Good FDR management is needed to prevent problematic financing does not occur. High financing costs increase NPF and, subsequently, reduce bank stability. This is based on research by Havidz and Setiawan (2015) and Rahman and Fatmawati (2020). This differs from the findings of Munifatussa'idah (2020) and Sofyan (2019), who state that FDR has a negative relationship with NPF, and thus, increases bank stability.

Several studies on the effect of FDR on bank stability serve as the basis for developing hypotheses. Research conducted by Rahman and Fatmawati (2020), with a sample of nine IRB in Yogyakarta from 2015 to 2018, stated that FDR had no significant effect on NPF. This finding is supported by the findings of Munifatussa'idah (2020) with a sample of IRBs in Indonesia from 2010 to 2019 using the autoregressive distribution lag (ADRL), which stated that the FDR did not affect NPF. This finding contrasts with that of Sofyan (2019), who studied several IRB in Indonesia. Their findings indicated that FDR affected ROA. For now, we suspect:

H_1: Financing to Deposit Ratio(FDR) ratio influences bank stability.

Non performing financing and bank stability

Previous research has often used NPF as a ratio to measure the financing risk in Islamic banks. NPF is a ratio used to measure bank health; the higher the NPF value, the better the bank's health, and vice versa, and bad credit can disrupt the stability of banking financial performance (Niswatin & Rahmat Santoso, 2025). Islamic banks also offer convenience in financing to increase NPF and reduce the health of Islamic bank portfolios (Fakhrunnas et al. 2022; Safar Nasir et al. 2022).

H_2: Non Performing Financing (NPF) has a negative effect on bank stability.

Learner index and bank stability

The Lerner index measures the market power. Lerner is the margin level, which is the difference between the price and cost (Lerner, 1934). Banks with high Lerner indicate that their power increases to maximize the margin obtained. Banks with significant market power increase profits and strengthen stability (Albaity et al., 2019).

H_3: Lerner Index has a positive influence on bank stability.

Assets and bank stability

Assets have a positive impact on bank stability (Chowdhury 2024). An asset diversification strategy can minimize risk by increasing the diversification of a bank's asset portfolio (Vu and Ngo, 2023;

Mats, 2024). This strategy helps banks withstand difficult periods even when some assets decline in value. Thus, asset diversification plays a crucial role in maintaining banks' stability.
H_4: Assets have a positive relationship with bank stability.

Capital adequacy ratio and bank stability
The Indonesian Financial Services Authority (OJK) sets the CAR at a minimum of 8% for risk-weighted assets. CAR functions to overcome financial decline due to losses (Priyadi et al., 2021). According to Munifatussa'idah (2020) and Sofyan (2019), CAR reduces NPF, and subsequently increases bank stability. However, according to Nugrohowati (2019), Priyadi et al. (2021), and Saputri et al. (2020), CAR increases NPF and reduces bank stability.
H_5: Capital Adequacy Ratio (CAR) has a positively influences bank stability.

Cost-income ratio and bank stability
The Cost Income Ratio (CIR) is part of the efficiency that banks consider. CIR has a negative effect on ROA (Al-Sharkas and Al-Sharkas, 2022). A high CIR negatively impacts bank profitability, which is a key component of stability. A high CIR reflects inefficiencies that can lead to financial stress, especially during an economic downturn (Aniemeke 2024).
H_6: The Cost Income Ratio (CIR) has a negative influence on bank stability.

Gross regional domestic product and bank stability
The Gross Regional Domestic Product (GRDP) is directly related to bank stability. When economic conditions improve, people's behavior toward saving increases, thereby increasing bank stability. Conditions are different When economic conditions are declining, people's interest in saving decreases, and the level of bank stability also decreases (Gamukin & Miroshnichenko, 2021).
H_7: Gross Regional Domestic Product (GRDP) positively influences bank stability.

The Covid-19 and bank stability
The Covid-19 pandemic is a variable that needs to be of concern to Islamic bank management. Covid-19 has caused banks' ability to distribute funds and customers' ability to repay loans (Nur Ajizah & Widarjono, 2022). According to Ajizah and Widarjono (2022), Covid-19 reduces Islamic bank profits, thereby affecting bank stability
H_8: The Covid-19 relationship has a negative impact on bank stability.

Research Methods

Data

This study examines the influence of bank risk and stability on institutional review boards (IRB in Indonesia. Of the 175 IRBs, 154 were selected with complete information for research purposes. The research period was from 2015 to 2023 using quarterly data. A total of 5496 observations with unbalanced panel data were used. The research data were obtained from the financial reports of each IRB to the Financial Services Authority (Otoritas Jasa Keuangan, OJK). The financial reporting data used were balance-sheet data, profit and loss reports, and financial ratio reports from each IRB. Financial report data for each IRB can be accessed through the Financial Services Authority (Otoritas Jasa Keuangan, OJK) (www.ojk.go.id). Gross regional domestic product data were obtained from the Central Bureau of Statistics (Badan Pusat Statistik; BPS) (www.bps.go.id).

Empirical estimation

This study examines the relationship between risk and IRB stability using a quantitative regression method. This study uses static panel regression to test the relationship between liquidity risk and IRB's review board stability. This research model follows that of previous studies (Ghenimi et al., 2024; Hassan et al., 2019; Sunarsih et al., 2022). The static panel data regression model used in this study is as follows:

$$Z - score_{it} = \phi_0 + \phi_1 FDR_{it} + \phi_2 NPF_{it} + \phi_3 Lerner_{it} + \phi_4 Lasset_{it} + \phi_5 CAR_{it} + \phi_6 CIR_{it} + \phi_7 LGRDP_{it} + \phi_8 COVID_{it} + e_{it} \quad (1)$$

The Z-score measures stability. FDR is the financing deposit ratio that measures the liquidity risk. NPF is non-performing financing that measures the financing risk. The Lerner index measures competition. Assets are the total assets that measure bank size. CAR is the capital adequacy ratio, which measures capital. The CIR is the cost-to-income ratio that measures operating efficiency. The GRDP is the gross regional domestic product that measures output at the provincial level. Covid-19 was the Covid-19 pandemic from the second quarter of 2020 to the fourth quarter of 2021.

Covid-19 has led to a decline in Indonesia's economic growth since the second quarter of 2020. To determine the impact of Covid-19 on IRB risk, this study examined the interaction between risk variables (FDR and NPF) and Covid-19. The regression equation model was as follows:

$$Z - score_{it} = \phi_0 + \phi_1 FDR_{it} + \phi_2 NPF_{it} + \phi_3 FDR_{it} * COVID + \phi_4 NPF_{it} * COVID + \phi_5 Lerner_{it} + \phi_6 Lasset_{it} + \phi_7 CAR_{it} + \phi_8 CIR_{it} + \phi_9 LGRDP_{it} + \phi_{10} Covid_{it} + e_{it} \quad (2)$$

Table 1. Summary of operational variable

Type of variable	Name	Variable definition	Hypothesis	Source of data
Dependent	Bank stability	Bank stability is measured using the Z-score (Khan, 2017; Mustafa, 2024; Smaoui et al., 2020). $Z - score = \frac{ROA + ({}^{equity}/_{asset}}{\sigma ROA}$		Quarterly data, published by OJK
Independent variable: bank-specific variable	FDR	The ratio of financing funds provided to customers to funds collected from the public (Priyadi et al., 2021).	+	Quarterly data, published by OJK
	NPF	The ratio of financing default to total financing (Niswatin & Rahmat Santoso, 2025; Pradesyah & Triandhini, 2021)	-	Quarterly data, Published by OJK
	Lerner	An index that measures the market power of a company (Lerner, 1934) $Lerner = \left[\frac{P-MC}{P}\right]$ P: price; C: marginal cost	+	Quarterly data, published by OJK
	Lasset	Total assets	+	Quarterly data, published by OJK
	CAR	Ratios in assessing banking capital adequacy (Priyadi et al., 2021; Sahul Hamid, 2017)	+	Quarterly data, published by OJK
	CIR	Operating expense to operating income ratio (Hussain & others, 2014)	-	Quarterly data, published by OJK
Independent variables: macroeconomic conditions	GRDP	An economic indicator measures the total value of goods and services produced in a region.	+	Quarterly data, published by BPS
	Covid	Covid-19 as a dummy variable starts from the second quarter of 2020 to the fourth quarter of 2021.	-	

Source: Authors' own work

Table 1 provides a summary of the operational variables used in the study. It categorizes the variables into three main types: dependent, bank-specific independent, and macroeconomic

independent variables. The dependent variable, Bank stability, is measured using the Z-score. Meanwhile, the independent variables include bank-specific ratios like FDR, NPF, and CAR, as well as macroeconomic conditions such as GRDP and Covid. For each variable, the table presents its definition, the proposed hypothesis, and the data source used, such as OJK and BPS.

This study used static panel data regression with unbalanced data. There are three static panel estimation methods: common, fixed, and random. Three methods are used to select an estimation method: the F-test tests the common effect and fixed effect methods; the LM test tests the common effect and fixed effect methods; and the Hausman test tests the fixed effect and random effect methods.

Results and Discussion

Descriptive Statistics

Table 2 presents the descriptive statistics for several variables, including their mean, standard deviation, and minimum and maximum values. The Z-score had a very wide range, from -2.709 to 73.552, with an average of 7.849. The NPF variable also showed significant outliers, with a maximum value of 104.090, which is far above its mean of 9.724. Meanwhile, the Covid-19 variable, with a mean of 0.196, indicates that the dataset includes only a small proportion of observations from the Covid-19 period. From the data, GRDP (log GRDP) appears to be the most stable variable. With a relatively small standard deviation of 1.166 compared with its mean of 11.655, this variable showed a more concentrated data distribution. Conversely, the NPF and Z-scores have a wider data spread, characterized by their extreme values.

Table 2. Summary statistics

Variable	Mean	Std. dev.	Min	Max
Z-score	7.849	6.864	-2.709	73.552
FDR	1.655	3.708	0.002	112.202
NPF	9.724	10.116	0.000	104.090
Lerner	0.411	1.165	-16.803	23.265
Lasset	17.540	1.150	13.769	21.371
CAR	0.184	0.207	0.018	6.104
CIR	0.358	0.430	0.000	25.938
GRDP	11.655	1.166	8.502	13.171
Covid	0.196	0.397	0.000	1.000

Source: Authors' calculation

Table 3. Correlation

	Z-score	NPF	FDR	Lerner	Lasset	CAR	CIR	LGRDB	Covid
Z-score	1.000								
NPF	-0.005	1.000							
FDR	-0.018	-0.038	1.000						
Lerner	0.090	0.019	0.046	1.000					
Lasset	-0.335	-0.236	0.008	-0.160	1.000				
CAR	0.423	0.282	0.106	0.182	-0.496	1.000			
CIR	-0.135	0.074	-0.008	-0.112	0.091	-0.018	1.000		
GRDP	-0.316	-0.042	0.034	-0.006	0.135	-0.099	0.001	1.000	
Covid	-0.033	-0.087	0.073	-0.009	0.098	-0.035	0.038	0.008	1.000

Source: Authors' calculation

This study examined the correlation between independent variables, and the results are presented in Table 3. In general, the correlation coefficients between the independent variables were < 0.5, indicating no perfect multicollinearity issues in the regression model. The highest correlation is found between Capital Adequacy Ratio (CAR) and Lassett, with a coefficient of -0.496. This condition ensures that the model does not face serious multicollinearity problems, which allows for an efficient estimation.

Regression results

Table 4 presents the results of the baseline regression. The methods used were Common Effect (CE), Fixed Effect (FE), and Random Effect (RE). Table 4 presents the results of the F-Test, LM Test, and Hausman Test. The results show that the best method for static panel estimation is the fixed effects method. This study used three regression models: (1) without GRDP and Covid variables, (2) without Covid variables, and (3) a complete model with GRDP and Covid. The three models were estimated to produce consistent results.

Estimation without using the macro variables of GRDP and Covid shows that FDR is negative and significant at the 1% level. NPF is negative and significant for the Z-score with α=1%. Lerner was negative and significant for the Z-score with α=1%. The asset is negative and significant for the Z-score, with α=1%. CAR is positive and significant for the Z-score with α=1%. The CIR was negative and significant for the Z-score with α=1%.

Estimation using macro-variable GRDP. The result is that the FDR is negative and significant for the Z-score with α=1%. NPF is negative and significant for Z-scores with α=1%. Lerner was negative and significant for the Z-score with α=1%. The asset is negative and significant for the Z-score, with α=1%. CAR is positive and significant for Z-scores α=1%. The CIR was negative and significant for the Z-score with α=1%. PDRB is positive and significant for Z-scores α=1%.

The final estimation result uses the macro variables GRDP and Covid. The result is that FDR is negative and significant for the Z-score with α=1%. NPF is negative and significant for Z-scores with α=1%. Lerner was negative and significant for the Z-score with α=1%. The asset is negative and significant for the Z-score, with α=1%. CAR is positive and significant for Z-scores α=1%. The CIR was negative and significant for the Z-score with α=1%. GRDP is positive and significant for Z-scores of α=1%. Covid-19 was positive, but not significant, to the Z-score.

Table 4. Baseline regression

	FE		FE		FE	
Variable	Coefficient	prob	Coefficient	Prob.	Coefficient	Prob
FDR	-0.034***	0.002	-0.034***	0.002	-0.035***	0.002
NPF	-0.041***	0.000	-0.044***	0.000	-0.044***	0.000
Lerner	-0.105***	0.004	-0.114***	0.001	-0.115***	0.001
Lasset	-1.529***	0.000	-2.164***	0.000	-2.176***	0.000
CAR	12.252***	0.000	11.732***	0.000	11.723***	0.000
CIR	-0.540***	0.000	-0.529***	0.000	-0.532***	0.000
GRDP	-	-	3.901***	0.000	3.903***	0.000
Covid	-	-	-	-	0.064	0.471
Cons.	33.107***	0.000	-1.081	0.806	-0.908	0.837
R-squared:	0.4059		0.4132		0.4133	
No. Banks	154		154		154	
No. observations	5,496		5,496		5,496	
F test	165.46		149.81		149.78	
LM test	61803.58		57903.92		57899.49	
Hausman test	91.1		85.79		87.29	

Note: ***, **, and * indicate significance at the 1%, 5%, and 10%levels, respectively
Source: Authors' calculation

Table 5 shows the results of the interaction variables between NPF and Covid-19 (NPF* Covid-19) and FDR with Covid-19 (FDR* Covid-19) for all regions of Indonesia. The bottom of Table 5 presents the F, LM, and Hausman tests. Based on the test results, the best method is the Fixed Effect for all regions in Indonesia. The results were FDR-negative and significant for the Z-score with α=5%. NPF was negative and significant for the Z-score with α=1%. NPF*Covid was positive and significant for the Z-score with α=1%. FDR*Covid negative and not significant for

Z-score. Lerner was negative and significant for the Z-score with α=1%. Asset negative and significant to the Z-score with α=1%. CAR is positive and significant for the Z-score with α=1%. The CIR is negative and significant for the Z-score with α=1%. GRDP is positive and significant for the Z-score with α=1%. The coefficient is positive and significant for the Z-score with α=5%.

Table 5. The moderating effect of Covid-19

	FE		FE		FE	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
FDR	-0.022	0.236	-0.022	0.234	-0.032**	0.049
NPF	-0.045***	0.000	-0.047***	0.000	-0.050***	0.000
FDR*Covid	-0.018	0.379	-0.018	0.376	-0.004	0.866
NPF*Covid	0.029***	0.000	0.027***	0.000	0.041***	0.000
Lerner	-0.108***	0.003	-0.117***	0.001	-0.118***	0.001
Lasset	-1.565***	0.000	-2.190***	0.000	-2.156***	0.000
CAR	12.248***	0.000	11.735***	0.000	11.772***	0.000
CIR	-0.561***	0.000	-0.548***	0.000	-0.548***	0.000
GRDP	-	-	3.849***	0.000	3.808***	0.000
Covid	-	-	-	-	-0.267**	0.037
Cons.	33.733	0.000	-0.049	0.991	-0.104	0.981
R-squared:	0.4075		0.4146		0.415	
No. Banks	154		154		154	
No. observations	5,496		5,496		5496	
F test	165.86		150.13		150.13	
LM test	61786.73		57905.83		57942.36	
Hauman test	34.75		84.12		83.6	

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively
Source: Authors' calculation

Table 6. Java vs off Java

	Java		Off Java	
Variable	Coefficient	Prob	Coefficient	Prob
FDR	-0.004	0.793	-0.176***	0.005
NPF	-0.006***	0.098	-0.098***	0.000
FDR*Covid	-0.027*	0.066	0.172**	0.044
NPF*Covid	0.013*	0.056	0.074***	0.001
Lerner	0.074***	0.003	-0.895***	0.000
Lasset	-1.008***	0.000	-3.032***	0.000
CAR	11.709***	0.000	12.289***	0.000
CIR	-0.998***	0.000	-0.592***	0.000
GRDP	1.197***	0.000	1.118*	0.069
COVID	-0.196**	0.029	-0.544**	0.037
Cons.	7.549***	0.006	50.880***	0.000
R-squared:	0.523		0.071	
No. Banks	97		57	
No. observations	3840		2106	
F test	138.38		151.31	
LM test	34037.22		21327.93	
Hauman test	62.97		14.9	

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively
Source: Authors' calculation

Table 6 presents the estimation results for IRBs based on their location: the Java region and outside of Java. The IRBs in Java operate in a more advanced economic environment, at the center of the Indonesian economy, and face intense competition. In contrast, IRBs outside of Java experience less competition and are located in less developed economic regions. Based on the F,

LM, and Hausman tests, the best method for this analysis is the Fixed Effect model. This approach is well-suited for capturing unobserved, time-invariant characteristics specific to each bank's location, such as local economic conditions and regional regulations, which significantly influence their performance.

The first discussion focused on the results of the IRB located in Java. FDR was negative, but not significant, for the Z-score. NPF is negative and significant for the Z-score with α=1%. FDR * Covid was negative and significant for the Z-score with α=10%. NPF * Covid was positive and significant for the Z-score with α=1%. Lerner is positive and significant for the Z-score with α=1%. The assets are negative and significant for Z-scores with α=1%. CAR is positive and significant for the Z-score with α=1%. The CIR was negative and significant for the Z-score with α=1%. GRDP is positive and significant for Z-scores of α=1%. Covid-19 is negative and significant, with a Z-score of α=5%.

The following discussion is the result of an IRB located outside Java: FDR was negative, but not significant, for the Z-score. NPF is negative and significant for the Z-score with α=1%. NPF*Covid was positive and significant for the Z-score with α=1%. FDR*Covid was positive and significant for the Z-score with α=5%. Lerner is positive and significant for the Z-score with α=1%. The asset is negative and significant for the Z-score, with α=1%. CAR is positive and significant for the Z-score with α=1%. The CIR was negative and significant for the Z-score with α=1%. GRDP is positive and significant for the Z-score with α=10%. Covid-19 was negative and significant for the Z-score with α=5%.

Discussion

The initial findings show that FDR has a negative effect on the stability of IRBs using the Z-score. The higher the FDR, the higher the expected profit. Risk control is needed to overcome problematic financing and maintain stability (Sunarsih et al., 2022). The Covid-19 pandemic has also had a negative effect on IRB stability. A failure to manage liquidity can lead to a decline in bank stability. This can disrupt bank operations in meeting financial obligations, reduce public trust and third-party funds, hinder the growth of productive financing, and become a source of instability in the medium-to long-term.

The second result shows that Non-Performing Financing has a negative relationship with the stability of IRBs, using the Z-score. This indicates that non-performing financing will disrupt the stability of IRBs. This result aligns with those of previous research (Muhammad et al., 2020; Widarjono et al., 2022). High NPF reduces bank margins and lowers stability (Widarjono et al., 2023). The Covid-19 pandemic has also resulted in a high NPF, which impacts the stability of Islamic banks. This finding is consistent with that reported by Omran et al. (2025).

The third finding shows that the Lerner index has a negative effect on the stability of IRBs when measured using the Z-score. This aligns with the findings of other studies (Bakhouche et al., 2019; Bakhouche et al., 2022). These findings indicate that tight competition promotes bank stability. An increase in market competition in the dual banking market will increase bank stability. Widarjono et al. (2022) indicated that the Lerner index has a negative effect on the stability of IRBs outside Java. This suggests that banks operating in a more competitive environment are forced to become more efficient and well-managed to survive. As a result, increased competition, as indicated by a lower Lerner index, directly contributes to a more stable banking system.

The fourth finding shows that assets have a negative effect on the stability of IRBs (Islamic Rural Banks) when measured by the Z-score. This finding is in line with previous research (Smaoui et al., 2020), which suggests that larger banks may take on more risk because of aggressive investment strategies aimed at maximizing returns. Larger IRBs, which are typically located in Java, may face a higher risk of bankruptcy than their smaller counterparts outside Java. This negative relationship between asset size and stability highlights the unique risks associated with the growth and scale of rural Islamic banks.

The fifth finding shows that CAR positively affects the stability of IRBs when measured by the Z-score. CAR measures bank capital, which is crucial for increasing financing and overcoming funding problems. Each bank must have sufficient capital to maintain its performance. This finding is in line with those of existing empirical studies (Dao & Nguyen, 2024; Dao & Nguyen, 2020; Harkati et al., 2020). A higher CAR indicates that a bank has a stronger buffer against unexpected losses and is better equipped to absorb shocks, thereby contributing directly to its overall stability. This strong capital base reassures both investors and regulators of the bank's ability to withstand financial distress.

The sixth finding indicates that CIR has a negative impact on stability, as measured by the Z-score. A level of bank efficiency can be observed in the CIR. A high CIR results in a low level of efficiency. A low level of efficiency caused by high bank costs disrupts bank stability. This finding is in line with that of previous studies (Khémiri et al., 2024). A high CIR suggests that a bank is spending too much to generate income, eroding its profitability and making it more vulnerable to financial shocks. Therefore, a high-cost structure directly undermines the bank's ability to maintain stable and profitable operations.

The seventh finding shows that the GRDP has a positive effect on bank stability. Good economic growth, as measured by the GRDP, can improve the financial health of businesses and individuals, which in turn increases the amount of financing and reduces funding problems for banks. As the economy grows, borrowers are more likely to repay their loans, thereby mitigating credit risk and enhancing bank stability (Jusuf & Widarjono, 2024; Widarjono et al., 2022). This positive economic environment ultimately contributes to a robust and stable banking sector.

The eighth finding is that the Covid-19 pandemic had a negative impact on bank stability. Low economic growth during this period meant that banks were generally unable to increase their financing, leading to a decline in profits and overall stability. Customers also face difficulties repaying their loan installments. This finding is in line with those of previous empirical studies (Risfandy & Pratiwi, 2022). The widespread economic shutdown and business disruptions during the pandemic directly increased banks' credit risk, as many borrowers lost their sources of income. This unprecedented event created a significant systemic shock that challenged the resilience and financial health of the global banking sector.

The results of the interaction between FDR and Covid (FDR × Covid) were not significant for stability. This finding indicates that during the Covid-19 pandemic, the negative impact of FDR on IRB stability remained unchanged. This finding confirms research on Islamic commercial banks in Indonesia during the Covid-19 pandemic (Sunarsih et al., 2022). The interaction between NPF and Covid (NPF*Covid) had a positive effect on stability. This finding indicates that during the Covid-19 pandemic, the negative impact of NPF on IRB stability decreased. This occurred because, during the Covid-19 pandemic, IRB's ability to disburse funds decreased, resulting in a decline in non-performing financing.

Based on the location of the IRB on Java, the results of the interaction between FDR and Covid (FDR*Covid) are negative and significant in terms of stability. This finding indicates that during Covid, the negative impact of FDR on IRB stability increased. This finding suggests that during the Covid-19 pandemic, liquidity risk has increased, thereby affecting IRB stability. The results of the interaction between NPF and Covid (NPF*Covid) showed a positive effect on stability. This result indicates that during Covid, the negative impact of NPF on IRB stability decreased. During the Covid-19 pandemic, there was a decrease in non-performing financing because the IRB's ability to channel funds was limited.

Based on the location of the IRB outside Java, the results of the interaction between FDR and Covid (FDR*Covid) were positive and significant in terms of stability. This finding indicates that during Covid, the negative impact of FDR on IRB stability decreased. The results of the interaction between NPF and Covid (NPF*Covid) showed a positive effect on stability. These results indicate that during Covid, the negative impact of NPF on IRB stability decreased. The bank's ability to channel funds decreased during Covid, so non-performing financing has also decreased.

Conclusion

This study analyzes the relationship between liquidity risk and financing risk on IRBs' stability using several control variables, including competition, bank specificity, and macroeconomic conditions. This study examines 154 IRBs from to 2015-2023 using quarterly data. Several significant findings were obtained from the results of this study. First, this study suggests that liquidity and financing risks are negatively correlated with IRB stability. Second, this study demonstrates that the negative impact of liquidity risk on IRB stability remained unchanged during the Covid-19 pandemic. Interestingly, the negative effect of financing risk on IRB stability has decreased during the Covid-19 pandemic. Based on location, the negative effect of liquidity risk on IRB stability increased for IRBs in Java, whereas the negative effect of financing risk on stability decreased for IRBs located in Java and outside Java. Third, strong bank fundamentals increase banks' stability. Fourth, favorable macroeconomic conditions encourage bank stability.

These findings have several important implications for both the OJK and IRB. First, banks must effectively manage their liquidity risk to prevent disruptions in bank stability. Second, the IRB must be able to reduce the financing risk. Bad financing, as measured by non-performing financing (NPF), is on average above the maximum limit of 5% set by OJK. A decrease in NPF encourages bank stability. Third, the IRB must be able to improve operational efficiency and increase bank capital to support its stability.

This study has several limitations. First, the study period will be from to 2015-2023. Future research could extend this study to 2025. Second, this study focuses only on IRBs. Future research could compare this to conventional rural banks. Third, this study used the macroeconomic variables LGRDP and Covid. Future research could add other macroeconomic variables, such as inflation rate, interest rate, exchange rate volatility, unemployment rate, and EPU index.

This study provides several recommendations. First, IRB should strengthen liquidity risk management by implementing more conservative liquidity policies, such as establishing a more dynamic minimum liquidity buffer and strengthening the Early Warning System (EWS). Second, the OJK must implement region-based supervision and incentivize the IRB to successfully maintain sustainable financing quality.

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