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Cash Flow Risk and Financial Balance: Evidence from Islamic Rural Banks in Indonesia

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Abstract

This study delves into the impact of funding liquidity risk (FLR) counting, including several bank-specific variables and the Coronavirus outbreak, on the balance of Islamic rural banks (IRBs) in Indonesia. Utilizing unbalanced quarterly panel data from 97 IRBs in Java from 2015 (Q1) to 2023 (Q4), the analysis is conducted using panel data regression. The results confirm that FLR significantly decreases bank stability. However, this negative influence was notably weakened during the COVID-19 Crisis. The analysis further reveals that the negative outcome of FLR on stability is more pronounced in smaller IRBs compared to their larger counterparts. Additionally, the findings show that while bank capital and operational efficiency enhance balance, factors such as larger bank size, high financing levels, and the pandemic period itself tend to reduce it. This research offers two key implications. Theoretically, it highlights how FLR can erode stability, a risk amplified when banks undertake high-risk investments. Practically, it underscores the critical need for especially the smaller IRBs to proactively manage asset-liability maturity mismatches to ensure financial stability.

Keywords: Bank Stability; Financial Balance; Funding Liquidity Risk; Islamic Rural Banks; Panel Data Regression

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Introduction

In addition to capital adequacy and capital buffer, managing funding liquidity risk has become essential for keeping banks stable amidst the world financial crisis (Abbas et al., 2021; Dahir et al., 2019). Funding liquidity risk for banks is caused by a maturity mismatch, which is an imbalance between their short-term deposit obligations and their long-term loans. Maturity mismatch, if not correctly managed, poses a risk to the bank because it cannot pay the debt at maturity. As a result, banks face a possible liquidity shortage and a liquidity crisis. Facts show that banks generally face excessive maturity mismatches. For this reason, funding liquidity risk management is very important for Islamic rural banks (IRBs) in maintaining their balance (Widarjono et al., 2022).

IRBs focus their financing on micro, small, and medium enterprises (MSMEs). MSMEs are the largest sector in the Indonesian economy (Widarjono et al., 2020; Widarjono & Mifrahi, 2024). Therefore, if IRBs can effectively manage funding liquidity risk, they strongly support the development of MSMEs. In other words, the Indonesian economy depends on how well IRBs manage funding liquidity risks, as they disburse their financing primarily to MSMEs. There are 175 IRBs across Indonesia, holding total assets amounting to IDR 23.177 trillion in 2023. Additionally, the concept of profit-sharing financing through Mudharabah contracts enables MSMEs to benefit greatly from this type of Mudharabah financing. A key feature of this Mudharabah financing is its repayment flexibility, which is specifically designed to accommodate the operational and financial characteristics inherent to Micro, Small, and Medium Enterprises (MSMEs).

The world economic downturn was triggered by the global recession due to the impact of COVID-19. This situation led to an increase in funding liquidity risk within the banking sector. As a result, banks, including Islamic Rural Banks (IRBs), experienced a decline in their ability to distribute financing. The following resulted in the performance of Islamic banks, particularly IRBs, worsening (Hassan et al., 2019; Smaoui et al., 2020; Widarjono et al., 2022). In addition, the rise in funding liquidity risk also negatively affected the performance of MSMEs, which rely on financing from IRBs.

The impact of liquidity risk, where a bank`s cash is not enough to pay the bill, on bank performance has been the central focus of empirical studies concerning large conventional and Islamic banks. In conventional banks, this risk has been shown to suppress credit growth (Dahir et al., 2019; T. N. L. Nguyen & Nguyen, 2020; Tran,

2020) and increase banks' risk exposure (Abbas et al., 2021; Wang & Zhuang, 2022). Meanwhile, research on its impact on the balance of Sharia-compliant banks has shown inconsistent results (Berger et al., 2019; Hassan et al., 2019; Smaoui et al., 2020). They analyzed the effect of cash insufficiency on the balance of Islamic banks, but the results are mixed. In addition, this topic is still far from validated in the Indonesian context. Sutarmin & Hartono (2022) analyzed the effect of funding liquidity risk on the balance of conventional banks. Muharyadi et al. (2023) examined the effect of funding liquidity risk on credit distribution in conventional banks. Indeed, Widarjono et al. (2022) investigated the effect of funding liquidity risk stability of Islamic non-urban banks before the Coronavirus outbreak, which does not represent the latest condition.

Addressing the gap, this study aimed to encapsulate the influence of funding risk, along with some control variables, on the balance of IRBs, including the period of the Coronavirus outbreak. This study focuses on Java Islamic Rural Banks (IRBs), which were specifically selected based on two factors. First, Java has the highest concentration of these banks, hosting 98 of the 175 IRBs in Indonesia (56%) as of 2023. Second, the island is the nation's economic powerhouse, accounting for approximately 57% of Indonesia's total Gross Domestic Product (GDP) in the same year (Badan Pusat Statistik, 2024). Thus, this dual concentration of IRBs and economic activity makes Java an ideal and representative case for this research.

This study is expected to provide a powerful contribution by enhancing both the theoretical understanding and practical management of Islamic Rural Banks (IRBs). Theoretically, it addresses critical gaps by extending the limited research on how funding liquidity risk (FLR) affects IRB stability and introduces novel moderating variables. The study first investigates how this relationship is influenced by the COVID-19 Crisis, which is more current than previous pre-crisis research (Widarjono et al., 2022). Besides, it also analyzes how the relationship is affected by bank size. Practically, the outcomes are expected to provide an actionable understanding for regulators like the Financial Services Authority (OJK). The results can inform the design of more effective supervision for IRB liquidity, promoting good governance and ensuring these banks can continue their powerful role in supporting Micro, Small, and Medium Enterprises (MSMEs) in Indonesia.

Literature Review

Funding Liquidity Risk (FLR) arises when a bank cannot meet its short-term financial obligations, either because it has difficulty obtaining market funding or due

to sudden, large withdrawals of deposits. Two fundamental theories explain how this risk ultimately influences bank balance. First, Wagner (2007) assumes that banks constitutively operate with a liquidity mismatch, funding long-period assets like loans with short-period liabilities such as deposits. Consequently, a bank with high liquidity may feel emboldened to take on higher risks by lending aggressively. However, this strategy is risky because if the bank is suddenly unable to meet its short-term obligations, it can trigger bank runs and defaults, thereby threatening its stability. Similarly, Acharya & Naqvi (2012) argue that the availability of funding directly affects a bank's risk-taking behavior. When banks receive large inflows of funds, for instance, managers are encouraged to expand credit rapidly. As a result, they often choose high-risk projects to boost short-term profits, which concurrently increases the risk of default and jeopardizes the balance of the financial system.

In essence, both models propose that banks are more willing to take on greater risk precisely when their funding liquidity risk is low. The condition when a bank has a high ratio of stable deposits to its total assets leads to a low FLR. Therefore, with ample funding at their disposal, banks are incentivized to channel more credit to generate higher profits. This investment expansion, however, must be balanced with careful risk management to minimize bad loans and maintain profitability. Contrarily, if high-risk financing is not controlled effectively, it will almost certainly lead to a surge in bad debts, which subsequently decreases bank profits and stability.

Empirical studies had shed light on the real-world impact of FLR. These studies have produced mixed and often contradictory findings for both conventional and Islamic financial institutions. In conventional banks, for instance, some research indicates that FLR increases a bank's overall risk (Abbas et al., 2021; Khan et al., 2017) and lowers its loan growth (Dahir et al., 2019; Y. Nguyen & Nguyen, 2022; Tran, 2020). In stark contrast, other studies suggest that FLR can actually increase a bank's stability (Vazquez & Federico, 2015; Wang & Zhuang, 2022). This lack of consensus extends to the Islamic banking sector, where research remains limited and just as inconsistent. While Hassan et al. (2019) found that FLR negatively affects the balance of banks under Islamic law in OIC member countries, a study by Berger et al. (2019) reported the exact opposite, finding a positive effect in 24 other countries. Adding further to the ambiguity, (Smaoui et al., 2020) concluded that a powerful influence cannot be detached at all between liquidity risk and the balance of Islamic banks in their sample of 18 countries.

The condition of the bank`s inability to pay its bills on banking performance in Indonesia is still lacking in fact. Sutarmin & Hartono (2022) analyze the effect of

funding liquidity risk on bank risk-taking as measured by Z-score in 43 conventional banks in Indonesia in the period 2015-2019. The results show that the cash insufficiency does not affect bank risk-taking. Muharyadi et al. (2023) examined the effect of funding liquidity risk on credit distribution at banks categorized as BUKU III and BUKU IV in the 2020-2021 period. The results show that funding liquidity has a negative effect on credit distribution. This shows that lower funding liquidity makes it difficult for banks to distribute credit to business players during the pandemic.

Widarjono et al. (2022) examined the effect of banks' cash insufficiency risk on IRBs' stability as measured by Z-score and financing loss provision (FLP) in the 2013-2018 period. The results of the study show that funding liquidity risk improves the balance of IRBs. Interestingly, small IRBs face greater risks compared to large IRBs related to the negative impact of cash flow risk on stability. In addition, the influence of cash flow risk on the balance of IBRs is greater for IRBs located in Java than for IRBs located outside Java.

The study on the effect of funding liquidity risk on the balance of IRBs was conducted in the pre-COVID-19 Crisis (Widarjono et al., 2022). There is no research on the effect of a bank`s cash insufficiency during COVID. The existence of the Coronavirus outbreak is predicted to increase the cash flow risk, which will affect the balance of IBRs. Thus, this study analyzes whether the influence of this cash insufficiency on bank stability is affected by the COVID-19 Crisis. This study contemplates COVID-19 as a moderating variable by conducting an interaction between funding liquidity risk and COVID-19 to find out whether COVID-19 affected the effect of cash insufficiency risk on IRBs' stability during COVID-19.

Methods

This study aims to examine the influence of cash flow risk on the balance of IRBs. A quantitative approach using regression was chosen because it provides an objective framework. Specifically, the analysis employs static panel data regression to evaluate this impact. The model specification is adapted from previous research, particularly the work of Smaoui et al. (2020) and Widarjono et al. (2022). Therefore, the relationship between the variables is captured in the following static panel data regression model.

$$\begin{aligned}\text{Zscore}_{\text{it}} = {} & \emptyset_0 + \emptyset_1 \text{FLR}_{\text{it}} + \emptyset_2 \text{Lasset}_{\text{it}} + \emptyset_3 \text{CAR}_{\text{it}} + \emptyset_4 \text{FDR}_{\text{it}} + \emptyset_5 \text{CIR}_{\text{it}} + \\ & \emptyset_6 \text{LGRDP}_{it} + \emptyset_7 \text{COVID}_{it} + \text{e}_{\text{it}} \end{aligned} \quad (1)$$

The dependent variable in this study is stability. Stability is measured using a Z-score (Rizvi et al., 2020; Widarjono et al., 2022). Z-score is measured using the following formula:

$$\text{Zscore} = \frac{(ROA+CAR)}{SD\ ROA} \quad (2)$$

The Z-score is a key metric used to assess a bank's risk of failure, calculated using variables. They are Return on Assets (ROA), the Capital Adequacy Ratio (CAR), and the standard deviation of ROA (SDROA). Crucially, a higher Z-score indicates greater financial balance and a lower probability of default.

Funding liquidity risk (FLR) is the main independent variable. As financial intermediaries, IRBs disburse their funds to generate income. The problem that arises is that Islamic rural banks carry out investment activities that are continuing assets but must pay their obligations in the short term. As a result, IRBs often face this maturity mismatch. Maturity mismatch directly affects the IRBs' ability to carry their funds and, afterward, influences profits and stability. The inability of a bank to satisfy a depositor's claim punctually over a certain period due to long-term investment is called Funding liquidity risk (Tran, 2020; Wang & Zhuang, 2022). Total deposits divided by total assets is widely used to measure the cash insufficiency risk (Dahir et al., 2019; Smaoui et al., 2020). A bunch of empirical studies documented that cash flow risk influences bank stability for both conventional banks and Islamic banks (Abbas et al., 2021; Y. Nguyen & Nguyen, 2022; Wang & Zhuang, 2022; Widarjono et al., 2022).

Our study included bank-internal factors and external conditions, as well as control variables that influence bank stability (Rizvi et al., 2020). Numerous studies show that bank-specific variables and macroeconomic variables affect bank stability. Bank-specific variables comprise bank size (Assets), capital (CAR), financing (FDR), efficiency (CIR), and non-performing loans (NPF). The macroeconomic condition is the Gross Regional Domestic Product (GRDP) and the Coronavirus outbreak.

Bank size is measured by total assets and is expressed in the form of a natural logarithm (Widarjono & Misanam, 2024). Capital Adequacy Ratio (CAR) represents a bank's capital, and it is measured as the ratio of equity to risk-weighted assets (Šeho et al., 2024). Financing is measured by the ratio of total financing to total deposits (Sutrisno & Widarjono, 2024). Operating efficiency is calculated by the ratio

of cost to income (Rizvi et al., 2020). GRDP is the gross regional domestic product for each province with the constant price of 2010. COVID-19 is a pandemic that began in the second quarter of 2020. COVID-19 is a dummy variable, and it is one from the second quarter of 2020 to the fourth quarter of 2021. Table 1 represents the variable measurement and hypothesis of this study.

Table 1. Variable definitions and hypotheses

Variable	Definition	Hypothesis
Dependent variable		
Zscore	$\text{Zscore} = \frac{(ROA+CAR)}{SD\ ROA}$	
Independent variables		
FLR	Total deposit/total assets	-
Asset	Total assets	+
CAR	Equity/Assets weighted risk	+
FDR	Total financing/Total deposit	+
CIR	Total cost divided by total income	-
GRDP	Gross Regional Domestic Product	+
COVID	Covid-19 Crisis	-

For further analysis, this study analyzes whether the effect of FLR on bank stability is affected by the COVID-19 Crisis. To answer the purpose of this study, this study uses the COVID-19 variable as a moderating variable by conducting the interaction between FLR and COVID-19. COVID-19 is hypothesized to increase the negative influence of funding liquidity risk on IRBs' stability. The model of the static panel regression can be written as follows:

$$\text{Zscore}_{\text{it}} = \emptyset_0 + \emptyset_1 \text{FLR}_{\text{it}} + \emptyset_2 \text{FLR} * \text{COVID}_{\text{it}} + \emptyset_3 \text{Lasset}_{\text{it}} + \emptyset_4 \text{CAR}_{\text{it}} + \emptyset_5 \text{FDR}_{\text{it}} + \emptyset_6 \text{CIR}_{\text{it}} + \emptyset_7 \text{LGRDP}_{it} + \emptyset_8 \text{COVID}_{it} + \text{e}_{\text{it}} \quad (3)$$

The next analysis is to investigate whether the effect of FLR on bank stability is affected by bank size. The bank's balance is highly dependent on the size of the bank (Ibrahim & Rizvi, 2017). Their assets can measure the size of Islamic banks. Banks whose asset value is above the median value of all Islamic bank assets are grouped into large Islamic banks, while Islamic banks whose asset value is below the median

are grouped into small Islamic banks. Large IRBs are given the number 1, and small IRBs are given a value of 0 with the symbol of the Large. To find out whether the size of IRBs affects the influence of cash flow risk on IRBs' stability, this study uses the large variable as a moderating variable. In the regression equation of this large variable, there is an interaction between funding liquidity risk. The large is hypothesized to reduce the negative influence of cash flow risk on the balance of IRBs. The equation model is written as follows:

$$\begin{aligned}\text{Zscore}_{\text{it}} = {} & \emptyset_0 + \emptyset_1 \text{FLR}_{\text{it}} + \emptyset_2 \text{FLR} * \text{Size}_{\text{it}} + \emptyset_3 \text{Lasset}_{\text{it}} + \emptyset_4 \text{CAR}_{\text{it}} + \\ & \emptyset_5 \text{FDR}_{\text{it}} + \emptyset_6 \text{CIR}_{\text{it}} + \emptyset_7 \text{LGRDP}_{it} + \emptyset_8 \text{COVID}_{it} + \text{e}_{\text{it}} \end{aligned} \quad (4)$$

Our study employs static panel regression. Three methods are usually used to estimate static panel regression, namely common effect (CE), fixed effect (FE), and random effect (RE). Three tests are used to find out which method is the best. First, the F test is used to select the common effect and fixed effect methods. Second, the LM test is used to choose between the common effect and random effect methods. Finally, the Hausman test is used to determine the fixed effect and random effect methods.

This study comprises 97 Islamic Rural Banks (IRBs) in Java. In addition, the analysis employs an unbalanced panel of quarterly data from 2015 to 2023, yielding a total of 3,480 observations. The collected data were in the form of balance sheets, profit and loss statements, and financial ratio reports, were sourced from the official publications of the Financial Services Authority (OJK) and are publicly available on its website (www.ojk.go.id).

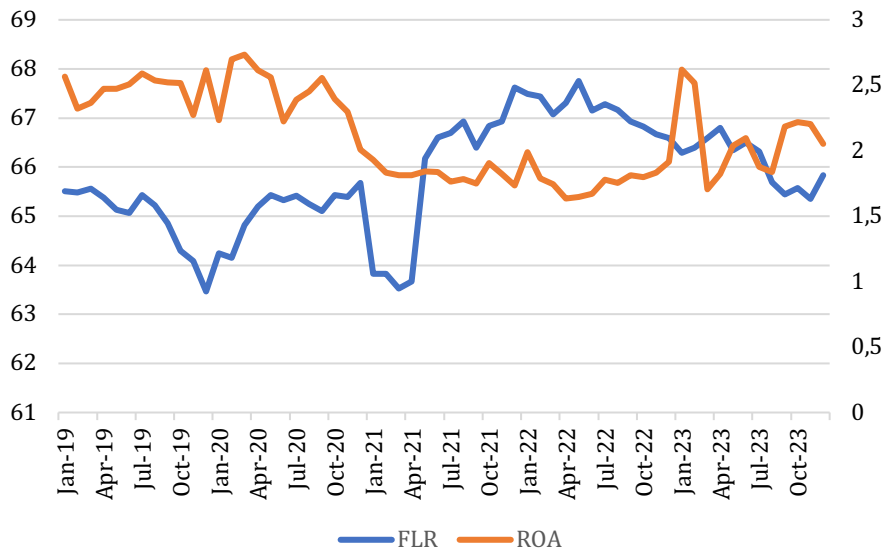
Results and Discussion

Results

The discussion began with a summary of the condition of IRBs in Indonesia. The number of IRBs in 2023 was 175 banks with assets of 23.177 trillion. Figure 1 illustrates IRB's financial performance in terms of profitability and funding liquidity risk in the 2019-2023 period. Profit is measured by return on assets (ROA), and funding liquidity risk is measured by the ratio of total deposits to total assets (FLR). The average ROA was 2.12% which is above the 1.5% threshold. The condition indicates that, in general, IRBs are in a healthy condition. Nevertheless, profitability has been on a downward trend since the Covid-19 outbreak, and since 2023 has

shown an increasing trend. Meanwhile, funding liquidity risk shows an upward trend, although it will decline in 2023. The very interesting thing is that there is a negative correlation between ROA and FLR of -0.5739. The magnitude of the correlation coefficient demonstrates a strong negative relationship between funding liquidity risk and profit. This means that a high cash flow risk will reduce IRB's profits, and conversely, a low cash flow risk will increase profits. The existence of a negative relationship between funding liquidity risk and this profit, of course, will reduce the balance of IRBs.

Figure 1. FLR and ROA, 2019-2023



The Z-score was between -2.709 and 52.1666 with an average of 5.725 and a standard deviation of 4.165. The FLR was from 5% to 2359% with an average of 64.5% and a standard deviation of 18.8%. The asset was from 0.955 to 1911.000 IDR billions with an average of 99.615 and a standard deviation of 170.178. The high standard deviation indicates that the IRBs vary widely. The CAR was from 1.18% to 610.4% with an average of 16% and a standard deviation of 16.7%. The average CAR is above the threshold of 12% established by the OJK, meaning that IRBs have strong capital. The FDR was from 2% to 11202% with an average of 165.2% and a standard deviation of 438.4%. The FDR is above the threshold of 75% set by the OJK, indicating that IRBs are carrying out an expansionary financing policy. The CIR was

from 1% to 677.3% with an average of 37.1% and a standard deviation of 27.1%. The average CIR is still below the threshold of 94% determined by the OJK, so IRBs, on average, have a good level of operational efficiency (see Table 2).

Table 2. Summary statistics

Variable	Mean	Std. dev.	Min	Max
Z-score	5.725	4.165	-2.709	52.166
FLR	0.645	0.188	0.005	2.359
Asset	99.615	170.178	0.955	1911.000
CAR	0.160	0.167	0.018	6.104
FDR	1.652	4.384	0.002	112.202
CIR	0.371	0.271	0.001	6.773
PDRB	275.956	130.861	20.287	524.686
COVID	0.195	0.396	0.000	1.000

Table 3 shows the correlation matrix between independent variables. In general, the correlation matrix value is below ± 0.5. The low correlation matrix value indicates that there is no multicollinearity problem, thus producing a robust estimator.

Table 3. Correlation matrix

	Zscore	FLR	LAsset	CAR	FDR	CIR	LPDRB	COVID
Zscore	1.000							
FLR	-0.119	1.000						
LAsset	-0.320	0.036	1.000					
CAR	0.485	-0.151	-0.436	1.000				
FDR	-0.029	-0.391	0.013	0.180	1.000			
CIR	-0.174	-0.005	0.105	0.067	-0.048	1.000		
LPDRB	0.036	-0.089	-0.010	0.136	0.075	-0.125	1.000	
COVID	-0.050	-0.047	0.100	-0.026	0.095	0.024	0.017	1.000

Table 4 presents the baseline results, consisting of accepted, fixed-effect, and random effects. The bottom of Table 4 presents the selection of static regression models consisting of the F test, LM test, and Hausman test. Based on the three tests,

the best model is the fixed effect model. Table 4 shows that funding liquidity risk (FLR) is negative and significant to the Z-score at α=1%. The assets are negative and significant to the Z-score at α=1%. CAR is positive and significant to the Z-score at α=1%. FDR is negative and significant to the Z-score at α=1% in model 2. CIR is negative and significant to the Z-score at α=1%. GRDP is positive and significant to the Z-score at α=1%. COVID-19 is negative and significant to stability at α=10%.

Table 4. Baseline results

	CE		**FE**		**RE**	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
Constant	15.187***	0.000	-18.265***	0.000	7.193***	0.008
FLR	-2.516***	0.000	-2.234***	0.000	-2.030***	0.000
LASSET	-0.289***	0.000	-1.557***	0.000	-1.068***	0.000
CAR	12.076***	0.000	11.784***	0.000	12.131***	0.000
FDR	-0.156***	0.000	-0.049***	0.000	-0.047***	0.000
CIR	-3.269***	0.000	-0.952***	0.000	-0.980***	0.000
LGRDP	-0.256***	0.000	4.202***	0.000	1.408***	0.000
COVID	-0.141	0.172	-0.109*	0.056	-0.127**	0.032
R-squared	0.314		0.865		0.515	
Adj. R-squared	0.312		0.860		0.514	
No. Banks	97					
Observations	3480					
Diagnostic test						
F-test	142.978***					
LM-test	34435.260***					
Hausman-test	95.266***					

***, **, * denote significant at α=1%, α=5%, α=10%.

The main finding reveals that cash flow risk (FLR) has a significant negative effect on the balance of IRBs, as measured by the Z-score. This indicates that as cash flow risk increases while a bank's stability tends to decrease. In accordance, this phenomenon aligns with the bank liquidity and risk-taking theory proposed by Acharya & Naqvi (2012). It highlights that when banks aggressively pursue high-return investments without prudent management in client selection and financing oversight, the risk of non-performing financing rises. Previous empirical research by Abbas et al. (2021), Y. Nguyen & Nguyen (2022), and Sahyouni & Wang (2019) also

brought evidence that this, one after another, decreases profitability and stability. Notably, the severity of this impact appears to be amplified during the Crisis. The FLR coefficient in this study was -3.123, which is substantially larger in magnitude than the pre-COVID-19 coefficient of -0.6523 reported by Widarjono et al. (2022). Moreover, this stark difference suggests that the COVID-19 era exacerbated cash flow risk, making its detrimental effect on IRB stability significantly more pronounced.

The next discussion is the control variable in the study. First, assets negatively influence the bank balance. Assets have a strong influence on encouraging bank stability. The size of the assets will meet obligations, avoid the risk of bankruptcy, and increase operational efficiency due to economies of scale. However, having large assets may result in operational inefficiencies, poor funding management, and narrower profit margins. Assets decrease the balance of IRBs because the efficiency level of IRBs is low (Hendri et al., 2025). This is supported by the negative influence of CIR on bank stability. The results of this finding are also supported by research from Saif-Alyousfi et al. (2020) and Putri & Widarjono (2023).

CAR has a positive influence on stability. CAR, which measures bank capital, functions to increase financing and, at the same time, anticipate non-performing financing that occurs. CAR and bank performance have a powerful relationship. Banks are required to maintain adequate capital to create effective performance. Banks with high CAR can channel funds well and can manage bad financing that will occur. Thus, banks with high CAR can generate high profits and further improve bank stability (Putri & Misbah, 2025). The results are supported by previous studies by Dao & Nguyen (2020), Harkati et al. (2020), and Asiamah et al. (2024).

FDR, which measures the amount of financing, has a negative influence on the balance of IRBs. Banks with high FDR rates are expected to generate high profits. However, expansive financing without being balanced with good control will increase non-performing financing, thereby reducing profits and balance (Sutrisno et al., 2023). FDR has a negative effect on stability because IRBs face a high level of non-performing financing as measured by non-performing financing (NPF). IRBs' NPF is 9%, which exceeds the threshold of 5% set by the OJK. The findings of this study are in line with Alkheil et al. (2021) and Widarjono et al. (2022).

CIR has a negative influence on balance. Banks with high CIR indicate low efficiency levels, whereas banks with low CIR show low operational efficiency levels. CIR is inversely proportional to the level of bank profitability (Rizvi et al., 2020). The low level of efficiency of banks causes expensive bank fees and subsequently

decreases the bank's stability. The findings of this study are supported by previous research, such as research from Khémiri et al. (2024).

GRDP positively affects stability. High economic growth encourages banks to undertake expansive financing. Furthermore, high economic growth will also reduce non-performing financing due to the high ability of customers to repay their financing. High financing with low financing risk drives the level of profit and balance of Islamic rural banks. This finding is in line with empirical studies from Widarjono et al. (2022) and Jusuf & Widarjono (2024).

The coronavirus pandemic has harmed the balance. The impact of COVID-19 occurred in the second quarter of 2020, causing Indonesia's economic growth to experience negative growth in the second, third, and fourth quarters of that year. Due to low economic growth, Islamic rural banks are unable to distribute funds, and customers have difficulty repaying their financing, so their profits and stability decline. This study confirms the empirical findings of Risfandy & Pratiwi (2022).

Further investigation

The next analysis examines the COVID-19 moderating variable and the large moderating variable that affect the influence of cash flow risk on IBRs' stability. Table 5 shows COVID-19 as a moderating variable as indicated in equation 3, and Table 6 reveals large as a moderating variable as shown in equation 4. Before analyzing the results, this study checks the validity of the static panel regression model. Based on the F-test, LM test, and Hausman test, we reject the null hypothesis, meaning that the best method to estimate equations 3 and 4 is the fixed effect model.

Model 3 shows that the funding liquidity risk (Frisk) is negative and significant at α=1%. The interaction variable between funding liquidity risk and COVID-19 (FLR*Covid) is positive and significant at α=1%. The assets are negative and significant at α=1%. CAR is positive and significant at α=1%. FDR is negative and significant at α=10%. CIR is negative and significant at α=1%. COVID-19 is negative and significant at p α=10%. Model 4 shows that the funding liquidity risk (Frisk) is negative and significant at α=1%. The interaction variable between funding liquidity risk and large (FLR*large) is negative and significant at α=1%. The assets are positive and significant at α=1%. CAR is positive and significant at α=1%. FDR is negative and significant at α=1%. CIR is negative and significant at α=1%. COVID-19 is negative and significant α=5%.

Table 5. Further results: The moderating effect of COVID-19

	CE		**FE**		**RE**	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	15.432***	0.000	-18.022***	0.000	7.472***	0.006
FLR	-2.723***	0.000	-2.336***	0.000	-2.136***	0.000
FLR*COVID	1.513*	0.072	0.989***	0.005	1.018***	0.008
LASSET	-0.293***	0.000	-1.559***	0.000	-1.069***	0.000
CAR	12.075***	0.000	11.784***	0.000	12.132***	0.000
FDR	-0.146***	0.000	-0.042***	0.000	-0.040***	0.000
CIR	-3.260***	0.000	-0.945***	0.000	-0.972***	0.000
LGRDP	-0.261***	0.000	4.189***	0.000	1.391***	0.000
COVID	-1.104**	0.023	-0.738***	0.002	-0.774***	0.001
R-squared	0.314		0.865		0.516	
Adj. R-squared	0.313		0.861		0.515	
No. Banks	97					
Observations	3480					
Diagnostic test						
F-test	143.117***					
LM-test	34428.010***					
Hausman-test	97.528***					

***, **, * denote significant at α=1%, α=5%, α=10%.

Table 6. Further results: The moderating effect of bank size

	CE		**FE**		**RE**	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	13.643***	0.000	-14.656***	0.000	7.870***	0.004
FLR	-2.098***	0.000	-3.792***	0.000	-3.664***	0.000
FLR*Size	-0.474**	0.048	2.891***	0.000	2.928***	0.000
LASSET	-0.201***	0.006	-1.518***	0.000	-1.110***	0.000
CAR	12.074***	0.000	12.095***	0.000	12.395***	0.000
FDR	-0.153***	0.000	-0.051***	0.000	-0.049***	0.000
CIR	-3.236***	0.000	-1.029***	0.000	-1.059***	0.000
LGRDP	-0.266***	0.000	3.847***	0.000	1.412***	0.000

	CE		FE		RE	
COVID	-0.165	0.135	-0.099**	0.037	-0.110*	0.054
R-squared	0.315		0.866		0.523	
Ad. R-squared	0.313		0.862		0.522	
No. Banks	97					
Observations	3480					
Diagnostic test						
F-test	145.046***					
LM-test	34197.760***					
Hausman-test	85.161***					

***, **, * denote significant at α=1%, α=5%, α=10%.

The analysis across both Model 3 and Model 4 confirms a consistent and robust finding that liquidity risk has a negative impact on the balance of IRBs. This core result holds even after introducing moderating variables, gaping initial findings presented in Table 4. However, the story gets more distinction when looking at the moderating factors. Interestingly, the study reveals a powerful positive interaction between cash flow risk and the COVID-19 period. The logic was that, as suggested by Nur Ajizah & Agus Widarjono (2023), Crisis-related lockdowns actually reined in the IRBs' ability to disburse funds. This unexpected slowdown effectively lowered their immediate liquidity risks, which in turn provided a temporary boost to their balance. Bank size also plays a crucial role in shaping this relationship, as shown by another powerful and positive interaction term. What this means is that the detrimental effect of cash insufficiency risk on stability is much more severe for smaller IRBs. Larger institutions appear better insulated from this particular risk, in contrast. This resilience likely stems from the superior infrastructure and more sophisticated risk management facilities that larger IRBs possess, allowing them to better handle maturity mismatches compared to their smaller counterparts (Widarjono et al., 2022). Meanwhile, it's worth noting that the effects of the control variables in Models 3 and 4 (Table 4) remained consistent with the results from the initial models, reinforcing the overall stability of the findings.

Conclusion

The outcome of the structural analysis offers powerful theoretical and practical implications for understanding and managing bank stability. This study investigates the impact of cash flow risk, bank-specific factors, and the Coronavirus outbreak on

the balance of banks. A total of 98 IRBs located on the island of Java were selected as the sample. The analysis covers the period from 2019 to 2023, using quarterly data and a static panel regression method. The findings show that this cash insufficiency has a negative effect on bank stability. However, during the COVID-19 period, the effect of funding liquidity risk on stability is powerfully moderated by bank size, with larger IRBs experiencing greater imbalance. In addition, capital positively influences stability, while high financing levels, low operational efficiency, and the Coronavirus outbreak have an unfavorable effect.

Theoretical and practical implications of the research can be drawn. Low funding liquidity encourages Islamic banks, including IRBs, to make high-risk investments in generating income. However, if not balanced with good lending monitoring, it will increase bad financing and reduce profits, which ultimately disrupts the balance of IRBs. This finding makes it important information for OJK as a regulator and IRBs in formulating banking policies in managing funding liquidity risk. First, OJK must carry out early detection related to maturity mismatch so as not to disturb the balance of IRBs. Second, IRBs must fortify bank fundamentals by strengthening capital and efficiency to encourage stability.

There are several weaknesses in this study. First, the study does not describe the condition of IRBs throughout Indonesia because the object of this study is limited to IRBs located on the island of Java. Second, the variables of this study have not included elements of competition, some bank-specific variables, such as non-performing financing. The next study, therefore, must include the variables of competition and NPF and cover all regions of Indonesia.

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