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Financial Risk Determinants in Islamic Rural Banks: Static and Dynamic Models

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Abstract
This study aims to determine the effect of financial performance on the financial risk of the Islamic Rural Bank (IRB) in Indonesia. The data period used from 2012 to 2019 on 65 IRBs using static and dynamic panels. The static panel test uses the common, fixed, and random effects, while the static panel uses the SYS-GMM test. The test results of 8 models on the static panel show that the best model is to use the random effect. The dynamic panel test shows the results of the AB test, Sargan test, PLS test, and FE test; it can be seen that the equation model has a consistent estimator. The data processing results show that the activities of the IRB, profitability, and economic growth have a negative relationship to the financial risk of the IRB. Then, the efficiency level of the IRB and inflation did not affect its financial risk. Finally, the policy implications of IRB management should adopt a cautious approach to financial risk management by recognising the inherent dangers in funding and financing policies.

INTRODUCTION

The role of the IRB in driving growth in the real sector can be seen in the increase in the value of IRB assets from 2016 to 2019. The asset value of IRB in 2016 was IDR 6.573 billion with 163 IRB, and at the end of 2019, the number of IRB was 164 with assets of IDR 13.758 billion (OJK, 2020). The increase in these assets shows the significant mobility of incoming and distributed funds. This situation also indicates increased competition between IRB and IRB with microfinance institutions (MFIs), savings, loan cooperatives, etc. This competition influences IRB management policies to avoid financial risk. To prevent uncontrollable risks, the OJK issued Regulation number 13/POJK.03/2015 concerning applying risk management for IRB and IRB to create an institutionally strong micro-banking sector with an excellent reputation to survive intense competition.

Risk is the uncertainty about circumstances based on currently planned policies. This understanding is in line with the statement of Bouslama and Lahrichi (2017), who states that risk is based on the probability of loss. Risk must be distinguished from uncertainty, while risk is the possibility of an event occurring when its occurrence is uncertain. However, an event's risk level goes hand in hand

with uncertainty. Higher uncertainty tends to cause higher risks (Rhanoui & Belkoutour, 2019). Therefore, risk is a consequence of uncertainty.

In its operations, the IRB faces uncertainties that impact the emergence of many risks. The IRB can minimise risk by identifying the uncertainties that will be encountered. Increasingly complex economic activities cause the IRB to face various risks. Therefore, Bank Indonesia has set the minimum standard Sharia banking uses to manage multiple risks. Bank Indonesia issued Bank Indonesia Regulation (PBI) Number 15/12/PBI/2013 concerning the minimum capital adequacy requirement for commercial banks in response to the issuance of Basel III.

Basel III, published in 2010, is the Global Regulatory Framework for More Resilient Banks and Banking Systems (Basel Committee on Banking Supervision, 2010). Its objectives include overcoming banking problems, such as increasing the capacity to overcome potential risks of banking losses, improving the quality of risk management in banking, and proposing systematic policies on cross-border banking. In addition, Basel III is expected to strengthen the macroprudential regulatory side in dealing with economic crises (Hafez & El-Ansary, 2015).

The Islamic Financial Service Board (IFSB) is an international organisation that issues several management principles and standards for Islamic financial institutions. The BI uses IFSB provisions to issue policies related to Islamic banks (Meutia & Adam, 2021). Sharia bank management regulations are contained in BI Regulation Number 13/23/PBI/2011, which discusses implementing risk management for Islamic Commercial Banks and Islamic Business Units. The regulation describes many Sharia banking risks, including financing, market, operational, liquidity, legal, compliance, reputation, and strategic risks. The regulation lists two specific risks Islamic banking faces: yield and investment.

IRB have several prominent risks, including financing, operational, and liquidity risks (Sudarsono et al. 2024). Financing risk can be observed in the performance of disbursed financing repayments. Operational risk relates to a bank's internal processes, which inadequate quality human resources can cause. Meanwhile, the liquidity ratio relates to a bank's ability to meet its financial obligations (Sudarsono et al., 2021). Therefore, IRB must be creative in diversifying to obtain sources of income from fee-based income, such as transfer and collection processes, payment of water bills, electricity, telephone, mortgage instalments, and so on. Additionally, IRB's financial risk can be reduced by increasing efficiency by maintaining the ratio of operating costs to operating income at a maximum value. If the IRB cannot optimise operational income to cover operational costs, the efficiency level of the IRB will decrease.

Research on risks in financial institutions and their determinants has become a widely discussed topic (Laeven & Levine, 2009; Acharya & Naqvi, 2012; Agarwal et al., 2012). Many studies have also attempted to identify the determinants of banking risk, such as regulation (Laeven & Levine, 2009; Black & Hazelwood, 2012), competition (Berger et al., 2009), bank size (Bhagat et al., 2012), and governance (Laeven & Levine, 2009). Other studies include financial performance instruments (Khan et al., 2016; Lei & Song, 2013; Sudarsono & Ash Shidiqie, 2021; Vazquez &

Federico, 2015), as well as liquidity and capital funding banks (Berger & Bouwman, 2009; Horváth et al., 2014; Lei & Song, 2013; Vazquez & Federico, 2015).

This study adopts the theories developed by Acharya and Naqvi (2012), Mokni and Rajhi (2016), and Dahir et al. (2018), which provide evidence that a large number of deposits withdrawn by banks reduce liquidity risk funding and encourage banks to take many risks. Because of this, IRBs tend to be aggressive in disbursing financing without considering security to optimise revenue. Management, too oriented toward revenue without considering security, will lead to lower efficiency. This situation causes IRB management to face more complex risks in managing IRB finances.

IRB must be able to manage various risks related to their business and try different ways to prevent opportunities for uncontrollable risks. Risks in the banking world are often associated with each other so that a contagion effect can occur. The contagion effect is a state of failure that appears continuously and disrupts the financial system's stability. A high level of risk in the banking industry can lead to the fragility of the institutional system and reduce the level of bank stability (Kasri & Azzahra, 2020; Sarkar & Sensarma, 2015; Akins et al. 2016; Wibowo & Siantoro, 2017).

This study aimed to determine the risk of IRB funding (FLR), IRB activity (BAC), IRB size (LZE), IRB capital structure (ETA), IRB profitability (NTA), IRB liquidity (LIK), IRB efficiency (EFC), economic growth (GDP), and inflation (INF) that affect the risk of IRB in Indonesia from the 2012–2019 period because the period data available for calculating the variables in this study's model is more complete. The results of this study can help determine the extent to which the variables in the model affect IRB financial risk. We hope this research will provide input for IRB management in formulating risk-based financial policies.

The remainder of this paper is organised as follows. Section 1 provides the background and theoretical debate based on previous literature. Section 2 discusses the methods used, including variable selection and data processing analysis. Section 3 presents the data processing results and a discussion. Finally, Section 4 summarises the research findings, discusses their implications, acknowledges the research limitations, and provides recommendations for future research.

RESEARCH METHODS

Data Description

This study uses annual data from the IRB in Indonesia obtained from financial reports from the Financial Services Authority (OJK). The data period was from 2012 to 2019 at 65 IRB in Indonesia. The consideration is to use 65 IRB because the variable data in the financial reports from 65 IRB is more complete than other IRBs. Meanwhile, data on economic growth were obtained from GDP at constant prices from the annual financial reports of the Central Bureau of Statistics (BPS), and inflation was obtained from yearly data from Statistics (BPS).

Financial performance

Financial risk is often the focus of analysis because the ability of a financial system to manage such risks can determine the system's stability. When financial risk is not managed correctly, it can threaten financial stability by causing failure of financial institutions, financial crises, or broader economic instability. IRB financial risk is used as the dependent variable in this study and measured by a Z-score, equal to the sum of ROA and CAR divided by the standard deviation of ROA. In other words, capital and income can cover losses within a certain period (Lepetit & Strobel, 2013). The Z-score is also a proxy for financial resilience or bank stability (Kasri & Azzahra, 2020; Beck, 2013). In addition, The Z-score is used to assess a bank's risk (bankruptcy) (Khan et al., 2016; Laeven & Levine, 2009; Mokni & Rajhi, 2016). Z-score technical abstraction can be formulated as follows:

$$Z_{score} = \frac{E(ROA_{it})+CAR_{it}}{\sigma(ROA_{it})} \quad \text{.....(1)}$$

ROA_{it} is the ratio between return and total assets in IRB i and year t. CAR_{it} is the ratio of total equity to the IRB's total assets.

Table 1 shows the financial performance variables, including the risk of funding (FLR), activity (BAC), size (LZE), capital structure (ETA), profitability (NTA), efficiency (EFC), liquidity (LIK), economic growth (GDP), and inflation (INF). The variables used in this model are based on Laeven et al. (2016), Mateev et al. (2024), Beck et al. (2013), Saif-Alyousfi and Saha (2021), Kasri and Azzahra (2020), Ashraf et al. (2016), Srairi (2013), Mahdi and Abbes (2018), Chiaramonte et al. (2024), and Hassan et al. (2019).

The relationship between financial performance and financial risk can be explained as follows:

Table 1. Independent Variables

Variables	Measurement	Sign	Value	Source
Funding risk (FLR)	Total funding divided by total assets	+/-	%	Laeven et al. (2016), Mateev et al. (2024).
Activities (BAC)	Total financing divided by total assets	+	%	Beck et al. (2013), Laeven et al. (2016), Saif-Alyousfi and Saha (2021).
Size (LZE)	Logarithm of total assets	+/-	%	Kasri and Azzahra (2020), Ashraf et al. (2016), Beck et al. (2013), Srairi (2013).
Capital structure (ETA)	Total equity divided by total assets	-	%	Mahdi and Abbes (2018), Srairi (2013), Chiaramonte et al. (2024).
Profitability (NTA)	Net profit divided by total assets	-	%	Kasri and Azzahra (2020), Hassan et al. (2019), Chiaramonte et al. (2024).
Efficiency (EFC)	Operating costs divided by total revenue	+	%	Ashraf et al. (2016), Hassan et al. (2019).

Liquidity (LIK)	Total financing divided by total funding	+	%	Mahdi and Abbes (2018), Mateev et al. (2024).
Economic growth (GDP)	Logarithm Gross Domestic Product	_	%	Kasri and Azzahra (2020), Ashraf et al. (2016), Hassan et al. (2019).
Inflation (INF)	Inflation rate	+	%	Kasri and Azzahra (2020), Saif-Alyousfi and Saha (2021).

Source: Compilation of various journals discussing banking financial risks.

Model specifications

This study uses a dynamic panel to accommodate changes in financial performance, such as IRB funding risk (FLR), IRB activity (BAC), IRB size (LZE), IRB capital structure (ETA), IRB profitability (NTA), IRB liquidity (LIK), IRB efficiency (EFC), economic growth (GDP), and inflation (INF), all of which affect IRB risk. IRB management should consider all changes to minimise risks now and in the future. In addition, the dynamic model allows IRB to control adjustment costs to cope with changes in financial performance (Ashraf et al., 2016; Daher et al., 2015; Dahir et al., 2018). The model used is as follows:

$$RISK_{it} = \partial + \beta_1 RISK_{it-1} + \beta_2 FLR_{it} + \beta_3 BAC_{it} + \beta_4 LZE_{it} + \beta_5 ETA_{it} + \beta_6 NTA_{it} + \beta_7 LIK_{it} + \beta_8 EFC_{it} + b_9 GDP_{it} + \beta_{10} INF_{it} + \Phi X_{it} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where the subscripts i and t refer to IRB and year, RISK, respectively, $_{it}$ is bank risk; $RISK_{it-1}$ is the risk lag of IRB; FLR_{it} is the funding liquidity risk; BAC_{it} is bank activity; δ, β_1, b_2, b_3,...,b_{10} is the slope coefficient to be calculated, and εit is the composite error term. This study considers temporal dependence on bank risk by including a lag variable with a Z-score size that ongoing regulatory changes regarding liquidity requirements can explain.

Model estimation

This study uses static and dynamic panel data to examine eight IRB financial risk equation models. A dynamic model using the test common effect (CE), random effect (RE), and fixed effect (FE), followed by the Hausman test and Lagrange test (LM test), was used to obtain the best model. Then, a dynamic panel test is carried out, in line with the existence of the model cross-section or time series, a dynamic relationship characterised by panel data using the lag of the dependent variable or variable as a regressor in the regression. This causes the problem of endogeneity, which causes the model to be estimated by an approximation fixed effect or random effect that produces inconsistent and biased estimators (Verbeek, 2008; Harris & Mátyás, 2004)

RESULT AND DISCUSSION

Data Processing Results

Table 2 presents statistical descriptions of the variables used in this study. The table shows that the risk of IRB ranged from 0.018 to a high of 10.853 standard deviations, with an average score of 0.847. Funding liquidity risk has an average value of 0.541 with a value between 0.001 and 24.121, IRB activity value from 0.001 to 11.159, bank size value from 14.876 to 20.921, bank capital value ranging from -0.437 to 4.043, and IRB profitability value of-0.715 to 3.272. The institutional review board (IRB) liquidity level ranges from 0.001 to 10.250, while the IRB efficiency level ranges from 0.001 to 5.623. Meanwhile, the value for economic growth was 15.742–16.160, with inflation rates of 0.420 and 2.460.

Table 2. Statistical Description

Variable	Obs	Mean	Std. Dev.	Min	Max
RISK	455	1.971	0.847	0.0178	10.853
FLR	455	0.541	1.1557	0.001	24.121
BAC	455	0.128	0.530	0.001	11.159
LZE	455	17.186	1.114	14.876	20.921
ETA	455	0.174	0.235	-0.437	4.043
NTA	455	0.082	0.185	-0.715	3.272
LIK	455	0.621	1.442	0.001	10.250
EFC	455	0.623	0.348	0.001	5.623
GDP	455	16.011	0.099	15.742	16.160
INF	455	0.894	0.659	0.420	2.460

Note: RISK= Financial risk; FLR= Total funding divided by total assets; BAC= Total financing divided by total assets; LZE= Logarithm of total assets; ETA= Total equity divided by total assets; NTA= Net profit divided by total assets; LIK= Total financing divided by total funding; EFC= Operating costs divided by total revenue; GDP= Logarithm Gross Domestic Product; and INF= Inflation rate

The correlation value between IRB financial risk (RISK) and funding risk (FLR), IRB activity (BAC), IRB profitability (NTA), IRB liquidity (LIK), economic growth (GDP), and inflation (INF) is below 0.10. These results suggest that FLR, BAC, NTA, LIK, GDP, and INF do not affect the RISK. The RISK correlation value for the size of the IRB (LSZ) is negative, with a value of -0.1659. Meanwhile, RISK has a positive correlation with IRB capital structure (ETA), with a value of 0.3772, and RISK has a positive correlation with IRB efficiency (EFC) of 0.1078. Overall, the correlation between the variables provided an initial picture of the results of this study.

Table 3. Correlation Matrix

	RISK	FLR	BAC	LZE	ETA	NTA	LIK	EFC	GDP	INF
RISK	1									
FLR	-0.0258	1								
BAC	-0.0152	0.9325	1							
LZE	-0.1659	-0.0452	-0.0141	1						
ETA	0.3772	0.7654	0.7388	-0.1885	1					
NTA	-0.0685	0.8199	0.7908	0.0695	0.7894	1				
LIK	-0.0121	-0.125	0.1029	0.0699	-0.066	-0.0107	1			
EFC	0.1078	-0.0582	-0.3353	-0.3353	0.0008	-0.2347	-0.2347	1		
GDP	-0.0301	-0.0099	-0.0288	0.2766	-0.0685	-0.0438	-0.0438	0.0377	1	
INF	0.0001	0.0949	0.1088	-0.0487	0.0895	0.0912	-0.0069	0.0087	-0.1519	1

Note: RISK= Financial risk; FLR= Total funding divided by total assets; BAC= Total financing divided by total assets; LZE= Logarithm of total assets; ETA= Total equity divided by total assets; NTA= Net profit divided by total assets; LIK= Total financing divided by total funding; EFC= Operating costs divided by total revenue; GDP= Logarithm Gross Domestic Product; and INF= Inflation rate

Further analysis of this model is divided into two parts. First, the results of the static panel model estimation analysis with the approach of common effects (THIS), random effect (RE), and fixed effect (FE). Second, the results of the estimation analysis using the dynamic panel models generalised method of moments (GMM), which is divided into different GMM and system GMM. Tables 4, 5, and 6 present the results of the first regression analysis. The first step was to test the best model among CE, RE, and FE. Based on the model specification test results, the p-value for the LM test yielded significant results, which means that the chosen model was RE between the CE and RE models. In the second test, namely the Hausman test, the value was insignificant; therefore, it can be concluded that the RE model is better than the other models.

The results of the model specification test show that the best model is RE, based on eight random effects in Table 5, which shows that funding risk has a negative relationship with RISK in Models 5 and 6. Meanwhile, the size of the IRB (LSZ) has a positive relationship with RISK in models 2,3, 6, and 8. Capital structure (ETA) positively affects RISK in Models 1, 2, 3, 4, 5, and 8. IRB profitability (NTA) negatively affects RISK in Models 1, 2, 3, and 8. IRB efficiency (EFC) hurt RISK in Models 1 and 8. Meanwhile, IRB activity (BAC), IRB liquidity (LIK), economic growth (GDP), and inflation (INF) are not related to RISK in all models. The number of variables in models 1, 3, and 8 shows that the number of variables with a significant value for RISK is greater than that of the other models.

Table 4. Common Effect

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
FLR	-0.169	-0.173	-0.225**	-0.486***	-0.476***	-0.143	-0.0539	-0.168
	(-1.92)	(-1.95)	(-3.18)	(-6.11)	(-5.97)	(-1.18)	(-0.41)	(-1.92)
BAC	-0.159	-0.186	-0.0771	-0.168	-0.185	0.275	0.221	-0.16
	(-0.89)	(-1.03)	(-0.54)	(-1.01)	(-1.11)	-1.05	-0.84	(-0.90)
LZE	0.0870**	0.102***	0.101***	-0.0194	-0.00351	-0.119**		0.0880**
	-3.1	-3.67	-3.64	(-0.64)	(-0.11)	(-3.04)		-3.29
ETA	4.933***	4.846***	4.828***	3.459***	3.460***			4.933***
	-22.89	-22.67	-22.67	-16.04	-16.08			-22.95
NTA	-4.161***	-3.909***	-3.868***				-0.449	-4.163***
	(-13.05)	(-12.87)	(-12.85)				(-1.12)	(-13.10)
LIK	0.0244	0.0239				-0.0252	-0.0216	0.0245
	-1.02	-0.99				(-0.72)	(-0.61)	-1.03
EFC	-0.212*				0.151	0.141	0.215	-0.211*
	(-2.46)				-1.58	-1.18	-1.77	(-2.47)
GDP	0.0352	-0.0449	-0.0384	0.272	0.201	0.105	-0.292	
	-0.12	(-0.16)	(-0.13)	-0.82	-0.6	-0.25	(-0.72)	
INF	0.000548	-0.00178	-0.00329	-0.0101	-0.0114	-0.00855	-0.00669	
	-0.01	(-0.04)	(-0.08)	(-0.21)	(-0.24)	(-0.14)	(-0.11)	
_cons	-0.374	0.529	0.472	-2.364	-1.587	2.305	6.571	0.171
	(-0.08)	-0.12	-0.11	(-0.45)	(-0.30)	-0.35	-1.01	-0.35
N	455	455	455	455	455	455	455	455
LM Test	87.55	95.74	96.24	98.98	101.59	143.65	146.37	87.64
Prob > chibar2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
F Test	3.41	3.53	3.54	3.76	3.81	4.49	4.52	3.42
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-Squared	0.5574	0.5514	0.5504	0.3842	0.3877	0.0347	0.0175	0.5574

t statistics in parentheses= * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: RISK= Financial risk; FLR= Total funding divided by total assets; BAC= Total financing divided by total assets; LZE= Logarithm of total assets; ETA= Total equity divided by total assets; NTA= Net profit divided by total assets; LIK= Total financing divided by total funding; EFC= Operating costs divided by total revenue; GDP= Logarithm Gross Domestic Product; and INF= Inflation rate

Table 5. Random Effect

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
FLR	-0.159	-0.172	-0.222*	-0.614***	-0.606***	-0.277*	-0.187	-0.161
	(-1.49)	(-1.61)	(-2.47)	(-6.28)	(-6.19)	(-2.00)	(-1.21)	(-1.53)
BAC	-0.194	-0.191	-0.0912	0.105	0.0898	0.556	0.488	-0.191
	(-0.91)	(-0.89)	(-0.51)	-0.51	-0.43	-1.85	-1.6	(-0.91)
LZE	0.105**	0.117**	0.115**	-0.0187	0.00503	-0.149**		0.103**
	-2.65	-2.96	-2.93	(-0.42)	-0.11	(-2.69)		-2.92
ETA	4.976***	4.930***	4.915***	3.378***	3.397***			4.974***
	-21.57	-21.49	-21.5	-14.99	-15.1			-21.65
NTA	-4.165***	-4.007***	-3.963***				-0.307	-4.162***
	(-12.53)	(-12.62)	(-12.65)				(-0.77)	(-12.59)
LIK	0.0259	0.0235				-0.025	-0.0199	0.0258
	-0.94	-0.85				(-0.64)	(-0.50)	-0.94
EFC	-0.131				0.184*	0.124	0.173	-0.133
	(-1.59)				-2.02	-1.11	-1.51	(-1.62)
GDP	-0.0345	-0.0911	-0.0826	0.291	0.192	0.258	-0.223	
	(-0.13)	(-0.35)	(-0.32)	-0.96	-0.63	-0.69	(-0.67)	
INF	0.000276	-0.00135	-0.00282	-0.00967	-0.0114	-0.00972	-0.00984	
	-0.01	(-0.04)	(-0.08)	(-0.23)	(-0.28)	(-0.19)	(-0.19)	
_cons	0.371	0.997	0.917	-2.633	-1.566	0.423	5.514	-0.136
	-0.09	-0.25	-0.23	(-0.58)	(-0.34)	-0.08	-1.03	(-0.22)
N	455	455	455	455	455	455	455	455
Hausman	2.77	0.80	0.76	0.77	7.29	3.98	3.64	2.58
Prob>chi2	0.9727	0.9992	0.9978	0.5500	0.3994	0.7825	0.8199	0.9212

t statistics in parentheses= * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: RISK= Financial risk; FLR= Total funding divided by total assets; BAC= Total financing divided by total assets; LZE= Logarithm of total assets; ETA= Total equity divided by total assets; NTA= Net profit divided by total assets; LIK= Total financing divided by total funding; EFC= Operating costs divided by total revenue; GDP= Logarithm Gross Domestic Product; and INF= Inflation rate

Table 6. Fixed Effect

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
FLR	-0.146	-0.162	-0.209	-0.785***	-0.776***	-0.437**	-0.359	-0.158
	(-1.06)	(-1.19)	(-1.73)	(-6.20)	(-6.15)	(-2.61)	(-1.87)	(-1.17)
BAC	-0.224	-0.207	-0.115	0.485	0.464	0.874*	0.819*	-0.206
	(-0.82)	(-0.76)	(-0.48)	-1.79	-1.73	-2.4	-2.19	(-0.77)
LZE	0.147*	0.160*	0.157*	-0.00584	0.0362	-0.236*		0.121*
	-2.01	-2.23	-2.19	(-0.07)	-0.44	(-2.40)		-2.28
ETA	5.036***	5.008***	4.997***	3.338***	3.379***			5.020***
	-19.13	-19.14	-19.14	-13.32	-13.5			-19.25
NTA	-4.192***	-4.082***	-4.038***				-0.128	-4.175***
	(-11.13)	(-11.37)	(-11.41)				(-0.29)	(-11.17)
LIK	0.0266	0.0241				-0.0196	-0.0132	0.0257
	-0.8	-0.73				(-0.43)	(-0.28)	-0.78
EFC	-0.0858				0.205*	0.106	0.159	-0.0932
	(-0.98)				-2.13	-0.91	-1.33	(-1.08)
GDP	-0.167	-0.218	-0.205	0.284	0.127	0.566	-0.172	
	(-0.52)	(-0.69)	(-0.64)	-0.78	-0.34	-1.26	(-0.52)	
INF	-0.000273	-0.00157	-0.00297	-0.0122	-0.0144	-0.0108	-0.0134	
	(-0.01)	(-0.04)	(-0.08)	(-0.30)	(-0.35)	(-0.22)	(-0.27)	
_cons	1.735	2.288	2.157	-2.681	-1.022	-2.96	4.741	-0.483
	-0.39	-0.52	-0.49	(-0.53)	(-0.20)	(-0.48)	-0.89	(-0.52)
N	455	455	455	455	455	455	455	455
F Test	3.41	3.53	3.54	3.76	3.81	4.49	4.52	3.42
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

t statistics in parentheses= * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: RISK= Financial risk; FLR= Total funding divided by total assets; BAC= Total financing divided by total assets; LZE= Logarithm of total assets; ETA= Total equity divided by total assets; NTA= Net profit divided by total assets; LIK= Total financing divided by total funding; EFC= Operating costs divided by total revenue; GDP= Logarithm Gross Domestic Product; and INF= Inflation rate

The above results show that the static panel model does not accommodate the theory developed by many previous researchers. Theoretically, this results in biased conditions if an appropriate analytical tool is not used. Therefore, a dynamic panel model was used because the static panel model did not show the maximum results in this study. This study develops this using the Generalized Method of Moments (GMM) to overcome the problems arising from the dynamic conditions of the IRB financial risk model.

Table 7 shows several model specifications to get the best model that can represent the best results in the model. Table 7 presents the results of estimating the coefficients of the factors influencing IRB financial risk using the GMM system. It

must meet several criteria to find the best model: a consistent, valid instrument and an unbiased estimator. The consistency of the estimator is shown by the Arellano-Bond (AB) estimation results (Arellano & Bover, 1995). The results of the AB estimation are indicated by the significant value of m1 in models 1, 2, 3, 7, and 8, which show significance at the 10 per cent significance level. Statistical value m_2 in all models is insignificant at the 5 per cent or 10 per cent significance level. No significant statistical value m_2 indicates a lack of second-order serial correlation in the residuals of the specification differences so that the estimators can be said to be consistent.

The validity of the instrument can then be checked using the Sargan test. Statistical values in the Sargan test in Models 3, 4, 5, and 8 were insignificant at the 1 per cent, 5 per cent, or 10 per cent levels of significance. Models 1, 2, 6, and 7 show significant results at the 10 percent significance. Models 3, 4, 5, and 8 show that there is no correlation between the residuals and over-identifying restrictions; therefore, it can be said that the instrument is valid.

The test of pooled least squares (PLS) and fixed effects (FE) to determine unbiased properties can be determined from the RISK lag coefficient. The estimated coefficient value of the RISK lag using GMM is greater than the RISK lag coefficient value in FE and smaller than the RISK lag coefficient value in PLS. However, in Model 8, the RISK lag coefficient is smaller than the RISK lag coefficient in the GMM system. So, it can be said that the estimators in models 1, 2, 3,4, 5, 6, and 7 are unbiased.

Table 7. System GMM

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
L.RISK	0.283***	0.283***	0.283***	0.289***	0.293***	0.312***	0.334***	0.353***
	-42.06	-42.22	-44.91	-35.74	-33.34	-34.36	-30.7	-76.35
FLR	0.390***	0.391***	0.312***	-0.418***	-0.413***	-0.00734	0.444***	0.151**
	-5.47	-5.45	-5.63	(-6.21)	(-5.91)	(-0.16)	-4.76	-3.05
BAC	-1.283***	-1.281***	-1.139***	0.419**	0.417**	0.00346	-0.519*	-0.920***
	(-9.86)	(-9.80)	(-11.52)	-2.78	-2.67	-0.04	(-2.56)	(-10.27)
LZE	0.434***	0.431***	0.418***	0.166***	0.175***	-0.0249		0.284***
	-13.19	-13.34	-13.37	-4.28	-3.55	(-0.52)		-10.34
ETA	5.499***	5.496***	5.539***	1.475***	1.454***			6.106***
	-42.01	-42.56	-38.76	-13.61	-11.81			-51.96
NTA	-4.842***	-4.852***	-4.822***				-1.526***	-5.216***
	(-36.50)	(-36.52)	(-37.63)				(-8.54)	(-35.52)
LIK	0.0494*	0.0496*				0.0408	0.106**	0.0428
	-2.26	-2.26				-1.59	-3.29	-1.85
EFC	0.00794				0.0358	0.000262	0.046	-0.0204
	-0.38				-0.25	0	-0.86	(-0.35)
GDP	-1.134***	-1.125***	-1.077***	-0.237	-0.268	0.312	0.185	

	(-6.95)	(-6.94)	(-6.46)	(-1.36)	(-1.35)	-1.52	-1.27	
INF	0.0161	0.0163	0.0115	0.00374	0.00785	0.0294*	0.0465***	
	-1.43	-1.46	-1	-0.38	-0.85	-2.51	-3.34	
_cons	11.44***	11.36***	10.87***	2.17	2.471	-3.349	-1.906	-4.193***
	-4.82	-4.81	-4.42	-0.94	-1	(-1.21)	(-0.81)	(-8.68)
N	390	390	390	390	390	390	390	390

t statistics in parentheses= * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: RISK= Financial risk; FLR= Total funding divided by total assets; BAC= Total financing divided by total assets; LZE= Logarithm of total assets; ETA= Total equity divided by total assets; NTA= Net profit divided by total assets; LIK= Total financing divided by total funding; EFC= Operating costs divided by total revenue; GDP= Logarithm Gross Domestic Product; and INF= Inflation rate

From the results of the AB, Sargan, PLS, and FE tests in Table, it can be concluded that models 1, 2, 3, 4, 5, 6, and 7 have consistent estimators, and models 3, 4, 5, and 8 show that the instruments in the model are valid. Meanwhile, models that suspect are unbiased are found in Models 1, 2, 3, 4, 5, 6, and 7. The entire test shows that the models have consistent estimators, valid instrument models, and unbiased estimators in models 3, 4, and 5. Models 3, 4, and 5 were used as the basis for this research.

Table 8. AB, Sargan, PLS and FE Result Test

PLS_Lag	0.3142	0.3188	0.3195	0.3975	0.3977	0.4927	0.5016	0.3114
P-Value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FE_lag	0.1415	0.1413	0.1422	0.1321	0.1320	0.1361	0.1395	0.1395
P-Value	0.001	0.001	0.001	0.004	0.004	0.005	0.004	0.001
AB Test-m1	-1.6785	-1.6787	-1.6927	-1.5376	-1.5446	-1.6122	-1.852	-1.669
Prob>z	0.0933	0.0932	0.0905	0.1241	0.1224	0.1069	0.0640	0.0951
AB Test-m2	-1.0265	-1.0257	-1.0204	-.67576	-.67223	-.61881	-.66128	-1.045
Prob>z	0.3046	0.3050	0.3076	0.4992	0.5014	0.5360	0.5084	0.2960
Sargan Test-Chi2	27.27272	27.41027	26.92301	24.42775	24.31985	30.6993	30.77943	20.53603
Prob>chi2	0.0985	0.0955	0.1065	0.1803	0.1842	0.0435	0.0427	0.3630

t statistics in parentheses= * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: RISK= Financial risk; FLR= Total funding divided by total assets; BAC= Total financing divided by total assets; LZE= Logarithm of total assets; ETA= Total equity divided by total assets; NTA= Net profit divided by total assets; LIK= Total financing divided by total funding; EFC= Operating costs divided by total revenue; GDP= Logarithm Gross Domestic Product; and INF= Inflation rate

Source: Author's computation

Models 3, 4, and 5 used in Table 7 show that the previous year's IRB financial risk in all models has a positive effect with a significance level of 1 per cent on IRB financial risk. While model 3 shows that funding liquidity risk has a positive impact on IRB financial risk, on the other hand, models 4 and 5 have a negative effect at the 1 and 5 percent significance level, and model 6 does not affect IRB financial risk. Bank activity in Model 3 hurts risk, while Models 4 and 5 are positive at the 1 percent significance level. IRB size positively affected risk in Models 3, 4, and 5 at the 1 percent significance level.

IRB capital in Models 3, 4, and 5 positively affects risk at the 1% significance level, while IRB profitability negatively affects risk in Model 3. IRB efficiency does not affect IRB financial risk in Model 5. While GDP negatively affects risk in Model 3, it is significant at the 1% level, while economic growth in Models 4 and 5 does not involve risk. Inflation did not affect risk in Models 3, 4, and 5.

The data processing results show that not all financial performance variables are related to the IRB financial risk variable that follows the hypothesis. Of the selected models, Models 3, 4, and 5 are known to have the same results and are consistent with the assumption that institutional review board size and capital structure variables positively affect IRB financial risk. Besides IRB size and capital structure, other variables are known to have inconsistent results between the selected models.

Discussion

IRB's financial development from 2013 to 2019 showed a relatively stable trend. This situation has led IRB management to adopt policies that are not significantly different from year to year. The effect of the previous year's risk (L.RISK) on the current IRB financial risk shows the IRB's risk during the study period. IRB management has no reason to change policies under relatively stable economic conditions. On the other hand, the stable financial development of the IRB shows that management is too careful to take risks when determining financial policy.

Funding risk (FLR) is positively related to the financial risk of the IRB. This shows that increasing the funding from third parties provides an alternative for management to increase financing and allocate funds to IRB revenue sources. A higher ratio of funding to assets raises the potential for growing unmanaged funds or *liquid*, which increases the *cost of funding* IRB. IRB management steps to reduce risk over liquidity by channelling funding in the form of financing. However, funding will be problematic if management considers only the liquidity balance without considering financing risks. The results of this study justify the findings of Acharya and Naqvi (2012) and Khan et al. (2016) on the positive relationship between funding risk and increased IRB financial risk.

IRB activity (BAC) has both positive and negative effects on IRB financial risk. These results are the same as those of Dahir et al. (2018), who reveal a negative relationship between banking activity and bank risk. The increase in the ratio of financing to total assets shows management's ability to channel IRB assets through funding (Saif-Alyousfi & Saha, 2021). The rise in IRB activity can be caused by an

effort to maintain institutional review board (IRB) liquidity so that it does not experience risk over liquidity. However, on the other hand, increased IRB activity will increase the risk of problem financing or financing default.

An increase in the value of IRB assets (LZE) reduces IRB management's ability to anticipate IRB financial risks. The higher the value of the IRB's assets, the more management is required to utilise assets to optimise their economic potential (Srairi,2013). However, increasing efforts to use assets will further increase the risks IRB management faces. These results are the same as those reported by Laeven et al. (2016) and Dahir et al. (2018), who found a positive relationship between bank size and risk. The size of the IRB affects the bank's risk structure, which is related to several management decisions in allocating financing (Bougatef & Mgadmi, 2016).

IRB Capital (ETA) has a positive effect on IRB financial risk. This finding is the same as that of Mahdi and Abbes (2018) and Harkati et al. (2019), who reveal a positive relationship between capital and risk in Islamic and conventional banks. IRB management is responsible for utilising capital to provide added value to the IRB. More capital increases the capital-benefit ratio to generate IRB revenue. Expanding the use of capital will increase the chances of failure; therefore, IRB management needs to be careful when using capital. On the other hand, IRB will face liquidity risk if the capital owned by the IRB is relatively low. Therefore, the IRB must set aside additional capital above the minimum required capital (Chiaramonte et al.,2024; De Young and Jang, 2016; Khan et al., 2016).

IRB profitability (NTA) is the ability of assets to generate institutional review board (IRB) net profit, negatively affecting IRB financial risk. These results differ from the findings of Dahir et al. (2018) and Ashraf et al. (2016), who reveal a positive relationship between profitability and bank risk. This negative relationship occurs because the profits obtained by the IRB are relatively stable during the study period; therefore, IRB management can detect the risks the IRB faces. This situation can be interpreted as management being better able to control risk when the bank's financial position is stable (Hong et al., 2014; King, 2013).

IRB Liquidity (LIK) shows the ability of the IRB to generate income that is used to cover operational costs (Hassan et al., 2019). Data processing results show a positive relationship between liquidity and IRB financial risk. If the IRB's liquidity increases, the ability to operate income to cover operational costs decreases. Lower IRB revenue ability to cover operational costs will cause IRB management to look for ways to reduce operational costs. Olah because IRB management faces more complex risks in overcoming IRB financial stabilisation when operational costs increase compared to the income earned.

The ratio of financing to IRB funding (EFC) does not affect the level of IRB financial risk. This situation shows that the IRB's management can maintain its liquidity so that the proportion of funds coming in through savings and deposits to funds channelled in the form of financing is relatively stable. Stable liquidity does not affect IRB financial risk because risk tends to occur when financial conditions are unstable, which is marked by an unstable ratio between the value of funding and financing.

The rate of economic growth (GDP) reflects the performance of the real sector, which influences a country's economic cycle (Ashraf et al., 2016; Jokipii and Monnin, 2013). When the performance of the actual industry increases, the demand for financing in the IRB increases. IRB management will choose not to disburse or disburse funding based on its liquidity. IRB management faces the risk of maintaining the proportion of funds channelled in financing, with funds coming in as savings and deposits. In addition, IRB management faces the risk of problematic financing if the funds channelled are not allocated to the wrong sector. The negative effect of economic growth on IRB financial risk can be interpreted as indicating that increasing economic growth reduces the risk of default in IRB financing.

The inflation rate (INF) or general price increases during a period do not affect the risk. These results differ from those of Abdul-Rahman et al. (2018), who revealed a negative relationship between inflation and risk. High inflation indicates that the economy is sluggish because people's purchasing power decreases; thus, the level of public consumption falls. If the level of purchasing power decreases, it will impact the decline in the production level of the business sector. This situation causes the business sector to reduce production costs, which are incredibly variable, and capital costs. The results of the data processing show that inflation does not affect risk. It can be interpreted that the inflation rate in the study period has a low value and tends to be stable; therefore, management does not pay enough attention to make inflation a vital policy component.

CONCLUSION

The dynamic panel model test results at 65 IRB show that the AB estimation results, the statistical value m_2, and the Sargan test are valid. The results of the data processing show that the independent variables have various influences on IRB financial risk. The eight models generally show that the previous period risk, funding risk, IRB size, IRB capital, and IRB liquidity positively affect risk. IRB activity, profitability, and economic growth have a negative relationship with risk. Meanwhile, the level of institutional review board (IRB) efficiency and inflation do not affect IRB financial risk.

In light of this study's findings, policymakers are advised to adopt a cautious approach to managing IRB financial risks. Specifically, policies related to funding and financing should prioritise risk-mitigation strategies, considering the nuanced impact of various factors on financial risk. Given the mixed effects observed in IRB activity, policymakers should carefully assess the implications of increased IRB activity on financial risk and develop strategies to mitigate the potential risks associated with heightened activity levels.

Despite this study's contributions, some limitations should be acknowledged. The reliance on retrospective data and the study's specific timeframe may limit the findings' generalizability to broader contexts. This study's focus on particular variables may overlook other factors influencing IRB financial risk dynamics. Future research should address these limitations by conducting longitudinal studies and exploring the impact of emerging factors on IRB financial risk.

Recommendations for future research include conducting longitudinal studies to track changes in IRB financial risk over time and exploring the impact of emerging factors, such as technological advancements and regulatory changes, on risk dynamics. Comparative studies across different regions and banking systems can provide valuable insights into institutional review IRB financial risk determinants. Furthermore, qualitative research methods can complement quantitative analyses by capturing the contextual factors that may influence risk management practices in IRB.

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