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Equivalent rate thresholds and financing risk in Indonesian Islamic commercial banks: Evidence from a nonlinear panel analysis

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ABSTRACT

Introduction

Indonesian Islamic banking has expanded considerably over the past two decades, yet its financing risk has not consistently remained lower than that of conventional banking. Islamic banks also continue to operate within a dual banking system in which conventional interest rates influence the pricing of Islamic financing. These conditions highlight the need to understand whether the equivalent rate of profit-and-loss-sharing financing affects Islamic banking risk in a linear or nonlinear manner.

Objectives

This study examines the threshold effect of the equivalent rate of profit-and-loss-sharing financing on Indonesian Islamic banking risk. It also estimates a critical equivalent-rate level that may serve as an early warning indicator for financing risk mitigation.

Method

The study employed a quantitative explanatory design using quarterly unbalanced panel data from 15 Indonesian Islamic commercial banks between 2014 and 2024. Islamic banking risk was measured by the ratio of non-performing financing to total financing. The equivalent rate was calculated from returns on profit-and-loss-sharing financing relative to total profit-and-loss-sharing financing. The analysis applied a fixed-effects panel regression model with a least-squares dummy-variable estimator and corrected standard errors. Conventional interest rates, inflation, economic growth, the

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exchange rate, and the coronavirus disease 2019 period were included as control variables.

Results

The equivalent rate of profit-and-loss-sharing financing demonstrated a significant inverted U-shaped relationship with Islamic banking risk. Below the estimated threshold of 10.96 percent, an increase in the equivalent rate raised non-performing financing because higher financing costs increased customers' repayment burdens. Above the threshold, however, a higher equivalent rate reduced financing risk, indicating that Islamic banks strengthened customer screening, feasibility assessment, and project monitoring when expected financing returns were sufficiently high. Conventional interest rates showed a U-shaped relationship with Islamic banking risk, with an estimated threshold of 6.01 percent. Inflation significantly reduced financing risk, whereas economic growth, exchange rates, and the coronavirus disease 2019 period had no significant effects.

Implications

The findings support the use of the equivalent-rate threshold as an early warning mechanism. Islamic banks should improve financing portfolio diversification, strengthen customer selection, monitor financed projects continuously, and design profit-and-loss-sharing products that generate stable returns without increasing default risk.

Originality/Novelty

This study contributes new evidence on the nonlinear relationship between equivalent rates and Islamic banking risk and provides a measurable threshold for risk management in Indonesian Islamic commercial banks.

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INTRODUCTION

Islamic banking has experienced strong growth over the past two decades and has contributed to the country's development. Islamic banking has demonstrated its efficiency and stability in the face of risks (Beck et al., 2013; Gheeraert & Weill, 2015; Safiullah, 2021), its contribution to economic growth (Imam & Kpodar, 2016), poverty alleviation (Parewangi & Iskandar, 2020), increasing financial inclusion (Aysan et al., 2013; Imam & Kpodar, 2016; Léon & Weill, 2018; Sorwar et al., 2016), as well as demonstrating good resilience during uncertain economic conditions (Bilgin et al., 2021; Caporale et al., 2020), such as during the Covid-19 pandemic (Akkas & Al Samman, 2022; Rizwan et al., 2022).

The development of Indonesian Islamic banking, consisting of Islamic Commercial Banks (ICB), Islamic Business Units (IBU), and Islamic Rural Credit Banks (IRCB), continues to show positive growth. As of December 2024, there were 14 ICB, 19 IBU, and 174 IRCB. Total Islamic banking assets had reached 923 trillion rupiah. This growth in Islamic banking assets was 11 percent, supported by growth in total financing of 9.9 percent and third-party funds of 10.1 percent. Total financing and third-party funds in Islamic banking reached 624 trillion rupiah and 736 trillion rupiah by December 2024.

Over the past 21 years, the proportion of assets, or market share, of total national banking assets has increased from 1.2 percent in 2004 to 7.44 percent in 2024. Although Islamic banking has shown significant growth, conventional banking has also experienced significant growth. The average annual increase in Islamic banking assets over the past 21 years is 26.68 percent. Meanwhile, the average annual increase in Islamic banking assets over the past 10 years is 12.78 percent. This means that the growth of Islamic banking assets from 2015 to 2024 is lower than that from 2004 to 2014. Compared to national banking asset growth, Islamic banking assets remain superior, except in 2014 and 2015. The average growth ratio of Islamic banking assets to national banking assets over the past 10 years is 13.51 percent compared to 8.45 percent. This difference is more minor compared to the average asset growth of Islamic banking compared to national banking over the past 21 years, which was 27.02 percent compared to 12.35 percent. This means Islamic banking asset growth has declined more rapidly than conventional banking.

One reason for the low market share of Islamic banking is that it is still considered not to have fully implemented Islamic principles (Abasimel, 2023; Aman, 2019; Islam & Hasan, 2024). Therefore, it is unsurprising that many still assume that Islamic banking practices are the same as conventional banking (Khan, 2010a, 2010b; Mindra et al., 2022; Relano, 2023) and tend to imitate conventional banking (Izzeldin et al., 2021). For example, Islamic banking products still use conventional banking interest rate benchmarks (Azad et al., 2018; Junaidi et al., 2022), namely Return on Mudharabah Deposit (ROMD), which tends to follow conventional banking interest rate rather than Islamic banking Return on Equity (ROE) (Belkhaoui et al., 2020; Diaw & Mbow, 2011).

Indonesian Islamic banking faces risks that are no better than conventional banking. Conventional banking financing risk was lower than Islamic banking in the first semester of 2014 to 2021. However, from the second semester of 2021 to the first semester of 2024, Islamic banking financing risk was lower, and in the second semester of 2024, Islamic banking financing risk was again higher. In this regard, Islamic banking financing risk was better during COVID-19.

This study analyzes the nonlinear effect of equivalent rate of PLS (Profit Loss Sharing) on Islamic banking risk. This study provides the threshold of equivalent rate as an early warning system for Islamic banking risk mitigation. This early warning system anticipates risk Islamic banking risk based on equivalent rate of PLS. Control variables included in this model include interest rate, economic growth, inflation, exchange rates, and COVID-19. Research on this topic is still scarce, especially regarding Islamic banking

risk. Previous research only discussed the non-linear relationship between interest rate and conventional banking financing (Mahrous et al., 2020; Saliba et al., 2023).

LITERATURE REVIEW

Islamic Banking Risk

In general, the risks that occur in the banking sector are information issues. Information is at the heart of all financial contracts. There are three key issues regarding information: not all parties to a transaction have the same information, each party does not have perfect information, and some parties have information unavailable to others (Iqbal & Molyneux, 2005).

Due to the imbalance of information held by each party, there is the potential for asymmetric information. Asymmetric information occurs when one party does not know enough about the other party's condition. In theory, asymmetric information is expressed by (Akerlof, 1970) which describes a lemon market where sellers have more information about the market than buyers. Due to this uneven distribution of information, buyers find it difficult to differentiate between good and bad quality cars in the lemon market.

The intransparency that occurs in a market that results in poor-quality goods dominating the market is called adverse selection. As a result, the prevailing price in the market is the average price, so those selling poor-quality goods will profit, while those selling good-quality goods will lose money (Akerlof, 1970). Similarly, adverse selection is highly likely in financial markets where customers with high risk profiles dominate. This high-risk profile refers to the quality of the bank's projects financed by the customer. Poor project quality will result in higher capital costs for the bank in financing the customer's projects, as poor-quality projects will ultimately dominate the market (Blaseg et al., 2021; Leland & Pyle, 1977; Ogwang & Vanclay, 2021).

The incident of selecting the wrong customer, caused by a market dominated by low-quality projects, is due to customers providing inaccurate information to banks when applying for financing. Banks do not have sufficient information regarding the reputation and financial condition of customers applying for financing (Doan et al., 2020; Özkan et al., 2019; Rodoni & Yaman, 2018). Customer behavior in hiding information or providing inaccurate information is called the moral hazard problem. Moral hazard can also be defined as the behavior of customers who use financing funds for purposes other than financing (Chod et al., 2022; Oktarina et al., 2019)

The risks faced by Islamic and conventional banks are different. Islamic banking operates an interest-free financial intermediation mechanism (Abedifar et al., 2012; Oktaviana & Miranti, 2025; Saleem et al., 2024). Islamic banking applies the PLS concept to critique the conventional banking's interest rate. By implementing PLS, Islamic banking implements risk sharing. This risk-sharing practice is believed to reduce economic uncertainty (Anis et al., 2025; Asdrubali et al., 2020; Bocola & Lorenzoni, 2023; Cole et al., 2024; Hasan & Dridi, 2011).

Equivalent Rate of Islamic Banking

In Islamic banking, the term "equivalent rate" is often used as a counterpart to or substitute for the interest rate used in conventional banks. Because Islamic principles prohibit banks from charging interest (riba), they use alternative concepts such as profit margin, fee, or equivalent rate, which describe a rate of return or financing cost comparable to the interest rate in conventional banks, but with a structure that complies with Islamic principles.

Interest rate has a positive impact on banking risk. Rising interest rate mean a greater burden on customers in repaying their funds. Therefore, high interest rate can reduce bank profitability, increasing banking risk (Asutay et al., 2020; Hasnaoui & Fatnassi, 2019; Wang, 2025). Increasing interest rate can shift conventional banking customers to Islamic banks. This customer shift can improve Islamic banking performance and ultimately reduce the level of risk in Islamic banking financing. This case is similar to Displaced Commercial Risk (DCR), which involves the transfer of investment funds between Islamic and conventional banks. The emergence of DCR is driven by customer dissatisfaction with the profits obtained, which results in customer shifts from conventional banks to Islamic banks (Ahmad et al., 2024; Rouetbi et al., 2023; Widarjono et al., 2022).

On the other side, an increase in conventional bank lending rates will also be followed by an increase in the equivalent rate of financing in Islamic banking. An increase in the equivalent rate in Islamic banking will impact the costs paid by customers. Islamic banks will tighten their selection of prospective customers for financing (Aledeimat & Bein, 2025; Amalia & Suriani, 2023; Nisa' et al., 2023), then by increasing selectivity can reduce banking risk. These conditions show that the Indonesian banking system still implements a dual banking system, making it difficult to avoid the dependence of Islamic banking on conventional banking (Nahar et al., 2022; Saeed et al., 2023), and conventional bank lending rates indirectly serve as a reference or benchmark for Islamic banking financing (Azad et al., 2018; Diaw & Mbow, 2011).

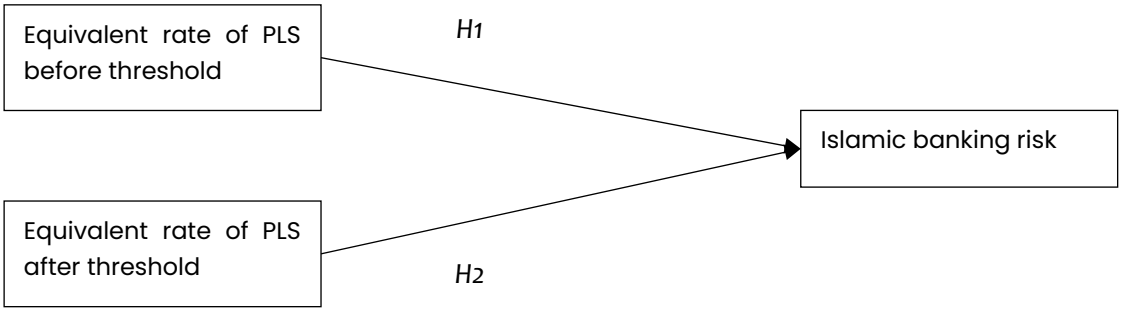
Research on estimating the threshold value of equivalent rate of PLS in relation to banking risk still very limited Mahrous et al (2020) found that conventional lending interest rate positively impact on banking risk above the estimated threshold level. This study aims to identify the threshold level of equivalent rate of PLS for Islamic banking risk.

Research Framework

Therefore, the research framework designed for this study is as follows.

Figure 1

Research framework



Source: Authors' analysis.

Furthermore, the following hypotheses are developed:

H1: Before reaching the threshold level, equivalent rate of PLS has a negative effect on Islamic banking risk.

H2: After reaching the threshold level, equivalent rate of PLS has a positive effect on Islamic banking risk.

METHODO

This empirical study aims to provide evidence on the threshold effect of equivalent rate on Islamic banking risk. This study also added control variables such as inflation, GDP, exchange rate, and COVID-19. The study used quarterly data of 15 Indonesian Islamic commercial banks from 2014 to 2024.

Table 1

Samples Used in the Study

No	Islamic Commercial Banks	Total data
1	Bank Syariah Indonesia	16
2	Bank Muamalat	44
3	BTPN Syariah	40
4	Bank BCA Syariah	44
5	Bank Aceh Syariah	32
6	Bank Jabar Syariah	25
7	Bank Bukopin Syariah	44
8	Bank Mega Syariah	44
9	Bank Riau Kepri Syariah	9
10	Bank Panin Dubai Syariah	44
11	Bank Victoria Syariah	44
12	BRI Syariah	28
13	BNI Syariah	28
14	Bank Syariah Mandiri	28
15	Bank NTB Syariah	24
Total Data		494

Source: Secondary data. Authors' estimation.

This study also used unbalanced data due to several reasons, as follows:

1. The merger of Bank Syariah Mandiri, BNI Syariah, and BRI Syariah to become Bank Syariah Indonesia on January 27, 2021.
2. The conversion of the Aceh Regional Development Bank into an Islamic Commercial Bank on September 1, 2016.
3. The conversion of Bank Riau Kepri into an Islamic Commercial Bank on August 19, 2022.
4. The conversion of Bank NTB into an Islamic Commercial Bank on September 13, 2018.
5. The spin-off of the BTPN Islamic Business Unit on July 14, 2014.
6. Bank Nano Syariah began operations on January 2, 2024.
7. Outlier data on financing risk at Bank Jabar Syariah from 2016 Q2 to 2018 Q3

To analyze the threshold effect of equivalent rate on Islamic banking risk, the author employed panel data regression analysis using the Fixed Effects Model (FEM) with the Least Squares Dummy Variable (LSDV) estimator. The FE model with LSDV is obtained by adding a dummy variable for each individual (cross-section unit) in the panel regression model.

The FEM model was selected based on its superiority over the PLS model, using the F-statistic test, also known as the Chow Test. If the F-statistic value is greater than the F-table value at a particular significance level, the assumption of equal intercept and slope coefficients is invalidated, thus the FEM model is superior to the PLS model.

Meanwhile, to test the best model between FEM and REM, the Lagrange Multiplier test is used. Model selection can also be made by considering the ratio of the number of individuals (i) and the number of time periods (t). If the number of t is greater than the number of i, then the FEM model is selected. The panel data regression equation with the FEM model is as follows:

$$NPFit = \beta_0 + \beta_1 INT_{it} + \beta_2 EQPLS_{it} + \beta_3 INF_{it} + \beta_4 GDP_{it} + \beta_5 LnEXC_{it} + \beta_6 COV_{it} + \beta_7 INT^2_{it} + \beta_8 EQPLS^2_{it} + \beta_9 INF^2_{it} + \beta_{10} GDP^2_{it} + \varepsilon_{it}$$

Table 2

Research Variables

Variables	Indicators	Measurement
NPF	Non-Performing Financing	NPF = Non-Performing Financing/Total Financing
EQPLS	Rate of return on PLS financing	EQPLS = Return on PLS Financing/Total PLS Financing
Control Variables		
INT	Central Bank of Indonesia's fund rate	Central Bank of Indonesia's fund rate
INF	Growth of the consumer price index	$INF = (CPI_{t-1} - CPI_{t-1})/CPI_{t-1}$
GDP	Growth of Gross Domestic Product	GDP Growth = $(GDP_{t-1} - GDP_{t-1})/GDP_{t-1}$

LnEXC	Natural logarithm of nominal exchange rate	LnEXC = Natural logarithm (IDR/USD)
COV	The period of COVID	1= the period of COVID, 0 = otherwise

Source: Secondary data. Authors' estimation.

RESULT AND DISCUSSIONS

The average NPF of Indonesian Islamic commercial banks is around 3.258% with a minimum value of 0.1% and a maximum value of 12.52%. The average of the Central Bank of Indonesia's fund rate is around 6.054% while the average of the equivalent rate of PLS financing is 10.154%. The minimum values of GDP and inflation were -5,320 and -0.430. These two phenomena explain that the economy experienced negative growth accompanied by deflation during the COVID-19 pandemic.

Table 3

Descriptive Analysis

Variables	Mean	SD	Min	Max
NPF	3.258	2.139	0.100	12.520
EQPLS	10.154	1.617	7.280	13.230
INT	6.054	1.173	4.250	8.000
INF	0.804	0.728	-0.430	4.430
GDP	4.205	2.537	-5.320	7.080
LnEXC	9.565	0.078	9.342	9.706
COV	0.310	0.463	0	1

Source: Secondary data. Authors' estimation.

All variables in this study were tested for stationarity to ensure that the panel regression results were not spurious. Spurious regression occurs when the results do not accurately reflect the actual conditions. This study performed a stationarity test to examine whether unit roots exist in the panel data series. The test tools used for panel data stationarity testing are the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. Table 4 shows that all variables have passed the unit root tests. A summary of unit root tests can be seen in the table below.

Table 4

Unit Root Tests

Variabel	Unit Root Tests	
	Augmented Dickey Fuller	Philips Perron
NPF	1st difference	1st difference
EQPLS	1st difference	1st difference
INT	1st difference	1st difference
INF	level	level
GDP	level	level
Ln EXC	level	level
INF^2	level	level

Variabel	Unit Root Tests	
	Augmented Dickey Fuller	Philips Perron
GDP^2	level	level
INT^2	1st difference	1st difference
$EQPLS^2$	1st difference	1st difference

Source: Secondary data. Authors' estimation.

The analysis used FE model with corrected standard errors. During the previous FE model, violations of regression assumptions were found, so corrections were made to the standard errors to avoid bias in statistical testing. Table 5 shows how all variables influence Islamic banking risk. A summary of the regression result can be seen in the table below.

Table 5

Regression results

Variables	Coefficient	Std Err	t	P>t
CONS	4.474	15.373	0.290	0.771
EQPLS	2.451	0.882	2.780	0.006***
INT	-1.315	0.715	-1.840	0.067*
PDB	0.037	0.030	1.220	0.222
INF	-0.396	0.183	-2.170	0.031**
LnEXC	-1.123	1.797	-0.620	0.532
COV	-0.144	0.255	-0.570	0.572
INT^2	0.109	0.064	1.700	0.089*
$EQPLS^2$	-0.112	0.044	-2.550	0.011**
PDB^2	-0.007	0.007	-0.880	0.38
INF^2	0.077	0.058	1.320	0.188

Source: Secondary data. Authors' estimation. Note : *significant at 10%, **significant at 5%, ***significant at 1%

Meanwhile, based on the regression results above, it shows that equivalent rate of PLS has a significant effect on Islamic banking risk at a significance level of 1%, interest rate has significant effect on Islamic banking risk at significance level of 10%, and inflation has significant effect on Islamic banking risk at significance level of 5%,

For equivalent rate of PLS, the estimation demonstrated a positive effect on Islamic banking risk or NPF. When equivalent rate of PLS are below the threshold value, their effect on Islamic banking risk is positive, with a 1 percent increase in equivalent rate of PLS escalating Islamic banking risk by approximately 2.451 percent. Increasing equivalent rate of PLS will burden partners in repaying their funds to banks, thus reducing bank profitability, and increasing Islamic banking risk (Asutay et al., 2020; Fahamsyah et al., 2023; Hasnaoui & Fatnassi, 2019; Ibrahim et al., 2022) .

In the long term, equivalent rate of PLS negatively impact Islamic banking risk. By performing the first partial derivative of the regression coefficient using the $EQPLS^2$ variable, a value of 10.96 was obtained. This means that when equivalent rate of PLS exceed 10.96%, the impact on Islamic banking risk is negative. An increase in the

equivalent rate of PLS will increase costs. Therefore, Islamic banking will tighten its selection process for prospective partners, reducing banking risk (Amalia & Suriani, 2023; Basiruddin & Ahmed, 2019; Faizi, 2024).

$$\delta NPF/\delta EQPLS = 2.451 + 0.223\ EQPLS = 0 \quad (1)$$

$$EQPLS = 2.451/-0.223 = -10.96 \quad (2)$$

The model also explains that when interest rate are below the threshold value, their effect on Islamic banking risk is adverse, with a 1 percent increase in interest rate potentially decreasing the risk by 1.315 percent. Increasing conventional banking interest rate can shift conventional banking customers to Islamic banking. This customer shift can improve Islamic banking performance and ultimately reduce the level of Islamic banking financing risk. This case is similar to Displaced Commercial Risk (DCR), which involves the transfer of investment funds between Islamic and conventional banks. The emergence of DCR is driven by customer dissatisfaction with the benefits obtained, which results in customer shifts from conventional banks to Islamic banks (Rouetbi et al., 2023; Said et al., 2022).

In the long term, interest rate positively affect Islamic banking risk. By performing the first partial derivative of the regression coefficient using the INT^2 variable, a value of 6.01 was obtained. This means that when interest rate exceed 6.01%, the impact on Islamic banking risk is positive. Interest rate of 6.01% are a threshold value that requires attention to maintain low Islamic banking risk. An increase in the equivalent rate of PLS will also accompany an increase in conventional banking interest rate. The reason is that the dependency of Islamic banking on conventional banking is complicated to avoid (Saeed et al., 2023), and conventional banking interest rate are still the benchmark for Islamic banking financing (Azad et al., 2018; Diaw & Mbow, 2011). Therefore, an increase in equivalent rate of PLS will burden partners in repaying their funds to banks, thus reducing bank profitability, and increasing Islamic banking risk (Asutay et al., 2020; Hasnaoui & Fatnassi, 2019).

$$\delta NPF/\delta INT = -1.315 + 0.219\ INT = 0 \quad (3)$$

$$INT = 1.315/0.219 = 6.01 \quad (4)$$

The effect of inflation on Islamic banking risk or NPF is adverse, with every 1 percent increase in inflation reducing Islamic banking risk by approximately 0.396 percent. This finding aligns with research by Najwa et al. (2019), İncekara and Çetinkaya (2019) and Girdzijauskas et al. (Girdzijauskas et al., 2022) that found that rising inflation reduces people's purchasing power, potentially leading to a decline in economic activity. This decline in economic or business activity can also reduce demand for financing, thus lowering financing risk. Another argument is that high inflation affects the real value of loans, making it easier to repay debt. High inflation usually accompanies increased customer income, resulting from higher wages and business income adjusted to market prices. Meanwhile, nominal debt remains stable while business income increases due to rising prices of goods and services. Likewise, the purchasing power of

money relative to debt decreases, resulting in a lighter real debt burden. Thus, customers can better repay their funds on time, ultimately reducing risk (Adrian & Mancini-Griffoli, 2021; Anwar et al., 2023; Koju et al., 2018). Furthermore, similar findings suggesting that inflation negatively impacts banking risk are found in (Anita et al., 2022; Kanapickienė et al., 2022; Kjosevski et al., 2019; López-Salido & Loria, 2024; Louati & Boujelbene, 2020).

CONCLUSION

This study demonstrates that the equivalent rate of profit-and-loss-sharing financing has a significant nonlinear relationship with Islamic banking risk in Indonesia. The estimated pattern is inverted U-shaped: below the 10.96 percent threshold, an increase in the equivalent rate raises non-performing financing, whereas above that threshold, the effect becomes negative. This finding suggests that moderate increases in financing returns may initially intensify customers' repayment burdens and elevate default risk. However, once the equivalent rate reaches a sufficiently high level, Islamic banks appear to respond by applying stricter customer screening, more rigorous feasibility assessment, and closer monitoring of financed projects, thereby reducing financing risk.

The analysis also reveals that conventional interest rates affect Islamic banking risk through a U-shaped relationship, with an estimated threshold of 6.01 percent. Below this level, higher conventional interest rates may encourage customers to shift toward Islamic banks, improving business opportunities and reducing financing risk. Above the threshold, however, rising interest rates increase Islamic banking risk because Islamic financing prices remain influenced by conventional benchmarks within Indonesia's dual banking system. Inflation was found to reduce non-performing financing, while economic growth, exchange-rate movements, and the coronavirus disease 2019 period showed no statistically significant effects. These findings emphasize the importance of monitoring both internal financing prices and external monetary conditions.

The study contributes to the Islamic banking literature by extending threshold analysis from conventional lending rates to the equivalent rate of profit-and-loss-sharing financing. It provides empirical evidence that the relationship between financing returns and risk cannot be adequately explained through a simple linear framework. More importantly, the estimated threshold offers a practical early warning indicator for Islamic bank managers, regulators, and policymakers. Islamic banks should diversify financing toward productive sectors, strengthen project supervision, and design return structures that balance profitability with customers' repayment capacity. Future research should test whether similar nonlinear patterns exist across countries, financing contracts, bank sizes, and different regulatory environments.

Limitation of the Study

This study is limited by its focus on Indonesian Islamic commercial banks and therefore may not fully represent Islamic banking systems operating under different institutional, regulatory, and macroeconomic conditions. The use of unbalanced quarterly panel

data was necessary because of bank mergers, conversions, spin-offs, operational changes, and unavailable observations. However, these structural differences may affect the comparability of banks across the observation period. The sample also excludes Islamic business units and Islamic rural banks, which may exhibit distinct financing structures, customer profiles, and risk behavior. Consequently, the estimated equivalent-rate threshold should be interpreted as specific to the sampled commercial banks rather than as a universal benchmark for the entire Islamic banking industry.

A further limitation concerns the measurement and specification of risk. Islamic banking risk was represented solely by non-performing financing, although bank risk also includes liquidity, market, operational, insolvency, and Sharia noncompliance risks. The model incorporated several macroeconomic controls, but it did not include potentially important bank-specific variables such as capital adequacy, liquidity, profitability, operating efficiency, governance quality, financing concentration, and bank size. In addition, the equivalent rate was analyzed at an aggregate profit-and-loss-sharing level, without separating different contractual forms or economic sectors. The model identifies statistical threshold relationships, but it does not directly establish the managerial mechanisms through which customer selection and monitoring practices change above the estimated threshold.

Recommendations for Future Research

Future research should extend the analysis to Islamic banks in other countries and compare jurisdictions with different banking structures, monetary regimes, Sharia governance arrangements, and levels of Islamic financial development. A cross-country panel could determine whether the 10.96 percent threshold is unique to Indonesia or reflects a broader pattern in Islamic banking. Comparative studies between Islamic and conventional banks would also clarify whether nonlinear pricing-risk relationships differ according to financing principles. Researchers should further distinguish among profit-and-loss-sharing contracts, including mudarabah and musharakah, and compare them with sale-based and lease-based financing. Sector-level analysis could identify whether equivalent-rate thresholds vary across agriculture, manufacturing, trade, property, and consumer financing.

Subsequent studies should employ broader measures of bank risk and include additional institutional and bank-specific determinants. Capital strength, liquidity, profitability, cost efficiency, governance, financing concentration, Sharia supervisory quality, and digital risk-management capacity may improve model accuracy and explain differences among banks. Alternative methods, such as dynamic panel estimation, panel threshold regression, quantile regression, and regime-switching models, could test the robustness of the nonlinear relationship and address possible endogeneity. Qualitative interviews with risk managers, financing officers, customers, and regulators could also explain why screening and monitoring intensify at particular pricing levels. Finally, future research should develop and validate operational early warning systems that integrate equivalent-rate thresholds with customer-level and macroeconomic indicators.

Author Contributions

Conceptualization	A.S.R., J.E., N.A.A., & S.	Resources	A.S.R., J.E., N.A.A., & S.
Data curation	A.S.R., J.E., N.A.A., & S.	Software	A.S.R., J.E., N.A.A., & S.
Formal analysis	A.S.R., J.E., N.A.A., & S.	Supervision	A.S.R., J.E., N.A.A., & S.
Funding acquisition	A.S.R., J.E., N.A.A., & S.	Validation	A.S.R., J.E., N.A.A., & S.
Investigation	A.S.R., J.E., N.A.A., & S.	Visualization	A.S.R., J.E., N.A.A., & S.
Methodology	A.S.R., J.E., N.A.A., & S.	Writing – original draft	A.S.R., J.E., N.A.A., & S.
Project administration	A.S.R., J.E., N.A.A., & S.	Writing – review & editing	A.S.R., J.E., N.A.A., & S.

All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement

Informed consent was not required for this study.

Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work the authors used ChatGPT, Grammarly, and PaperPal to translate from Bahasa Indonesia into American English, and to improve clarity of the language and readability of the article. After using these tools, the authors reviewed and edited the content as needed and took full responsibility for the content of the published article.

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