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SECTORAL FINANCING CONCENTRATION AND SHARIA RURAL BANKS' PROFITABILITY

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ABSTRACT

Introduction: Sharia rural banks (SRBs) in Indonesia face high non-performing financing (NPF). The high NPF likely causes a decrease in the profitability of SRBs. One strategy to overcome high financing risk is selecting the appropriate financing strategy either sectoral financing diversification or concentration. This study explores the impact of sectoral financing concentration along with some control variables on the profitability of Sharia rural banks in Indonesia using aggregate data of SRBs from 2010:M1 to 2023:M12

Methods: Our study employs the quantitative method utilizing the Autoregressive Distributed Lag (ARDL). Returns on Assets (ROA) are utilized to measure profitability and Sectoral financing concentration is measured by the Herfindahl-Hirschman index (HHI). Some control variables are assets, capital adequacy ratio (CAR), financing (FIN), cost-income ratio (CIR), NPF, consumer price index (CPI), and COVID.

Results: The results show cointegration, indicating the long-run relationship among the variables being studied. The findings signify that sectoral financing concentration fortifies Sharia rural banks' profitability. Also, size and equity enhance profitability. The results also highlight that low inflation increases profitability and COVID-19 lowers profitability.

Conclusion and suggestion: Our results suggest that Sharia rural banks should have competent experts in specific economic sectors such as trade, restaurants, and hotels, which generate more profit due to comparative advantage.

INTRODUCTION

Sharia Rural Bank (SRB) is one of the important pillars in supporting small and medium enterprises, which are the largest part of the economic sector in Indonesia. Sharia Rural Bank is a financial intermediary whose function is to channel funds from those who have excess and those who need funds. Thus, financing activities are the main activities of banks to generate profits. As a result, the success and failure of Sharia rural banks in managing these financings will affect small and medium enterprises and the Indonesian economy (Widarjono et al., 2020).

One of the important issues Sharia rural banks face is high non-performing financing (NPF), which measures financing defaults (Widarjono et al., 2020; Priyadi et al., 2021). The Financial Services Authority has set a maximum NPF rate of 5% for Islamic banks, including SRBs. The average NPF of Sharia rural banks in the 2016-2022 period was 9.06%, while the NPL of the conventional rural banks as a competitor to SRB was 4.18% (www.ojk.go.id). The NPF of SRB exceeds the maximum threshold and this high NPF will discourage SRB's performance and increase the risk of SRB's bankruptcy. Controlling financing is very important to maintain the profitability of Sharia rural banks.

Concerning this highly impaired financing, one of the main issues of Sharia Rural Bank as a financial intermediary at the regional level is financing diversification. There is an ongoing debate between the choice of financing diversification or financing concentration (Tabak et al., 2011). Banks diversify financing in various sectors avoiding idiosyncratic shocks on their financing portfolio since their financing spreads across many economic sectors. As a result, well-diversified financing enhances profitability and less probability of bankruptcy. By contrast, banks should focus on specific economic sectors to benefit the competitive advantage by capitalizing expertise in a few economic sectors and reducing agency problems. Consequently, concentrated financing supports the bank's profitability.

A strand of empirical studies has been conducted to examine the effect of financing diversification on the profitability of large Islamic banks. However, the previous studies resulted in mixed findings. Some studies found that sectoral financing diversification encourages profitability (Al-kayed & Aliani, 2020; Hamid & Ibrahim, 2021; Šeho et al., 2021). Conversely, some researchers documented that the sectoral financing concentration enhances profitability (Prastiwi & Anik, 2020; Widarjono et al., 2022; Widarjono & Sidiq, 2022). A bunch of empirical studies have analyzed the impact of financing diversification based on financing contracts, namely Mudharabah, Musaryakah, Murabahah, Ijarah, Istisna, and Qard, on non-performing financing of Islamic rural banks. The results suggest that financing concentration reduces non-performing financing (Aiyubbi et al., 2022; Sutrisno et al., 2023). However, there has been no research examining the impact of financing diversification based on economic sectors on the profitability of SRBs.

The high NPF likely causes a decrease in the profitability of SRBs. One strategy to overcome high financing risk is selecting the appropriate financing strategy. The two strategies are sectoral financing diversification and sectoral financing concentration (Šeho et al., 2024). Therefore, it is interesting to examine the effect of sectoral financing diversification or concentration on the profitability of SRBs.

This study aims to analyze the impact of sectoral financing concentration along with some control variables on the profitability of Sharia rural banks in Indonesia. More importantly, the study of the impact of sectoral financing diversification on the profitability of small Islamic banks such as Sharia rural banks has not been carried out yet. Accordingly, our empirical study aims to fill this literature gap and enhance the empirical literature by examining the effects of financing portfolio diversification on Indonesian Sharia rural banks' profitability. Furthermore, this study investigates the impact of COVID-19 on Sharia rural banks' profitability as well.

LITERATURE REVIEW AND HYPOTHESIS

Theoretical background

Loan diversification vs. loan concentration is an ongoing debate in the banking literature. Two theories that explain loan diversification are the traditional banking and corporate finance theories. According to the traditional banking theory, a bank should diversify its loan portfolios across different economic sectors to avoid the probability of default (Berger et al., 2010). A well-diversified bank may eliminate the idiosyncratic shock on their loan portfolios since the loans are spread across different economic sectors. By contrast, banks concentrating their loans on some sectors are vulnerable since banks are subject to the sectoral volatility in which they concentrate on the specific sectors. Loan diversification enhancing the bank profitability is known as the diversification stability hypothesis.

On the other hand, a bank should concentrate on specific economic sectors according to the corporate finance theory. This theory suggests that a bank may build up a comparative advantage by specializing their loan in specific economic sectors (Denis et al., 1997). Banks can monitor their loans well and reduce agency problems and asymmetric information By specializing in a few economic sectors. Indeed, a bank can detect impaired loans much earlier due to better control to undertake action to mitigate loan risk. Hence, the concentration stability hypothesis states that loan concentration can strengthen bank profitability.

Literature review

Several studies found that diversification affects bank performance in line with traditional banking theory. Rossi et al. (2009) found that bank with high diversification implies more extensive provisions for risk. Bank with more loan portfolio diversification decreases the number of provisions for bad loans. Moreover, in terms of cost-efficiency, it shows that banks' higher concentration raised cost efficiency. An

empirical study by Shim (2019) indicates that increased loan diversification positively impacts the bank's financial strength. The results suggest when banks diversify their loan portfolio, it can reduce the risk of their fragility more efficiently than banks focusing their loan-making on the specialized area. Concerning bank diversification and financial stability, Kim et al. (2020) found that financial stability was associated significantly with bank diversification before the economic crisis. Furthermore, financial stability increases with bank diversification up to an optimal level but decreases as bank diversification increases beyond the optimal point.

Although some studies tested the effect bank diversification has a positive impact on bank performance, some empirical studies found that excessive bank diversification is not surprisingly profitable for the bank return (Acharya et al., 2006). Moreover, diversification allowed higher costs for the high-risk banks. Another study conducted by Tabak et al. (2011) tested the relationship between bank returns and loan portfolio diversification. This study found that bank concentration positively affects a bank's return. Moreover, those banks with higher risks may decrease their returns due to high concentration. Another study conducted by Adzobu et al. (2017) also analyzed the impact of loan portfolio diversification on profitability and credit risk. The study uses ROA and ROE as proxies of bank profitability, along with NPLR and LLPR are used as proxies for credit risk. The result shows that the increase in loan diversification would reduce banks' profitability and increase credit risk.

Islamic banks with different management and operations commonly have specified diversification products based on Islamic transactions. Al-kayed and Aliani (2020) studied the effects of diversification on bank risk and return in the Gulf Cooperation Council (GCC) region. They suggest that Islamic banks should diversify their instruments when their risk increases, while the focus on Islamic bank instruments is favorable when risk is low to moderate. Šeho et al. (2021) examined the financing diversification on Islamic profitability in the dual system in six countries. They found that financing diversification positively influences profitability. Šeho et al., (2024)documented that the stability of Islamic banks in Malaysia is not affected by sectoral financing diversification.

Several studies have also analyzed the impact of financing concentration on the performance of Islamic banks in Indonesia. Prastiwi and Anik, (2020), Widarjono et al. (2022), and Widarjono and Sidiq (2022) have investigated the impact of financing diversification on the profitability of Islamic commercial banks in Indonesia. The results show that financing diversification significantly increases Islamic commercial bank's profitability. Aiyubbi et al. (2022) and Sutrisno et al. (2023) investigated the effect of financing diversification on financing defaults of SRBs. They found that financing concentration lowers the non-performing financing of SRBs.

Hypothesis development

Our study employs the Herfindahl-Hirschman index (HHI) to measure financing diversification. It is the sum of squares of sectoral financing to total financing ratio. According to both the traditional banking theory, financing diversification generates more profit, while financing concentration leads to higher profit based on the corporate finance theory (Šeho et al., 2024)

H1: *Diversification affects bank profitability*

Indeed, Sharia Rural Bank's profitability also depends on bank-specific conditions such as size, equity, financing, efficiency, impaired financing, and macroeconomic conditions such as domestic output and inflation. Bank size is measured using total assets. Large banks could benefit from economies of scale due to low operating costs to generate more profitability (Ibrahim et al., 2017).

H2: *Bank size influences bank profitability*

The capital adequacy ratio (CAR) is the ratio of equity to the asset representing how much assets are funded by the owner's equity. An increase in CAR improves the bank's resilience and in turn, strengthens bank profitability according to the risk-return theory. Indeed, CAR also indicates the bank's ability to cover bad financing and, accordingly, support bank profitability (Ashraf et al., 2022).

H3: *CAR positively affects bank profitability.*

The financing asset ratio (FIN) represents how much banks allocate their financing. High FIN shows that banks can produce more profit because of high financing. However, it is debatable because high financing indicates low liquidity (Trinugroho et al., 2017). The low liquidity indicates that banks are inability to manage unexpected falls in their financing. This situation may increase high financing risk, and then worsen the bank's performance.

H4: *Financing affects bank profitability.*

The cost-to-income ratio (%) corresponds to operating efficiency, which calculates how much it costs to produce income per unit (Sutrisno & Widarjono, 2024). A high cost-to-income ratio (CIR) shows that the cost to generate per unit income is high. Consequently, a high CIR indicates lower efficiency, and vice versa. Low CIR results in a high margin, so banks produce higher profits (Trinugroho et al., 2018).

H5: *CIR negatively influences bank profitability*.

Financing risk is an important aspect of Islamic banks' profitability. Non-performing financing (NPF) is intensively applied to measure financing risk in an Islamic bank. NPF is the ratio of bad financing to total financing (%). The high NFP indicates that Islamic

banks face high financing risk, and it is difficult to restore. Therefore, high NPF shows that the bank can not produce high profits (Alandejani & Asutay, 2017)
H6: *NPF negatively affects bank profitability*.

Our study uses the consumer price index (CPI) to measure the inflation rate. Inflation leads to the prices of goods and services increasing, and it lowers the bank customers' ability to pay back their financing (Widarjono, 2020; Priyadi et al., 2021). Therefore, inflation deteriorates the Islamic banks' ability to produce income and lowers the profitability of Islamic banks.
H7: *CPI negatively influences bank profitability*.

GDP is widely applied to measure economic growth. Yet, GDP is subject to external shocks such as COVID-19. COVID-19 lowers the GDP of each country across the world, including Indonesia. A decrease in GDP shows that the production of goods and services rises, and income also decreases. Consequently, the profitability of Islamic banks is negatively associated COVID- 19 (Yudaruddin, 2023).
H8: *COVID negatively affects profitability.*

METHOD

Data

Our study assesses the effect of financing diversification in different economic sectors on Sharia rural banks' profitability, including some bank-specific and external control variables in the Sharia rural bank Industry in Indonesia. The bank-specific factors are asset, equity, efficiency, financing, and financing risk, while external factors are domestic output and inflation. We employ the aggregate data of Indonesian Sharia rural banks, covering from January 2010 to December 2023. This period was selected because the number of SRBs has been relatively stable since 2010 after the government passed Islamic Banking Law No. 21 of 2008. All financing data of SRBs are extracted from the Indonesian Financial Authority (OJK) (www.ojk.go.id), and macroeconomic data are sourced from Indonesian statistics (www.bps.go.id).

Empirical Model

This study employs a quantitative approach. The quantitative method used is the regression method. Our paper follows the existing empirical studies such as Kabir and Worthington (2017) and Hassan et al. (2019) to assess the impact of financing diversification on Sharia rural banks' performance. The model of Sharia rural banks' profitability can be expressed in the following regression equation:

$$\mathrm{ROA}_t = \delta_0 + \delta_1 \mathrm{HHI}_t + \delta_2 \mathrm{LASSET}_t + \delta_3 \mathrm{CAR}_t + \delta_4 \mathrm{FIN}_t + \delta_5 \mathrm{CIR}_t + \delta_6 \mathrm{NPF}_t + \delta_7 \mathrm{CPI}_t + \delta_8 \mathrm{COVID}_t + \mathrm{e}_t \quad (1)$$

Where the profitability is measured using return on asset (ROA). HHI is the Herfindahl-Hirschman Index, which measures sectoral financing concentration. The asset is a total asset as a proxy of bank size. CAR is the capital adequacy ratio, which represents bank capital. FIN is the financing asset ratio, which calculates the amount of financing. CIR is the cost-income ratio which represents efficiency. NPF is non-performing financing as a proxy of financing default. CPI is a consumer price index which measures inflation. COVID is the COVID-19 outbreak, starting in the second quarter of 2020 as a proxy of economic shock. The asset is expressed in a natural logarithm.

Herfindahl-Hirschman (HHI) is widely used to measure sectoral financing concentration Šeho et al., 2021; Hamid & Ibrahim, 2021; Šeho et al., 2024). Herfindahl-Hirschman Index (HHI) is calculated according to economic sectors. Economic sectors consist of 10 sectors: (1) Agriculture (AGR); (2) mining (MIN); (3) manufacturing (MAN); (4) water, gas and electricity (WAT); (5) construction (CON); (6) trade, restaurants and hotels (TRA); (7) transport, cargo storage and communication (TRN); (8) business services (BUS); (9) social services (SOC); (10) others (OTR). as follows:

$$\mathrm{HHI} = \left(\frac{\mathrm{AGR}}{\mathrm{TFin}}\right)^2 + \left(\frac{\mathrm{MIN}}{\mathrm{TFin}}\right)^2 + \left(\frac{\mathrm{MAN}}{\mathrm{TFin}}\right)^2 + \left(\frac{\mathrm{WAT}}{\mathrm{TFin}}\right)^2 + \left(\frac{\mathrm{CON}}{\mathrm{TFin}}\right)^2 + \left(\frac{\mathrm{TRA}}{\mathrm{TFin}}\right)^2 + \left(\frac{\mathrm{TRN}}{\mathrm{TFin}}\right)^2 + \left(\frac{\mathrm{BUS}}{\mathrm{TFin}}\right)^2 + \left(\frac{\mathrm{SOS}}{\mathrm{TFin}}\right)^2 + \left(\frac{\mathrm{OTR}}{\mathrm{TFin}}\right)^2 + \quad (2)$$

Where TFin is total financing (TF). Sectoral financing concentration, which is measured by HHI, indicates that banks spread their financing in different economic sectors. High HHI indicates that financing is less diversified financing (Widarjono et al., 2020), supporting the concentration-stability hypothesis. By contrast, Islamic banks diversify their financing in various economic sectors to lower financing risk, confirming the concentration-fragility hypothesis. Table 1 presents variable measurements.

Table 1
Variable measurement

Variable	Measurement	Source
Dependent variable		
ROA	Earning after tax divided by total assets	Rizvi et al. (2020)
Independent variable		
HHI	Herfindahl-Hirschman index	Šeho et al. (2024)
Asset	Total assets	Ibrahim et al. (2017)
CAR	Equity divided by assets weighted risk	Ashraf et al. (2022)
FIN	Total financing divided by total assets	Trinugroho et al. (2017)
CIR	Total cost divided by total income	Sutrisno and Widarjono (2024)

NPF	Financing default divided by total financing	Alandejani and Asutay (2017)
CPI	Consumer price index	Priyadi et al. (2021)
COVID	Covid-19 pandemic	Yudaruddin 2023)

Our study employs the Autoregressive Distributed Model (ARDL). Some advantages exist as we employ the ARDL model for the time series model (Pesaran & Shin, 1998). We do not need all variables to be integrated in the same order, but none is integrated at I(2). ARDL can examine short-run and long-run conditions. The equation (1) can be written in the ARDL model as

$$\begin{aligned}\Delta \mathrm{ROA}_t = {} & \emptyset_0 + \emptyset_1 ROA_{t-1} + \emptyset_2 \mathrm{HHI}_{t-1} + \emptyset_3 \mathrm{LASSET}_{t-1} + \emptyset_4 \mathrm{CAR}_{t-1} + \emptyset_5 \mathrm{FDR}_{t-1} + \\ & \emptyset_6 \mathrm{CIR}_{t-1} + \emptyset_7 \mathrm{NPF}_{t-1} + \emptyset_8 \mathrm{CPI}_{t-1} + \emptyset_9 \mathrm{COVID}_{t-1} + \sum_{i=1}^{p} \delta_{1i} \Delta \mathrm{ROA}_{t-1} + \\ & \sum_{i=1}^{p} \delta_{2i} \Delta \mathrm{HHI}_{t-1} + \sum_{i=1}^{p} \delta_{3i} \Delta \mathrm{LASSET}_{t-1} + \sum_{i=1}^{p} \delta_{4i} \Delta \mathrm{CAR}_{t-1} + \\ & \sum_{i=1}^{p} \delta_{5i} \Delta \mathrm{FDR}_{t-1} + \sum_{i=1}^{p} \delta_{6i} \Delta \mathrm{CIR}_{t-1} + \sum_{i=1}^{p} \delta_{7i} \Delta \mathrm{NPF}_{t-1} + \\ & \sum_{i=1}^{p} \delta_{8i} \Delta \mathrm{CPI}_{t-1} + \sum_{i=1}^{p} \delta_{9i} \Delta \mathrm{COVID}_{t-1} + \mathrm{e}_t \qquad (3)\end{aligned}$$

where Δ is the first different operator, $\emptyset_1 - \emptyset_8$ represent the long-run coefficients. $\delta_{1i} - \delta_{8i}$ shows the short-run coefficients

Moreover, an error correction model (ECM) can be derived from the ARDL model. The ECM-ARDL can be written as

$$\begin{aligned}\Delta \mathrm{ROA}_t = {} & \theta_0 + \sum_{i=1}^{p} \theta_{1i} \Delta \mathrm{ROA}_{t-1} + \sum_{i=1}^{p} \theta_{2i} \Delta \mathrm{HHI}_{t-1} + \sum_{i=1}^{p} \theta_{3i} \Delta \mathrm{LASSET}_{t-1} + \\ & \sum_{i=1}^{p} \theta_{4i} \Delta \mathrm{CAR}_{t-1} + \sum_{i=1}^{p} \theta_{5i} \Delta \mathrm{FDR}_{t-1} + \sum_{i=1}^{p} \theta_{6i} \Delta \mathrm{CIR}_{t-1} + \\ & \sum_{i=1}^{p} \theta_{7i} \Delta \mathrm{NPF}_{t-1} + \sum_{i=1}^{p} \theta_{8i} \Delta \mathrm{CPI}_{t-1} + \sum_{i=1}^{p} \theta_{9i} \Delta \mathrm{COVID}_{t-1} + \theta_{10} \mathrm{EC}_{t-1} + \mathrm{e}_t \\ & (4)\end{aligned}$$

ECM-ARDL indicates a disequilibrium condition in the short run. This disequilibrium condition occurs since some variables are not stationary at the level. For that reason, the ECM-ARDL model comprises the lag error (EC_{t-1}) as a correction variable to restore the long-run equilibrium condition. The ECM-ARDL model is appropriate as (EC_{t-1}) is a negative sign and statistically significant. Accordingly, θ_{10} represents the speed of adjustment coefficient.

We need some steps to estimate the ARDL model. Firstly, we check stationary data. Secondly, we estimate the ARDL model by selecting the optimal lag. Our study applies the Akaike information criterion (AIC) and Schwarz Criterion (SC). We select both methods to choose the longest lag length. Thirdly, we check the cointegration using the bound testing approach. The final step is to estimate the long-run and short-run coefficients.

RESULTS AND ANALYSIS

Summary Statistics

Table 2 exhibits the descriptive statistics of dependent and explanatory variables. ROA, on average, was 2.44% and was relatively stable, with a standard deviation of 0.473. This profitability was above the threshold value of 1.5% as regulated by the Indonesian Financial Service Authority. On average, the sectoral financing diversification was 26.29%, with a standard deviation of 2.435. Figure 1 reports the sectoral financing diversification during the studied period. HHI decreased in 2010, then it was stable but dropped to below 20% in the fourth quarter of 2019, but then it has increased since 2022. Figure 2 reports each sectoral diversification where two sectors, i.e. trade, restaurants, and hotel (TRA) and others (OTR), were dominant.

The average asset was IDR 9.98 trillion. The average equity (CAR) is 23.67%, and this equity exceeds the threshold value of 15% as regulated by the Indonesian Financial Service Authority. Financing rate (FDR) on average is 75.84%, with a standard deviation of 2.61. This financing rate is reasonable since Islamic banks are prohibited from any speculative financing (Azmat, Skully, & Brown, 2015). Islamic bank efficiency (CIR) is 84.50, ranging from 75.20 to 92.25, which is less than the maximum rate of 95%. On average, impaired financing (NPF) was high (8.77%), which is above the threshold of 5%. Overall, the performance of Sharia rural banking in Indonesia was good as a new player in the banking industry.

Table 2
Summary statistics

Var	Mean	Maximum	Minimum	Std. Dev.
ROA (%)	2.443	3.970	1.635	0.473
HHI (%)	26.290	33.989	18.847	2.826
ASSET (Trillions IDR)	9.985	23.177	2.139	5.668
CAR (%)	23.668	33.265	17.990	3.230
FIN (%)	75.843	81.733	70.245	2.612
CIR (%)	84.504	92.250	75.200	4.464
NPF (%)	8.770	82.400	5.914	5.893
CPI	136.326	171.190	97.550	21.490
COVID	0.203	1.000	0.000	0.403

Source: Data Processed

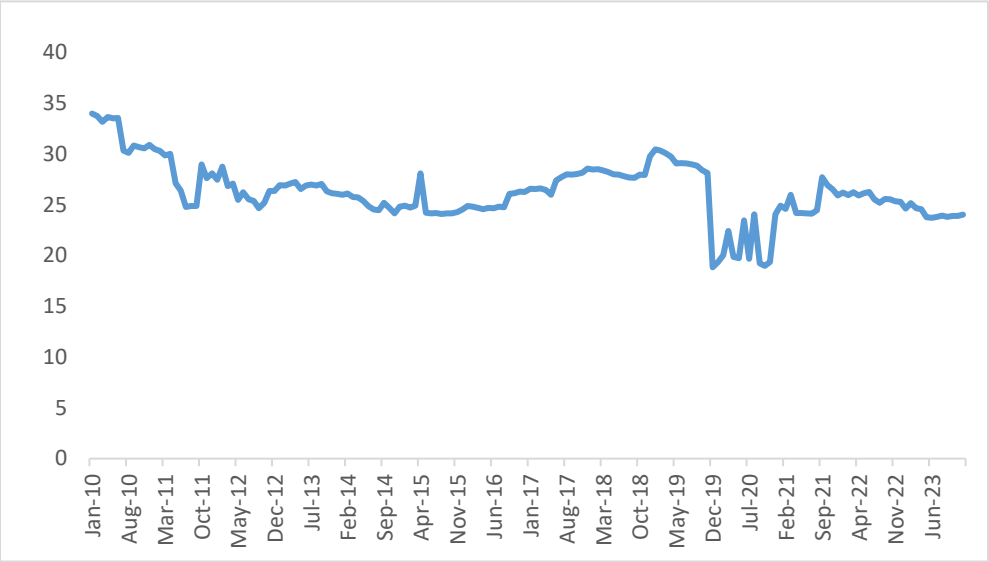
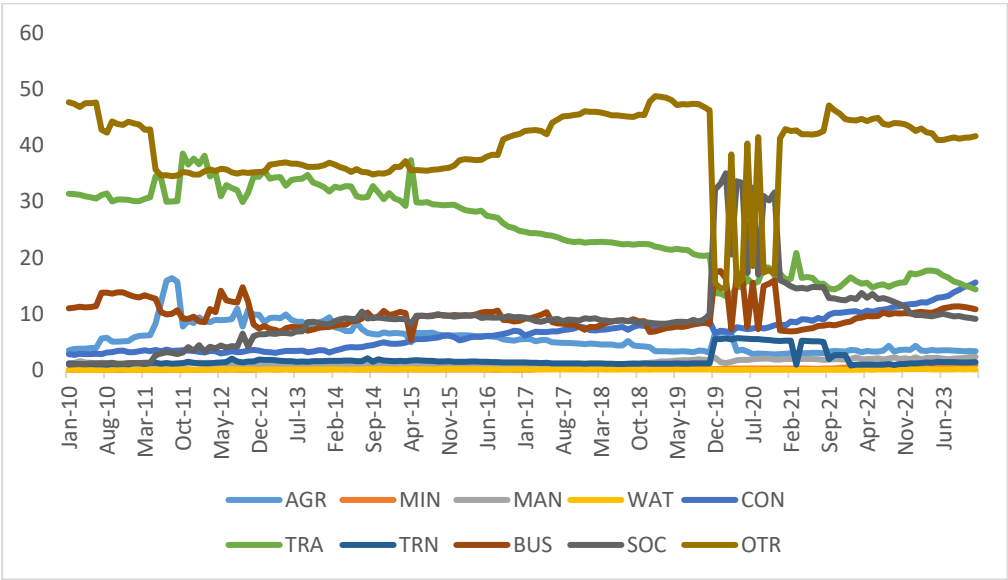


Figure 1 Financing diversification



Source: Data Processed

Figure 2 Sectoral financing concentration

ARDL Results

The ARDL model is valid provided that the stationarity of second differenced data is not found. We apply the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) with no trend and trend to test stationary variables. The results of the ADF and PP tests are reported in Table 3. No variable is stationary at the second difference. These unit root tests warrant that the ARDL method is applicable to estimating rural Islamic banks' profitability.

Table 3
Unit-root test: ADF and PP

	Level data				First differenced data			
	ADF		PP		ADF		PP	
Variable	Constant	Trend	Constant	Trend	Constant	Trend	Constant	Trend
ROA	-2.579*	-4.163***	-2.671*	-3.903**	-12.170***	-12.191***	-16.413***	-16.794***
HHI	-3.290**	-3.352*	-3.616***	-3.756**	-16.530***	-16.517***	-16.928***	-17.146***
LASSET	-3.645***	-2.851	-3.762***	-2.695	-1.753	-11.216***	-10.813***	-11.307***
CAR	-3.431**	-3.212*	-4.125***	-3.744**	-17.734***	-17.794***	-18.059***	-18.448***
FIN	-2.344	-3.403***	-3.368**	-4.669***	-2.220	-2.236	-8.842**	-8.785***
CIR	-1.931	-1.502	-2.317	-2.305	-13.670***	-13.742***	-19.534***	-19.781***
NPF	-12.299***	-12.463***	-12.317***	-12.467***	-10.740***	-10.772***	-149.630***	-161.075***
CPI	-1.343	-1.506	-1.107**	-1.478	-10.204***	-10.281***	-9.230***	-9.408***
COVID	-1.762	-1.816	-1.792	-1.906	-12.806***	-12.787***	-12.806***	-12.787***

Source: Data Processed
Notes: ***, **, * report significance in 1%, 5%, and 10%, respectively

Our study then estimates the ARDL model applying the OLS method and selects the optimum lag up to 6 using the Akaike Information Criterion (AIC) and Schwarz Criterion (SC). Table 4 presents Sharia rural banks' profitability. Model 1 presents the model without any macroeconomic variable and model 2 incorporates the Consumer Price Index (CPI) which measures inflation and COVID-19 as a proxy of external shock. Model 2 with macroeconomic variables is used to determine the consistency of the results because bank performance is not only influenced by bank-specific variables but also macroeconomic conditions as external variables.

The coefficients of determination (R^2) are 0.894, 0.891, 0.908, and 0.903, indicating that both AIC and SC methods can explain well for profitability. Autoregressive Conditional Heteroscedasticity (ARCH) and Lagrange Multiplier (LM) are employed to check heteroscedasticity and serial correlation problems. Both AIC and the adjusted R^2 methods pass the heteroscedasticity and serial correlation problems. The CUSUM and CUSUM Squares test, which are presented in Figure 1- 4, also indicate evidence of the coefficient stability. Based on the CUSUM test, the estimated coefficients of models 1 and 2 are within the range of 5% significance so the coefficients of both models are stable. According to the CUSUM Squares test, the estimated coefficients of models 1 and 2 in a certain period are out of the range of 5% significance but return to the range of 5% significance so that the coefficients of both models are also stable.

Table 4
ARDL: Sharia rural banking's profitability

	Model 1				Model 2			
	AIC		SC		AIC		SC	
Variable	Coeff.	Prob.	Coeff.	Prob.	Coeff	Prob	Coeff	Prob.
C	1.630	0.177	1.962	0.107	-4.999	0.117	-5.608*	0.074
ROA(-1)	0.734***	0.000	0.708***	0.000	0.710***	0.000	0.687***	0.000
HHI	-0.014	0.164	-0.013	0.196	-0.013	0.187	-0.011	0.242

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HHI(-1)	0.028***	0.005	0.027***	0.007	0.036***	0.000	0.034***	0.001
LASSET	-4.591***	0.003	-4.653***	0.003	-3.526**	0.019	-3.683**	0.015
LASSET(-1)	4.523***	0.003	4.588***	0.003	5.776***	0.002	4.137***	0.006
LASSET(-2)	-	-	-	-	-1.880	0.114	-	-
CAR	0.022***	0.008	0.021**	0.011	0.026***	0.001	0.024***	0.000
CAR(-1)	0.008	0.359	0.009	0.306	0.012	0.145	-	-
CAR(-2)	-0.025***	0.002	-0.027***	0.002	-0.021**	0.016	-	-
FIN	-0.035**	0.020	-0.036**	0.017	-0.025*	0.098	-0.035**	0.019
FIN(-1)	0.043***	0.004	0.044***	0.004	0.037**	0.015	0.042***	0.005
CIR	-0.031***	0.000	-0.014***	0.004	-0.030***	0.000	-0.032***	0.000
CIR(-1)	0.021**	0.020	-	-	0.024***	0.004	0.025***	0.003
NPF	0.000	0.960	0.000	0.915	0.000	0.927	0.000	0.875
CPI	-	-	-	-	-0.012*	0.068	-0.014**	0.025
COVID	-	-	-	-	-0.083	0.470	-0.147	0.195
COVID(-1)	-	-	-	-	0.461***	0.003	0.444***	0.004
COVID(-2)	-	-	-	-	-0.469***	0.000	-0.439***	0.000
R-squared	0.894		0.891		0.908		0.903	
LM	2.743	0.254	3.013	0.222	1.147	0.564	1.147	0.564
ARCH	0.169	0.681	0.096	0.757	0.018	0.893	0.018	0.893

Source: Data Processed

Notes: ***, **, * report significance in 1%, 5%, and 10%, respectively.

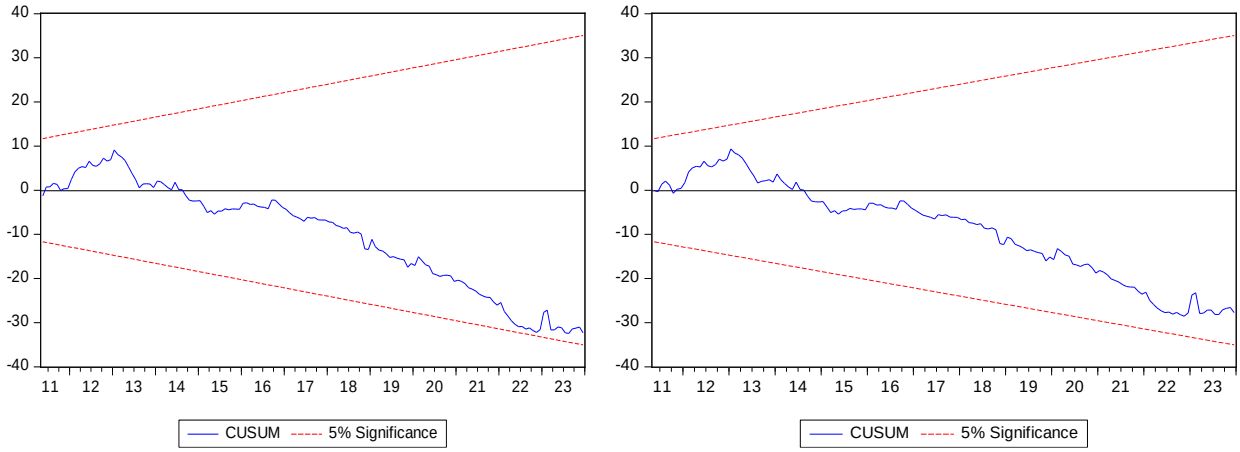


Figure 1 Stability test of CUSUM for Model 1

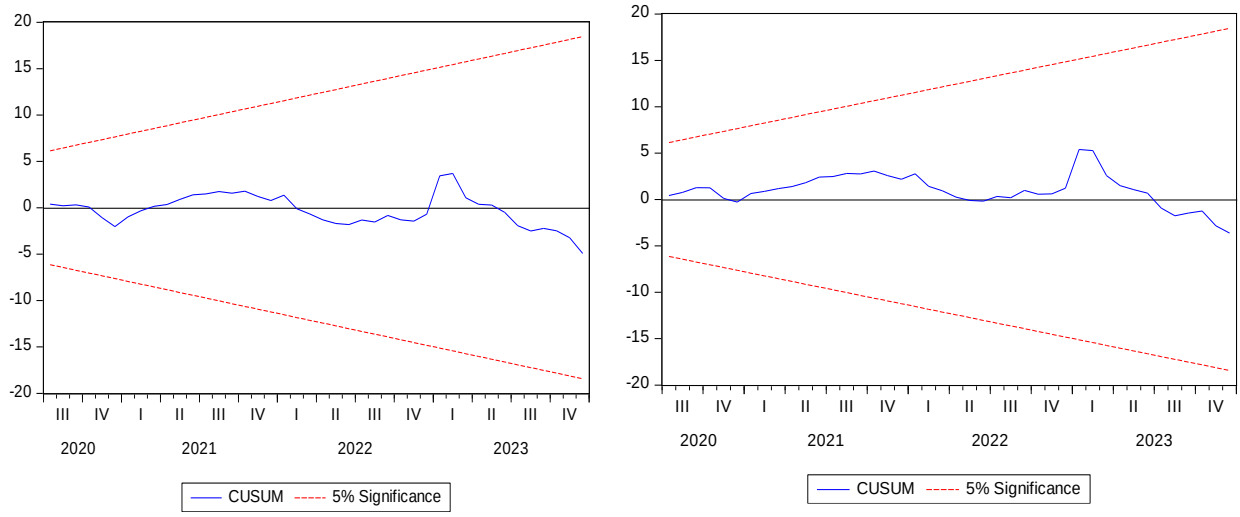


Figure 2 Stability test of CUSUM for model 2

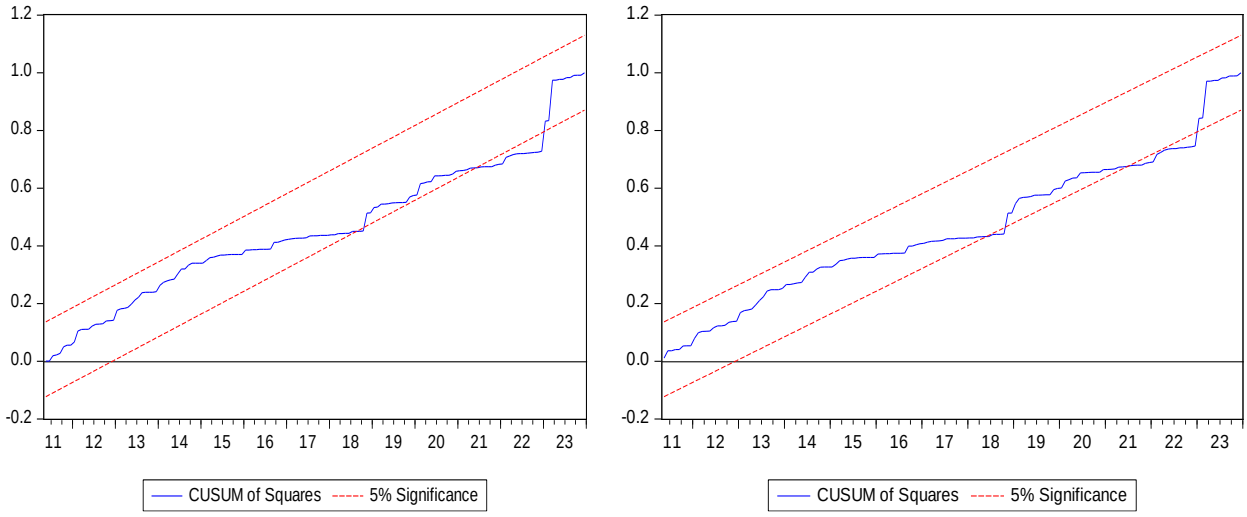
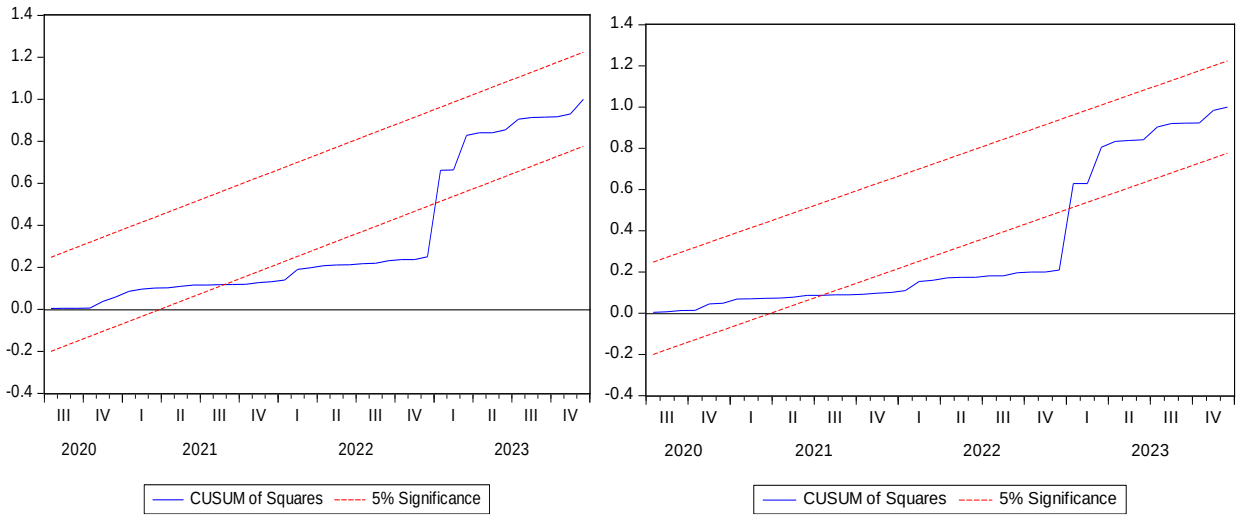


Figure 3 Stability test of Squared CUSUM for model 1



Source: Data Processed

Figure 4 Stability test of Squared CUSUM for model 2

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The next step checks cointegration, employing the bound testing approach to test the long-run relationship (M. Hashem Pesaran, Shin, & Smith, 2001). If F-statistics (F_{PSS}) exceed the upper bond, then cointegration exists, and otherwise, there is no cointegration. The cointegration results are exhibited in Table 5. All computed F-statistics exceed than upper bound at $\alpha = 1\%$ or $\alpha = 5\%$, indicating that the cointegration exists. We then proceed to examine short-run and long-run conditions.

Table 5
Cointegration test

Model	F-statistic	α	Lower bound	Upper bound
Model 1: AIC	4.244***	10%	1.99	2.94
Model 1: SC	5.351***	5%	2.27	3.28
		1%	2.88	3.99
Model 2: AIC	3.741**	10%	1.85	2.85
Model 2: SC	4.684***	5%	2.11	3.15
		1%	2.62	3.77

Source: Data Processed
Notes: ***, **, * report significance in 1%, 5%, and 10%, respectively

The long-run coefficients of Sharia rural banks' profitability are reported in Table 6. The HHI is positive and significant, implying that sectoral financing concentration supports the probability of Sharia rural banks. As predicted, the asset that measures the size of Sharia rural banks positively affects the Sharia rural banks' profitability. ROA also positively links to CAR. Financing is not positively associated with profitability and operating efficiency negatively affects profitability. High inflation, as expected, lowers the profitability of Sharia rural banks, and as predicted, COVID-19 negatively affects ROA

Table 6
Long-run coefficient: Islamic rural banks' profitability

	Model 1				Model 2			
	AIC		SC		AIC		SC	
Variable	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob	Coeff.	Prob.
C	6.119	0.167	6.721	0.102	-17.248	0.124	-17.906**	0.041
HHI	0.055**	0.027	0.049**	0.029	0.081***	0.001	0.072***	0.002
LASSET	-0.257*	0.073	-0.225*	0.088	1.274*	0.098	1.451**	0.044
CAR	0.016	0.206	0.011	0.269	0.060***	0.006	0.076***	0.000
FIN	0.030	0.248	0.028	0.244	0.040	0.113	0.024	0.282
CIR	-0.041**	0.014	-0.050*	0.002	-0.019	0.134	-0.022*	0.080
NPF	0.000	0.480	0.001	0.458	0.001	0.463	0.001	0.438
CPI	-	-	-	-	-0.040**	0.034	-0.045**	0.014
COVID	-	-	-	-	-0.313**	0.030	-0.452**	0.001

Source: Data Processed
Notes: ***, **, * report significance in1%, 5%, and 10%, respectively.

The results of the ECM-ARDL estimation are presented in Table 7. R^2 ranges from 0.290 to 0.404. More importantly, all error correction variables (EC_{t-1}) are negative and statistically significant, implying the ECM-ARDL is applicable to investigate the short-run condition. Moreover, these findings reinforce previous results that ROA is cointegrated with HHI, ASSET, CAR, FIN, CIR, NPF, CPI, and COVID-19. The speed of adjustment is quite slow, varying from 26.6% to 31.3%. It means that, on average, the disequilibrium condition is corrected by about 26.6-3.13% in the following month.

Table 7
ECM-ARDL: Islamic rural banks' profitability

	Model 1				Model 2			
	AIC		SC		AIC		SC	
Variable	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
D(HHI)	-0.014	0.125	-0.013	0.152	-0.013	0.142	-0.011	0.188
D(LASSET)	-4.591***	0.000	-4.653***	0.000	-3.526***	0.000	-3.683***	0.000
D(LASSET(-1)	-	-	-	-	1.880**	0.033	-	-
D(CAR)	0.022***	0.003	0.021***	0.004	0.026***	0.000	-	-
D(CAR(-1))	0.025***	0.001	0.027***	0.001	0.021***	0.005	-	-
D(FIN)	-0.035***	0.004	-0.036***	0.003	-0.025**	0.028	-0.035***	0.003
D(CIR)	-0.031***	0.000	-	-	-0.030***	0.000	-0.032***	0.000
D(COVID)	-	-	-	-	-0.083	0.428	-0.147	0.167
D(COVID(-1))	-	-	--	-	0.469***	0.000	0.439***	0.000
EC(-1)	-0.266***	0.000	-0.292***	0.000	-0.290***	0.000	-0.313***	0.000
R-squared	0.315		0.290		0.404		0.370	

Source: Data Processed

Notes: ***, **, * report significance in1%, 5%, and 10%, respectively.

Discussion

Our paper starts with HHI, which shows the diversification of financing in various economic sectors as the key finding of this empirical study. Sectoral financing concentration in some economic sectors increases the profitability of Sharia rural banks. Sharia rural banks are more focused on certain sectors that are likely to generate high profits for two reasons. First, Shariah rural banks have a slight knowledge of channeling financing as a new player in the banking industry, so they emphasize certain economic sectors to shape their main sectoral competence to hinder high financing risk (Risfandy et al., 2020). SRBs should focus on sectors that are related to trade, restaurants, and hotels in building their competitive advantage. Second, due to the prohibition of excessive and speculating financing, Shariah rural banks concentrate on certain economic sectors (Beck et al., 2013; Widarjono et al., 2020)

Our findings support the hypothesis of concentration stability. Sharia rural banks can learn and benefit from the given economic sectors and likely produce more profit by focusing their financing activities on specific economic sectors (Acharya et al., 2006).

Sharia rural banks must shape their sectoral economic competence through sectoral financing concentration to capitalize on their competitive advantage. This study confirms the empirical literature where sectoral financing concentration enhances banks' profitability (Prastiwi & Anik, 2020; Widarjono et al., 2022; Widarjono & Sidiq, 2022).

Our discussion then turns to the control variables, both bank-specific and macroeconomic variables. Asset positively affects profitability. SRBs with large assets can generate operating efficiency from economies of scale so they can get more margin and profitability (Sutrisno & Widarjono, 2022). This finding implies that large Sharia rural banks encourage profitability and fail to support "the too big to fail" hypothesis.

CAR has a positive and significant effect on ROA. The high CAR shows the ability of Islamic banks to increase their financing to increase the profitability of Sharia rural banks. Islamic financing was typically allocated to productive financing, such as working capital and investment financing, which accounted for 60% of total financing from 2010 to 2022. This productive financing likely enhances Islamic banks' stability. CAR is for safety control devices and warrants stability because Islamic banks can preserve a minimum capital to assure sufficient funds due to unexpected losses (Čihák & Hesse, 2010). Accordingly, an adequate CAR provides better protection against Islamic banks' bankruptcy (Ghenimi et al., 2017). These findings support the existing empirical studies such as (Lassoued, 2018) for Malaysia Islamic banks.

The cost-to-income ratio (CIR), which measures operating efficiency, has a negative effect on ROA. The plausible reason is that this level of inefficiency is relatively high. The average level of operational inefficiency of Islamic banks is 84% with a maximum rate of 94% and a minimum rate of 70% in the study period. The inefficiency negatively affects bank profits because Sharia rural banks as small Islamic banks are more vulnerable to bank-specific factors than big Islamic banks (Ibrahim et al., 2017).

As predicted, inflation negatively affects ROA. Inflation deteriorates consumers' ability to pay back their financing because of a decrease in real income so it lowers the Islamic rural banks' profitability (Widarjono & Rudatin, 2021). These results support the empirical study that a worse economic condition through high inflation reduces Sharia rural banks' profitability (Srairi, 2019).

COVID-19 negatively affects profitability. COVID-19 which started in April 2020 caused the Indonesian economic growth to deteriorate, even it is negative growth in the third quarter of 2020. Low economic growth causes SRB can disburse their financing and client can pay back their financing in a timely manner, even if they have to reschedule their payment (Risfandy & Pratiwi, 2022; Yudaruddin, 2023).

CONCLUSION

Sharia rural banks are very susceptible to economic shocks. Furthermore, Sharia rural banks, as a new player, must contend with established and dominated conventional rural banks. Accordingly, a study on Sharia rural banks is important to

investigate Sharia rural banks' sustainability. Our study analyzes the impact of sectoral financing concentration with some control variables on Sharia rural banks' profitability. Bank-specific control variables consist of asset, equity, operating efficiency, financing rate, and financing risk, and external control variables comprise domestic input and inflation

Our findings confirm that sectoral financing concentration boosts the profitability of Sharia rural banks. This result is plausible since Sharia rural banks have little knowledge in channeling their financing as new players. Therefore, they should emphasize specific sectors that lead to high profits. This sectoral financing concentration is also significant in shaping the sectoral core competence of Sharia rural banks. More importantly, large Sharia rural banks and high equity are very important to maintain profitability. Also, operating inefficiency lowers Sharia rural banks' profitability. A low inflation rate also enhances profitability.

Our results have important implications for Sharia rural banks and policymakers in encouraging Sharia rural banks' financial performance. Sharia Rural Bank must establish sectoral core competence to create its comparative advantage. Consequently, Sharia rural banks must select highly expert workers associated with specific economic sectors such as trade, restaurants, and hotels. Also, Sharia rural banks must train the existing workers to have better skills in the behavior of each economic sector. Indeed, large size and equity support the profitability of Sharia rural banks. Therefore, the Indonesian financial service authority conducts prudential policy regarding financing. Controlling and monitoring financing is the key to enhancing Sharia rural banks' profitability.

AUTHOR CONTRIBUTIONS

The first author contributed the majority of the manuscript's content, ideas, and writing. Co-authors contributed equally to support the manuscript content. We declare no conflict of interest among the contributors.

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