Does bank size matter for Islamic banks' profitability?
The insight from Indonesia

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Abstract

This research explores how bank size affects the profitability of Islamic banks in Indonesia, a predominantly Muslim country. The goal of this study is to answer an ongoing debate about whether Islamic banks should be large or small. We employ 31 banks and use quarterly data from 2014 to 2020 with unbalanced panel data. We document that the impact of bank size on profitability is non-linear in terms of the U-shaped impact. Raising bank size first worsens the profitability, but once it achieves a threshold value, it boosts profitability. Therefore, our findings confirm the advantages of having larger Islamic banks instead of small Islamic banks.

Keywords: Size, Profitability, Islamic Bank, Indonesia

INTRODUCTION

According to Islamic banking literature, bank size greatly affects the performance of Islamic banks. Čihák and Hesse (2010) document that bank size determines the stability of Islamic banks, where large banks are less stable than small banks. Ibrahim and Rizvi (2017) show a U-shaped impact between Islamic bank size and stability, implying that larger banks are more secure as they exceed a certain threshold size. Alqahtani et al. (2017) and Naseri et al. (2020) indicates that large banks can boost efficiency. Bank size also negatively influences credit risk in Islamic banks (Alzoubi & Obeidat, 2020).

There is an ongoing debate in the banking literature about the relationship between bank size and the soundness of the banking system. Large banks are eager to take excessive risks, thereby contributing to systemic risk through the "too big to fail" theory. Besides that, agency problems also arise when the bank scale gets bigger (Farhi & Tirole, 2012). On the other hand, with a large size, the bank can benefit due to economies of scale and accordingly have lower intermediation costs, better control, and lower prices. In addition, because of diversification, banks may encounter lower risk and thereby influence the bank's soundness (Beccalli et al., 2015).

As a country with a majority Muslim, Indonesia is late in practicing Islamic banking, which started in 1992. Indonesian Islamic banking is ranked 10th in the world's Islamic banking. However, the market share of Islamic banking as a new sector in the banking industry is still small at 6% of the total banking sector in Indonesia. As a result, Islamic banking in Indonesia has not achieved efficiency, so the prices of Islamic banking products are still more expensive than conventional banking products (Widarjono et al., 2022). Do Islamic banks in Indonesia need large banks to achieve economies of scale and increase their performance?

This study explores the effect of bank size on Islamic banks' profitability in Indonesia. There are several contributions from this study to the Islamic banking literature. First, we investigate the effect of bank size on Islamic banks' profitability, while the existing studies examined the effect of bank size on stability (Ibrahim et al., 2017) and efficiency (Alqahtani et al., 2017; Naseri et al., 2020) and credit risk (Alzoubi & Obeidat, 2020). Second, this study uses a non-linear approach to test the U-shaped impact of bank size on profitability.

LITERATUR REVIEW

Banking performance, including Islamic banking, is greatly influenced by bank size (Ibrahim et al., 2017). Bank size is commonly measured by total assets (Smaoui et al., 2020); (Risfandy et al, 2022). Banks with

large assets can diversify their financing and gain benefits from economies of scale and economies of scope so they can provide low cost of intermediation. However, large banks can reduce their performance if controls are not carried out properly

Several studies have analyzed the influence of assets on Islamic bank performance using both liner and non-liner effect. Research on the effect of assets on bank profits has mostly been carried out in the case of conventional banking. González et al. (2017) shows that assets have a positive influence on bank profits in the MENA region. Likewise, bank profits really depend on dependent on bank size in the case of East Asian countries (Phan et al., 2019). However, several studies show that assets have a negative effect on profits. Bank size has a negative effect on profits in the case of banks in China (Tan, 2017)and in the case of banks in India (Rakshit & Bardhan, 2022).

Research on the influence of bank size on bank profits has been carried out in cases of countries that practice Islamic banking as well. Azad et al. (2019), using data from a sample of 20 countries, shows that assets have a positive effect on Islamic bank profits. By using data from Islamic rural banks in Indonesia, Trinugroho et al. (2018) shows that assets have a positive effect on BPRS margins. Likewise, Sutrisno and Widarjono (2022) using data from Islamic commercial banks, assets have a positive influence on the profits of Islamic commercial banks. The positive influence of bank size on profits also occurs in the case of Islamic banking in Malaysia (Khattak et al., 2022). However, Bougatef and Korbi (2018) document that assets have a negative effect on Islamic bank profits.

In contrast to previous research which assumes that the influence of assets on the performance of Islamic banks is linear, several studies analyze the non-linear influence of assets on the performance of Islamic banks. Ibrahim et al., (2017) indicate that the influence of assets on the stability of Islamic banks is U-Shaped impact for case 45 Islamic bank in 13 countries. This finding shows that increasing assets initially reduces Islamic bank stability but once the size passes a threshold, it strengthens Islamic bank stability.

RESEARCH METHODS

Empirical method

We apply panel regression to analyze the impact of bank size and Islamic banks' profitability. First, we initially analyze the influence of bank size on profitability using the linear relationship:

$$ROA_{it} = \theta_0 + \theta_1 Size_{it} + \sum_{l=1}^{n} \emptyset_j \mathbf{X_{lit}} + \delta_1 Covid_t + e_{it}$$

The dependent variable is the return on assets (ROA) as a proxy of profitability (Zarrouk et al., 2016; Rizvi et al., 2020). Size, our key explanatory variable, is bank size. Bank size is calculated by the total asset expressed in the natural logarithm (Risfandy et al., 2020; Widarjono et al., 2022). Besides key independent variables, we include X_lit as a control variable normally deemed in the Islamic banking literature, consisting of market and bank-specific variables (Alqahtani et al., 2016; Alharbi, 2017; Elseoud et al., 2020). Covid is a coronavirus disease outbreak that represents external shock. The market variable is the Lerner index which measures market competition. Bank-specific variables encompass capital adequacy ratio (CAR), efficiency (Eff), financing (Fin), and non-performing financing (NPF).
Lerner index is measured as follows:

$$Lerner = \left[\frac{Price - Marginal\ cost}{Price}\right]$$

Marginal cost is obtained from the cost function. We utilize the trans-log function with two input function that is suitable for the banking system in emerging market (Fu et al., 2014; Risfandy et al., 2022) as follows:

$$TC_{it} = \emptyset_0 + \sum_{k=1}^{2} \emptyset_1 LnV_{k,it} + 0.5 \sum_{k=1}^{2}\sum_{l=1}^{2} \rho_{kl}\ LnV_{k,it}LnV_{l,it} + \rho_1 LnAsset_{it} +\ 0.5\delta_2(LnAsset_{it})^2$$
$$+ \sum_{k=1}^{2} \rho_{2k}LnAsset_{it}\ LnV_{k,it} + \varepsilon_{it}$$

TC is the total cost, consisting of profit-sharing expenses and other operating costs. V1 denotes the ratio of profit-sharing expense to total customer deposits. V2 shows the ratio of other operating costs to total fixed assets. Ln represents the natural logarithm. Deriving eq. (4) with respect to asset results in MC as:

$$MC_{it} = \left(\rho_1 + \rho_2 LnAsset_{it} + \sum_{k=1}^{2} \rho_{2k} LnV_{k,it} \right) \frac{TC_{it}}{LnAsset_{it}}$$

Next, we employ a quadratic form for size (Size2) to capture the possibility of a non-linear relationship between profitability and size following Ibrahim et al. (2017) as follows:

$$ROA_{it} = \theta_0 + \theta_1 Size_{it} + \theta_2 Size_{it}^2 + \sum_{l=1}^{n} \emptyset_j X_{lit} + \delta_1 Covid_{it} + e_{it}$$

The market share of Indonesian Islamic banks is small, so they haven't achieved economies of scale. Thus, according to the efficiency effect hypothesis, Islamic banks must achieve a minimum threshold size to obtain benefits from economies of scale. Accordingly, our study expects that the profitability effect of size will first be negative and then positive if they reach a certain threshold size. We hypothesize that $\theta\_1 < 0$ and $\theta\_2 > 0$.

From equation (3) and by assuming other variables held constant, we can then calculate the threshold bank size to achieve Islamic banks' profitability as follows:

$$\frac{\partial ROA}{\partial Size} = \theta_1 + 2\theta_2 Size_t = 0$$

Data

There are 33 Islamic banks in Indonesia. We select 31 Islamic banks that provide complete data for this analysis. The period of study is from 2014 to 2020, using quarterly data. The final data set is 704 with unbalanced panel data. All financial data are retrieved from the Indonesian Financial Services Authority (www.ojk.go.id).

RESULTS AND DISCUSSION

Table 1 presents the descriptive statistics of all variables. The average profit rate is 1.84%, but the profit rate varies greatly because the standard deviation is quite high (0.0246). The average asset size is IDR 14.7 trillion, with a very large standard deviation (20.6). These results imply that there is a huge gap among banks based on their assets, causing the profit rate also to vary.

Table 1. Summary Statistics

Variable	Variable definition	Mean	Std. Dev.
ROA	Return on asset	0.0184	0.0246
Size	Total asset (IDR trillion)	14.7000	20.6000
Lerner	Adjusted Lerner Index	0.2689	0.6723
CAR	Equity divided by assets weighted risk	0.2104	0.0643
Fin	Total financing divided by total deposit	1.0065	0.3092
Eff	Total income divided by the total cost	1.1973	0.2771
NPF	Financing defaults divided by total financing	0.0376	0.0359
Covid	Covid-19	0.1321	0.3388

The correlation among the independent variable is presented in Table 2. The largest correlation coefficient is 0.9991, showing the relationship between Size and Size2. Nevertheless, all correlation coefficients are less than 0.5, providing no evidence of the multicollinearity problem. Consequently, we don't need to drop one of the Independent variables to generate a robust estimator.

Table 2. Correlation matrix

Variable	ROA	Size	Size²	Lerner	CAR	Fin	Eff.	NPF
ROA	1							
Size	-0.1507	1						
Size²	-0.1478	0.9991	1					
Lerner	0.1109	0.1096	0.1154	1				
CAR	0.3459	-0.2255	-0.2331	0.0058	1			
Fin	0.3681	-0.3440	-0.3419	-0.0265	0.1258	1		
Eff.	0.3205	-0.2371	-0.2339	0.0050	0.4772	0.1107	1	
NPF	-0.4357	-0.0230	-0.0236	-0.0206	-0.2734	-0.0455	-0.1725	1
Covid-19	-0.0124	0.0754	0.0740	-0.0491	0.1251	-0.0001	-0.0218	-0.0276

We first present the linear effect of bank size on profitability in Table 3 using panel regression. Regression (a) contains only bank-specific factors, while regression (b) incorporates market variables, namely the Lerner Index. Some statistical tests are reported at the bottom of the table. According to the LM, F, and Hausman tests, the fixed effect is more applicable for both regressions.

Table 3. Profitability and bank size: linear relationship

	Regression (a)		Regression (b)	
Variable	Fixed effect	Random effect	Fixed effect	Random effect
Size	0.0025*	0.0010	0.0025*	0.0009
	(0.0015)	(0.0013)	(0.0015)	(0.0013)
Market variable				
Lerner	-	-	0.0017**	0.0019**
	-	-	(0.0009)	(0.0009)
Bank-specific variables				
CAR	-0.0071	0.0016	-0.0052	0.0032
	(0.0135)	(0.0131)	(0.0136)	(0.0131)
Fin	0.0123***	0.0128***	0.0128***	0.0133***
	(0.0020)	(0.0020)	(0.0020)	(0.0020)
Eff.	0.0058**	0.0055**	0.0057**	0.0054**
	(0.0024)	(0.0024)	(0.0024)	(0.0024)
NPF	-0.2394***	-0.2438***	-0.2426***	-0.2467***
	(0.0221)	(0.0216)	(0.0222)	(0.0216)
External shock				
Covid-19	-0.0033**	-0.0029**	-0.0031**	-0.0027**
	(0.0014)	(0.0014)	(0.0014)	(0.0014)
Cons.	-0.0299	-0.0061	-0.0299	-0.0067
	(0.0245)	(0.0204)	(0.0245)	(0.0205)
R-sq: within	0.2011	0.1994	0.2053	0.2037
R-sq: between	0.2760	0.3590	0.2912	0.3703
R-sq: overall	0.2548	0.3083	0.2683	0.3200
No. Banks	31	31	31	31
No. Obs.	704	704	704	704
Diagnostic test				
LM-test	42.41***		41.51***	
F-test	2624.22***		2582.39***	
Hausman-test	29.33***		16.41**	

Note: ***, **, and * are significant at $\alpha=1\%$, $\alpha=5\%$, and $\alpha=10\%$. Parentheses indicate standard errors.

The first discussion begins with the key independent variable, namely bank size. Bank size is positive and significant. More importantly, the findings are consistent across regressions (a) and (b). These findings imply that banks with large assets can drive high profits. Large banks can achieve

economies of scale, diversification benefits, and better monitoring to increase profits (Ibrahim et al., 2017; Naseri et al., 2020). This finding aligns with previous research using a linear relationship between size and profitability (Zarrouk et al., 2016; Rizvi et al., 2020).

As for controlled variables, market power has a positive effect on profit. Banks with high market power can generate high margins and subsequently increase profits (Trinugroho et al., 2018). Financing has a positive effect on profits. The traditional activity of Islamic banks is disbursing financing. Banks with high financing will likely cause high income and further increase profits (Sun et al., 2017). Profit is positively linked to efficiency. Efficiency causes banks to be able to reduce intermediation costs and prices for their products to increase bank margins and profit (Bougatef & Korbi, 2018). Non-performing financing (NPF) has a negative effect on profits. High NPF indicates that banks have low financing quality, which will reduce profits (Sutrisno & Widarjono, 2022). Covid-19 lowers banks' profitability. Covid-19 caused an economic downturn, so the ability of banks to distribute funds decreased and subsequently reduced profits.

The next step is to examine the possibility of a non-linear effect of bank size on profitability. Regression (c) consists of only bank-specific variables, and regression (d) incorporates Lerner Index. Table 4 at the bottom part presents several statistical tests for selecting the best estimation. The fixed effect is more pronounced than PLS and the random effect in both regression results.

Table 4. Profitability and bank size: non-linear relationship

Variable	Regression (c)		Regression (d)	
	Fixed effect	Random effect	Fixed effect	Random effect
Size	-0.0464**	-0.0357**	-0.0416**	-0.0309*
	(0.0192)	(0.0181)	(0.0195)	(0.0183)
Size^2	0.0016**	0.0012**	0.0014**	0.0010*
	(0.0006)	(0.0006)	(0.0006)	(0.0006)
Market variable				
Lerner	-	-	0.0014*	0.0017**
	-	-	(0.0009)	(0.0009)
Bank-specific variables				
CAR	-0.0096	0.0014	-0.0079	0.0026
	(0.0135)	(0.0131)	(0.0136)	(0.0131)
Fin	0.0122***	0.0126***	0.0125***	0.0130***
	(0.0020)	(0.0020)	(0.0020)	(0.0020)
Eff.	0.0057**	0.0053**	0.0056**	0.0052**
	(0.0024)	(0.0024)	(0.0024)	(0.0024)
NPF	-0.2415***	-0.2453***	-0.2438***	-0.2476***
	(0.0221)	(0.0216)	(0.0221)	(0.0216)
External shock				
Covid-19	-0.0036**	-0.0030**	-0.0034**	-0.0028**
	(0.0014)	(0.0014)	(0.0014)	(0.0014)
Cons	0.3431	0.2766	0.3059**	0.2384*
	(0.1482)	(0.1405)	(0.1502)	(0.1422)
R-sq: within	0.2088	0.2058	0.2114	0.2087
R-sq: between	0.1897	0.3230	0.2106	0.3382
R-sq: overall	0.1897	0.2842	0.2069	0.2975
No. Banks	31	31	31	31
No. Obs.	704	704	704	704
Diagnostic test				
LM-test	42.58***		41.72***	
F-test	2603.70***		2574.36***	
Hausman-test	80.63***		1272.37***	

Note: ***, **, and * are significant at α=1%, α=5%, and α=10%. Parentheses indicate standard errors.

Table 4 reports that the coefficient of size is negative, and the coefficient of Size2 is positive. More importantly, the coefficients of size as well as size squared, are statistically significant. We may note that the results are consistent with either regression (a) or regression (b). The results provide strong evidence for non-linear profitability-bank size relation following the U-shaped effect of size on Islamic banks' profitability. Accordingly, rising bank size at the start reduces Islamic banks' profitability, but once their size reaches a threshold, it enhances their profitability. These results confirm the U-shaped effect of bank size on Islamic banks' stability (Ibrahim et al., 2017).

We, then, can calculate the threshold bank size because of the U-shaped impact of size and profitability. Based on equation (6) and results from regression (d), the threshold bank size is IDR 1.911 trillion. According to our data, some Islamic banks begin with small, but except for two Islamic banks, all Islamic banks have reached threshold assets since 2017. The findings suggest that Islamic banks in Indonesia have achieved the threshold asset to gain from economies of scale. These findings confirm that the Indonesian Islamic banking system requires bigger Islamic banks instead of small ones and fails to support the theory of "too big to fail."

Turning to the market variable and bank-specific variables as our control variables, we document that profitability is positively associated with the Lerner index, financing, and efficiency and is negatively linked to financing risk and covid-19. These results are consistently using regression (b) and (d). Furthermore, the influence of control variables on profitability is similar to the linear model for equation (1).

CONCLUSION

As the latest player in the banking system in Indonesia, profitability is an important indicator of sound Islamic banks. Our research examines the impact of bank size, the key independent variable, together with the bank-specific factors on profitability. The findings document that the impact of bank size on profitability is a U-shaped impact. Furthermore, profitability is also associated with market power, financing, efficiency, financing risk, and external shocks

Of specific interest is the U-shaped effect of bank size on profitability. This finding suggests that increasing bank size firstly lower profitability but then raising bank size finally boosts profitability after reaching the threshold size. This finding implies that the Indonesian banking system needs bigger Islamic banks to enhance its financial performance.

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