

LIQUIDITY RISK AND FACTORS DETERMINANT: A CASE STUDY ON ISLAMIC RURAL BANKING IN INDONESIA

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Abstract

To maintain public trust, a bank should hold liquidity risk. The purpose of the study is to analyze the internal factors that affect liquidity risk in Islamic rural banks in Indonesia. The banks have more complicated liquidity management than conventional banks due to the application of sharia law in the banks. Islamic rural banks' liquidity risk is measured by the financing-to-deposit ratio. The internal factors are the capital adequacy ratio, non-performing financing, return on assets, operating expenses to income ratio, third-party funds, and the type of financing consisting of profit margin financing and profit-sharing financing. This study uses 100 Islamic rural banks as a sample. The data span from 2018Q1 to 2021Q4. The analysis is conducted by estimating and testing panel regression models. The estimation results of the chosen fixed-effect model show a positive effect of profit margin financing and negative effects of capital adequacy ratio, non-performing financing, and profit-sharing financing on the dependent variable. It also finds that return on assets, operating expenses to income ratio, and third-party funds have no significant impact on the dependent variable. Recall that cost is the difference between return and profit. The novelty of this paper is as follows. With the significance of profit margin and the insignificance of return, it can be inferred the cost of banks operation matters for the bank's liquidity risk. With the significance of profit sharing financing and the accompanied non-performing financing, the study also suggests that syariah principles in bank's operation matters for the bank's liquidity risk.

Keywords : Liquidity risk, Islamic rural bank, Financing to deposit ratio
JEL : G21, G32

INTRODUCTION

Liquidity risk matters for the bank's operation, including the Islamic banks. Islamic banks have unique characteristics in running their business [1]. They do not allow interest instruments; rather, they use principles that do not violate Islamic law, better known as sharia law. Those principles are the profit-sharing system and profit-margin system, among others [2]. Islamic Rural Banks (IRBs) are a special type of Islamic bank. Similar to Islamic commercial banks in general, IRBs operate under islamic principles. IRBS is different from the sharia commercial banks in that IRBs do not provide payment traffic services and they have a narrower operating area. IRBs operate in specific areas such as districts or cities [3].

IRBs provide banking services to low-income communities and micro, small and medium-sized entrepreneurs (SMEs) who have limited access to the commercial bank services [4]. Therefore, IRBs are an essential financial intermediary in Indonesia [5]. According to Sharia Banking Statistics 2021 issued by Financial Service Authority, there are more than 160 IRBs in Indonesia, spread across the provinces [6].

Banks, including IRBs, are risky institutions. One of the risks is the liquidity risk [7]. Liquidity management in Islamic banks is more complicated than that in conventional banks. There are not many instruments for placing funds for liquidity purposes that meet sharia provisions [8], [9], and [7].

There are various factors that affect liquidity risk, both external and internal factors. Among the internal factors are bank capital, profitability, financing risk, operating risk, third-party funds, and financing provided by the banks.

The amount of capital owned by a bank is essential for the bank's liquidity. The capital needed by the bank can be estimated by the capital adequacy ratio (CAR) [10]. The larger the bank's capital, the more funds are available to meet customer withdrawals and fulfil financing commitments. According to [11] and [12], capital significantly affects conventional bank liquidity. Likewise, with Islamic banks, CAR positively impacts the bank liquidity [13].

Profitability is the company's ability to generate profits. The profits obtained by the bank can be used to increase the bank's liquidity. [11], [4], and [15] found a positive and significant effect of profitability on bank liquidity. On the other hand, [16] and [17] found that profitability had a negative and significant effect on bank liquidity.

One of the risks that constantly threatens banks is a non-performing loan (NPL) for conventional banks or non-performing financing (NPF) for Islamic banks. A high NPF can reduce bank profits. The larger the NPF, the more likely the bank is to experience losses. This will reduce the bank's liquidity capacity. [18]; [11]; [19] and [13] found a negative effect of NPF on bank liquidity. Meanwhile, [20] and [21] found that there was no effect of NPF on bank liquidity.

A bank incurs operational costs to obtain income. The cost-efficiency of a bank is measured by a comparison between operating expenses and operating income (OEIR). A higher OEIR indicates a bank's operational inefficiency, which will reduce bank profits, thereby reducing the bank's ability to maintain liquidity. [11] found a negative effect of OEIR on liquidity while [22] found that OEIR did not affect bank liquidity.

Bank collects public funds in the form of deposits, also called third-party funds (TPF). The higher the TPF, the greater the bank's ability to meet financing commitments. [23] and [24] found that TPF has a significant positive effect on liquidity.

There are two financing schemes in Islamic banks, namely profit margin-based financing (PMF) and profit-sharing-based financing (PSF). An example of PMF is *murabahah* financing. Examples of PSF are *mudharabah* financing and *musyarakah* financing [25]. In PMF, the bank buys the assets needed by the customer and then sells them to the customer with additional profit. This financing scheme has been dominating the Islamic bank operations because of its ease of operation. In PSF, the bank finances customers in which the return is based on profit sharing from the customer's business profits. [26] also found a significant effect of financing on liquidity risk.

The objectives of this paper is derived from the aforementioned background. To be more precise, the objectives of this paper is to analyze liquidity risk in Rural Islamic banks in Indonesia. This will provide empirical evidence on the impact of the application of syariah law principles on liquidity risk. Such evidence will be beneficial for the sustainability of bank's operation since liquidity risk is one of the fundamental issues of bank's operation.

LITERATURE REVIEW

Two types of banks operate in Indonesia, namely commercial banks and rural banks (RB). Commercial banks accept public deposits and provide payment traffic services. Rural banks only accept public deposits, namely saving and time deposits. A special type of banks, namely Islamic banks, also operate in Indonesia. Along with the conventional banks, the Islamic banks construct a dual banking system in Indonesia (for further discussion about dual banking system, please visit [27] and [28]). Islamic Rural Banks (IRBs) were established based on Law No. 7 of 1992 concerning banking and Government Regulation No. 72 year 1992 concerning banks based on profit-sharing. Point 4 of article 1 of the Law. No. 10 of 1998 states that IRBs are banks that carry out business activities based on sharia principles and do not provide payment traffic services.

Rural Banks (RBs) conducting business activities based on sharia principles are further regulated in the Decree of the Director of Bank Indonesia No.32/36/KEP/DIR/1999, May 12, 1999, concerning Rural Banks based on Sharia principles. Similar to sharia banks, IRBs must also operate using sharia principles.

Liquidity is important to meet the customer's funding needs and to fulfil credit or financing commitments [29]. The ability to perform payments to customers who withdraw funds has been regulated by the Financial Services Authority (FSA). The bank's ability to fulfil credit or financing commitments is measured by the loan-to-deposit ratio (LDR) for conventional banks and the financing-to-deposit ratio (FDR) for Islamic banks [8]. FDR is essential for banks in that a high FDR indicates the bank's ability to channel financing. Bank's profit depends on the income generated by the bank's financing to customers [7]. Considering the importance of FDR as a measure of liquidity, this paper builds a model of FDR to analyze the factors affecting Islamic Rural Banks' liquidity. This will help capturing the impact of complicated liquidity management in Islamic banks (for further discussion please refer to [30] and [31]).

Various factors affect liquidity risk, both external and internal factors [32]. The internal factors are bank capital [33], profitability[34], financing risk[18], operating risk [19], third-party funds, and financing provided by the banks.

The capital adequacy ratio (CAR) measures the adequacy of capital in an institution [10]. The larger the bank's capital, the more funds available to meet customer withdrawals and fulfil financing commitments. [20] found a positive effect between CAR and liquidity on IRBs [14] Indonesia. Meanwhile, according to [11] and [12] who researched conventional banks, capital has a significant effect on bank liquidity. Likewise, with Islamic banks, CAR has a positive effect on the bank liquidity [13]. Thus, the first proposed hypothesis in this paper is that: Capital adequacy ratio has a positive effect on liquidity risk.

Profitability is the bank's ability to generate profits [35]. The profits obtained by the bank can be used to increase bank funds to meet bank liquidity so that profitability can increase bank liquidity. Research by [11]; [14] and [36] found a positive and significant effect of profitability on bank liquidity. Likewise, [22] also found a positive effect between ROA and liquidity. Therefore, the second proposed hypothesis is that: Profitability (ROA) has a positive effect on liquidity risk.

One of the risks that always threatens banks is non-performing-loan (NPL) for conventional banks or non-performing-financing (NPF) for Islamic banks. NPF, as a form of operational cost for banks, can reduce banks' profits [10]. The larger the NPF, the more likely it is to experience losses. This will, eventually, reduce the bank's liquidity. Yustina et al. (2021); [11]; [19] and [13] found a negative effect of NPF on bank liquidity. Meanwhile, [21] and [20] found that there was no effect of NPF on bank liquidity. Therefore, the third proposed hypothesis is that: Financing risk (NPF) has a negative effect on liquidity risk.

To gain revenue, banks incur operational costs, measured by operating costs and operating income ratio (OEIR). A higher OEIR indicates the inefficiency of the bank's operations, which in turn reduces the bank's profits, thereby reducing the bank's ability to maintain its liquidity. [11] and [23] found a negative effect of OEIR on liquidity, while [22] found that OEIR had no effect on bank liquidity. Thus, the fourth proposed hypothesis in this paper is that: Operational risk (OEIR) has a negative effect on liquidity risk.

Banks are institutions that collect public funds in the form of deposits called third-party funds (TPF). Banks raise funds to provide financing to customers. The larger the TPF, the greater the bank's ability to meet financing commitments. As found by [23] and [24], TPF positively affects liquidity. Therefore, the fifth proposed hypothesis is that: TPF has a positive effect on liquidity risk.

There are two main financing schemes in Islamic banks, namely profit margin-based financing (PMF) and profit-sharing-based financing (PSF) [25]. PMF is a financing scheme where the bank buys the assets needed by a customer and then sells them to the customer with additional profit (for further discussion about PMF, please refer to [37], and [38]. [26] found the effect of financing on liquidity risk. Thus, the sixth proposed hypothesis is that: Profit margin financing has a positive effect on liquidity risk. The role of profit-sharing-based financing in Islamic banking system has been analyzed by some scholars such as [39] and [40]. The seventh proposed hypothesis is that: Profit-sharing financing has a positive effect on liquidity risk.

The aforementioned review suggests that Islamic banks liquidity risk might be influenced by both conventional and Islamic factors. This paper models the impact of bank's internal factors related to the application of Islamic law on the liquidity risk measures in Islamic rural banks. To control the impact of conventional bank's factors on the dependent variables, this paper includes them in the model.

Based on the aforementioned literature review and the problem formulation, this study proposes the following hypotheses:

- H₁ : capital adequacy ratio (positively/negatively) influences financing-to-deposit ratio
- H₂ : non-performing financing (positively/negatively) influences financing-to-deposit ratio
- H₃ : return on assets (positively/negatively) influences financing-to-deposit ratio
- H₄ : operating expenses to income ratio (positively/negatively) influences financing-to-deposit ratio
- H₅ : third-party funds (positively/negatively) influences financing-to-deposit ratio
- H₆ : profit margin financing (positively/negatively) influences financing-to-deposit ratio
- H₇ : profit-sharing financing (positively/negatively) influences financing-to-deposit ratio

METHOD

The population in this study is 163 Islamic rural banks in Indonesia [6]. A sample consisting of 100 banks is taken from the population. The data are secondary data in the form of financial statements of these banks. The data can be accessed from the Financial Services Authority (OJK) website (<https://www.ojk.go.id>). The data spans from 2018Q1 to 2021Q4.

The dependent variable is liquidity risk which is measured by the financing to deposit ratio (FDR). The independent variables are the capital (CAR), profitability (ROA), financing risk (NPF), operating risk (OEIR), fund third party (TPF), profit margin financing (PMF) and profit-sharing financing (PSF). The variables along with the symbols and measurements are listed in Table 1.

Table 1: Variables and Measures

| Variable | Symbol | Measures | Source |
|-----------------------------------|--------|--|--------|
| Financing to Deposit Ratio | FDR | Total financing/Third party fund | [14] |
| Capital Adequacy Ratio | CAR | Equity/Assets weighted risk | [11] |
| Return on Assets | ROA | Earning After Tax/Total Asset | [36] |
| Non-Performing Financing | NPF | Non perform financing/Total financing | [18] |
| Operating Expense to Income Ratio | OEIR | operating expense/operating income | [22] |
| Third Party Fund | TPF | Ln Total Third Party Fund | [23] |
| Profit Margin Financing | PMF | Ln Total Murabaha financing | [1] |
| Profit Sharing Financing | PSF | Ln Total Mudharaba + Musyaraka financing | [1] |

To analyze the impact of the independent variables on the dependent variable, this paper uses three models of panel data regression, namely the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). To choose the most appropriate model, it conducts Chow-test, Hausman-test, and Lagrange Multiplier (LM-test).

The Common Effect Model regression model can be written as follows:

$$FDR_{it} = \alpha + \beta_1 CAR_{it} + \beta_2 ROA_{it} + \beta_3 NPF_{it} + \beta_4 OEIR_{it} + \beta_5 TPF_{it} + \beta_6 PMF_{it} + \beta_7 PSF_{it} + \varepsilon_{it} \quad (1)$$

The Fixed Effect Model regression model can be written as follows:

$$FDR_{it} = \alpha_i + \beta_1 CAR_{it} + \beta_2 ROA_{it} + \beta_3 NPF_{it} + \beta_4 OEIR_{it} + \beta_5 TPF_{it} + \beta_6 PMF_{it} + \beta_7 PSF_{it} + \varepsilon_{it} \quad (2)$$

Please note that in Equation (1), α is a constant, while in Equation (2), α_i might vary from one bank to another.

The Random Effect Model regression model can be written as follows:

$$FDR_{it} = \alpha + \beta_1 CAR_{it} + \beta_2 ROA_{it} + \beta_3 NPF_{it} + \beta_4 OEIR_{it} + \beta_5 TPF_{it} + \beta_6 PMF_{it} + \beta_7 PSF_{it} + u_i + \varepsilon_{it} \quad (3)$$

In Equation (3), ε_{it} is the residual as a whole where the residual is a combination of cross-section and time series, whereas u_i is the individual residual which is the random characteristic of the i^{th} unit observation and remains at all times.

In Equations (1) to (3),

- R : Financing to Deposit Ratio
- CAR : Capital Adequacy Ratio
- ROA : Return on Assets
- NPF : Non-Performing Loan
- $OEIR$: Operating expense to operating income ratio
- TPF : Third party fund
- PMF : Profit margin financing
- PSF : Profit sharing financing
- α : constant
- $\beta_1 - \beta_7$: coefficients of regression
- $i = 1, 2, \dots, N$

$t = 1, 2, \dots, T$

RESULTS

This paper analyses 100 IRBS quarterly data for four years, with a total of 1,600 observations. Table 2 lists the statistics of the variables on the banks.

Table 2: Descriptive Statistics

| Variable | N | Minimum | Maximum | Mean | Std. Deviation |
|-----------------------|------|---------|---------|---------|----------------|
| FDR | 1600 | 11.18 | 321.15 | 91.0651 | 2.764.820 |
| CAR | 1600 | 8.50 | 149.50 | 25.9309 | 1.789.382 |
| ROA | 1600 | -52.20 | 110.00 | 1.8781 | 658.972 |
| NPF | 1600 | 0.23 | 75.56 | 10.1066 | 860.816 |
| OEIR | 1600 | 43.41 | 286.35 | 83.5607 | 3.518.667 |
| TPF | 1600 | 0.32 | 13.51 | 10.1624 | 120.290 |
| PMF | 1600 | 5.02 | 13.85 | 10.0949 | 107.796 |
| PSF | 1600 | .00 | 12.22 | 6.6999 | 336.195 |
| Valid N (listwise) | 1600 | | | | |

Note: developed by the authors

Table 2 shows that the minimum and maximum FDR are 11.18% and 321.15%, respectively, with an average of 91.07%. This indicates that there are IRBs that provide very small and very large financing, but the average is less than 100%. The CAR has a minimum of 8.5% and a maximum of 149.5% with an average of 25.93%, meaning that all IRBs' capital is above the government regulation, which is 8%. It should be noted that the average is high, which might reduce the profitability of the banks. However, there are IRBS with CAR of 149% indicates a lack of good capital management. ROA has a minimum value of -52.20%, meaning that there are IRBS with very large losses, and a maximum value of 110% with an average of 1.88% indicating that the bank's profitability is quite good.

The NPF has a minimum of 0.23% and a maximum of 75.56% with an average of 10.11%. These statistics reflect the poor management of the banks. The average of 10.11%, is far above the government regulation. The OEIR, which shows operating risk, has a minimum of 43.41% and a maximum of 286.35% with an average of 83.56%, which means that the IRBS have been operating efficiently.

In panel data regression analysis, it is necessary to select the best model between the common effect model (CEM), fixed effect model (FEM) and random effect model (REM). The first stage is to select the better model between CEM and FEM using the Chow test. Table 3 shows the Chow-test result. It shows that the probability of the Chow test is 0.000, which is less than 0.05. This means that the FEM is preferable to the CEM. The next stage is choosing between FEM and REM using the Hausman test. Table 3 also shows the Hausman-test results with the probability of 0.0007, which is less than 0.05. This suggests that FEM is better than REM.

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Table 3: The result of the Chow test and Hausman-test

| Type of test | Summary | | |
|--------------|-----------|----------|--------|
| | Statistic | d.f | Prob |
| Chow-test | 8.146.955 | -99,1493 | 0.0000 |

| | | | |
|--------------|-------------------|-----------|--------|
| Hausman-test | Chis-Sq-statistic | Chi-Sqd.f | Prob |
| | 25.315.068 | 7 | 0.0007 |

Note: developed by the authors

The selection model tests reveal that the best model is the fixed effect model (FEM). Table 4 reports the estimation results of the model.

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Table 4: Regression result of Fixed Effect Model

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-------------------|-------------|----------|
| C | 5859380. | 794514.4 | 7.374.794 | 0.0000 |
| CAR | -0.287694 | 0.043060 | -6.681.156 | 0.0000 |
| ROA | -0.005805 | 0.036730 | -0.158054 | 0.8744 |
| NPF | -2.071.759 | 9.486.222 | -2.183.966 | 0.0291 |
| OEIR | 0.010225 | 0.033764 | 0.302847 | 0.7620 |
| TPF | 0.002523 | 0.020100 | 0.125498 | 0.9001 |
| PMF | 178877.1 | 78244.59 | 2.286.128 | 0.0224 |
| PSF | -54237.47 | 25243.19 | -2.148.598 | 0.0318 |
| R-squared | 0.036119 | F-statistic | | 8.522 |
| Adjusted R-squared | 0.031881 | Prob(F-statistic) | | 0.000000 |

Note: developed by the authors

DISCUSSION

This section discusses the estimation results and compare the results with those of various previous papers. Table 4 shows that capital adequacy ratio has a negative effect on financing to deposit ratio, which does not match the proposed hypothesis. This suggests that the greater the capital adequacy ratio, the smaller the financing to deposit ratio. The increase in the capital should be used for expansion in financing but this did not happen in IRBs [41]. More capital additions are needed to cover high non-performing financing because the average non-performing financing are more than 10% (see Table 2). These results contradict [23], [11], [22] and [13] who found a positive effect of capital on liquidity. However, the results are in line with the results of [12], [42], [28] and [17].

Table 4 also shows that return on assets does not affect financing to deposit ratio. The profits obtained by IRBs should be used to increase financing in order to increase income. However, the average return on assets is low and the non-performing financing is high, so profitability can not increase financing to deposit ratio. This result contradicts the research of [33], [14], [43] and [23] which found a positive effect of return on assets on financing to deposit ratio. However [12], [41] and [16] support the results of this study.

Non-performing financing has a negative effect on financing to deposit ratio. These results are in accordance with the proposed hypothesis. A higher non-performing financing reduces financing to deposit ratio. This will motivate banks to increase capital to maintain the financing activities. This result is supported by [24], [44], [15] and [19], who found a negative effect of non-performing financing on financing to deposit ratio. However, some researchers found an insignificant effect from non-performing financing to financing to deposit ratio such as [21] and [20].

Operating expense to operating income ratio does not affect financing to deposit ratio. Operating expenses to income ratio shows the number of operational costs incurred by banks in their activities; the greater the operating expenses to income ratio, the greater the operating costs and lower profits. Table 2 shows that the bank's average operating expenses to income ratio of 83.56% that will generate efficient profit and can be given additional financing for expansion; however, because the non-performing financing is still high, the high profit does not affect the financing to deposit ratio. This result contradicts the results of [19], [11] and [23], which found a significant and negative effect of operating expenses to income ratio on financing to deposit ratio.

The results also suggest that third-party funds do not affect financing to deposit ratio. This indicates that the management has not been able to raise enough funds. This is also possible because bank managers are cautious in distributing financing. After all, the non-performing financing is still very high. The results of this study contradict the findings of [24] and [23]. However, the results are supported by [18].

Profit margin financing has a positive effect on the financing to deposit ratio. Profit-sharing financing has a negative effect on financing to deposit ratio. This result is interesting because profit margin financing has a positive effect, meaning that the larger the profit margin financing, the greater the financing to deposit ratio, while the higher the profit-sharing financing, the smaller the financing to deposit ratio. This is because IRBs provide much more profit margin financing than profit-sharing financing system does. This indicates that IRBs management prefers low-risk financing over high-risk financing. There are two types of profit sharing financial scheme, namely *musyarakah* and *mudharabah* [26]. According to [45], there is a negative relationship between *musyarakah* financing and *mudharabah* financing. It can be concluded that Islamic rural banks face a problem of high non-performing financing that makes greater capital adequacy ratio cannot increase the financing to deposit ratio. This might happen because the additional capital is used to cover the non-performing financing. The same thing also happen to return on assets ratio. A higher return on assets ratio cannot increase financing.

Macroeconomic conditions and the business cycle have run more dynamically as the impact of higher technology application in trading and payment systems. This will make external factors have stronger impacts on the bank's performance measures. Future research should consider accommodating such factors. This represents the limitation of this research.

CONCLUSION

This research models and tests the impact of various factors on the liquidity risk of Islamic rural banks, which means that it has a quantitative perspective. The main findings of the study is that the contribution of PMF to FDR is positive while the contribution of PSF is negative. The implication of this finding is that Islamic banks should promote more profit sharing financing, rather than the profit margin financing. This is because the primary basis of Islamic economics is profit sharing, not profit margin financing. To compare with other papers, according to Sutrisno (2016), there is a negative relationship between *musyarakah* financing and *mudharabah* financing.

In addition, the management of IRBs needs to pay attention to the factors that affect FDR to improve liquidity management. The results of this study that need attention are the amount of NPF, which has a negative effect on FDR. The high FDR must be accompanied by a tight

selection of financing so that the high FDR in the hope of increasing profits, if not managed properly, will reduce profits because the NPF increases high.

This study focuses more on examining the internal factors of IRBs that affect FDR. Using panel data regression, the study found that CAR, NPF, and PSF had a significant and negative effect on FDR. In contrast, PMF had a positive and significant effect on FDR. Meanwhile, ROA and TPF have no significant impact on FDR. The novelty of this paper lies on the results that the cost of banks operation matters for the bank's liquidity risk, and that syariah principles in bank's operation matters for the bank's liquidity risk.

The strength of this study is the uniqueness of the investigated banks, which are banks using special types of financing system, namely one using a non interest based. This study considered only internal factors in the bank, especially those related to the application of Islamic law. However, liquidity risk might also related to external factors, such as macroeconomic conditions, which is not yet accommodated in this study. This represents the limitation of this study. Future research should consider such external factors.

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