"Liquidity risk management in the Islamic rural banking: evidence from Indonesia"

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Abstract

As a financial intermediary, Islamic rural banks serve as maturity transformer such as transforming short term deposits into longer term financing. In serving this function, Islamic rural banks face risks, especially liquidity risk. Liquidity risk is regarded as a single risk that makes a bank experience difficulty in short term as it can generate reputation risk and insolvency. The author studies the determinant of liquidity risk position of Islamic rural banking using series of the data from Indonesia. ARIMAX regression methods are applied to study the behavior of liquidity risk in the industry. The result shows that liquidity risk is determined by asset management, leverage and capital adequacy. Asset size is also important as a growing asset improves bank liquidity position. Weaknesses in liquidity management in the Islamic rural banking market are detected. They set high liquidity ratio (up to 35%) as self insurance to anticipate liquidity risk. Further elaboration on this issue, especially on the manager's side should be done to provide better understanding on liquidity risk management.

Introduction

According to Law number 10/1998, Sharia banks are banks that conduct its business based on sharia principles and provide services in payment traffic. Sharia principles in accordance with Article 1, paragraph 13 of Law No. 10/1998, is the Sharia law agreement between the bank and other parties to deposit funds or financing business activities, or other activity that is expressed in accordance with sharia financing based on the principles for results (mudaraba), based on the principle of equity financing (musharaka), the principle of buying and selling goods with profit (murabaha), or the financing of capital goods is based on the principle of pure lease without option (ijara), or with the option of transfer of ownership of the leased item bank by the other party (ijara wa iqtina).

In general, Sharia bank has two important functions, namely as business agencies and charities. In terms of a business entity that Sharia banks will be looking to the function as an investment fund manager and as a provider of banking services. As the investment manager function Sharia bank looks for investors and invests the available funds to finance customer's productive business. In terms of fund raising is clearly different from commercial banks that use fixed principles. In practice for savings there are three groups: deposit, loan virtue and profit sharing (Venardos, 2010).

In Indonesia currently there are six Sharia commercial banks and 79 Sharia rural banks. Non regulated Islamic financial institution known as Baitul Mal WA Tanwil (BMT) or Islamic cooperative are more than 600 institutions. Since 2005 Sharia bank performance improves. The Sharia banking industry has developed as a fast growing business. In 2014 the total volume of business of Sharia banks IDR was 234 trillion. In addition to the increased volume of business it is also supported by the increase in the number of offices and office networks of Sharia banks.

A specific characteristic of Indonesian banking is the existence of rural bank. In this case Sharia rural banks (IRB). It operates around the country with small size in assets. They are the main providers of banking services in the rural area. Compared to conventional rural, IRB business is relatively smaller due to size and number.

Sharia rural bank (SRB) as part of the Sharia banking institutions also experienced fast progress. In 2012, SRB assets increased by 33% to IDR 4, 46 trillion (YoY), with funding share is 77.68% of total assets. SRB also increased fundraising by 41.47% to Rp2, 77 trillion. SRB has been running the bank intermediation well, reflected in the ratio of aggregate FDR SRB reached 124.80%. Growth funds are adequately controlled with good quality with a reduced financing NPF (non performing financing) ratio (net) from 5.90% to 5.60%. SRB adequate capital ratio as reflected in the aggregate CAR ratio is high at 25%. SRB characteristics of excellence are due to its operation in remote areas to provide service with wider range coverage. SRB apparently is capable to maintain the level of profitability. In 2012, ROE increased from 16.10% to 22.30%, ROA increased from 2.40% to 2.80%, although the ratio of ROA higher than the average of BUS (Sharia bank) and UUS (Sharia window unit), but the cost to income ratio (CIR) can be maintained in the range of 86.20%.

Table 1. Sharia rural banks in Indonesia

	Region	2013								2014
		May	June	July	Aug	Sep	Oct	Nov	Dec	Jan
1	West Java	26	28	28	28	28	28	28	27	28
2	Banten	8	8	8	8	8	8	8	8	8
3	DKI Jakarta	0	0	1	1	1	1	1	2	1
4	D.I. Yogyakarta	2	3	6	6	7	8	9	9	9
5	Central Java	8	11	13	13	15	15	15	19	16
6	East Java	12	17	19	19	21	22	23	25	23
7	Indonesia	159	159	160	160	160	160	160	163	163

1. Problem of the research

Risk management is very important for financial institutions as their business is managing risk. Failure to perform good and reliable risk management can end in failure of the institution. Bank Indonesia always stresses that risk management should be embedded in the daily operation. Risks are always inherent in all rural bank business activities. The study indicates that the success of bank as financial institution is not depending on its capacity to develop technically, but more on ability to perform risk management. The problem in this research is what is the banking firms' characteristics determining risk management practice in the Sharia rural bank.

Currently, Islamic banks apply an individual approach for liquidity management. Each bank provides higher liquidity ratio to guarantee the cash, which is available when the depositors withdraw their savings. In Malaysia, the ratio is 34% and Indonesia's Islamic rural banking is around 29%. It makes Islamic banks less capable to provide finance for business because they also concern on liquidity risk. Better liquidity management will improve Islamic bank's performance. To answer the question above, we conduct this study to assess liquidity risk management practice in the Islamic rural banking industry.

2. Literature review

Banking firms are intermediary institutions that provide services to both depositors and borrowers. While doing so they take on part of their risk. Risk is viewed as a negative condition. It is a condition in which there is a possibility that an outcome deviates from a desired outcome that is expected or hoped for (Gallati, 2003). It is implied that banks have to manage the risks through appropriate structuring of their activities and to maximize their profitability.

Ideally, risk management is combined with good corporate governance practice. The combination will give improvement to risk governance and risk culture. In a banking organization, top executive function is mainly about risk management. Before

making decisions top executive should ask questions before making the best decisions. Altunbas, Carbo, Gardener and Molyneux (2007) suggest capital position and size are important for risk taking.

The main problem for Islamic bank is how to manage liquidity efficiently. Liquidity risk can be viewed from two perspectives. From asset perspective, its inability to finance additional increase in assets or inability to liquidate assets without incuring loss. From liability perspective, liquidity risk is inability to repay the obligation or the inability of bank to borrow at reasonable cost. In other words, it is the risk of not being able to generate liquid asset such as cash or marketable securities to repay all liabilities or commitment. In practice, liquidity risk is the inability of a bank to repay all its obligation in time.

Drehman and Nikolou (2010) state liquidity risk is the most prominent risk in the banking industry. Failure to manage it can be an end to the sale of the bank itself. However, attention on the issue is relatively new. In the academic literature, the work on liquidity is scarce compared to credit risk. Furthermore, regulators also pay less attention to this risk and mostly rely on the lender of the last resort instrument.

For Bangladesh's case, Sarker (2005) also stated one of the topical problems being faced by the Islamic banks is the absence of an organized Islamic inter-bank money market. When it is not available, Islamic bank must provide a higher liquid asset to insure the liquidity need in the future. Sabri (2013) mentions some reasons that make liquidity risk in Islamic banking more severe than in conventional one. These are limited accessibility of the Shariah-compatible money market and intra-bank market, less developed Islamic instrument, the dominance of interest based liquidity instruments, market deepening, reliance on unstable sources of funding and knowledge on liquidity management and l interpretation on Islamic legal rule (Sharia).

Arifin (2012) using Malaysian Islamic bank confirms the important position of liquidity manage-

ment among Islamic banks. She finds that liquidity management among Islamic banks is robust and it makes them less prone to crisis. The average liquidity ratio is 32%, meaning banks are to have a liquidity safe approach strategy. It makes financial crisis have little impact on the Islamic banks. Further, the conventional financial theory of "high risk-high return" as Ford and Weston (2009) prescribed is not applicable for liquidity risk taking. Small (2009) stated liquidity management among Islamic banks is a challenge because beside internal factors, the bank must consider macroeconomic conditions that can influence liquidity availability.

Basel II Accord (BCBS, 2004), the regulatory standards for managing credit risk, market risk and the operational risk are important aspects of the global bank management practice. Unfortunately, there is no discussion on liquidity risk. This regulatory myopic view is also noticed by Landskroner and Paroush (2008). They indicated that liquidity risk is neglected in the light of extensive academic discussion on bank risk, such as credit risk, market risk and operational risk. Although experiences show that the banking crisis is started with liquidity problems, unfortunately, little attention has been given to liquidity risk. Global Financial Crisis in 2007-2009 showed that liquidity risk is the major risk faced by banks and other financial institutions and require government intervention in terms of liquidity facility or asset purchase agreement.

The global financial crisis in 2007-2009 resulted in the pivot point of liquidity risk and management. As a response to the development, the Basel Committee has conducted a fundamental review of its 2000 Sound Practices for Managing Liquidity in Banking Organizations.

The Basel Committee publishes the Guidance of liquidity management such as: set rule on liquidity risk tolerance; minimum level of liquidity position using liquid assets; maximum liquidity maintaning costs, liquidity risk from other significant business activities especially from subsidiary; the identification and measurement of the liquidity risks including contingent liquidity risks; the design and use of severe stress test scenarios; and the need for a robust and operational contingency funding plan; the management of intraday liquidity risk and collateral; and public disclosure in promoting market discipline (BCBS No. 144; 2008).

Barrel et al. (2009) stress the importance of liquidity and criticize the regulators that also focuse on capital adequacy. From various episodes of banking crisis, it is clear that liquidity plays more important role than capital. In the Basel II, liquidity is untouched. What the determinants of liquid asset holdings are assumed set by regulator not the real needs. In the past, liquidity risk measurement is focused on liquidity ratios. How-

ever, the traditional ratio has some weakness as it is only covering *ex post* information (*ex post*). That is why forward looking liquidity measure should be introduced.

Poorman and Blake (2005), also have similar reasons on this issue. They recall that measuring liquidity position using liquidity ratios is not sufficient. Individual bank and industry should work together to develop a new liquidity measurement. Recently, there are many efforts to provide a tool to assess bank liquidity risk position beyond traditional liquidity ratios. Saunders and Cornett (2007) introduce bank liquidity risk measurement using liquidity gap. In a normal condition, the liquidity crisis, is rare as liquidity crisis is related to the overall economic environment. Besides, previous studies seldom focus on the causes of liquidity risk.

Basel III responses the proposal to improve liquidity risk management by issuing standard for liquidity ratios. All financial institutions need to calculate stable funding and liquidity coverage ratio for managing liquidity and funding risk. It helps to provide safeguards from the risk emerge from institution-specific or systemic liquidity crisis management should be. However, one size fits all is not applicable for the success of liquidity risk management. The people's aspect of liquidity involved in its management and execution. Guglielmo (2007) concludes that institutions that successfully manage liquidity and liquidity risk have the following characteristics:

1. Ability to maintain liquidity information system such as measuring and monitoring process, sources and risk using a comprehensive collateral inventory that contains process, forecasts and business continuity for alternative funding.
2. Apply a liquidity stress-testing that quantify the probability and impact, then classify the situation into low, moderate, significant and severe liquidity risk events.
3. Set up monitor tools that will serve as an early warning system that provides information before events become problems.
4. Set up a liquidity contingency plan to guide the bank during the event of liquidity crises.

All previous work on bank liquidity unanimously concludes that liquidity risk management is very important. However, researchers and regulators are less interested to study or regulate the risk management in practice. The works on Islamic banking are less abundant either. As Islamic rural banks grow very fast in recent year, efficient liquidity management will benefit micro and small enterprises and improve their operating efficiency (Mongid and Tahir, 2010).

3. Research methodology

Study by Sarker (2005) and Arifin (2012) confirms that liquidity management in Islamic banking is a chal-

lenge task because the instrument and market for that purpose is not yet available. For Islamic rural banks, the challenges are higher as it is small in size and operating in the rural area. By investigating how liquidity risk is managed, the study will provide a general overview how Islamic rural bank manages their liquidity and will benefit the industry in their role as sources of financing for micro and small enterprises in the rural area.

According to the predictions of the consulting firm Ernst & Young (2014), Sharia finance grows at least 11 percent in 2015 to reach more than USD 2 trillion. Sharia banks are forced to be more conservative in investment as their risk management tool is not well in place. In Indonesia, Sharia banking performance was also strong. This is evident from the high growth, and high FDR, low NPF and CAR are maintained far above 8%. Based on data from Bank Indonesia, the Sharia banking industry recorded growth of 37.9% in the last 5 years. FDR is 88.6%, NPF is approximately 2.52%. Investment based financing is 33% of total financing. Lack of risk management and product development, hinder the capacity of Sharia banks to compete with conventional ones.

3.1. Data and sample. This study uses secondary data. Secondary data used in this study are the data associated with the development and performance of Islamic rural banking (SRB) in Indonesia. Data are gathered from Bank Indonesia. Secondary data are then tabulated to the subject of data analysis.

3.2. Variables. There are two groups of variables used in this study. Dependent variable in this study is Liquidity risk (Y_1). Independent variables in this study reflect financial characteristics of the SRB. These variables are bank size, NPF as a measure of *ex post* credit risk that will influence credit risk taking decision. Capital position is measured by the capital adequacy ratio (CAR). The higher capital ratio should give a positive impact to risk taking a position.

Table 2. Variables and definitions

No	Dependent variables	Measurement	Symbol
1	Liquidity risk	Liquid asset to total funding	Y_1
Explanatory variables			
1	Bank's size	Logarithm of total assets	X_1
2	NPFs ratio	Non-performing financing /total financing	X_2
3	Capital adequacy ratio	Tier 1 capital + Tier 2 capital / risk weighted assets	X_3
4	Leverage	Total bank debt/equity	X_4
5	Asset management	Asset utilization ratio = operating income/total assets	X_5

3.2. Econometric models. Based on previous studies related to risk taking, we find that bank size, problem loan, capital adequacy, leverage and asset management are important for credit risk taking, liquidity risk and operational risk. Time series modelling is applied. As time series modelling is more complicated and require special treatments in modelling, we decide to apply ARIMAX. ARIMAX is superior because it can handle autoregressive and independent variables. To capture all these variables in the model, we set up model as follows. There are three models to estimate the risks:

$Liquidity\ risk = \alpha + X_1\beta_1 + X_2\beta_2 + X_3\beta_3 +$

$+ X_4\beta_4 + X_5\beta_5 + \varepsilon.$ (1)

In order to ensure that all regression assumptions are met, we will test each variable using linearity and normality test. This test increases the reliability of the model.

4. Result

4.1. Data description. Figure 1 depicts the liquidity risk of the Islamic rural banking. We can see that liquidity position is seasonal in nature. As most of their customers are Moslem and operating in the suburban and rural area, Islamic rural banks serve as liquidity and saving vehicles. During Ramadhan banks must provide high cash and liquid asset to anticipate the withdrawal for Eid festival. After Eid festival, money are returned to the industry. Compared to the CAR, it is clear the CAR is much more stable.

Table 3 shows the descriptive statistics of the data for this liquidity risk modelling. LIQRISK has a mean value 29.78 meaning that IRB – almost 30% – of funding is allocated to finance liquid assets. Liquid assets in this study cover cash, bank and other short-term placement in other Islamic rural and commercial banks. The data are stationary. For ASSSETMGM the mean value is 9.62 but not stationary. The mean value for LEVERAGE is 5.2 meaning every one unit capital, the bank borrows 5.2 to finance the operation. It is very good as there are always 20% of the assets.
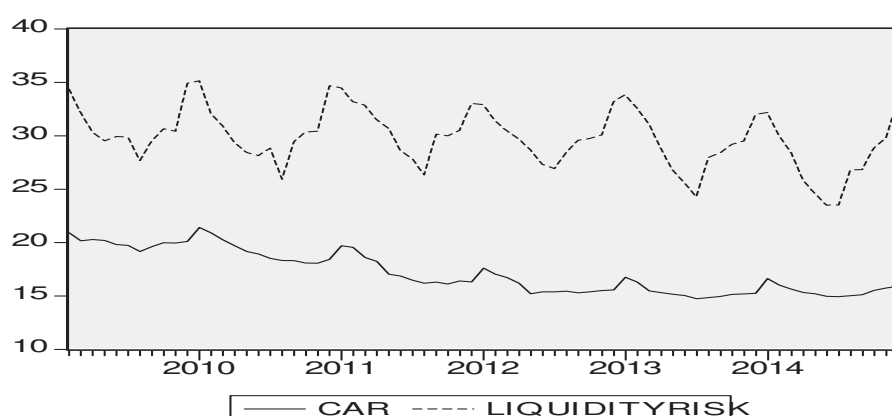
Fig. 1. Liquidity risk versus capital adequacy ratio (CAR)

Table 3. Variable description

Variable	Obs	Mean	Std. dev.	Min	Max	Stationary
LIQRISK	71	29.778	2.700	23.498	35.139	Yes
ASSETMGM	71	9.617	4.817	1.464	17.997	No
LEVERAGE	71	5.172	0.620	4.148	5.987	No
CAR	71	17.163	1.997	14.745	21.403	No
NPF	71	2.005	0.184	1.671	2.552	No
LASSET	71	15.076	0.420	14.347	15.699	No

The CAR is 17.2 meaning the capital adequacy is exceeding the minimum 8% set by Basel Committe. When NPF is 2%, it means in every one hundred financing, two will be the default. In general, it is quite low as banking authority sets the maximum NPF around 5%. However, the trend is upward. Asset size is 15.1 with standard deviation 0.4.4. However, all predictors are not stationary. This means the data must be in the first difference.

4.2. Interpretation. Liquidity risk is very complex in term of the nature and sources. It is becoming a single risk that possibly causes a failure as it can spread very fast and undermine the capital position of the bank. Liquidity risk can arise from various sources, both idiosyncratic and systemic. Liquidity risk can arise

from credit risk. For example, when a bank experiences a massive loan default, its cash inflow decreases and it can treat the capability of the bank to fulfil its obligation to its customers. The situation can also arise when the market for short term funds is dried. When the market is not liquid, the bank will not be able to refinance its obligation at reasonable cost.

Liquidity risk also arises when a bank provides a loan commitment to the borrowers. When noticeably borrower withdraws the money, at the same time bank does not anticipate the withdrawal, bank experiences liquidity shortage. Liquidity shortage is liquidity risk event. It is a very difficult situation and spread of liquidity can generate bank run. It is the background why liquidity risk management is very critical in the modern banking business.

In this study, we apply the ARIMAX model to study the determinant of liquidity risk in the Islamic rural banking industry. Total observations are 70. The statistics of Wald chi-square with seven variables is 541.61. It is significant at 1%, meaning that the model is eligible for liquidity risk model for Islamic rural banks. The Log likelihood ratio is -69.30. In short, the model is capable for further analysis.

Table 4. Empirical liquidity model

Variable	Coefficient	Std. err.	Z	P>z
D. LIQRISK				
ASSETMGM D1.	0.55	0.04	13.80	0.00
LEVERAGE D1.	18.86	1.51	12.51	0.00
CAR D1.	6.57	0.39	16.87	0.00
NPF D1.	-0.20	1.06	-0.19	0.85
LASSET D1.	20.58	9.66	2.13	0.03
_cons	-0.38	0.19	-2.05	0.04
ARMA				
Ar L1.	-0.83	0.24	-3.49	0.00
Ma L1.	0.70	0.32	2.16	0.03
/sigma	0.65	0.07	9.26	0.00

D1 = Differencing with previous month.

The coefficient for asset management (ASSETMGM) variable is 0.55 and significant at 1%. It

means when ASSETMGM increases by 1%, the bank liquidity risk reduces by 0.55%. The finding is

reasonable as AM is very close to profitability indicator. When a bank produces higher profit, its liquidity position is better as profitability is related to the higher cash inflow and it improves liquidity position. Better bank management is also related to better liquidity. Bank management is very complex, however, its quality is unobservable, especially in terms of liquidity position.

Variable leverage (LEVERAGE) is also significant at 1%. The coefficient is very high, 18.86. It means when the leverage increases by 1%, liquidity risk will reduce by 18%. Again the situation related to comprehensive risk management in the industry. Increasing leverage is very risky action as it may jeopardise the capital and liquidity position. However, improving leverage also increases the return for shareholders. From model, we can see that the Islamic rural bank is very smart that every increase in leverage, bank provides cushion by putting more liquidity on its balance sheet. On the other way round, it also unveiled a negative story that Islamic rural banks' capacity to absorb more funding is limited and resulted in more investment in liquid assets. The motivation to put more on liquidity is to prevent the Islamic rural bank from the possible credit risk due to less qualified borrowers.

The variable for CAR is positive and significant at 1%. It means the higher capital ratio is very important for liquidity risk of Islamic rural bank. Higher CAR refers to the ability of the bank to cushion the risk. Banks may put some of its capital funds on liquid asset. As capital is important to the strength of the banking firm, the ration provides further evidences that capital ratio is very important for general bank management especially on liquidity. The coefficient is very high, 6.57, meaning that an increase of 1 in CAR, industry will enjoy 6.57% increase in liquidity ratio. In other words, any increase by 1% of capital, liquidity risk of the banks will reduce by 6.57%.

NPF, as a measure of bank loan quality, has a negative sign. The negative sign on our expectation as higher ratio means bank experiences an extensive loan default. When the loan is default, the stream of cash flow is disturbed and will impact on liquidity position. Although the sign is in accordance with the expectation, the NPF is not significant. When bank experiences an increase by one percent of NPF, bank's liquidity risk will increase by 0.2%. The result confirms that loan quality has important implication on liquidity position and risk.

Asset growth (LASSET) is positive and significant. The coefficient is 20.58 meaning that any increase by 1% of asset growth will increase by 20% in liquidity position. The result provides an explanation on the weakness of liquidity management at industrial level. Asset growth is used to improve bank

liquidity position. It is always the case for Islamic banking that their liquidity position is much higher that its conventional counterparts implying less efficiency. The background of their position is: liquidity market is relatively not established so bank relies on its liquidity management on the traditional way. However, we should note carefully as the variable is on logarithm that implies 1% increase, which is very high in terms of the real figure.

Variable AR (Li) is negative and significant that autoregressive variable is in operation. Autocorrelation is persistent. It means that previous liquidity position is an important determinant of the current liquidity position. Negative sign means that there is a tendency that liquidity position in the previous period is higher so banks compensate the current position with only 13% of the previous position. This may be important to counter the seasonality. The Islamic banking deposit has a seasonal pattern that during certain times, withdrawal is massive.

In terms of the variable MA (Li), we find that the coefficient is 0.7 meaning MA contributes 70%. In net position, ARMA model contribute − 13%. A residual variable known as Sigma-Squared is 0.65 and significant at 1%. It means the residual follow independent, identical distribution (*i.i.d.*) and support the application of ARIMAX model.

Conclusion and implication

From our result, we can conclude that liquidity risk is determined by asset management, leverage and capital adequacy. Asset size is also important as a growing asset improves bank liquidity position. However, Islamic rural banking is weak in managing liquidity because the liquidity ratio is still very high. Non performing finance (NPF), although not significant, has negative impact on the bank's liquidity position and can bring devastated impacts on bank rigidity position. Improving asset management and loan quality will improve bank liquidity management. Relating to efficiency, better liquidity management will improve operating efficiency as liquidity self insurance is costly.

The weakness of this study is neglecting of economic environment variable such as central bank interest rate and inflation. The Islamic bank will experience liquidity problem when depositors withdraw their savings and place it in the conventional bank. Further research should include macroeconomic variable in the liquidity risk modelling.

Acknowledgement

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