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# DETERMINANTS OF LIQUIDITY RISK IN ISLAMIC BANKS

## Abstract

This research analyzes the determinants of liquidity risk in Islamic banks by using a comprehensive model that incorporates several variables that impact the liquidity of Islamic banks. A panel data analysis is conducted on a sample of 42 Islamic banks from 15 countries between 2007 and 2014. The results show a negative correlation between liquidity risk and cash ratio, as the cash balance can be used to meet any demands for liquidity from the bank's customers. There is negative correlation between liquidity risk and securities held by the bank, since banks which need liquidity can sell these assets to meet any liquidity shortages they face. Bank size also has a negative relationship with liquidity risk, as larger banks tend to have more stability and customers feel safer dealing with large banks. Bank's equity also has a negative correlation with liquidity risk, as equity is a more stable source of funding for banks, a higher ratio of equity lowers liquidity risk. On the other hand, there is a positive relationship with high profit assets, as banks shift their portfolio towards more profitable assets in order to increase their earnings, they face greater liquidity risk, a positive relationship also exists with bad finance provision. Additionally, the findings demonstrate that the relationship between bank size and liquidity risk is not linear.

## Keywords

liquidity risk, Islamic banks, conventional banks, size of the bank, investment in financial assets

**JEL Classification** G21, G11

## INTRODUCTION

One of the most important roles of any financial system is to provide liquidity. Therefore, financial intermediaries always try to manage their liquidity positions to support this fundamental role. Liquidity management is more essential for some financial intermediaries than others. Banks, for example, cannot afford to encounter liquidity problems. They must plan their liquidity positions very carefully and assess their liquidity risk on a regular basis.

Liquidity risk for banks arises from a mismatch between the demand for and the supply of funds. The supply of funds comes from customer deposits, repayments of credit facilities, borrowing from financial markets, interest and non-interest income and sales of banks' assets. On the other hand, demand for funds comes from customer withdrawals, demand for credit, interest and non-interest expenses. The difference between the supply and demand of funds is called "the net liquidity position", which banks must carefully manage in order to reduce their liquidity risk (Rose & Hudgins, 2013).

In order to manage their liquidity positions, banks can follow one of three strategies: assets liquidity management, liabilities liquidity management, or balanced liquidity management. When conducting assets

liquidity management, banks hold liquid assets in periods of positive liquidity and use (sell) these liquid assets in periods of negative liquidity. Liabilities liquidity management involves banks borrowing funds to cover liquidity shortfalls. Finally, balanced liquidity management means that banks will use a combination of assets and liabilities strategies to manage their liquidity positions. Banks decide to follow any of the previous strategies based on the advantages and disadvantages associated with each approach.

Conventional banks have no problem in using any of these three strategies. Islamic banks, however, have many restrictions placed on them related to their special nature. Islamic banks cannot use or deal in interest, which means they cannot give or accept interest. In addition, Islamic banks can only invest in “Sharia” compliant instruments.

The restrictions placed on Islamic banks make liquidity management a more difficult task. Islamic banks cannot invest in short-term financial instruments such as treasury bills, as they carry interest income which is forbidden in Islam. They also cannot borrow from other banks or financial institutions, because that option requires paying interest on the loans which is also forbidden for Islamic banks. Even the option of taking loans from central banks is problematic, since it will require paying interest on these loans. This situation might force Islamic banks to depend more on their internal sources of liquidity by holding higher levels of cash assets and abandoning many profitable investment opportunities in order to reduce their liquidity risks.

Many researchers have analyzed liquidity risks in Islamic banks. The majority of these studies were descriptive in nature and identified the different sources of risk for Islamic banks including liquidity risk. These studies proposed some guidelines to manage or reduce liquidity risk, while other research has introduced models to measure the liquidity risk in Islamic banks. However, these models generally focused on some major variables of liquidity risk determinants. This research will develop a more comprehensive model by including more relevant and specific variables to measure liquidity risk in Islamic banks. This study also attempts to understand how these variables affect liquidity risk in Islamic banks.

By finding more specific determinants of liquidity risk in Islamic banks we can help Islamic bank managers to manage their liquidity positions by making the process a little bit easier; a process which is a very difficult task considering the many restrictions that control the Islamic banking sector.

The remainder of this paper will be organized as follows: section 1 will outline the relevant literature about the topic. The data and methodology will be presented in section 2. Section 3 will discuss the results and findings of this paper. Subsequently, the conclusion of this paper will be presented in final section.

## 1. LITERATURE REVIEW

Diamond and Dybvig (1983) argued that deposits contracts lead to liquidity demands that can cause bank runs. Consequently, this might lead to real economic damage.

Diamond and Rajan (2001) suggested that banks can face a critical liquidity situation when depositors withdraw their money at undesirable times, especially if these banks have illiquid loans. Such circumstances can lead to liquidity shock.

Majid (2003) discussed the importance of liquidity risk management as a key tool in protecting banks

from collapse and ensuring the stability of the financial system. He also emphasized the importance of including Islamic Sukuk as part of capital requirements, as well as cooperation between central banks and the International Islamic Financial Market (IIFM) in that matter.

Chen (2009) measured liquidity risk and its causes in a sample of 12 countries during the period from 1994 to 2006. He found that liquidity risk is endogenous to the performance of banks and depends on liquid assets and external funding, and macroeconomic, regulatory and supervisory factors. He also found that liquidity risk can lower bank's profitability. When he classified countries into market-based

or bank-based, he found that in market-based countries, there is a negative correlation between performance and liquidity risk, while there is no such relationship in bank-based countries.

Ismael (2010) investigated the liquidity of a sample of 3 Islamic banks in Indonesia by considering 3 aspects only. These include assets side, liability side and liquidity management policy. The results showed the various achievements of these banks.

Ahmed et al. (2011) investigated the impact of firm size, tangibility, leverage, profitability and firm age on the liquidity risk of Islamic banks. They found that leverage, tangibility and age have a significant impact on liquidity risk, while profitability and size have no significant relationship to liquidity risk. These results were obtained from a study of a sample of 6 Islamic banks over the period from 2006 to 2009.

Akhtar et al. (2011) compared the liquidity risk of conventional and Islamic banks. Using 6 conventional and 6 Islamic banks from the period 2006–2009, their findings showed that size has an insignificant positive effect on liquidity risk for conventional and Islamic banks and a significant positive relationship between return on assets and liquidity risk for Islamic banks. Additionally, there is a significant positive relationship between net working capital to net assets and liquidity risk for conventional banks.

Cornett et al. (2011) conducted an analysis of liquidity risk and credit supply during the financial crisis. They found that credit risk is associated with liquidity risk generated by depositor withdrawals.

Iqbal (2012) investigated liquidity risk on a sample of 5 conventional and 5 Islamic banks from 2007 to 2010. The findings showed that non-performing loans have a negative relationship with liquidity risk, while capital adequacy ratio, return on assets, return on equity and size have a positive relationship with liquidity risk.

Arif and Anees (2012) examined the effect of liquidity risk on profitability based on a sample of 22 Pakistani banks from 2004 to 2009. The findings showed that a liquidity gap, as well as non-performing financing, has a negative effect on bank profitability.

Mohamad et al. (2013) examined liquidity risk and

how it relates to other types of risk on a sample of 17 Islamic banks from Malaysia from 1994 to 2009. They found that macroeconomic variables and the economic cycle can impact liquidity risk.

Paldi (2014) analyzed how capital adequacy might affect liquidity and other risks in Islamic banks. He found that because of the cost and risk associated with true Islamic banking, it is difficult to implement true Shariah banking.

Imbierowicz and Rauch (2014) investigated the relationship between liquidity and credit risk in conventional banks, based on a sample of US banks during the period from 1998 to 2010. The research identified that both liquidity and credit risk have a significant impact on bank default probability. They also found that even with no direct relationship between liquidity and credit risk, the interaction of the two types of risk increases the probability of bank default.

Khan et al. (2015) examined how liquidity affects banks' ability to accept risk. They found that banks can take more risk when they face a strong liquidity position.

Many studies have investigated the liquidity risk in Islamic banks by applying their models on a small sample over a short period of time, and, in most cases, on one country only. Some of these studies were descriptive while others used a simple model with limited variables. This research applies a comprehensive model that includes more specific variables other than variables used in the literature on a larger sample that includes banks from many countries to understand the liquidity risk in Islamic banks. The study tests the following hypotheses:

$H_1$ : *Cash held by Islamic banks will reduce liquidity risk.*

$H_2$ : *Islamic banks that hold more financial assets have less liquidity risk.*

$H_3$ : *Larger banks enjoy a low level of liquidity risk.*

$H_4$ : *Increasing the size of a bank will not always decrease its liquidity risk.*

$H_5$ : *Investing in more profitable assets will increase liquidity risk.*

$H_6$ : A greater equity ratio will decrease liquidity risk.

$H_7$ : Banks that are involved in bad financing face higher levels of liquidity risk.

## 2. DATA AND METHODOLOGY

The study sample includes 42 Islamic banks from 15 Arab countries including Algeria, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi, Sudan, Syria, UAE and Yemen between 2007 and 2014. The researcher used panel data analysis to examine the liquidity risk in Islamic banks.

The dependent variable in this research is liquidity risk (L), which is measured as total deposits to total assets. As this ratio represents the percentage of assets which are financed by customers' deposits, and since these deposits are subjected to frequent withdrawal, any increase in this ratio will indicate a higher level of liquidity risk. Some studies measured liquidity risk as cash to total assets. This research uses total deposits to total assets for two reasons: cash to total assets has been used as one of the independent variables to understand how cash already held inside the bank can impact the liquidity risk, and more importantly, since deposits endogenously determine banks' liquidity reserves as suggested by Acharya and Naqvi (2012). This ratio has previously been used by Mohamad et al. (2013) and Khan et al. (2015).

This study uses seven independent variables that we believe have an effect on liquidity risk in Islamic banks. These variables are:

**Cash ratio (CASH):** cash ratio is measured as cash and cash equivalents to total assets. Banks with more cash and cash equivalents will have less exposure to liquidity risk, as these banks will have a body of cash to meet the liquidity demands of their customers.

**Securities (SEC)** are measured as investment in securities to total assets. When banks hold more financial assets, they can use these securities as a substitute for cash in times of liquidity shortage in order to reduce liquidity risk.

**Bank's size (SIZE):** bank size is measured as the natural logarithm of the total assets. Larger banks can reduce their liquidity risk, as they can provide greater confidence to both their customers and outside financiers, which lowers liquidity risk.

The squared value of a bank's assets ( $SIZE^2$ ) is measured as the natural logarithm of the squared total assets. This variable aims to capture the effect of increasing the size of a bank. In other words, it is used to investigate whether there is a non-linear relationship between the bank's size and liquidity risk.

**Return on assets (ROA)** is measured as net income after tax to total assets. In order to reduce liquidity risk, banks tend to hold more cash and liquid assets, which have lower returns compared to more profitable but less liquid assets. This variable aims to measure the opportunity cost of liquidity.

The equity ratio (EQTY) is measured as total equity to total assets. Banks that are more dependent on equity face lower liquidity risk, as they have more stable funds compared to deposits, which are subject to customer withdrawals.

**Bad financing (BAD)** is measured as impairment provisions to total assets. Banks with more non-performing financing will face greater liquidity risk.

All of the variables have been calculated based on annual numbers taken from the annual reports of banks.

The following model is applied to measure the liquidity risk in Islamic banks:

$$L_{i,t} = \beta_1 \cdot CASH_{i,t} + \beta_2 \cdot SEC_{i,t} + \beta_3 \cdot SIZE_{i,t} + \beta_4 \cdot SIZE^2_{i,t} + \beta_5 \cdot ROA_{i,t} + \beta_6 \cdot EQTY_{i,t} + \beta_7 \cdot BAD_{i,t} + \varepsilon_{i,t} \quad (1)$$

Using panel data analysis will help to understand how a bank's characteristics will impact its liquidity position and how this effect will contribute to liquidity risk. By understanding this relationship, liquidity risk management in Islamic banks can become easier and bank managers can avoid liquidity issues.

### 3. RESULTS AND ANALYSIS

Table 1 shows the descriptive results for our sample between 2007 and 2014.

Table 1 shows that the research variables are not widely ranged. The standard is not high, the averages and the medians are very close to each other, which suggests that the variables' distributions are within a normal range.

Table 2 shows the correlation matrix for our sample between 2007 and 2014.

Table 2 shows that these variables display low correlations, which suggests that there is no multicollinearity between the research variables.

Table 3 shows the results of our models between 2007 and 2014.

**Table 3.** Regression results

| Variable      | Coefficient | t-statistics |
|---------------|-------------|--------------|
| CASH          | -0.2027**   | -2.0340      |
| SEC           | -0.4159**   | -2.1489      |
| SIZE          | -0.0117     | -0.6712      |
| SIZE2         | 0.0157*     | 1.7842       |
| ROA           | 2.1260***   | 3.3306       |
| EQTY          | -0.2453     | -1.4816      |
| BAD           | 3.5474***   | 4.2335       |
| Adj. R square | 16.72%      |              |
| Observations  | 232         |              |

Note:  $L_{i,t} = \beta_1 \text{CASH}_{i,t} + \beta_2 \text{SEC}_{i,t} + \beta_3 \text{SIZE}_{i,t} + \beta_4 \text{SIZE}^2_{i,t} + \beta_5 \text{ROA}_{i,t} + \beta_6 \text{EQTY}_{i,t} + \beta_7 \text{BAD}_{i,t} + \epsilon_{i,t}$ . The dependent variable is the liquidity risk (L). The independent variables are as follows: Cash ratio (CASH); Securities (SEC); Bank's size (SIZE); Squared value of the bank's assets (SIZE<sup>2</sup>); Return on assets (ROA); Equity ratio (EQTY); and Bad financing (BAD) between 2007–2014. \*\*\*, \*\*, \* indicate that coefficients are significant at the 1%, 5% and 10% levels, respectively.

**Table 1.** Descriptive results

Source: calculated from banks' annual reports, period 2007–2014

| Variable     | Average | Median | Maximum | Minimum | Standard deviation |
|--------------|---------|--------|---------|---------|--------------------|
| L            | 39.95%  | 35.37% | 90.76%  | 3.10%   | 24.71%             |
| CASH         | 27.72%  | 23.00% | 89.43%  | 3.49%   | 19.84%             |
| SEC          | 10.38%  | 9.53%  | 44.70%  | 0.00%   | 8.25%              |
| SIZE         | 21.60   | 21.53  | 25.04   | 18.38   | 1.56               |
| SIZE2        | 44.57   | 44.22  | 51.39   | 38.15   | 3.04               |
| ROA          | 1.39%   | 1.11%  | 12.85%  | -5.39%  | 2.41%              |
| EQTY         | 15.98%  | 13.66% | 76.39%  | 4.89%   | 9.08%              |
| BAD          | 1.75%   | 1.28%  | 17.03%  | 0.00%   | 1.87%              |
| Observations | 232     | 232    | 232     | 232     | 232                |

Note: the dependent variable is the liquidity risk (L). The independent variables are as follows: Cash ratio (CASH); Securities (SEC); Bank's size (SIZE); Squared value of the bank's assets (SIZE<sup>2</sup>); Return on assets (ROA); Equity ratio (EQTY); and Bad financing (BAD) for the period from 2007 to 2014.

**Table 2.** Correlation matrix

Source: calculated from banks' annual reports, period 2007–2014.

| Variable | L      | CASH   | SEC    | SIZE   | SIZE2  | ROA    | EQTY   | BAD   |
|----------|--------|--------|--------|--------|--------|--------|--------|-------|
| L        | 1.000  |        |        |        |        |        |        |       |
| CASH     | -0.035 | 1.000  |        |        |        |        |        |       |
| SEC      | -0.099 | -0.392 | 1.000  |        |        |        |        |       |
| SIZE     | 0.265  | -0.569 | 0.172  | 1.000  |        |        |        |       |
| SIZE2    | 0.317  | -0.101 | -0.011 | 0.736  | 1.000  |        |        |       |
| ROA      | 0.150  | 0.076  | 0.013  | -0.046 | 0.044  | 1.000  |        |       |
| EQTY     | -0.133 | 0.004  | 0.005  | -0.230 | -0.223 | 0.188  | 1.000  |       |
| BAD      | 0.277  | 0.096  | -0.074 | 0.106  | 0.138  | -0.157 | -0.246 | 1.000 |

Note: The dependent variable is the liquidity risk (L). The independent variables are as follows: Cash ratio (CASH); Securities (SEC); Bank's size (SIZE); Squared value of the bank's assets (SIZE<sup>2</sup>); Return on assets (ROA); Equity ratio (EQTY); and Bad financing (BAD) for the period from 2007 to 2014.

Table 3 shows several results. The cash ratio has a significant negative relationship with liquidity risk, while banks with more cash will face less liquidity risk, as the cash balance can be used to meet any demands for liquidity from the bank's customers.

There is also a significant negative correlation between liquidity risk and investment in securities. Financial assets can be used as a second line of defence against liquidity shortage or risk, since banks which need liquidity can sell these assets to meet any liquidity shortages they face.

Banks' size also has a negative relationship with liquidity risk. Moreover, although the result is insignificant, but bank's size has the correct sign. Larger banks tend to have more stability and customers feel safer dealing with large banks.

The squared value of the size has a significant positive relationship with liquidity risk. The purpose of this variable is to capture any non-linearity in the relationship between a bank's size and its liquidity risk. The results demonstrate that the negative relationship between a bank's size and its liquidity risk does not always remain negative. If a bank's size keeps increasing, the relationship might become positive after a certain size.

Return on assets has a positive significant relationship with liquidity risk. Given a level of assets, a bank's management can distribute these assets between high liquid assets with low returns and illiquid assets with high returns. As banks shift their portfolio towards more profitable assets in order to increase their earnings, they face greater liquidity risk.

Equity ratio has a negative relationship with liquidity risk. As equity is a more stable source of

funding for banks, a higher ratio of equity lowers liquidity risk.

Bad financing can cause banks to lose their returns, and, in some cases, their original capital. Additionally, bad financing increases liquidity risk, as signified by the positive significant relationship.

The results show that as banks increase their cash holdings, they lower their liquidity risk as this cash can be used to provide the liquidity if needed. Since Islamic banks cannot borrow funds from other banks, which would involve the payment of interest, it is important for Islamic banks to hold more cash in order to reduce their liquidity risk. Also, banks that hold more securities can place them self in better liquidity position and avoid illiquidity. These securities can be considered a secondary line of defence, as banks can sell them in the financial markets to raise liquidity, especially when the borrowing of funds is restricted as in the case of Islamic banks.

High profitability can come at the cost of lower liquidity. When banks shift their asset portfolios towards more profitable assets, they reduce their investment in low profit, highly liquid assets. This explains the positive correlation between liquidity risk and profitability. When Islamic banks finance their clients, they become partners in an actual project which is very difficult to liquidate. This is unlike the approach of conventional banks that provide their clients with direct loans which can be sold to third parties to provide liquidity if necessary.

Bad financing will increase banks' liquidity risk, as losses resulting from poor financing decisions means they become unable to meet liquidity needs and face greater liquidity risk.

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## CONCLUSION

Banks face many types of risks including liquidity risk. Conventional banks can use many tools to deal with this type of risk. Islamic banks, on the other hand, are more limited in using some of these tools. Therefore, it is important to understand the nature of liquidity risk in Islamic banks and what factors can affect and contribute to liquidity risk.

Based on a sample of 42 Islamic banks from 15 countries, the findings show that liquidity risk in Islamic banks is negatively related to cash held by the banks, investment in financial assets, the equity that the

bank depends on and the size of the bank. The results also show that the relationship with a bank's size is not linear. Bad financing decisions and investments in more profitable but less liquid assets will lead to more liquidity risk.

The findings of this paper will help banks' managers to reduce liquidity risk and keep their banks at a better liquidity position. Efficient asset management will allow managers to maintain a balance between the required liquidity and the desire for profitability. Bank managers can also reduce liquidity risks by keeping part of their assets in cash or by investing in securities. Increasing the size of a bank or its equity will help to reduce liquidity risk. Bank managers should be more careful when financing their clients as bad financing can increase liquidity risk.

One of the limitations of this research is that it only focuses on liquidity risk. Another limitation is the sample, which only looks at banks from Arab countries. We recommend applying this methodology to a larger sample. We also recommend investigating the effect of other types of risk on Islamic banks, as well as comparing the effect of these types of risk on conventional banks.

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