The Determinants of Liquidity Risk: A Panel Study of Islamic Banks in Malaysia

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Abstract

Liquidity risk occurs when a bank is unable to cover its financial obligation when it is due without bearing any costs. For Islamic bank, there will be additional risk due to limited access to Shariah compliant fund at a reasonable time and cost. Due on the importance on managing liquidity risk, the Basel Committee on Banking Supervision (BCBS) introduced the Basel 111 to emphasize the use of liquidity coverage ratio (LCR) and Net Stable Funding Ratio (NSFR) as measurement of liquidity risk. . This study attempts to examine the determinants of liquidity risk measured with the LCR and NSFR and two groups of variables which is microeconomic (size, capital adequacy ratio, profitability, asset quality and bank specialization) and macroeconomics (GDP and inflation rate). The sample included 17 Islamic Banks in Malaysia and based on secondary data covers a period from 2000 until 2013. Our findings show that characteristic of banks which are CAR and financing are significance with liquidity risk. Other that, both macroeconomic variable, GDP and inflation are also significance with both liquidity measurement proposed by Basel 111.

Keywords Liquidity risk, NSFR, LCR, Basel 111

1. Introduction

According to Bank in Settlement (2008), liquidity is the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. Liquidity risk is sometimes also referred to as a sub-category of market risk related to bank ability to fulfil their obligations in meeting demands from depositors for withdrawal of their deposits. (Khadijah Iskandar, 2014).

In order to improve liquidity risk management practices, the Basel Committee on Banking Supervision on Jan 2013 published the Basel III: The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools. Basel III was introduced with objective to ensure sound liquidity in financial institutions and prevent recurrence of the liquidity crisis. Compared to the earlier Basel I and II frameworks, Basel III proposes many additional capital, leverage and liquidity standards to strengthen the regulation, supervision and risk management of the banking sector. Two measurement for liquidity management have been introduced which is Liquidity Cover Ratio (LCR) and Net Stable Funding Ratio (NSFR).

According to (Basel III 2013), the objective of introducing the LCR is to promote short term resilience of the liquidity risk profile of banks by ensuring that bank have sufficient high quality liquidity assets can be converted to cash to survive any stress scenario lasting for 30 calendar days. For NSFR, the main objective is to promote resilience over a longer time horizon by creating additional incentives for banks to fund their activities with more stable sources of funding on-going basis. Normally Net Stable Funding Ratio has a time horizon is one year and has been

developed to provide a sustainable maturity structure of assets and liabilities. (Khadijah Iskandar 2014)

Parallel to the importance of liquidity risk to be measured clearly by banks, many researcher measured the variable will influence liquidity risk using the traditional proxy as example total deposit to total assets, cash to total assets, capital to total assets and ratio of current assets to total liabilities . This paper tried to contribute the new measurement as proposed by Basel 111 which is Liquidity Coverage Ratio and Net Stable Funding Ratio to calculate the level of liquidity for Islamic Banks in Malaysia.

This study aims to examine the determinants of the liquidity risk in Islamic banking in Malaysia. The sample of data covered from year 2000 until 2013. The year 2000 is chosen as 2000 was the year after 1998 financial crisis start to recover. This unbalanced panel data is estimated using fixed effect random effect models.

1.1. Overview of Islamic Banking in Malaysia and Liquidity Risk

In 1983, the Islamic Banking was introduced in Malaysia with the establishment of 1st Islamic Bank in Malaysia, Bank Islam Malaysia Berhad (BIMB). Islamic banking refers to a system of banking that complies with Islamic law. The underlying principles that govern Islamic banking are mutual risk and profit sharing between parties, the assurance of fairness for all and that transactions are based on an underlying business activity or asset. These principles are supported by Islamic banking's core values whereby activities that emphasis entrepreneurship, trade bring development or benefit are encouraged. Activities that involve interest (riba), gambling (maisir) and speculative trading (gharar) are prohibited.

The risk profile of an Islamic bank is almost similar to the conventional interest-based bank. However according to Rania Abdelfattah Salem (2013), Islamic banks are faced with some challenges in managing risk as example in liquidity management, Islamic bank faced the lack of liquid assets as well as the non-existence of a lender of last resort along with the minimal use of securitisation will lead liquidity risk among Islamic banks. Because the Islamic banks deals in the real assets so it deals in within the business cycles, cooperation among the business partners and good conduct of the stakeholders. Due on that, Islamic banks are more exposed to the liquidity risk whenever there is disharmony between business partners or an obvious decline of business condition (Anjum Iqbal 2012).

The quick development of Islamic banking in the last three decades has raised the limitation of Shariah compliant money market instruments used by Islamic Bank for Interbank transactions and liquidity management. One of the major challenges in liquidity management for Islamic bank will be to identify suitable assets that can be the basis for the underlying transactions and that is tradable on a cross-border basis (Daud, 2010). According to Habib Ahmad (2011), Islamic Bank facing the liquidity risk when there are still limited Islamic money markets in most jurisdictions from which funds can be sought in times of need and secondly, most assets of Islamic banks are mostly debt-based, these become illiquid due to restrictions on sale of debt.

In line with the objectives of the Islamic Financial Services Board (IFSB) to support development of a prudent, efficient and resilient Islamic financial services industry, in March 2012, IFSB issued 'Guiding Principles on Liquidity Risk Management for Institutions Offering Islamic Financial Services [Excluding Islamic Insurance (Takaful) Institutions And Islamic Collective Investment Schemes] that must be followed by Board of Directors and also Supervisory Authorities in order to ensure an appropriate framework for liquidity risk management for IIFS. The Guiding Principles for Islamic Financial Services (IIFS) specify the structure of liquidity risk

management process and provide necessary guidance on the identification, measurement, monitoring, control, reporting and mitigation of liquidity risk.

2. Literature Review

Liquidity risk in banks is defined as the risk of being unable either to meet the obligations of the depositors or to fund increases in assets as they fall due without incurring unacceptable costs or losses. According to Iqbal (2012), liquidity problem also arises because of the depositors' decisions to withdraw their deposits but the bank has not enough cash in hand. In real, banks find imbalances in the asset and liability side on the regular basis and need to manage it accurately; otherwise they would face insolvency risks.

Previous studies on the determinants of bank liquidity risk focused more on the characteristic of banks to measure factor influence liquidity risk. The research done by Mohammad Abdelkarim (2013) compared liquidity risk management between Saudi and Jordanian banks during the period 2007 and 2011. He calculated liquidity risk using cash divided by total assets as proxy and bank size, investment to asset ratio, capital to asset ratio, debt to equity ratio, loan to deposit ratio, the return on equity and also return on assets as variable to measure liquidity risk at selected banks. From the regression results, Saudi bank shows only debt to equity ratio and capital to total assets have positive significance while size and loan to deposit ratio are negative significance with liquidity risk. The Jordanian banks show all variable except bank size are significance with liquidity risk with debt to equity ratio, return on asset ratio, capital to asset ratio indicate positive sign while investment to assets ratio, loan to deposit ratio and return on equity indicate negative sign . Based on findings, they concluded that Jordanian banks have a better liquidity position compared to Saudi banks.

Asim and Abdul Qayyum (2012) study the liquidity risk management between domestic and foreign banks in Pakistan between 2001 until 2010. They measure liquidity risk using the different proxy, namely capital to total assets and include characteristic of banks similar with Mohammad Abdelkarim (2013) which is asset size, debt to equity ratio, investment to asset ratio, return on equity and also total loans to total deposits. The results show bank size and debt to equity ratio have negative significant relationship with liquidity risk for domestic banks while foreign banks indicate debt to equity ratio and total loans to total deposits ratio have significant relationship with liquidity risk. The results obtained only variable debt to equity ratio significance with negative relationship for both domestic bank and foreign banks. They suggest that liquidity risk will decrease for both banks in Pakistan by minimize debt to equity ratio.

Meanwhile, Muhammad Farhan et al. (2011), Sayedul Anam (2012), Anjum Iqbal (2011), analyse the comparison for liquidity risk management between conventional and Islamic banks. Firstly, Muhammad Farhan et al. (2011), focused on Pakistan covers a period of four years from 2006 until 2009, study using size of firm, networking capital, return on equity, capital adequacy ratio and return on assets. The study shows positive sign for all variables for Islamic bank but only significance with return on Assets. With using the same proxies as Muhammad Farhan et al. (2011), Anjum Iqbal (2011) add the other variable which is Non Performing Financing covered period starting 2007 until 2010. The result contrast with Muhammad Farhan et al. (2011) which is the all variable measured by them shows positive significance with liquidity risk while NPF indicate negative significance with liquidity. They prove that the higher ratio of NPF indicate the higher liquidity risk due to banks have the large number of bad debts. Both models proved failure

of banks to collect debt will increase liquidity risk and the greater the bad debts for both banks the more with adverse will be the liquidity position of the bank.

Sayedul Anam et al. (2012) examined liquidity risk management for Islamic and Conventional in Bangladesh covering five years from 2006-2010. They focused only characteristic of bank which is size, networking capital, return on equity, capital adequacy ratio and return on assets. The results show, only variable which is size of bank have positive and significance for Islamic bank. In contrast with Islamic banks, only networking capital measured by current ratio indicated positive and significant relationship with conventional banks. As Anjum Iqbal (2011) shows that NPF is determinant for liquidity risk, the findings by Sayedul Anam (2012) could be different if NPF is included in the analysis.

Besides that, only a few studies include macroeconomic factors as determinants for liquidity risk. Ahmad Azam et al. (2013) study how Islamic bank in Malaysia managed liquidity through confronting economic cycles. Besides characteristic of bank, they include interest of three months Interbank Money Market, money supply, inflation rate, gross domestic product (GDP) as dependent variable to measure liquidity risk. Due to endogeneity problem of time period between Islamic observation banks, they used Generalized Method of Moments (GMM) to estimate on the dynamic panel data for 17 Islamic banks within year 1994 until 2009. The method is suitable in dealing with omitted variable bias caused by time differences between certain Islamic banks as well as any measurement error in the estimation. The results show that macroeconomic control variable which is inflation rate and GDP directly influence liquidity risk. Economic growth will gives good prospects for bank to generate more income and will reduce the liquidity risk. Although GMM is appropriate to solve endogeneity issue of time, (Heino Bohn Nielsen, 2005) suggest large cross section is required for GMM to produce an excellent estimation. Since Azam (2013) only have 17 banks, their findings could be challenge in futures. In contrast, Doriana (2013), who included GDP and Inflation as variable to measured liquidity risk only shows a significant positive relationship between GDP and liquidity risk measured by liquidity coverage ratio, this means economy growth will increase liquidity coverage ratio for banks.

For the Malaysian context, the study for liquidity risk is still limited. Besides Ahmad Azam et al. (2013) that focused on macroeconomic cycles on top of a few bank specific variables, Noraini (2012) analysed the relationship between liquidity risk and performance by only using two variables which is return on assets (ROA) and return on equity (ROE). The study only focuses on the top six Islamic Banks in Malaysia from 2006 to 2008 which is during financial crisis. From the analysis of correlations, the study finds that the financial crisis has impact on liquidity risk and performance due to the higher the liquidity risk, the lower will be the ROA and ROE.

Based on previous studies, most of the researcher used the simple calculation as proxy to describe liquidity risk. Farhan et al. (2011), Sayedul Anam et al. (2012), Mohammad Abdelkarim (2013), Anjum Iqbal (2012), Muhammad Ramzan (2014) use cash to total assets as proxy for measurement of liquidity risk. Ahmad Azam et al. (2013) used total deposits to total assets while Asim Abdullah (2012) extended the proxy using different proxy which is capital to total assets (refer Appendix B) . However, parallel with new liquidity indicators proposed by Basel 111, Doriana Cucinelli (2012) and Claudio Giannoti (2010) extend their study with new calculation for liquidity risk. Doriana Cucinelli (2012) within the context of Euro Area used Liquidity Coverage Ratio (LCR) as proposed by Basel Committee to measure for short term horizon and Net Stable Funding Ratio (NSFR) for long term horizon. Six different bank characteristics variable represent the control variable which is bank capitalization, bank size, bank specialization, loan loss reserve ratio and two macroeconomic variables which are GDP and inflation. The results shows all variables except the dummy listed significance with LCR with size and specialization indicate

positive signed with liquidity risk while for NSFR only significance with characteristic of bank but insignificance with macroeconomic factors.

Based on the existing literature, studies focusing on the determinants of liquidity risk for Islamic banking in Malaysia are still limited especially for the latest measures of liquidity risk. In this regards, this study tried to measure liquidity risk using calculation as suggested from Basel Committee which is Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) instead of the balance sheet ratios as previous studies. In addition, this study captures both micro and macroeconomic variables in investigating factors affecting liquidity risk of Islamic banking institutions.

3. Methodology and Research Design

To achieve the research objectives, this paper uses a sample of 17 Islamic banks in Malaysia using unbalanced panel data regression analysis for 14 years between years 2000 until 2013. Two models are tested using fixed effect and random effect. According to Hun Myoung Park (2011), fixed effect model examines the individual differences in intercepts, assuming the same slopes and constant variance across individual. Since an individual specific effect is time invariant and considered a part of the intercept, μ_i is allowed to be correlated with other regression. The fixed-effects model also controls for all time-invariant differences between the individuals, so the estimated coefficients of the fixed-effects models cannot be biased because of omitted time-invariant characteristics (Reyna, 2007).

Similarly different with random effect model, individual effect is not correlated with any regression and then estimates error variance specific to groups (or times). Hence μ_i is an individual specific random heterogeneity or a component of the composite error term. Unlike the fixed effects model, the variation across entities is assumed to be random and uncorrelated with the predictor or independent variables included in the model (Reyna, 2007).

Fixed and random effect regression will be explained as below:

While,
= The dependent variable observed for individual i in time t.
= Time-variant regression
The time-invariant regression; when cannot be estimated directly by the fixed effect model and only can be estimated by the random effect model
= The unobserved individual effect
= The error term

The best model is selected based on the Hausman test. The test can also use to differentiate between fixed effects model and random effects model in panel data study.

The research from previous authors provides some basis theory on the relationship of each determinants and liquidity risk. The model developed in this study is modification from previous models that divides from characteristic of banks and macroeconomics factors. (Refer to appendix B for the list of variable adapted by previous studies) The data for characteristic of banks obtained from the bank's annual report and Bankscope database while macroeconomic data were retrieved from the websites of Global Market Data Index (GMDI).

The dependent variables considered two method proposed by Basel Committee (2010), namely Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR). To the best of our

knowledge, Doriana Cucinelli (2013) and Claudio Giannoti (2010) measured liquidity risk with same method. To be aligned with the item in balance sheet for Islamic Banking, this study will follow guideline issued by Islamic Financial Services Board, namely the 'Guidance Note on Quantitative Measures for Liquidity Risk Management in Institutions Offering Islamic Financial Services [Excluding Islamic Insurance (Takāful) Institutions and Islamic Collective Investment Schemes' to measure the liquidity risk between Islamic Bank in Malaysia. (IFSB, 2014). As proposed by Basel 111, the liquidity coverage ratio and the Net Stable Funding Ratio are two dependent variables considered:-

a) Liquidity Coverage Ratio (LCR)

According to IFSB 2014, the objective of the LCR is to ensure Islamic Banking to withstand the short-term liquidity shocks. To meet this requirement, Islamic banking should ensure have an adequate stock of unencumbered high quality liquid assets (HQLA) that can be converted easily and immediately into cash in order to meet its liquidity needs for a 30-calendar-day period under a liquidity stress scenario. This is based on the assumption that, if the requirement is met, the Islamic could survive for the 30 days of the given stress scenario. The formula as follow:

$$\frac{\text{Stock of Shariah-Compliant (HQLA)}}{\text{Total net cash outflows over the next 30 calendar days}} \geq 100$$

b) Net Stable Funding Ratio (NSFR)

According to IFSB 2014, the objective of NSFR is to promote resilience over a longer time horizon. It has been developed to provide a sustainable maturity structure of assets and liabilities. It ensures that long-term assets are funded with at least a minimum amount of stable liabilities. The formula as follow:

$$\frac{\text{Available amount of stable funding}}{\text{Required amount of stable funding}} \geq 100$$

A high value of this ratio means the bank hold high liquidity ratio and the lower value will lead bank to have higher liquidity risk. The constraint of the research is to include all the term provided by IFSB for calculation due to data limitation. The analysis focuses on the balance sheet item.

Table 1 LCR items and implemented proxies

ITEMS	PROXY	FACTOR (%)
Stock Of Hiqh Liquidity Assets		
Coins and banknotes	Cash and due from banks	100
Qualifying central bank reserves (including required reserves).	Statutory with Bank Negara Malaysia	100
Cash outflow over 30 days		
Retail deposits		
Stable Deposits	Total Deposits	Minimum 5
Less Stable Deposits	Total Deposits	Minimum 10
Qualifying other Sharī`ah-compliant liquidity instruments that are widely recognised in the jurisdictions of the home country	Total Deposits	75

Cash inflows over 30 days		
Amounts to be received from non-financial wholesale counterparties, from transactions other than those listed in above inflow	Total retail Deposit	50

Table 2 NSFR items and implemented proxies

ITEMS	PROXY	FACTOR (%)
Available stable Funding (sources)		
Total regulatory Capital	Total Capital	100
Stable non-maturity (demand) deposits and term deposits with residual maturity of less than one year provided by retail and SME customers	Proxy Not Implemented	
Less stable non-maturity deposits and term deposits with residual maturity of less than one year provided by retail and SME customers	Total Deposits	90%
Funding with residual maturity of less than one year provided by non-financial corporate customers	Proxy Not Implemented	
All other liabilities and equity not included in above categories, including liabilities without a stated maturity	Total Liabilities and Equity	0
Required Stable Funding (Uses)		
Coins and banknotes and All central bank reserves	Cash and due from Banks	0
Other unencumbered performing financing with risk weights greater than 35% under the Standardised Approach and residual maturities of one year or more, excluding financing to financial institutions	Total Financing	85
All assets that are encumbered for a period of one year or more	Total Assets	100%

The independent variable contains the characteristic of banks and macroeconomics variable. The variable details explanation as below tables:

The framework modification and regression estimation as below:
When,

Table 3 The variable and proxy

VARIABLES	PROXY
LQ	Two dependent variable measures proposed by Basel 111 with is LCR and NSFR
SIZE	Logarithm of bank assets
CAR	Capital Adequacy ratio measured by Tier 1 capital + Tier 2 capital to risk weighted assets
ROA	Return on Assets measured by Net income divided by Total Equity
NPF	Non performing Financing measured by Total Non-Performing Financing divided by total financing
FIN	Financing provided by bank measured by Total of Financing divided by Total Assets
GDP	Gross Domestic Products measured by Growth of Gross Domestic Product

Table 4 Results for Fixed Effect Random Effect Models

	LIQUIDITY COVERAGE RATIO (LCR)				NET STABLE FUNDING RATIO (NSFR)			
	FIXED EFFECTS		RANDOM EFFECTS		FIXED EFFECTS		RANDOM EFFECTS	
	C (S.E)	P VALUE	c (S.E)	P VALUE	c (S.E)	P VALUE	c (S.E)	P VALUE
ROA	0.402	0.916	0.128	0.973	-0.684	0.677	-0.705	0.667
	(3.818)		(3.704)		(1.636)		(1.637)	
CAR	2.680	0.036**	3.945	0.000***	0.710	0.192	1.373	0.006**
	(1.262)		(1.131)		(0.540)		(0.498)	
FIN	-1.517	0.002**	-1.007	0.009***	-0.023	0.909	0.291	0.086*
	(0.466)		(0.386)		(0.200)		(0.169)	
NPF	-0.018	0.546	-0.011	0.701	0.011	0.381	0.017	0.185
	(0.03)		(0.030)		(0.013)		(0.013)	
SIZE	14.56	0.131	1.625	0.827	2.317	0.573	-3.336	0.306
	(0.956)		(0.074)		(0.041)		(0.032)	
GDP	-4.997	0.001***	-5.119	0.001***	-1.545	0.02**	-1.550	0.023**
	(0.015)		(0.015)		(0.007)		(0.007)	
INF	9.573	0.001***	9.692	0.001***	3.872	0.003***	3.828	0.003***
	(0.029)		(0.029)		(0.041)		(0.013)	
	0.2629		0.2362		0.1169		0.0855	
Hausman	Prob >chi2 = 0.0422,Ho failed to reject							

Note: Based on the Hausman test, the fixed effect models will the best model for this study. The sign ***, ** and * denoted significance at the 1%, 5% and 10% confidence level. Dependent Variable is LCR and NSFR which is to study for liquidity ratio. The higher index means a low bank liquidity risk exposure, thus the relationship between independent variables and liquidity risk exposure is reversed from the coefficient sign in this table.

4. Findings

Table 4 presents the regression result obtained from the liquidity measure. For the purpose of discussion, the both liquidity measurement is a ratio for banks liquidity which means a higher value means that banks hold higher liquidity ratio. Hence, the intuition on the liquidity risk exposure is opposite to the coefficient signs in table 3.

The results show two characteristic of banks significance with LCR which is CAR and Financing. For CAR, the negative significant signs infer that an increase in capital adequacy ratio for Islamic banks in Malaysia is associated with a decrease in liquidity risk exposure. This result is parallel with expected sign and consistent with Ahmad Azam (2013) and Anjum Iqbal (2012). Islamic banks in Malaysia maintained very high CAR with average 18.804% which means that they had adequate capital to manage any shock to the balance sheet. It also gives some protection to depositors. The higher the capital adequacy ratio, the higher the level of protection available to depositors (Reserve Bank of New Zealand, 2007)

Turning to the other determinants of liquidity risk exposure, our study shows financing is positively significance with liquidity risk. This result is parallel with expected sign and consistent with Ahmad Azam (2013). Increase in total financing will increase liquidity risk exposure means the institutions failed to maintaining their demand deposits. This will increase the risk of bankruptcy in the event of a bank run due to banks are lacking in liquidity compare to total amount provided.

With regard to the macroeconomic variables, GDP and Inflation are contradicted with our sign and expectations. This may be attributed from the unique features of Islamic Banks principle.

Both liquidity measurement proposed by Basel 111 are significance with macroeconomic factors. Firstly, GDP results indicate positive significance with liquidity risk exposure. Increasing on Gross Domestic Product will increase the liquidity risk for Islamic Banks. The results are contrast with (Ahmad Azam, 2013) and (Doriana 2013). It means Islamic banks in Malaysia not remain the liquidity ratio even though economy growth. This may be happened due to during the stable economic situation, bank holding less liquidity and increase their financing and investment to increase their profitability.

Another variable which is inflation shows different sign with GDP, the result shows negative significance with both liquidity measurements. Increasing in inflation will decrease liquidity risk among Islamic banks. This result shows that when inflation occurs, the interest or profit rate will increase and can reduce the financing provided by the bank. This will increase liquidity holdings by banking institutions and thus can reduce the exposure to liquidity risk. During inflation, the bank will increase the liquidity ratio to protect depositor and vigilant in the event of bank runs.

5. Conclusion

The aim of this study is to investigate the determinants of liquidity risk and using two new indicators proposed by Basel Committee. The study cover the period between 2000 until 2013 and focused for Islamic Bank in Malaysia using fixed effect random effect model. Based on results, CAR and financing can have an impact on liquidity risk management for short term period. Besides that, both macroeconomic factor which is a gross domestic product and inflation show the significance results with liquidity measurement whether in the short or long term period. It can be proving that macroeconomic variable clearly influence the behaviour of Islamic Banking and will determine the percentage of the liquidity risk for banks Islam in Malaysia. The main restraint of this study is to include all the items for liquidity measurement due to data constraint. In future, studies can be improved by the increasing of sample data, considering all the items proposed by Islamic Financial Services Board.

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