Liquidity Risk Exposure in Islamic and Conventional Banks

Osama Omar Jaara[1], Bassam Omar Jaara[2], Jamal Shamieh[3], Usama Adnan Fendi[4]*

[1]Accounting Department, American University of Madaba, [2]Accounting Department, Al Ahliyya Amman University, [3]Risk Management Department, American University of Madaba, [4]Risk Management Department, American University of Madaba, Jordan. *Email: u.fendi@aum.edu.jo

ABSTRACT

This research aims to identify the factors influencing the ability of Islamic Banks (IB) and Conventional Banks (CB) to manage liquidity risk; determine the effects of the global financial crisis on Islamic and conventional banks, and propose some mechanisms to improve resilience against liquidity risk. Univariate and panel regression analyses were used. This was made by highlighting the factors affecting Liquidity Risk Exposure (LRE) in relation to a cross-country sample that utilises both accounting and economic data. 204 banks were investigated in the Middle East and North Africa (MENA) region, as well as South-Eastern Asian (SEA) countries during 2005-2012. Results revealed that IB recorded the highest average Liquidity Risk (LR) exposure compared to CB. There are significant differences between IB and CB banks in terms of LR factors. It is found that 92% of LR exposures are instigated by financial crises, banks' gearing, gross domestic product (GDP), off-balance sheet items, total securities held by the banks, non-earning assets divided by total assets for banks and liquid assets in CB.

Keywords: Liquidity Risk, Islamic Banks, Risk management
JEL Classification: G32

1. INTRODUCTION

Liquidity risk (LR) is one of the most significant types of risks facing the banking sector since the financial crisis in the Asian banking sector in the late 1990's and the global credit crunch of 2007 (Bonfim and Kim, 2012). Some financial crises occur when banks fail to cover the demand for money (i.e. liquidity). According to Diamond (2007), the problem arises when all liquid assets evaporate within a short period of time due to increased deposit withdrawals. Subsequently, banks are forced to sell particular assets in order to cover their commitments and avoid bankruptcy (Savoiu, 2009).

Liquidity in the banking sector is one of the economic tools of the financial market and is associated with solvency. The banking system transforms liquid liabilities (deposits) into liquid claims (loans), acting as a "money multiplier". This basic transaction leaves banks exposed to funding and market LR (Bonfim & Kim, 2012). LR refers to inability of banks to cover their expected and unexpected current and future cash flow needs and collateral requirements. Market LR refers to inability of banks to easily

eliminate or offset a financial transaction at the market price due to insufficient market depth (Greuning and Iqbal, 2008).

During the global financial crisis of 2007 (hereafter referred to as the financial crisis), conventional banks in Europe and US were restricted to keep sufficient levels of liquidity. Central Banks introduced a high level of liquidity support to the banking sector in order to maintain financial transactions. Yet, several banks failed even with this inclusive support (Reuters, 2009). These events showed that securing financial resources could easily evaporate in terms of capital adequacy and asset valuation. Liquidity management was not given priority similar to other risk areas (Jarboe and Furrow, 2008). According to Racickas and Vasiliauskaite (2010), the financial crisis revealed inaccuracies in controlling LR exposures and unsuccessful LRE practices. Smolo and Mirakhor (2010), Ellaboudy (2010) and Savoiu (2009) argued that the majority of financial crises were caused by problems in managing liquidity and/or controlling LR exposures.

Maintaining sufficient and high-quality liquid assets (HQLA) to cover liquidity needs is irrelevant in the Islamic Banking System

(IBS) because the profit and loss sharing (PLS) transactions contribute to the reduction of the impact of overall risks faced by banks. The IBS is based on the prohibition of interest transactions and the application of PLS transactions between the bank and the investor with strict conformance to Islamic Sharia (Gait and Worthington, 2008; Venardos, 2005; Greuning and Iqbal, 2008). The implementation of PLS transactions should theoretically make IB less exposed to financial risks, yet, it is more or less difficult to translate this concept into the real world due to the information asymmetry and market imperfections (Karim et al., 2013). Mohamad et al. (2013); Kumaran (2012) and Alman and Oehler (2012) argued that IB lack flexibility of their non-Islamic counterparts when seeking short-term finance. They are prohibited under Sharia principles from utilising the money market instruments employed by CB. This makes them more vulnerable to LR, magnifying the importance of effective LRE.

Previous studies focused on particular countries and areas when examining the relationship between LR and other banking risks, and when evaluating the impact of accounting and market data on LR (e.g. Shen et al., 2009; Alman and Oehler, 2012; Amba and Almukharreq, 2013). Few studies have investigated the factors affecting LRE using a cross-country sample that uses both accounting and economic data (Alman and Oehler, 2012). This study investigates the ways by which resilience within Islamic and CB against LR can be improved. Very few studies have investigated LRE in IB, Conventional Bank with Islamic Window (CBIW) and CB using empirical cross-country sampling of accounting and economic data.

2. LITERATURE REVIEW

2.1. Liquidity Risk Exposure

Liquidity is considered as an essential element to pay for expected or unexpected balance sheet fluctuations and provide funds for growth (Iqbal and Mirakhor, 2007). Liquidity demonstrates banks' ability to cover the redemption of its liabilities and deposits and also reflects their ability to pay the demand for refinancing in their investment portfolios and loans. A bank has adequate levels of liquidity when it becomes able to raise the required funds by selling assets at a reasonable price or increase securitisation and liabilities. LR occurs when the bank becomes unable to balance the maturity of liabilities and assets.

The Basel Committee on Banking Supervision (BCBS) (2008) defined LR as: "the variability in the capability of the banking system to fund increases in assets and cover commitments as they become due". Another version of the definition is that "a financial risk that for a certain period of time a given financial asset, security or commodity cannot be traded quickly enough in the market without impacting its market price" (Basel Accord III, 2013). Basel Accord III (hereafter referred to as Accord III) is a global, voluntary regulatory framework on commercial banking capital adequacy, stress testing, and market LR. It was agreed upon by the members of BCBS and developed in response to the deficiencies in the financial regulations revealed by the financial crisis. Accord III introduced two ratios that are expected to improve the commercial banking system LRE; Liquidity Coverage Ratio and Leverage Ratio.

Liquidity Coverage Ratio (LCR); which aims at improving short-term resilience of the commercial banking systems (CBS) LR profile. It does this by ensuring that banks have adequate stock of HQLA that can be converted easily and immediately.

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

Leverage Ratio; a non-risk based ratio that acts as a credible supplementary measure to the risk-based capital requirements. The objective of the Leverage Ratio is to restrict the build-up of leverage in CBS in order to avoid the destabilizing processes that can damage the broader financial system and the economy.

$$\frac{\text{Capital measure}}{\text{Exposure measure}} \geq 100$$

The capital measure for the leverage ratio is the Tier 1 capital of the risk-based capital framework, and the exposure measure is the on-balance sheet, non-derivative exposures. These two ratios are intended to strengthen the banking capital requirements by increasing banks' liquidity and decreasing leverage. All CB are expected, in a phased approach, to fully implement these ratios by March 2019 (Basel Accord III, 2013).

On the other hand, Islamic laws forbid interest, yet, gain on capital is permissible. The philosophy of the IBS was founded on incorporating two major principles: The prohibition of interest transactions, known as 'Riba' and the application of PLS transactions between the bank and the investor with strict conformance to Islamic Sharia laws (Gait and Worthington, 2008). The reason behind the prohibition of interest is to avoid exploitation. The charging of interest makes the lender profit at the expense of the borrower. If the borrower generates a low profit or is exposed to losses and the lender demands a high fixed return, then it becomes prejudicial to the borrower and vice versa (Millar and Anwar, 2008). In IB, money is supposed to be used in productive projects and investments in order to generate profit and capital (Khan and Ahmed, 2001).

CB and other financial institutions protect themselves from specific types of risks by providing investors with loans guaranteed by collateral (Mukuddem-Petersen et al., 2008). In contrast, IB allow depositors to share profits, investment decision and the risk related to choosing the right investment. Therefore, risk sharing is balanced by sharing of decision-making. This transaction allows people to be associated with the trading process rather than to be spectators, as is the case with CB (Cocheo, 2007). IB are profitable institutions similar to CB and they do not differ in terms of their objectives, constitutive arrangements, legal type and means of accomplishing those objectives. Differences appear mainly in the philosophy and the mechanism of running operations (Ali, 2010; Monzer, 2004).

IB are prohibited under Sharia principles from utilising the money market instruments employed by CB. Ariffin (2012) argues that this situation makes them more susceptible to LR and intensifies

LRE. Islamic laws require IB to share risk with their investors allowing them to own physical goods. Therefore, managing and controlling LR in IB is different from that in CB (Ali, 2010). Several international financial instruments are not available to IB due to being interest-bearing transactions. Yet, Mohamad et al. (2013) argued that in evaluating and monitoring LR, IB can adopt different policies and strategies to manage their LR due to the effect of Islamic Sharia law on the nature of assets and liabilities.

2.2. Factors Influencing LRE

Several methods have been employed to examine LRE, such as panel data regression, financial ratio analysis and qualitative analysis. However, the findings are still inconclusive. Berrios (2013), Ahmad et al. (2011) and Shen et al. (2009) concluded that several macro and micro economic factors affect LRM in both IB and CB. Some empirical studies have highlighted that IB lack the flexibility of their non-Islamic counterparts when seeking short-term finance due to the restrictions of Islamic laws (Alman and Oehler, 2012; Rajhi and Hassairi, 2012; Akhtar et al., 2011; Ismal, 2010). Mohamad et al. (2013) and Ariffin (2012) suggested that the ideal methods of liquidity management are not available to IB due to the prohibition of interest transactions. Hidayat et al. (2012) and Mounira (2008) advised that IB should adopt internal control systems over LRM process in order to avoid liquidity problems at the present and in the future.

Mohamad et al. (2013), Alman and Oehler (2012) and Greuning and Iqbal (2008) argued that IB face restrictions in refinancing due to the prohibition against engaging in financial contracts on the basis of interest. IB generally hold lower levels of liquidity and equity finance compared to conventional counterparts for the following reasons: 1) lack of active interbank market; 2) absence of a lender of last resort; and 3) the concentration on asset-backed short-to- medium term investments in their lending portfolios. Mohamad et al. (2013), Ariffin (2012), Greuning and Iqbal (2008), Al-Hallaq (2005) and Iqbal (2001) explained that the lack of a well-developed Islamic interbank market and the problem of lender of last resort make IB more susceptible to LR which allows CB outperform IB in terms of liquidity management.

Yaacob et al. (2016) investigated the determinants of liquidity risk using two new indicators proposed by Basel Committee. The study covered the period between 2000 until 2013 and focused on Islamic banks operating in Malaysia. The findings revealed that CAR and financing are likely to have an impact on liquidity risk management on the short run. Macroeconomic factors especially the gross domestic product and inflation show significant relationship with liquidity measurement on the short and long runs. Furthermore, a study by Jedidia and Hamza (2015) also investigated the determinant of Islamic banking liquidity using a panel of 60 Islamic banks over a long period; between 2004 and 2012. The results revealed that "Profit and Loss Sharing" investment, which is specific to Islamic mechanisms of "Musharaka" and "Mudaraba" leads to a less exposition to liquidity risk as it is based on sharing principle between IB and investors. Another study was conducted by Mazur and Szajt (2015) studied the determinants of liquidity risk characteristic for banks

operating in countries of the so-called old EU including; Austria, Belgium, Germany, Denmark, Spain, Finland, France, the UK, Greece, Ireland, Italy and Portugal, are slightly different from those operating in the so-called new EU including; Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovenia and Slovakia. However, there exists a set of internal determinants that affect the level of liquidity risk regardless the form of liquidity risk measures and country of operation.

Furthermore, in a similar empirical study by Moussa (2015) studied a group of 18 banks in Tunisia over the period (2000-2010) and found that financial performance, capital, loans / total assets, operating expenses / total assets, growth rate of GDP and inflation rate have a significant impact on bank liquidity, however some other factors including; size, total deposits/total assets and financial expenses / total loans do not have significant impact on bank liquidity. On the other hand, Cucinelli (2013) investigated the determinants of liquidity risk and the variables that impact on the two new indicators proposed by Basel Committee (i.e. Liquidity Coverage Ratio and Net Stable Funding Ratio). Results highlighted that size, capitalization, assets quality and specialization can have an impact on liquidity risk management. In addition, capitalized banks show a better liquidity on the long run, while banks with a better assets quality are more likely to manage liquidity on the short run.

According to a study by Almumani (2013) employed panel regression on 25 Islamic and commercial banks over the period 2007-2011. The findings showed that debt to equity, capital adequacy and return on assets had positive relationships with liquidity risk, whereas bank size, investment to asset ratio, loan to deposit ratio and return on equity had a negative relationships with liquidity risk in both IB and CB. The author argued that excess liquidity in Islamic and non-Islamic commercial banks had a negative influence on profitability. On the other hand, How et al. (2005) showed that off-balance sheet items, bank size and bank capital were significantly related to LR in IB and CB in Malaysia. Bank size increases the investment diversification for banks whereas capital covers financial obligations and is likely to mitigate risk. On the other hand, loan outstanding and off-balance sheet items increase LR due to the risk of these items on financial stability.

3. METHODOLOGY

This research investigates LRE using empirical cross-country sampling of IB and CB. Financial data from the countries that offer Islamic and non-Islamic commercial banking services is used.

The sample comprises countries with IB in the MENA and SEA regions, with at least seven consecutive yearly observations covering the global financial crisis of 2007and excluding IB in the European zone and US.

Following a similar methodology of Karim et al. (2013) and Alman and Oehler (2012), all the banks operating in 19 countries that offer Islamic banking services were considered. In order to compare LRE in both IB and CB, the selection of the sample of

CB and CCIW was made from the same countries of operation. In order to observe the impact of the financial crisis, sampling was restricted to only those banks which have available financial statements before 2007.

The researchers analysed the impact of various independent variables (factors) on the dependent variable (liquidity risk). The researchers applied (R2), T-test, and F-testing methods, in order to test the validity of the panel least square results. (R2) were applied to measure goodness of fit for the model, t-test to examine the significance level for each individual factor and F-tests were used to examine the significance level to the overall model (Wooldridge, 2012).

The dependent variable LRi,j,t measures liquidity risk for bank i in country j at time t. The researcher employs the financing gap to total assets ratio to proxy liquidity risk, which is defined as the difference between loans and customer deposits divided by total assets (Shen et al., 2009).

The population of IB, CB and CCIW covers the period 2005-2012 and includes 204 Islamic and non-Islamic commercial banks (total assets, $2.614 trillion) from three types, namely: 64 IB (total assets of $0.610 trillion), 140 CB (total assets of $2.004 trillion) and 42 out of the 140 CB are CBIW with total assets in 2012 of $0.842 (42% of total non-Islamic commercial assets banks), while 98 banks were purely CB with total assets of $1.162 (58% non-Islamic commercial assets banks).

Table 1 based on a panel data regression, the following hypotheses were proposed to improve resilience of IB and CB to LR:

H0: There are insignificant differences in the level of LR exposure between IB and CB.

H1: There are significant differences in the level of LR exposure between IB and CB.

The first hypothesis is related to the average LR exposure. It assumes that IB tend to be more liquid because they are unable to lay off their liquidity into interest-bearing, overnight and short-term deposits in the interbank market; therefore, they find themselves having to invest surplus funds in risky, profit sharing arrangement with other Islamic financial institutions. From a different point of view, IB generally hold lower levels of liquidity than their conventional counterparts as they have a limited number of liquidity management instruments compared to CB. The financing gap ratio is used as a proxy to measure LR exposure in both types of banks. This measurement is widely used in the empirical banking literature, which is defined as the difference between loans and customer deposits divided by total assets.

H0: Internal economic factors had no significant effect on liquidity management.

H2: Internal economic factors had significant effect on liquidity management.

The second hypothesis is related to the impact the bank's strategy for managing liquidity. Managing bank liquidity includes the implementation of strategies to ensure the effectiveness of the liquidity management process and finding early warning indicators for LR. However, if banks are not selective in their liquidity management strategy, they may become unable to assess the liquidity position and to suggest revisions or improvements of the process of managing liquidity to the decision makers. The assumption is that the internal control system in commercial banks contributes strongly to maintaining sound liquidity and LRE process. However, four different factors are used to measure the impact of the internal economic factors on LMR, namely;
I. The debt ratio is used as a proxy to measure commercial bank gearing, which is defined as total liabilities divided by total assets.
II. The logarithm of the off-balance sheet items held by banks is used as a proxy to investigate the impact of off-balance sheet items on LRE.

Table 1: Number of banks by region and country

Region	Country	Islamic	Windows	Conventional	Total	Assets 2012
Africa	Egypt	2	0	3	5	$24,222
	Sudan	3	0	2	5	$3,715
Middle East	Saudi Arabia	4	6	0	10	$385,726
	Bahrain	15	3	3	21	$91,696
	Kuwait	2	0	6	8	$186,823
	United Arab Emirates	4	1	12	17	$370,926
	Qatar	3	0	2	5	$82,026
	Yemen	2	0	3	5	$2,873
	Jordan	1	0	9	10	$58,171
	Syrian Arab Republic	1	1	2	4	$1,679
	Palestinian Territories	1	0	0	1	
	Iraq	1	0	2	3	$1,326
Asia	Bangladesh	5	5	15	25	$47,952
	Indonesia	2	8	19	29	$335,374
	Islamic Republic Of Iran	9	0	0	9	$216,685
	Malaysia	5	9	4	18	$606,823
	Pakistan	2	9	12	23	$88,848
	Thailand	1	0	2	3	$61,547
	Turkey	1	0	2	3	$48,110
	Total	64	42	98	204	$2,614,519

III. The logarithm of the total securities held by banks is used as a proxy to measure the total securities of commercial banks.

IV. Non-earning assets divided by total assets is used as a proxy to measure the influence on commercial banks.

H0: The external economic factors had no significant effect on liquidity management.

H3: The external economic factors had a significant effect on liquidity management.

The external economic factors that were considered in this research were the financial crisis of 2007 and the GDP. However, the assumption is that macroeconomic factors contribute to improve the resilience of CB to LR. The logarithm of the GDP rate is employed as a proxy to macroeconomic factors in order to investigate the impact of macroeconomic factors on LRE. In addition, the financial crisis is measured as a dummy variable which is equal to 1 for the financial crisis period (2008-2009), and 0 otherwise.

In order to improve resilience within IB and CB, the proposed model will be based on internal and external factors that have significant impact on LRM. This facilitates the investigation of the influence on CB specifications and the impact of macroeconomic variables on LRE. The estimation of panel regression has been developed as per Table 2.

Since variable intervals $LR_{i,j,t}$ considered to be as dependent variable, which measures LR for bank i in country j at time t, this research employs the fixed- and-random effect method to investigate the panel data. This method is more suitable when the sample of study includes cross sectional units with time series for each unit. In the same context, some of the empirical data for the banks are incomplete or missing, which is a common issue in panel data. Therefore, there are several advantages of a panel method such as: A panel methodology is more informative; and it has the ability to control individual heterogeneity, in particular when this kind of data involves time-invariant variables or countries.

The variables developed in this research are derived from previous models used to study IB, CB and CBIW and are based on the internal and external factors that have significant influence on LRM. For instance, Mohamad et al. (2013); Alman and Oehler (2012); How et. al. (2005) and Shen et al. (2009) adopted similar models to investigate the same issues. This section demonstrates the dependent and independent variables which have been used in the panel regression analysis.

i. Liquidity risk ($LR_{i,j,t}$) is measured by the difference between loans and customer deposits divided by total assets.

$$\frac{Loans - Customers\ deposits}{Total\ assets}$$

ii. The recent financial crisis (FC): Macroeconomic control variables play an important role in managing liquidity in the commercial banks. IB, CB and CBIW are vulnerable to financial shocks, which influence their ability to cover the demand for money. Therefore, the financial crisis is measured as a dummy variable equal 1 for the financial crisis period (2008-2009) and 0 otherwise.

iii. Bank gearing (GR) is measured as the total liabilities divided by the total assets. This factor indicates the bank financial leverage and demonstrates the degree to which its financial operations are financed by debt.

iv. Gross domestic product (GDP): This factor is taken into account as a measurement of the impact of macro-economic variables on liquidity management. In the context of this research, the GDP is considered to be as an indicator for the demand of commercial banking services such as: Money supply and loan extensions

v. Off-balance sheet items (OFFBS): Is the summation of debts or assets that are on a commercial bank's balance sheet. This variable was incorporated to detect the extent to which these items can influence the liquidity management in both types of banks.

vi. Total securitisation (TS) is the logarithm of the total securities held by bank i in country j at time t.

vii. Non-earning assets to total assets (NONERA) is the non-earning assets divided by total assets for bank i in country j at time t.

viii. Bank liquid assets (LIQAS) are the liquid assets divided by total assets for bank i in country j at time t.

4. FINDINGS

4.1. Univariate Analysis
4.1.1. Descriptive results of liquidity risk exposure in terms of sample distribution
Table 3 reports the mean value of LR for IB and CB in each country. The financing gap ratio ($LR_{i,j,t}$) is employed to measure LR for bank

Table 2: Estimation of panel development

$LR_{i,j,t} = B_0 + B_1FC + B_2GR_{i,j,t} + B_3GDP_{j,t} + B_4OFFBS_{i,j,t} + B_5TS_{i,j,t} + B_6NONERA_{i,j,t} + B_7LIQAS_{i,j,t} + \varepsilon$	
Variables	**Definition**
β_0	Intercept coefficient
$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$	Coefficient of the independent variables
β_3	Coefficient of the control variables
	The global financial crisis
GR	Total liabilities over total assets for bank i in country j at time t
GDP	Gross Demotic Products controlling variable for country j at time t
OFFBS	Is the logarithm of the total off-balance sheet items for bank i in country j at time t
TS	Is the logarithm of the total securities held by bank i in country j at time t.
NONERA	Non-earning assets over total assets for bank i in country j at time t.
LIQAS	Total liquid assets divided by total assets for bank i in country j at time t.
	Error term that is not serially correlated and uncorrelated with all variables

Table 3: Liquidity risk exposure in terms of sample distribution

Country	Islamic and windows			Conventional banks			Whole sample		
	Mean (%)	t	Significant	Mean (%)	t	Significant	Mean (%)	T	Signficant
Bahrain	12.8	4.48	0.000	−9.1	−2.77	0.011	9.5	3.71	0.000
Bangladesh	−8.9	−6.54	0.000	−11.7	−15.28	0.000	−10.6	−14.84	0.000
Egypt	−39.6	−6.11	0.000	−1.1	−0.09	0.931	−16.5	−1.99	0.054
Indonesia	−9.1	−3.96	0.000	−23.0	−19.41	0.000	−18.2	−15.34	0.000
Iraq	−49.7	−6.66	0.000	−53.8	−8.93	0.000	−52.5	−11.26	0.000
Islamic Republic of Iran	7.8	2.63	0.010				7.8	2.63	0.010
Jordan	21.8	1.79	0.111	−15.0	−10.22	0.000	−11.3	−5.23	0.000
Kuwait	0.011	0.01	0.994	2.2	1.96	0.057	1.6	1.78	0.080
Malaysia	−2.3	−0.62	0.537	−19.8	−10.77	0.000	−6.4	−2.17	0.032
Pakistan	−22.1	−15.06	0.000	−9.1	−3.03	0.003	−15.3	−8.62	0.000
Palestinian Territories	6.3	1.30	0.236				6.3	1.30	0.236
Qatar	−3.6	−1.13	0.270	−0.4	−0.21	0.836	−2.2	−1.13	0.264
Saudi Arabia	−7.4	−2.63	0.010				−7.4	−2.63	0.010
Sudan	10.4	1.74	0.097	0.0	0.00	0.999	5.9	1.03	0.312
Syrian Arab Republic	−50.4	−6.98	0.000	−26.9	−6.56	0.000	−38.2	−8.30	0.000
Thailand	−12.0	−2.27	0.053	2.6	1.20	0.248	−2.3	−0.86	0.401
Turkey	4.0	1.96	0.098	0.3	0.23	0.818	1.3	1.09	0.289
United Arab Emirates	−2.8	−1.16	0.255	−1.8	−1.07	0.289	−2.1	−1.52	0.131
Yemen	−39.8	−6.14	0.000	−68.2	−26.85	0.000	−56.9	−15.36	0.000

"i" in country "j" at time "t". The researches employed the financing gap to total assets ratio to proxy LR defined as the difference between loans and customer deposits divided by total assets.

This ratio investigates the liquidity surplus/deficit after the payment of loans from deposits. A higher ratio indicates higher LR, whereas if the liquidity ratio is positive, this indicates that the bank does not have enough cash to pay depositors because the amount of loans is higher than the amount of deposits. In contrast, a negative ratio indicates that a bank has liquidity surplus because the amount of deposits is higher than the amount of loans.

It is noted from Table 3 that IB and CBIW recorded the highest average of LR exposure in the sample distribution with a mean of total sample (−9.72%), whilst CB's recorded (−13.63%). This suggests that the current method of managing liquidity in IB is subject to several restrictions compared to CB.

It appears from country background that most IB and CBIW recorded higher LR exposure compared to CB in the SEA countries (Malaysia, Indonesia and Bangladesh), wherein the average LR ratio was (−2.3%) (−9.1%) and (−8.9%) respectively. This indicates that IB's lack the flexibility of having liquid asset holdings to cover their requirements compared to CB's in the SEA countries. In addition, regarding GCC and Middle East countries, IB's and CBIW's revealed higher LR ratio compared to CB's, as well. IB's and CBIW's recorded the highest average of LR exposure in the Kingdom of Jordan with a mean of 21.8%. Importantly, since Bahrain is considered as the hub of Islamic finance, IB's in Bahrain recorded the highest LR exposure in the GCC Countries with an average of (12.8%). This indicates that the financial instruments used for managing liquidity in these countries are not efficient enough. This is because the major difference between IB and CB is that CB are more efficient in controlling their level of debt through funding their liquidity from external financial sources from the secondary market, which gives CB

alternative resources to cover their liquidity needs. These results are consistent with Alman and Oehler (2012) findings that liquidity transformation is affected negatively by the regulation of IB.

4.1.2. Impact of the financial crisis on liquidity management in Islamic and non-Islamic commercial banks

Table 4 shows that the financial crisis increased LR in CB and CBIW. In contrast, it decreased LR in IB. This is because the less developed nature of Islamic financial instruments reduced the correlation between the financial markets and IB, which in turn reduced the average of LR in IB. This result is consistent with Beck et al. (2010) and Hidayat and Abduh (2012) findings that the financial crisis affected CB more than IB.

CB are often involved in risky financial instruments such as credit default swaps, options, forwards, futures contracts and CFD's. These financial instruments have negatively influenced their financial performance and the ability of CB to access the liquidity market during the financial crisis (Basel committee on banking supervision, 2008). On the other hand, IB do not involve in such financial instruments, as a result of which the financial crisis has not affected IB's to the same extent as CB in terms of liquidity.

A correlation analysis measures and examines the type of relationship between Y and X; therefore, the above table examines the correlation between liquidity risk and the main internal and external factors that have a direct impact on the liquidity risk management of IB, Islamic windows and conventional banks. The results of the correlation matrix reveal that:

1. Islamic commercial banks have higher liquidity risk compared to non-Islamic commercial banks.
2. National GDP has a significant positive impact on liquidity risk.
3. Total securities have an inverse impact on liquidity risk management. Primarily, increasing total securities leads to a decline in liquidity risk.

Table 4: Impact of the financial crisis on liquidity management in Islamic and Conventional Banks

Variable	Liquidity risk ratio and financial crisis		Significant
	Mean (%)	T	
IB's			
Pre	−2.506	−1.131	0.260
Post	−2.636	−1.485	0.139
Total	−2.590	−1.866	0.063
CBIW's			
Pre	−9.258	−3.890	0.000
Post	−7.827	−4.080	0.000
Total	−8.365	−5.604	0.000
CCB's			
Pre	−14.968	−10.810	0.000
Post	−12.847	−11.534	0.000
Total	−13.627	−15.677	0.000
Total			
Pre	−10.053	−9.193	0.000
Post	−8.654	−9.877	0.000
Total	−9.165	−13.387	0.000

Variable	Liquidity ratio	Crisis	Islamic banks	Gearing	Log GDP	Log off balance	Log total security	NERNTA	Log total asset
Liquidity ratio									
Pearson correlation	1	0.033	0.171**	−0.377**	0.208**	−0.004	−0.165**	−0.266**	−0.406**
Sig. (2-tailed)		0.19	0	0	0	0.896	0	0	0
N	1583	1583	1583	1583	1312	1385	1534	1583	1583
Crisis									
Pearson correlation	0.033	1	0.004	0.004	0.021	0.105**	0.127**	0.060*	−0.163**
Sig. (2-tailed)	0.19		0.865	0.87	0.441	0	0	0.018	0
N	1583	1583	1583	1583	1312	1385	1534	1583	1583
Islamic banks									
Pearson correlation	0.171**	0.004	1	−0.217**	0.121**	−0.032	−0.003	0.028	−0.02
Sig. (2-tailed)	0	0.865		0	0	0.236	0.915	0.258	0.425
N	1583	1583	1583	1583	1312	1385	1534	1583	1583
Gearing									
Pearson correlation	−0.377**	0.004	−0.217**	1	−0.307**	0.277**	0.236**	−0.034	−0.203**
Sig. (2-tailed)	0	0.87	0		0	0	0	0.171	0
N	1583	1583	1583	1583	1312	1385	1534	1583	1583
Log GDP									
Pearson correlation	0.208**	0.021	0.121**	−0.307**	1	0.405**	0.353**	−0.179**	−0.016
Sig. (2-tailed)	0	0.441	0	0		0	0	0	0.569
N	1312	1312	1312	1312	1312	1154	1270	1312	1312
Log off balance									
Pearson correlation	−0.004	0.105**	−0.032	0.277**	0.405**	1	0.704**	−0.042	−0.193**
Sig. (2-tailed)	0.896	0	0.236	0	0		0	0.12	0
N	1385	1385	1385	1385	1154	1385	1356	1385	1385
Log total security									
Pearson correlation	−0.165**	0.127**	−0.003	0.236**	0.353**	0.704**	1	−0.113**	−0.201**
Sig. (2-tailed)	0	0	0.915	0	0	0		0	0
N	1534	1534	1534	1534	1270	1356	1534	1534	1534
NERNTA									
Pearson correlation	−0.266**	0.060*	0.028	−0.034	−0.179**	−0.042	−0.113**	1	0.333**
Sig. (2-tailed)	0	0.018	0.258	0.171	0	0.12	0		0
N	1583	1583	1583	1583	1312	1385	1534	1583	1583
Log total asset									
Pearson correlation	−0.406**	−0.163**	−0.02	−0.203**	−0.016	−0.193**	−0.201**	0.333**	1
Sig. (2-tailed)	0	0	0.425	0	0.569	0	0	0	
N	1583	1583	1583	1583	1312	1385	1534	1583	1583

GDP: Gross domestic product

4. Off-balance sheet items have an insignificantly inverse impact on banks' liquidity risk.
5. Gearing ratios have a negative impact on the banks' liquidity risk; in other words, an increase in gearing leads to a decline in liquidity risk.
6. Total assets have an inverse impact on liquidity risk management. Primarily, increasing the size of a bank will lead to a decline in liquidity risk.
7. The financial crisis has had an insignificant positive impact on liquidity risk management.

8. The ratio of non-earnings assets to total assets has a significant positive impact on liquidity risk.

Importantly, these factors will be explained in depth in the panel analysis. The next part will employ several models, including pooled regression, fixed effect regression and random effect regression, in order to analyse the impact of internal and external factors on liquidity risk management and examine the significance level of these factors.

4.2. Panel Regression Estimation

Further to the results of the Univariate analysis, this section performs panel regression analysis, in order to suggest ways through which the resilience of IB and CB to LR might be improved. Therefore, this study ran regressions for these three groups separately, which consist of IB, CBIW, and CB. In addition, the robustness models had been checked and passed some tests, such as: Hetroskadisitsty, Multicolinearity, Normal Distribution and Autocorrelation.

To check robustness, dummy variables for each year and country were used in the regression analysis, in order to control the year and country effects, and there are very consistent findings in terms of the same sign and similar magnitudes of the coefficient being found.

In fact, previous empirical studies have mainly focused on a particular country, in order to examine LRE in the banking sector (e.g. Ariffin 2012; Mohamad et al., 2013). This is mainly due to the fact that country specific factors are considered moderating factors, which can be examined by using factor analysis, to examine a set of variables. In other words, country specific factors may influence the strength and the direction of the relation between LR and the bank specific factors. However, the findings of panel regression contributes to propose some mechanisms to improve resilience against liquidity risk

Unlike prior studies, this research controls the country specific factors and analyses the impact of the internal and external factors on IB and CB liquidity. After controlling the macroeconomic condition in terms of GDP, year and country effect, it is possible to generalise the results of the internal and external factors for the 19 different countries. Therefore, the findings of cross-country approach suggests that it is important for decision makers to concentrate on the banks specific factors, in order to propose ways to improve IB and CB resilience to LR.

The dependent variable is the LR ratio - measured by the difference between bank loans and customer deposits - divided by total assets. The method employed in the model is unbalanced Panel Least Squares, which covers the sample during the period 2005-2012, that included 64 IB, 42 CBIW and 98 CB. Table 5 presents the results of the external and internal factors that affect LRM in IB, CBIW and CB using three regression models: Pooled, random and fixed.

The Hausman test has been employed for the Exogeneity of the Unobserved Error Component to decide between fixed or random effects, whereas the null hypothesis is that the preferred model is random effects versus the alternative, fixed effects (Green,2008). It basically tests whether the unique errors (ui) are correlated with the regressors; the null hypothesis is that they are not. If the null hypothesis is rejected, then it is possible to conclude that a random effect is inconsistent and the fixed effects model is preferred. If the null hypothesis cannot be rejected, random effect is preferred because it is a more efficient estimator. However, as the Hausman test shows an insignificant result for the IB, then the null hypothesis cannot be rejected and it is concluded that the random effect is preferred for IB. In contrast, Hausman test presents significant results at a 5% level, then the null cannot be rejected and it can be concluded that fixed effects is preferred for CBIW and CB.

5. DISCUSSION AND POLICY IMPLICATIONS

The external and economic factors that were employed in this research were the GDP and the financial crisis of 2007. The GDP rate is employed as an indicator to the country's economic situation in order to determine the impact of the economic situation on LR exposure in IB, CBIW and CB. The results of the regression table indicate that the GDP rate has an insignificant negative impact on the banks' LR. This indicates that a stronger economy will have a direct impact on the financial market, which could lead to a decrease in the level of LR banks carry. Economic improvement helps banks to obtain additional funds from the market, using which they can cover their liquidity needs through debt management. This may be achieved by increasing debt or short-term deposits, by increasing their debt maturity and ultimately by increasing their capital.

Therefore, an effective economy helps the banks to cover their liquidity needs by debt. Consequently, banks have a larger variety of options from which they can select the most inexpensive method of raising funds from the monetary market as a source for discretionary purchasing of funds in the short term, based on the interest rate competition process that can help meet liquidity needs. Although the acquisition of funds on the market at a competitive cost allows profitable banks to satisfy increasing demand of customers for loans, an unsuitable implementation of debt management can have dangerous consequences, which may materialise in risks associated with the liquidity management based on market financing; for example:
- The funds may not always be available when needed;
- If the market losses confidence in a bank, its liquidity will be threatened;
- The concern of the banks to obtain funds at the lowest possible cost combined with insufficient attention toward maturity distribution may increase the exposure of the bank to the risk of fluctuations in interest rates.

With regard to the fact that a financial crisis occurs when banks are exposed to problems in covering the demand for money, Table 5 presents that the financial crisis had a significant negative impact on LR in IB. This is due to the insufficient development of Islamic financial instruments that has reduced the contribution of financial

Table 5: Panel regression estimation

Variable	IB			CBIW			CCB		
	Pooled	Random	Fixed	Pooled	Random	Fixed	Pooled	Random	Fixed
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
C	0.671***	0.732***	1.819**	1.077***	0.872***	1.621***	0.17	0.552***	0.74***
Financial crisis	−0.062***	−0.038***	−0.045***	−0.021	0.015	0.019*	0.001	0.023***	0.035***
Gearing	−0.658***	−0.725***	−0.742***	−1.373***	−1.187***	−1.227***	−0.268***	−0.742***	−0.83***
Log GDP	0.017	−0.039	−0.373*	0.199***	0.149***	−0.072	0.025**	0.034**	0.018
Log off-balance sheet	0.056***	0.081***	0.109***	−0.06**	0.004	0.031	0.117***	0.061***	0.024*
Log total securities	−0.072***	−0.045***	−0.033*	−0.116***	−0.126***	−0.14***	−0.13***	−0.107***	−0.105***
Non-earnings AS/TA	−0.178*	−0.173**	−0.08	0.584**	−0.09	−0.13	−0.303***	−0.199***	−0.112*
Liquid AS/TA	−1.05***	−0.828***	−0.827***	−1.17***	−0.697***	−0.659***	−0.845***	−0.519***	−0.428***
R^2	0.512	0.419	0.88	0.459	0.481	0.953	0.603	0.431	0.918
Adjusted R^2	0.5	0.405	0.847	0.442	0.465	0.94	0.599	0.425	0.901
F-statistic	43.316	29.803	26.602	27.17	29.642	78.606	128.384	64.029	53.843
Prob (F-statistic)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Correlated random effects - hausman test									
Chi-square statistic		8.208			16.786			84.137	
P		0.315			0.019			0.000	

markets to IB's, which in turn reduced the average LR of IB during the financial crisis. In contrast, the financial crisis had a significant positive impact on LRE at a 5% level for CB and CBIW. This is due to the fact that CB and CBIW are involved in risky financial instruments as discussed earlier.

To understand the available improvements to the resilience of concerned banks to LRE, policy makers should consider the importance of an efficient internal control system when designing policy for improving resilience to LR. This will help such banks to measure their LR levels efficiently and introduce varied financial resources. For instance, efficient management of a bank's gearing leads to a decline in LR. Some banks, particularly larger domestic and multinational institutions, turn to the financial markets for long term funding. Financial markets provide funding to banks in a variety of ways, including asset purchases, repurchase agreements, and equity and debt issuances.

These sources provide a broader and more diversified funding base to larger banks. Often these market-based funding programmes, when conducted on a broad scale, can allow banks to access funds at costs below those associated with more traditional retail deposit gathering. Thus, external financial sources could be used to fund liquidity from the financial market and control LR. In contrast, IB's are required to design financial instruments acceptable to the requirements of Sharia law. Therefore, in order to enable such institutions to better handle liquidity, policy makers should consider this option. The availability of external financial sources would increase the effectiveness of the available liquid assets. Consequently, this will increase the banks' ability to enhance the management of LR and better control liquidity.

Moreover, short-term financial liquidity instruments improve the resilience to LR, since the availability of short-term liquidity instruments will increase the effectiveness of the available liquid asset. This will contribute to increasing the ability of IB and CB to gather funds at reasonable cost and in sufficient time, which will increase the banks' ability to manage and reduce their LR.

Therefore, IB need to establish effective short-term financial liquidity instruments, in order to improve their resilience to LR, such as short-term money market securities, whereby, increasing the total securities will lead to a decline in LR. In the same regard, sufficient ratio of non-earning assets and liquid assets to total assets reduces LR. Therefore, increasing the liquid assets held by banks increases their ability to gather funds at reasonable cost and in sufficient time, which increases the banks' ability to manage their liquidity and reduces LR.

Islamic banks should develop new financial instruments compliant with the Sharia law in order to increase flexibility in raising funds and utilise money market instruments to reduce the average cost of funding liquidity risk. In addition, Islamic banks should cooperate to establish Islamic financial markets among Islamic countries in order to improve liquidity management of Islamic banks and enable them to control liquidity risk. Another implication of the study related to conventional financial instruments, such as financial derivatives and off-balance sheet transactions. Conventional banks should monitor these types of financial instruments as these tools can sometimes serve as an unexpected drain on liquidity and influence on the ability of banks to access liquidity markets during times of economic crises.

6. CONCLUSION

A resilient banking system is the foundation for sustainable economic growth since banks lie at the centre of the credit intermediation process between savers and investors. Banks provide critical services to consumers, SMEs, large corporate firms and governments who in turn rely on them to conduct their business, both at domestic and international levels.

This research demonstrated that one of the underlying features of the financial crisis was the build-up of excessive on- and off-balance sheet leverage in CBS. In order to counteract such situation, BCBS introduced two additional ratios that CB need to take into consideration for better LRE. These ratios are

intended to achieve the following objectives: Constrain leverage in the banking sector, thus helping to mitigate the risk of the destabilising processes which can damage the financial system and the economy; and Introduce additional safeguards against LR and by supplementing the risk-based measure with a simple, transparent, independent measure of risk. In addition, CB should monitor non-Islamic financial instruments - such as financial derivatives and off-balance sheet transactions. These types of financial instruments can sometimes serve as an unexpected drain on liquidity and influence the ability of such banks to access the liquidity market during times of economic crisis.

The findings of this research recommend that external financial sources could be used to fund liquidity from the financial market and control liquidity risk. It is also suggested that external funding resources helps banks to access funds at costs below those associated with more traditional retail deposit gathering , thus policy makers should consider this option, the availability of external financial sources would increase the effectiveness of the available liquid assets. Consequently, this will increase the bank's ability to enhance the management of liquidity risk and better control liquidity. This research suggests that Islamic banks have shown significant development over a short period in improving their resilience to liquidity risk. However, in order to maintain this development, there is a need to be an efficient improvement in the Islamic securities market, in order to increase the sources of liquidity. Policy makers should recognise that the lack of short term maturity (Sukuk securities) can also be an obstacle in Islamic finance as they limit their appropriateness for international money markets.

It can be concluded that this study contributes to the existing knowledge by improving our understanding of the factors that influence the ability of Islamic and conventional banks to manage their liquidity. Furthermore, the findings of this study are expected to help both Islamic and Conventional banks to examining the interaction between their management, decision making, reported performance, efficiency, risk and liquidity. Much of the existing literature did not investigate comparatively the management of such risk between Islamic and Conventional banks through the use of a cross- country sample of accounting and economic data. This study therefore contributes to the identification of the internal and external factors that affect liquidity through the measurement and analysis of liquidity risk within Islamic and Conventional banks.

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