Determinants of Liquidity Risk in Islamic Banks:
A Panel Study

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Abstract:

This paper investigates the determinants of Islamic bank liquidity using a panel of 60 Islamic banks in MENA and Southeastern Asian countries. The period of study considers the subprime crisis insofar it ranges from 2004 to 2012. The analysis illustrates that liquidity risk depends on idiosyncratic factors such as bank profitability, capital adequacy ratio and investment ratio. While the profitability bank indicator (Return on Assets : ROA) positively affects the exposure to liquidity shortage, the capital adequacy ratio (CAR) and the ratio of bank's investment have statistically significant negatively relationships with the liquidity risk measure. Nevertheless, the bank size does not matter probably because both small and large Islamic have difficulties to manage their liquidity risk. The real growth rate of Gross domestic product has negative but irrelevant association with liquidity risk.

Islamic bank should improve their Profits and Losses Sharing investment in order to reduce their liquidity risk. Moreover, it is critical to reinforce instruments of liquidity risk management.

Keywords: Islamic bank, Investment, Liquidity risk, Management, Return on Assets, Capital ratio

1-Introduction

The liquidity risk management is one of the most important challenges for Islamic banking (IFSB Stability Report, 2013). The Islamic bank liquidity position and liquidity risk « has been changing over time » (Salman, 2013)[1]. The author highlights the evolution toward acquiring more liquidity risk which requires greater efforts for Islamic bank liquidity management. This shift in the Islamic bank liquidity reinforces the importance of the study of liquidity and factors that may influence it. The particularities of Islamic bank related to distinct balance sheet structure and *Sharia*-compliant investment instruments should be taken in the liquidity risk assess (IFSB, 2012).

Islamic bank faces difficulties in managing their short-term liquidity fluctuations (Al-Muharrami and Hardy, 2013). The self insurance conduct them to the keep higher level of liquidity which can be a mandatory choice in a context of lack of availability of *Sharia*-compliant high-quality liquid assets, lack of active secondary market trading and insufficient tools available to monetary authorities for providing liquidity support to Islamic banks. Thus, the risk facing Islamic bank are « either magnified and/or difficult to mitigate » because of deficiencies and rigidities infrastructure in institutions and instruments (Habib, 2011). Furthermore, Kahf and Hamadi (2014) highlight that available liquidity management instruments for Islamic banks are not fully *Sharia* compliant due to problems of *tawarruq*, Riba and *ijārah īnah*.

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[1] Salman (2013) analyses the state of liquidity for 61 Islamic banks from 18 countries (2000 to 2009). The autor indicates that the financing to deposit ratio which was different among Asian Islamic bank and MENA Islamic bank (97.8 in MENA region against 72.8% in Asia) tends to move closer (82.3% in MENA and 80% in Asia).

Generally, Islamic bank seeks to optimise the liquidity-profitability relationship through the trade-off between liquidity and returns. The improvement of liquidity management can reduce the cost of intermediation and enhance the bank profitability. However, the liquidity excess negatively affects the profitability of Islamic banking while the lack of liquidity may causes crisis. Theorically, bank should hold sufficient liquidity in order to insure against liquidity risk (Diamond and Dybvig, 1983). In this respect, Islamic bank shoud strengthen its risk management practices (Ben Arab and Elmelki, 2008). Nevertheless, Ismal (2010) notes that the liquidity management of Islamic bank is less-than-ideal. Ramzan and Zafar (2014) recommend that Islamic banks deploy additional effots in their liquidity management.

Therefore, it is crutial to investigate the determinants of Islamic bank liquidity in order to improve the liquidity risk management especially along with the limited empirical research devoted to this topic. So, this paper aims to empirically identify factors that influence Islamic bank liquidity risk over the period 2004-2012 for a panel of 60 Islamic banks from MENA and Southeastern Asian countries. Section 2 carries out a short literature review. Section 3 specifies the model and identifies variables. Section 4 displays the results. Section 5 concludes with the main findings and policy recommendations.

2-Literature review

The bank liquidity position depends on its cash and others realizable assets, its financing structure and the amount and type of potential bank liabilities that may eventually become payable in a specified period (Gomes and Kahn, 2011)[2]. The liquidity risk can arise from the maturity mismatch related to the function of financial intermediation. On asset side, liquidity risk depends on the ability of bank to convert asset to cash quickly. On liability side, the risk arises from the unanticipated recall of deposits. So, the protection from liquidity risk requires a sound financial position, diversification of resources and restriction of asset transformations.

Islamic banks seem to hold liquidity buffers above legal or prudential requirements notably for rational precautionary. They are more liquid than conventional banks (Zaheer and Farooq, 2013). For instance, they are caracterized by a surplus of deposit funding and, in parallal, muslim countries do not offer suitable investment opportunities (Al-Muharrami and Hardy, 2013). Indeed, Islamic banks rely more on short-term funding to fund long term financing, which increases their liquidity risk (Salman, 2013). Compared to conventional ones, Islamic banks face grater risk of withradrawal deposits since they paye less return to its PSA depositors or they support a loss risk that they share with the bank (Sundararajan and Errico, 2002). Muharam and Kurnia (2012) note that the profit sharing system gives different influence on the Islamic bank liquidity risk while interest banking system is more fluctuative and more risky.

The bank liquidity is influenced by many internal and external factors. Unlike conventional litterature[3], there are limited empirical studies devoted to the liquidity risk of Islamic bank. Moreover, previous researches focusing on Islamic banks within the same country, stress different conclusions.

Considering a sample of 12 conventional and Islamic banks of Pakistan (2006 to 2009), the study of Akhtar et al (2011), highlights a positive and significant relation between Return on Asset and Islamic bank liquidity risk at 10%. However, the size of the bank and the net-working capital to net assets have positive but insignifiant relationship with liquidity risk faced by Islamic banks.

Ahmed et al (2011) studied a sample of 6 Islamic banks of Pakistan for the period of 2006 to 2009 and suggested that the bank size is directly associated to liquidity risk. Furhermore, there is a negative and significant association between the gearing ratio, the Non Performing Loans ratio and the liquidity risk. In contrast, the capital adequacy is positively associated to liquidity risk.

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[2] Principle 9 established by IFSB (2012) specifies that « An IIFS should maintain a liquidity buffer, composed of cash and other highly liquid Shari`ah compliant assets, in order to withstand a prolonged period of potential stress conditions ».

[3] For example, the study of Délachat et al (2012) for determinants of Banks' Liquidity Buffers in Central America concludes that smaller, lower-capitalized, less profitable and less efficient bank tend to mainitien higher liquidity buffers.

Comparing 10 domestic and foreign bank in Pakistan over the period 2001-2010, Abdullah and Khan (2012) found that bank size, debt to equity ratio are negative and significant correlated with liquidity risk for domestic banks (but negative and insignificant for foreign banks). However, liquid assets are negatif and insignifiant associated with liquidity risk for domestic bank (positive and significant for foreign bank).

Muharam and Kurnia (2012) investigate Islamic and conventional banks liquidity in Indonesia for period 2007-2011. They highlight a positive and significant impact of Net Interest Margin (NIM) and Return On Equity (ROE) on the liquidity risk of Islamic bank. In addition, liquidity gaps, Risky Liquid Assets to Total Assets (RLA) have insignificant effect. For conventional bank, the study concludes to negative and significant influence of Capital Adequacy Ratio (CAR) and ROE on liquidity risk.

The empirical study of Ramzan and Zafar (2014) investigates relationships between internal bank's caracteristics and liquidity risk (measured by the ratio of the most liquid assets to total assets) of Islamic banks of Pakistan over the period 2007-2011. This study concludes to positive and significant correlation between size of the bank and liquidity risk (other variables are statistically insignificant). Thus, strong asset base of Islamic bank helps to more strengthen liquidity control (Ramzan and Zafar, 2014). In contrast, Capital Adequacy Ratio (CAR), The Return on Equity (ROE), Return on Assets (ROA) and Networking Capital (NWC) has insignificant relationship with liquidity risk.

This previous brief literature reveals to deep more the study of liquidity risk management of Islamic bank. This work will enrich the literature in this regard by considering a large sample of Islamic bank and adopt a panel method.

3. Data and methodology
As noted before, the originality of this study lies in the empirical testing, using a sample of 60 Islamic banks in MENA and Asia region over the period 2004-2012 (including the subprime crisis), of liquidity determinants.

3.1 Sample
We retain 60 banks from 15 countries for a total of 344 observations. Bank's characteristic data are collected from Bankscope data and web site Zawya Islamic financial data. Macroecomic data are gathered from World Bank indicators. This sample seems to be fairly representative because it includes the main centers of Islamic finance, namely Malaysia, Bahrain, Pakistan and Saudi Arabia.

3.2. Model
In this study, we use panel data estimations which may allow to control for observable and unobservable country-level and bank-level heterogeneity. The specification of the empirical model is :

$$Y_{it} = \alpha + \beta_i X_{it} + \varepsilon it \quad \textbf{(1)}$$

The empirical evidence on the liquidy risk consists of cross-sectional units, denoted $i = 1\ldots60$, observed at each of time periods, denoted $t = 1\ldots9$ (in this case years).

where Y_{it} is the dependent variable (liquidity risk), β_i ($i = 1\ldots60$) are the regression coefficients, X_{it} stands for

the independent variables of both bank specific factors (Bank size, Capital adequacy ratio, Return on Asset, Investment assets) and external factors (GDP real growth rate). Two dummy variables are introduced for foreign/domestic Islamic bank and also to consider the subprimes financial crisis. Explanation of dependent and independent variables along with their proxies are specified in Table 1 (Appendix).

ε_{it} is the disturbance term

The Arellano-Bond model (1991) provides a first difference GMM estimator, which consists in taking each period the first difference equation to estimate to eliminate the individual specific effects and then instrumenting the lagged endogenous variable by its past two periods or more. Then, model is following :

$$Y_{it} = \alpha + \beta_0 Y_{it-1} + \beta_i X_{it} + \varepsilon_{it} \quad \textbf{(2)}$$

We suppose also that the error term εijt can be decomposed in two independent components to control for sample heterogeneity: a random country–specific component μi and a pure bank specific idiosyncratic component υijt.

3.3. Variables and hypothesis

Loan to Asset Ratio (*Liquidity-1*) : The dependant variable is loan to total asset ratio (*Liquidity-1* = Loans/total assets). Liquidity refers to the ability of the bank to quickly mobilize funds to immediate honor its

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commitments. *Liquidity-1* measures the percentage of total assets the bank has invested in financing. In general, loans are less liquid than other assets. So, the higher is the ratio, the lower the bank has liquidity (Bunda and Desquilbet, 2008).

Cash/total assets (*Liquidity-2*): In order to check the robustness of estimations, we add second dependent variable denoted *Liquidity-2* measured by the ratio between cash and total assets. This ratio « gives a quick picture of proportion of liquidity available within a bank » (Salman, 2013, p.70).

There is two main differences between *Liquidity-1* and *Liquidity-2*. The first difference is that Loan to Asset Ratio is inversely related to the bank liquidity while *Liquidity-2* is positively related to the liquidity level. The second difference is that loan reflects the use of resources for financing while the latter indicates a liquidity buffer that bank keep as unused resources.

Bank Size (SIZE) : In most studies, the natural logarithm of total assets is used as a measure of the bank size. The relationship between bank size and liquidity is ambiguous : some authors have found positive relationships between size of the bank and liquidity (Lucchetta, 2007, Isshaq and Bokpin (2009), others have found a negative relationship (Bunda and Desquilbet, 2008). By constrat, empirical studies such as Rauch et al (2010) have shown that bank size does not have a significant effect on liquidity.

H1: The size of the bank has a significant positive effect on the bank liquidity.

Capital Adequacy Ratio (CAR) : CAR, measured by Tier 1 Capital+ Tier2 capital/ Risk weighted assets[4], illustrates how far the risky bank assets (e.g. loans, investments, securities) financed of the bank's own capital funds (Shen et al, 2001). In fact, liquidity is somehow short-term solvency. Adequate capital provides a cushion to absorb potential losses. Hence, an important capital adequacy ratio is an indicator of low debt and therefore of a lower solvency risk. Repullo (2004) showed that capital allows the bank to absorb more risk. Empirically, CAR has positive influence on liquidity risk (Akhtar et al, 2011 ; Iqbal, 2012).

H2 : The capital adequacy has a significant positive effect on bank liquidity risk.

Bank profitability (ROA) : Economic profitability or Return On Assets (ROA) measures the percentage ratio between net income and total assets. It permits to measure the ability of bank management in acquiring and managing the profitability of overall bank business effeciency. The relationship between bank liquidity and performance is negative (e.g. Izhar and Asutay (2007) or positive (e.g. Berger and Bouwman (2009) and Wasiuzzaman and Tarmizi (2010). More liquid is the bank, the lower are its return on assets, all other things being equal. Moreover, the bank can use its good revenue to cover its short term obligation.

H3: ROA has a significant positive effect on the liquidity risk of Islamic banks.

Investment/total assets (Investassets): In line with Abdullah and Khan (2012), we consider ratio of investment based on PLS to total assets as a factor affecting the Islamic bank liquidity. PLS paradigm at both asset and liability sides induces specificities in the liquidity issue of Islamic banks. Participative financial intermediation can lead to less liquidity risk. Indeed, in the absence of guarantees of the nominal value of deposits, the Islamic banking system can better resist to the impacts of banking crises (Khan, 1986). In contrast, PLS intermediation can induce more liquidity risk. Financing based on equity increases the Islamic bank vulnerability to risks (Qureshi, 1984). The domination of financing based on real assets also conducts to lengthen the liquidity differential (Al Monayea, 2012). Then, seeing maturity transformation, more investment relative to total assets leads to a more exposition to liquidity risk (Ben Jedidia and Hamza, 2014).

H4 : Investassets may have either positive or negative effect on liquidity risk of Islamic banks.

GDP real growth rate (GDP) : GDP, a proxy of econonomic cycle, is introduced to check weather macroeconomic environment can be among the exogenous factors influencing bank liquidity[5]. We suppose that in economic growth all economic agents (including banks) are optimistic so they will increase their long-term investments and reduce their holdings of liquid assets. Thus, we except a negative relationship between GDP

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[4] This ratio is in comformity with bâle II. It is also used in Ramzan et Zafar's study (2014).

[5] Shen et al (2010) showed that the macro-economic environment could affect the banking and investment decisions (profit, bank liquidity).

growth and bank liquidity. Valla and Saes-Escorbiac (2006) found a negative relationship for a panel english bank between liquidity and the business cycle with the growth rate of GDP.

H5: The rate of GDP growth has a significant negative effect on the liquidity risk of Islamic banks.

Foreign : Foreign/ domestic bank is among exogenous factors that can influence the bank liquidity level. We expect that Foreign-owned Islamic may face less liquidity risk since the bank's holding can sustain the bank liquidity shortage. We will use this dummy variable defined as follow: Foreign=1 if bank is foreign-owned; Foreign = 0 if bank is domestic-owned

H6: The foreign-owned has a significant positive effect on the liquidity risk of Islamic banks.

Crisis subprimes : This dummy variable takes the value 1 during the crisis (we choose year 2009) and 0 for other years. The financial crisis may increase the liquidity risk of the bank. Bunda and Desquilbet (2008) and Vodova (2011) found a negative relationship between the crisis and liquidity.

H7: The crisis has a significant negative effect on the liquidity risk of Islamic banks.

3.4. Specification and estimation method

After presenting the model and the relationship between *liquidity* ratio and the different explanatory variables, it is possible to rewrite equation (1) as follows:

$$Liquidity\text{-}1_{ijt} = \alpha_0 + \alpha_1\ Liquidity1_{ijt\text{-}1} + \alpha_2 SIZE_{ijt} + \alpha_3\ CAR_{ijt} + \alpha_4\ investassets_{ijt} + \alpha_5 ROA_{ijt}$$

$$+ \alpha_6 GDP_{ijt} + \alpha_7\ foreign_{ijt} + \alpha_8\ crisefinan\text{-}e_{ijt} + \varepsilon_{ijt}$$

(3)

$$Liquidity\text{-}2_{ijt} = \beta_0 + \beta_1\ Liquidity\text{-}2_{ijt\text{-}1} + \beta_2 SIZE_{ijt} + \beta_3\ CAR_{ijt} + \beta_4\ investassets_{ijt} +$$

$$\beta_5 ROA_{ijt} + \beta_6 GDP_{ijt} + \beta_7 foreign_{ijt} + \beta_8\ crisefinan\text{-}e_{ijt} + \varepsilon_{ijt}$$

(4)

We use dynamic panel data estimations to take into account both the individual dimension and the temporal dimension of data. The estimation method is the system Generalized Method of Moments (system GMM) developed by Arellano and Bover (1995) and Blundell and Bond (1998). Compared to OLS method, the GMM system method is more efficient to control the endogeneity of variables in the model, and between the dependent variable and the other explanatory variables. The lagged dependent variable in the right of equation (3) generates a correlation between specific individual effects and explanatory variables. The GMM method permits to overcome these problems through the combination of a set of equations where the variables in first difference are instrumentalized by their own lagged values and expressed in levels, and a second set of equations in levels using first differences as instruments. According to Blundell and Bond (1998), this provides more efficient estimators than first-difference GMM because even if the variables are very persistent, the instruments used in the level equation adequately predict the endogenous variables in the model. We use the Sargan test of over-identifying restrictions to check the validity of instruments (lagged values) and the Arellano and Bond's serial correlation test to verify if errors exhibit second order serial correlation.

4. Results

4.1 Descriptive Statistics

Table 2 (Appendix) shows that the average Loan to asset ratio for the total sample is 53.3% with a standard deviation of 17.6%. The average ratio of cash is 23.1%. This high level testifies that Islamic banks keep higher liquidity due to difficulties to manage their liquidity risk. For instance, Islamic banks tended to have high holding of liquid assets notably those newly established (Salman, 2013). The investment to asset ratio has a mean of 22.2% and a standard deviation of 20.6 for the period of study. Regarding the bank size indicator, we note that size is highly volatile.

Before interpreting the estimation results, it is interesting to study the problem of multicollinearity between explanatory variables. According to Kennedy (1992), there is a serious problem of multicollinearity if the correlation coefficient is above 80% for each pair of variables. The matrix (see Table 3) shows that, in general, several variables are correlated but not beyond the critical threshold of multicollinearity. The highest correlation coefficient is between *Liquidity-1* and *investassets* (0.624), which is expected since more Islamic banks choose PLS investment, less they invest in loans. The coefficient between Foreign and *Liquidity-1* is important (-0.313) which means that if the bank is foreign-owned, its liquidity risk is lower. SIZE is positively correlated with *Liquidity-1* (0.299), which a priori confirms a positive relationship between bank size and liquidity risk. GDP is positively correlated with ROA, giving evidence that bank's profitability is stimulated by economic expansion.

4.2 Estimation results

Table 4 (Appendix) shows the results of the system GMM estimator, obtained using the command "xtabond2" in STATA 11.1. The p-values associated with over-identifying restrictions test and serial correlation test are quite high, indicating that the null hypothesis of correlation between instrumental variables and error terms (Sargan statistic) and second order correlation (Arellano and Bond statistic) are rejected.

The introduction of the lagged value of *Liquidity-1* ratio on the right of equation (3) implies the existence of liquidity adjustment. According to Table 4, the liquidity adjustment coefficient is statistically significant at 1% with a positive sign as expected. We conclude that liquidity ratios depend on idiosyncratic factors such as bank profitability, capital adequacy ratio and investment ratio. It appears that the profitability indicator ROA is statistically significant at 5% with a positive sign, which is in accordance with our expectations. This establish that more profitable banks can more invest and are therefore liquidity constrained. In contrast, empirical studies of Akhtar et al (2011) Ramzan and Zafar (2014) found that ROA has statistically insignificant relationship with liquidity risk measure. Nevertheless, the coefficient of size is statistically not significant. This can be explained by the fact that both small and large Islamic have difficulties to assess the narrow Islamic capital market for liquidity needs[6]. In addition, we find some evidence that GDP has positif but irrelevant association with liquidity risk. Then, bank's size and macroeconomic conditions do not seem to be determinant of Islamic banks liquidity.

Islamic banks' liquidity risk depends on CAR ratio. Its coefficient is significant with negative sign. Capital allows the bank to absorb more liquidity risk (Repullo, 2004). The value of capital adequacy ratio as defined in the Basel II accord constitute as a measure to reduce risk (Ojo, 2010). Foreign owned bank affects negatively the liquidity risk. In principle, foreign owned banks should be less liquidity-constrained than domestic banks, since foreign banks would have access to support from headquarters. Turning now to the main focus of this study, from table 4 it appears that the coefficient of investmentassets is statistically significant at 1% with negative sign. This results shows that the investments based on sharing decreses the exposure to liquidity risk. We observe the influence of investment Ratio as the most important for liquidity risk (ratio of 39%). Then, thanks to sharing principle, the equality of assets and liabilities can be established simultaneously and liquidity minimized (Ben Jedidia & Hamza, 2014). Globally, the sharing risk is important to insulate the Islamic economy from the shocks (Mirakhor, 1988). Islamic bank is less exposed to liquidity shortage problem since the remuneration of deposits does not guarantee fixed yields. Moreover, our results do not show any significant evidence that financial crisis does affect liquidity risk. For instance, Salman (2013) notes that the liquidity risk has moderately increased after the subprimes crisis. Finally, as a main robustness check, we estimate our model using the ratio cash to total assets as our dependent variable (see Table 4), we found that only ROA and SIZE are not significant. While *investassets* affect significant negatively the bank liquidity, others variables (Foreign, Crisis, CAR and GDP) positively influence the level of buffer liquidity of Islamic bank. As expectable, there are totally different influences over the two liquidity rates for the whole period. This additional regressions support

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[6] This is accordance with Akhtar et al (2011) but in contrast with Muhammad et al (2011) showing that size of the bank has positive and statistically significant relation with liquidity risk at 95% of confidence level.

our main findings that the investment ratio matters for bank liquidity. The influences of CAR and Foreign on liquidity risk are confirmed by two regressions.

5. Conclusion

The study investigates the determinant of Islamic bank liquidity using a panel of 60 Islamic bank. The strength of this study compared to previous ones is the data used which are more longer and up-to date (2004-2012). We use the GMM estimator that permits to correct bias caused by endogenous explanatory variables.

Based on the result of hypothesis testing, independent variables that have significant effects are ROA, CAR, investment ratio and Foreign. While the profitability bank indicator (Return on Assets) positively affects the exposure to liquidity shortage, the capital adequacy ratio and the ratio investment have statistically significant negative relationships with liquidity risk measure. It appears that PLS investment which is specific to Islamic bank (musharaka and mudaraba) leads to a less exposition to liquidity risk as it is based on sharing principle between Islamic bank and investors. Nevertheless, the bank size and GDP do not matter for liquidity risk since they have irrelevant association with liquidity risk.

In sum, Islamic banks can use capital for their liquidity risk management. In addition, they can convince their depositors to use their deposits for medium and long term investment which in return increase their investments and reduce their liquidity risk. Furthermore, it is critical to reinforce the management instruments of liquidity risk by the development of Islamic money market and Islamic lender at last resort. For instance, Islamic money market must be developed in order to allow the management of asset-liability mismatches. Further, in order to cater liquidity risk in Islamic bank, the Islamic lender at last resort is recommended to develop more instruments for sharia compatible refinancing.

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Appendix

Symbol	Variable	Proxies	Hypothesis relationship	Depended /Independed
Liquidity-1	Liquidity risk	Loan to Asset Ratio		Dependent
Liquidity-2	Liquidity risk	Cash to total assets		Dependent
SIZE	Bank size	Logarithm of total assets	+	Independent
CAR	Capital Adequacy Ratio	Tier 1 Capital+ Tier2 capital/ Risk weighted assets	+	Independent
Investassets	investment/ total asset	Investment/ total asset	+/-	Independent
ROA	Return on Assets	Profit after tax/ Total assets	-	Independent
GDP	GDP real growth rate	GDP real growth rate	-	Independent
Foreign	Dummy variables		+	Independent
Crisefinan-e	Dummy variables		+	Independent
C	intercept	-		-
□	Error term	-		-

Table 2. Descriptive analysis of all the dependent and independent variables (sample – 60 banks)

	Mean	Standard deviation	Minimum	Maximum
Liquidity-1	0.533	0.176	0.119	0.950
Liquidity-2	0.231	0.151	0.001	0.885
investassets	0.222	0.206	0. 0009	3.405
ROA	0.014	0.021	-0.122	0.132
SIZE	7.651	1.397	4.116	11.172
CAR	0.219	0.142	-0.028	1.02
GDP	0.052	0.041	-0.105	0.262

The study period extends from 2004 to 2012. Observations were made on a sample of 60 Islamic banks from 15 countries. Liquidity-1 = Loan to Asset Ratio. Liquidity-2 = Cash/total assets. investassets = Investment/total assets. ROA= Profit after tax/ Total assets. SIZE= Ln (Total Assets).CAR= Tier 1 Capital+ Tier2 capital/ Risk weighted assets. GDP= growth rate in real GDP.

Table 3. Correlation matrix

	Liquidity-1	*investas*	foreign	Crisefinan-e	*ROA*	*SIZE*	*CAR*	*GDP*
Liquidity-1	1							
investassets	-0.624	1						
foreign	-0.313	0.206	1					
Crisefinan-e	-0.021	-0.035	-0.001	1				
ROA	0.043	0.038	-0.045	-0.123	1			
SIZE	0.299	-0.160	-0.294	0.0008	0.096	1		
CAR	-0.271	0.140	0.114	-0.001	0.095	-0.299	1	
GDP	0.101	-0.091	-0.116	-0.360	0.294	0.033	-0.001	1

The study period extends from 2004 to 2012. Observations were made on a sample of 60 Islamic banks from 15 countries. Liquidity-1 = Loan to Asset Ratio. Liquidity-2 = Cash/total assets. investassets = Investment/total assets. ROA= Profit after tax/ Total assets. SIZE= Ln (Total Assets).CAR= Tier 1 Capital+ Tier2 capital/ Risk weighted assets. GDP= growth rate in real GDP.

Table 4. Determinants of islamic bank liquidity risk

	Liquidity-1	*Liquidity-2*

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Liquidity-1$_{t-1}$ / Liquidity-2$_{t-1}$	0.471***	0.358***
	(0.000)	(0.001)
investassets	-0.390***	-0.438***
	(0.000)	(0.000)
Foreign	-0.070**	0.107**
	(0.028)	(0.003)
Crisefinan-e	-0.0204	0.026**
	(0.119)	(0.044)
ROA	0.97**	-0.785
	(0.038)	(0.121)
SIZE	0.004	-0.007
	(0.634)	(0.384)
CAR	-0.332**	0.287**
	(0.006)	(0.038)
GDP	-0.261	0.377*
	(0.167)	(0.053)
Constante	0.428***	0.200**
	(0.000)	(0.040)
Observations	344	344
Statistic of Sargan (exogeneity of instrumental variables) :	36.62	25.01
p-value of Sargan statistic:	0.533	0.628
Test of Arellano-Bond AR(2) (Second order auto-correlation):	-1.32	-0.27
p-value AR2:	0.187	0.790
* significatif at 10%; ** significatif at 5%; *** significatif at 1%		

The study period extends from 2004 to 2012. Observations were made on a sample of 60 Islamic banks from 15 countries. Liquidity-1 = Loan to Asset Ratio. Liquidity-2 = Cash/total assets. investassets = Investment/total assets. ROA= Profit after tax/ Total assets. SIZE= Ln (Total Assets).CAR= Tier 1 Capital+ Tier2 capital/ Risk weighted assets. GDP= growth rate in real GDP.