PalArch's Journal of Archaeology of Egypt / Egyptology

LIQUIDITY RISK DETERMINANTS: A COMPARATIVE STUDY OF ISLAMIC AND CONVENTIONAL BANKS IN SAUDI ARABIA

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Yasmeen Diab Suleiman, Shabir Hakim. Liquidity Risk Determinants: A Comparative Study Of Islamic And Conventional Banks In Saudi Arabia-- Palarch's Journal Of Archaeology Of Egypt/Egyptology 18(12), 312-322. ISSN 1567-214x

Keywords: Conventional Bank, Islamic Bank, Liquidity Risk, Micro-Economy, Bank Specific

ABSTRACT

Both Islamic and conventional banks are exposed to the liquidity risk on asset side as well as liability side and management of the liquidity risk is indispensable for their smooth functioning and survival. This study identified seven internal (bank specific) and three external (macroeconomic) determinants of the liquidity risk and investigated their behavior in Islamic and conventional banks. Ten year data, from 2008 to 2017, of three Islamic banks and eight conventional banks operating in Saudi Arabia was used in panel at three levels: all banks, Islamic banks, and conventional banks. Generalize method of moments was applied to the estimation of the effect of the selected determinants on the liquidity risk. The test results of the model of this study show varied behavior of the determinants of liquidity in three datasets. In the composite of all banks, four factors: size, capital adequacy, earning assets and inflation were significant, with size having a negative relationship with the liquidity risk. In case of Islamic banks, two factors, size and inflation; size related positivity while inflation related negatively with the liquidity risk. The test results of the conventional banks reveal that five factors, return on assets, size, return on equity, earning assets, and inflation were significant. Among these, size had negative relationship with liquidity risk. Furthermore, the liquidity position of the conventional banks was observed to be better than that of the Islamic banks. These findings of this study shall be helpful for the banks in Saudi Arabia in understanding the sources of the liquidity risk and managing it properly. The investors can also the findings of this study in making well-informed investment decisions.

INTRODUCTION

Islamic banks, as an alternative financial platform, face additional risks than conventional banks do such as adhering to the shari'ah regulations [1]. Financial risks in the bank means it's the chances that fund suppliers will withdraw their deposit and fund demanders will not repay their loans on time, which can lead to a failure in the bank system. Diamond and Rajan [2] argued

that this sudden withdrawal of money in inconvenient times, in particular when their banks have illiquid loans, could lead to a liquidity shock. Majid [3] emphasized the importance of liquidity risk management and labeled it as the main tool to prevent bank failure and establish security within the financial system. Therefore, the banks are always trying to find creative ways to manage their assets and liabilities to avoid the risks. Malik and Rafique [4] argue that it is the role of bank management to determine the levels of liquidity based on the internal and external conditions of the bank.

Ghenimi and Omri [5] used a panel data framework (OLS, Fixed effect and Random effect) and the effects of the variable on liquidity risk. Net Income Margin (NIM), CAR and Inflation rate had a positive impact on liquidity risk for IBs, whereas ROA, NPL, GDP growth and size of bank showed a negative effect [5]. For Conventional banks; ROE, NIM, CAR, GDP and inflation rates had a positive impact, while the ROA and NPL caused a negative impact on liquidity risk.

Effendi and Disman [6] used fixed effect model and Pooled OLS model to test the impacts of micro-economy (bank-specific variables). They found that the liquidity risk in Islamic bank was affected by CAR, FEXP (Financial Expansion), FLP and NPF. In conventional bank, it was affected by FEXP, FLP, NPL (Non-performing Loans) and ROA. In Islamic banking; NIM (Net Income Margin), ROA and SIZE does not affect the liquidity risk, whereas CAR, NIM and SIZE does not affect the liquidity risk in Conventional banks.

Alzoubi [7] analyzed the determinants of liquidity risk in 42 Islamic Banks from 15 countries (including Saudi Arabia) between the years of 2007 and 2014. A panel data analysis was used with several internal bank specific variables including the ROA, ROE, size of bank, Capital and PBL (Bad financing). The results suggest that the size of the bank, capital and ROE had a negative correlation with liquidity risk, whereas the ROA and PBL demonstrated a positive relationship with the liquidity risk. However, the study does not mention how these variables affect the liquidity risk in conventional banks but it does recommend that the techniques used to tackle the risk in Islamic Banks be different that those in conventional Banks.

Ghenimi et al. [8] measures the relationship between liquidity risk and credit risk in MENA region and its effect on bank stability using a sample of 49 banks over the period of 2006 to 2013. They tested the impact of liquidity risk against several internal and external factors by employing the GMM model. The empirical analysis found that both risks separately influence bank stability especially the liquidity risk that had a negative and statistically significant impact on banking stability. Regarding the control variable; capital adequacy ratio (CAR), rate on assets (ROA) and income diversity had a positive impact on banks' stability whereas the bank size, the financial crisis, efficiency, GDP growth and inflation rate had a negative impact on the banks' stability. Some of these results contradict and others conform to an earlier study by Jedidia and Hamza [9] taking place in the MENA region. For example, both studies had similar conclusion regarding the ROA and GDP analysis but the results contradict with the outcomes for bank size and CAR. Therefore, this study

identifies seven internal (bank specific) and three external (macroeconomic) determinants of the liquidity risk and investigated their behavior in Islamic and conventional banks from year 2008 to 2017.

METHODOLOGY

This study examine and compare the liquidity risk of Islamic and Conventional banks in relation to the internal variables (size of bank, capital adequacy, non-performing loan, ROA, ROE, earning asset and provision for bad loans) and external variables (money supply, GDP and inflation rate).

A quantitative approach was use in this study. The study considers a balanced panel data as the observations of the cross sections included in the sample study have the same period with a sample size of 11 banks in Saudi Arabia for a period of ten years, from 2007 to 2017. The study excluded one Islamic bank known as Al-Inma Bank, which did not have data for the full study period, to avoid an unbalanced panel.

The secondary data includes the period of Global Financial Crisis (2007-2008) and excludes the foreign banks currently present in Saudi Arabia. The data was obtained from the published annual reports of the respective banks by using the Bloomberg Professional Database.

Composition of Sample Size

The study considers all the Saudi Banks into consideration except for one Islamic Bank (Al-Inma Bank) due to lack of annual data between the years 2007 and 2009. Table 1 tabulates the remaining 11 banks chosen for the study consists of 3 Islamic Banks and 8 Conventional Banks.

Table 1: Selected banks in this study

Type of banks	Names of the banks	Year of Establishment
Islamic banks	Al Rajhi bank.	1957
	Bank Al Jazira.	1975
	Bank Al Bilad	2004
Conventional banks	The Saudi British bank.	1978
	Saudi investment bank.	1977
	Banque Saudi Faransi.	1977
	Riyad Bank.	1957
	Samba Financial Group.	1980
	Saudi Holandi Bank (Al Awwal).	1926
	Arab National Bank.	1979
	National	1953

	Commercial Bank	

Research Model

Multiple linear regression analysis was intended to test the extent and direction of the influence of the independent variables (X for internal and Z represents the external factors) on the dependent variable (Y). The following equation was use in the Generalized Method of Moment estimator method to evaluate the relationship between the Liquidity Risk Proxy and the independent variables.

$Y = \beta + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4 + \beta5X5 + \beta6X6 + \beta7X7 + \beta8Z1 + \beta9Z2 + \beta10Z3 + €$

Where the independent variables;
X1= Return on Assets (ROA)
X2 = Return of Equity (ROE)
X3 = Size of Bank (SZ)
X4 = Provision for Bad Loans (PBL)
X5 = Non- Performing Loan (NPL)
X6 = Capital Adequacy (CAR)
X7= Earning Assets (EA)
Z1= Gross Domestic Product (GDP)
Z2 = Inflation Rate (IN)
Z3 = Money Supply (M3)
€ = Error term

On the other hand, the dependent variable is represented as LQR (Y). Based on calculations performed using the statistical tables on the importance of the multiple linear regression equation models the equation becomes:

$LQ = C + \beta1ROA + \beta2ROE + \beta3SZ + \beta4PBL + \beta5NPL + \beta6CAR + \beta7EA + \beta8GDP + \beta9IN + \beta10M3 + €t$

Result And Discussion

Panel Unit Root Test of all Banks

The test results of the stationarity presented in Table 2. There is only one variable (ROA) is stationary at first difference, while the remaining variables are stationary at level.

Table 2: All Variables Unit Root Test

Variables	All banks	
	P-Value at Level	P-Value at 1st difference
LQ	0.0069 ***	-
ROA	0.1132	0.0000 ***
ROE	0.0013 **	-
SZ	0.0194 **	-
PBL	0.0000 ***	-

NPL	0.0018 ***	-
CAR	0.0004 ***	-
EA	0.0022 ***	-
GDP	0.0001 ***	-
IN	0.0355 **	-
M3	0.0000 ***	-
The asterisks are used to denote the statistical significance *: The series is stable at a confidence level 10% **: The series is stable at a confidence level 5% ***: The series is stable at a confidence level 1%		

Panel Unit Root Test of IBs

The test results of the stationarity presented in Table 3 shows that variables (LQ, ROE, IN) are stationary at first difference, while the remaining variables are stationary at level.

Table 3: IB Variables Unit Root Test

Variables	Islamic banks	
	P-Value at Level	P-Value at 1st difference
LQ	0.6443	0.0000 ***
ROA	0.0207 **	-
ROE	0.9925	0.0056***
SZ	0.0079 ***	-
PBL	0.0000 ***	-
NPL	0.0412 **	-
CAR	0.024 **	-
EA	0.0013 ***	-
GDP	0.0071 ***	-
IN	0.9985	0.0122 **
M3	0.0178 **	-
The asterisks are used to denote the statistical significance *: The series is stable at a confidence level 10% **: The series is stable at a confidence level 5% ***: The series is stable at a confidence level 1%		

Panel Unit Root Test of CBs

The test results of the stationarity presented in Table 4 shows that there is only one variable (ROA) is stationary at first difference, while the remaining variables are stationary at level.

Table 4: CBs Variables Unit Root Test

Variables	Conventional banks	
	P-Value at Level	P-Value at 1st difference
LQ	0.0012 ***	-
ROA	0.1943	0.0000 ***

ROE	0.0222 **	-
SZ	0.0007 ***	-
PBL	0.0000 ***	-
NPL	0.0030 ***	-
CAR	0.0028 ***	-
EA	0.0298 **	-
GDP	0.0000 ***	-
IN	0.0618 *	-
M3	0.0003 ***	-
The asterisks are used to denote the statistical significance *: The series is stable at a confidence level 10% **: The series is stable at a confidence level 5% ***: The series is stable at a confidence level 1%		

Generalized Method of Moment Estimator for all Banks

The GMM test used to estimate the model for all bank by using the equation:
LQ = C + β1D(ROA) + β2ROE + β3SZ + β4PBL + β5NPL + β6CAR + β7EA + β8GDP + β9IN + β10M3 + DUM + €t

The estimation results show that only four variables (SZ, CAR, EA and IN) have significant impact on liquidity risk of the bank. The bank size (SZ) coefficient is 0.0492 with t-value of 3.73 and it is significant at 5% level. In another word, SZ has positive relationship with liquidity or negative relationship with liquidity risk. The capital adequacy ratio (CAR) coefficient is -0.286 with t-value of -3.25 and it is significant at 5% level. In another word, CAR has negative relationship with liquidity or positive relationship with liquidity risk. The earning assets (EA) coefficient is -0.2015 with t-value of -6.2700 and it is significant at 5% level. In another word, EA has negative relationship with liquidity or positive relationship with liquidity risk. Inflation (IN) coefficient is -0.0015 with t-value of – 2.24 and it is significant at 5% level. In another word, IN has negative relationship with liquidity or positive relationship with liquidity risk.

The study also finds that the ROE, ROA, PBL, NPL, GDP, and M3 are insignificant and has no impact on liquidity risk of the bank. Moreover, D(ROA) has beta coefficient of -0.624 with t-value and p-value of 1.269 and 0.207, respectively. The ROE has beta coefficient of -0.8366 with t-value and p-value of 1.036 and 0.302, respectively. The PBL has beta coefficient of 0.00425 with t-value and p-value of 0.558 and 0.577 respectively. Furthermore, the NPL has beta coefficient of 0.0022 with t-value and p-value of 0.661 and 0.509, respectively. The GDP has beta coefficient of -0.0008 with t-value and p-value of 0.7455 and 0.458, respectively. At last, M3 has no beta coefficient and its t-value is 0.9184 with p-value of 0.361. The Adjusted R-squared shows that the variance in independent variable explains 33% variance in the dependent variable.

This GMM equation include a Dummy Variable in which it is an essential aspect in determining the difference in Liquidity between the IBs and CBs where IBs are represented by number 1, and the CBs are represented by 0. The

result of liquidity for Islamic banks is only 0.0069 times smaller than the conventional banks.

Generalized Method of Moment Estimator on IBs' Panel Data

The GMM test used to estimate the model for Islamic bank by using the equation:
D(LQ)= C + β1ROA + β2D(ROE) + β3SZ + β4PBL + β5NPL + β6CAR + β7EA + β8GDP + β9D(IN) + β10M3 + €t

The estimation results show two variables (SZ and IN) that have a significant impact on liquidity risk of the bank. The bank size (SZ) coefficient is 0.05433 with t-value of 2.103 and it is significant at 5% level. In other words, SZ has a positive relationship with liquidity or negative relationship with liquidity risk. Inflation (IN) coefficient is -0.0058 with t-value of – 2.28 and it is significant at the 5% level. In other word, IN has a negative relationship with liquidity or a positive relationship with liquidity risk.

The study also finds that the (ROA, ROE, NPL, PBL, CAR, EA, GDP and M3) are insignificant and has no impact on liquidity risk of the bank. Moreover, The ROA has a beta coefficient of -1.307with t-value and p-value of – 1.496 and .1511, respectively. The D(ROE) has a beta coefficient of -0.159 with t-value and p-value of -0.929 and .3645, respectively . The PBL has a beta coefficient of -0.0112 with t-value and p-value of -0.557 and .5839, respectively. The NPL has a beta coefficient of 0.0102 with t-value and p-value of 1.391 and .18101, respectively. The CAR has beta coefficient of -0.029 with t-value and p-value of -0.0722 and 0.943, respectively. The EA has beta coefficient of 0.0139 with t-value and p-value of 0.154 and .879, respectively. The GDP has a beta coefficient of 0.00017 with t-value and p-value of 0.049 and 0.961, respectively. The M3 has beta coefficient of 4.14E with t-value and p-value of 0.958 and .3499. The Adjusted R-squared shows that the variance in independent variable explains 11% variance in the dependent variable.

Generalized Method of Moment Estimator on CBs' Panel Data

The GMM test used to estimate the model for conventional bank by using the equation:
LQ = C + β1D(ROA) + β2ROE + β3SZ + β4PBL + β5NPL + β6CAR + β7EA + β8GDP + β9IN + β10M3 + €t

The estimation results show that only fine variables (ROA, ROE, SZ, EA and IN) have significant impact on liquidity risk of the bank. Return on assets (ROA) coefficient is 1.644 with t-value of 1.9023 and it is significant at 10% level. In other words, ROA has a positive relationship with liquidity or a negative relationship with liquidity risk. Return on equity (ROE) coefficient is -0.344 with t-value of -1.967 and it is significant at 5% level. In other words, ROE has a negative relationship with liquidity or a positive relationship with liquidity risk. The bank size (SZ) coefficient is 0.269 with t-value of 0.0278 and it is significant at the 5% level. In other words, SZ has a positive relationship with liquidity or negative relationship with liquidity risk. The

earning assets (EA) coefficient is - 0.142 with t-value of – 3.161 and it is significant at the 5% level. In other words, EA has a negative relationship with liquidity or a positive relationship with liquidity risk. Inflation (IN) coefficient is -0.0022 with t-value of – 2.77and it is significant at 5% level. In other words, IN has a negative relationship with liquidity or a positive relationship with liquidity risk.

The study also finds that the (NPL, PBL, CAR, GDP and M3) are insignificant and has no impact on liquidity risk of the bank. Moreover, The PBL has beta coefficient of 0.0135 with t-value and p-value of 1.101 and 0.2749 .respectively, The NPL has beta coefficient of -0.00232 with t-value and p-value of -0.472 and 0.638 .respectively, The CAR has beta coefficient of -.0140 with t-value and p-value of -1.171 and 0.246 .respectively, The GDP has a beta coefficient of 0.00012 with t-value and p-value of -0.92 and 0.3611.respectively, The M3 has a beta coefficient of -4.19 E with t-value and p-value of -1.160 and 0.25 .The Adjusted R-squared shows that the variance in independent variable explains 42.52% variance in the dependent variable.

Summary of results

To summarize, when the sample for all banks are examined, the GMM estimation results present only four variables with a clear significant impact on liquidity. For Islamic banks, only two of the ten independent variables that included in our study are significant. On the other hand, five variables show significant impact with liquidity in Conventional banks. The complete outlines results of the three estimations are in Table 5.

Table 5: Summary of result for the three estimations

Independent Variables	Islamic Banks	Conventional Banks	All Banks
ROA	Insignificant and Negative	Significant and Positive	Insignificant and Positive
ROE	Insignificant and Negative	Significant and Negative	Insignificant and Positive
SZ	Significant and Positive	Significant and Positive	Significant and Positive
PBL	Insignificant and Negative	Insignificant and Negative	Insignificant and Positive
NPL	Insignificant and Positive	Insignificant and Positive	Insignificant and Positive
CAR	Insignificant and Positive	Insignificant and Negative	Significant and Negative
EA	Insignificant and Positive	Significant and Negative	Significant and Negative
GDP	Insignificant and Positive	Insignificant and Negative	Insignificant and negative
IN	Significant and Negative	Significant and Negative	Significant and Negative
M3	Insignificant and	Insignificant and	Insignificant and

	Positive	Negative	Positive

Earning Assets

The first determinant to be discussed is the Earning Asset (EA). This determinant has a negative impact on conventional banks so the higher the earning assets, the lower the liquidity. This means that Saudi Conventional Banks with low liquidity have been investing in more long-term high earning assets. Hassan and Lewis [10] expect that the banks would get higher returns or profits because they have been involved in higher risk levels that lower their liquidity.

Return on Assets

The second determinant is the Return on Assets. ROA had a negative relationship with liquidity in the GMM estimations for the Islamic Banks. Thus, for all Saudi Islamic Banks, the profits gained will not lead into an increase in liquidity. In fact, it might actually increase the liquidity risk instead. The opposite is true for the Conventional Banks.

Size of Bank

The overall assets of a bank or its size seems to have a positive impact on liquidity of all the Saudi Banks regardless of their nature (Islamic or Conventional), when the GMM test is being done them separately. Vodova [11] founds that the effect of size on the liquidity is ambiguous. The model in this study suggests that the bigger the bank, the higher the liquidity. Generally, banks viewing themselves, as "too big to fail" will almost always show hold low amounts liquid assets and that is not the case in Saudi Arabian Banks.

Capital Adequacy Ratio

The CAR determinant showed a positive relationship with liquidity in Islamic Banks. The average Capital Adequacy for IBs is at 19.9%, which is higher than the CBs with about 17.1%. This means that Saudi Islamic Banks have a sufficient capital to control any sudden change in the balance sheet as compared with Their Conventional counterparts. This control also gives some protection to the customers. This means the higher the capital adequacy ratio, the higher the level of protection available to depositors [12]. Consequently, higher CAR ratios in Saudi Islamic Banks will definitely decrease the liquidity risk.

Non-Performing Loans

The results were insignificantly positive when the GMM was estimated on data from all three banks data sample. This could mean than Saudi Banks enjoy a good internal risk management policy and rely less on lending to increase their profits and liquidity.

Provision of Bad Loans

This ratio estimates the credit risk and quality of banks' assets. The results appear to have a negative relationship between liquidity and PBL in GMM

estimations used in both types of banks. As a result, as the liquidity of the bank increases, also the expenses set aside for the uncollected loans in all the banks increases. This is made to cover any pending loan payments.

Macroeconomic Factors

The GDP of Saudi Arabia does not necessarily translate into higher liquidity in the country's banks. Based on Table 5, there are two opposite effects from the GDP determinants on liquidity of the different banks' types. However, the Inflation Rate determinant had a significantly negative correlation with the liquidity of all the Saudi-based Banks, whereas the Money Supply was insignificant with a positive effect on the Islamic banks' liquidity and positive effect on the conventional ones. On the one hand, the rate of inflation can affect the banks' liquidity by making them not able to pay back the loans and the demotivation of the customers for depositing their funds. On the other hand, it makes sense that M3 reduces liquidity risk since the overall money circulating the country had now increased.

CONCLUSION

For both banks, only the SZ has positive significant impact on liquidity .Whereas the ER, CAR and IN have a negative impact on it. The result indicates that different variables will have different effects on the both banks. However, the liquidity in Conventional Banks is greater than that in the Islamic Banks, even though it is by only 0.0068 times. In the Islamic bank context, although only two variables show a significant impact on liquidity, which is the bank size with a positive affect and inflation with negative affect. Regarding the Conventional Banks, two variables (ROA and SZ) have positive significant impact on liquidity. Whereas the ROE, EA and IN show a negative significant effect on liquidity.

In overall, the obtained results indicate that Saudi conventional banks have slightly higher liquidity than of the Islamic banks in the country. This result might be influenced by larger number of banks in the conventional system as it represents more than 70% of the overall sample. For Islamic banks, only two of the variables (SZ and IN) have a significant impact on liquidity. Whereas for the Conventional Banks, there are five variables (ROE, ROA, SZ, EA and IN) have a significant impact on liquidity.

Acknowledgments

The authors would like to thank the College of Business, Effat University for its unconditional support.

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