

# Liquidity Risk and Profitability: Evidence from Deposit Money Banks in Nigeria

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## **Abstract**

*The study examines effect of liquidity risk on profitability of Deposit Money Banks in Nigeria. Ex-post-facto research design was used for the study. This study used secondary data sourced from the data were extracted from the audited financial reports of the banks within the period of the study for the period of ten years spanning from 2007 to 2016. The data was analysed using panel data regression analysis. The study found that long-term and short-term liquidity risk have positive effect on profitability of Deposit Money Banks and liquidity risk exposure has negative effect on profitability of Deposit Money Banks. This study concluded that the magnitude of effect liquidity risk on profitability of deposit money banks does not follow specific pattern and persistent of long-term liquidity risk could erode depositors' confidence in the security of their funds. In view of this, the study recommends that the management of Deposit Money Banks should maintain moderate cash at hand in order to forestall problem of illiquidity and reduce the liquidity risk.*

**Keywords:** *Liquidity risk exposure, Long-term liquidity risk, short-term liquidity risk, Deposit Money Banks, Profitability*

## **1. Introduction**

Banks are the main components of financial sector in an economy and play valuable role towards the economic growth ([16]). However, the diverse operational nature of banks subjects them to various risks in their daily operations. In view of this, [5] posits that the two fundamental financial risks associated to the management of bank resources, are interest rate risk and the liquidity risk. This is due to the fact that both types of risk are caused by the uncertainty that characterize the way depositors may withdraw their investments and interest rate paid by the commercial bank to its customers in order to attract and keep funds in form of deposits. Thus, liquidity risk arises in the general funding of the bank's activities and in the management of the asset positions. [11] is of the opinion that for banking system to survive in crisis and competitive environment, management should revise operational procedures, reform administration procedures, upgrade information technology and develop risk management. This corroborates with the assertion of [8], that risk management is not only crucial for sustainability but growth of the banking sector as well. Recognizing the important of risk management, vast numbers of studies have been conducted most especially on liquidity risk as it affect the profitability of commercial banks but despite the volume of the empirical work, there is no consensus on the impact of impact of liquidity on banks' profitability. Thus, this lack of consensus has produced a variety of ideas on how liquidity risk influences banks' profitability.

In the light of the above, this study charts a different path to document empirical evidence

on liquidity risk and its effect on profitability of deposit Money banks in Nigeria. Based on the aforementioned gaps in the literature, the fundamental questions in this study are: Does long-term liquidity risk have significant effect on profitability of Deposit Money Banks in Nigeria? What significant effect does short-term liquidity risk have on profitability of Deposit Money Banks in Nigeria? Does liquidity risk exposure have significant effect on profitability of Deposit Money Banks in Nigeria? In line with these research questions the hypotheses are formulated; Long-term liquidity has no significant effect on profitability of Deposit Money Banks; Short-term liquidity risk has no significant effect on profitability of Deposit Money Banks; Liquidity risk exposure has no significant effect on profitability of Deposit Money Banks. To answer these questions and test the hypotheses the remaining part is structured thus: section two reviewed literature on liquidity risk and profitability, section three outlines the methodology adopted for the study. Data analysis and discussion were presented in section four while section five concludes the paper and proffer recommendations.

## **2. Empirical Review and Theory**

Liquidity risk is the potential inability to meet all payments obligations when they come due. The bank manages the liquidity risk with the purpose of maintaining an adequate liquidity, so as to cover at all times its commitments on all time bands, as well as to maximize the net interest income. Profitability is a performance tool that shows the effective utilization of firm's asset. Numerous researches have been conducted on liquidity risk and profitability and some of these are captured as follow. [7], conducted a study on liquidity risk in the Italian banking system with a sample of 675 Italian banks. The study found that larger banks have lower liquidity exposure. The study concluded that there is no significant difference in terms of liquidity risk exposure between banks specializing in real estate lending and other banks. The implication of this is that larger banks have a better reputation and so are less exposed to liquidity risk. This conforms to the finding of [17] on determinants of liquidity risk measured with different balance sheet indices using 22 banks during the 2006-2009. The study found that the liquidity measures show a positive relationship with capitalization and with size. The study concluded that bigger banks present lower liquidity in line with the "too big to fail" theory, where it would seem that bigger banks are less motivated to hold liquidity since they rely on government intervention in case of shortages. [14] examined the nature and extent of the relationship between liquidity and profitability. A model of perceived functional relationship was specified and estimated using correlation and regression analysis. The results indicated that while a trade-off existed between liquidity and profitability in the banks with a negative but insignificant impact, the two variables were positively correlated.

In a similar study conducted by [13], on the relationship between liquidity risk and bank market power. The study found that bigger banks, through lower capitalization and cost efficiency, endure a lower liquidity risk. The study concluded that listed banks usually hold more liquid assets than non-listed banks. [9] investigated the impact of liquidity management on the profitability of banks in Nigeria. Three banks were randomly selected to represent the entire banking industry in Nigeria and Elliot Rosenberg Stock (ERS) stationary test model was used to test the association of the variables under study, while regression analysis was used to test the hypothesis. The result showed that there is a statistically significant relationship between the variables of liquidity management and profitability of the selected banks. [10] critically examined the relationship between credit management, liquidity position and profitability of selected banks in Nigeria using annual data of ten banks over the period of 2006 and 2010. The study found that liquidity has significant positive effect on Return on Asset. [1] explored the efficacy of liquidity management and banking profitability

performance in Nigeria. The study found that there was a statistically significant relationship between efficient liquidity management and banking performance. The study concluded that liquidity and profitability are indicators of bank risk management efficiency and cushion against losses not covered by current earnings.

In a more recent studies, [3] analysed the determinants of liquidity risk in Islamic banks. The study adopted panel data analysis and the results show a negative correlation between liquidity risk and cash ratio, as the cash balance can be used to meet any demands for liquidity from the bank's customers. The study concluded that the relationship between bank size and liquidity risk is not linear. [2] conducted a study on liquidity and profitability management in banking industry. The study made use of Pearson correlation co-efficient technique and the empirical results revealed that there is a statistically significant relationship between banks' liquidity, return on asset and return on equity. The study concluded that the banks should evaluate and redesign their liquidity management strategy so that it will optimize returns to shareholders equity and also optimize the use of the assets. [12] examined the effect of liquidity risk on financial performance of commercial banks in Kenya. Panel data techniques of random effects estimation and generalized method of moments (GMM) were used. The study found that net stable funding ratio is negatively associated with bank profitability both in long-run and short-run while liquidity coverage ratio does not significantly influence the financial performance of commercial banks in Kenya both in long-run and short-run. The study concluded that bank's management to pay the required attention to the liquidity management.

From all these studies reviewed, few studies have been conducted on effect of long-term liquidity risk, short-term and liquidity risk exposure and their effect on banks' profitability and this justify the importance of carrying out this study in order to bridge the gap in the literature. Thus, in conducting this study Hirigoyen theory will be adopted. This theory advocates that a low liquidity will eventually compromise high profitability and low return and making it harder to achieve a high liquidity level.

### 3. Methodology and Model Specification

Expos-facto research design is adopted in this study which is characterizes with quantitative or numeric description of historical data. The population of the study comprises all the deposit money banks operating in Nigeria as 31st December, 2017 and sample were drawn through census sampling technique. Thus, the sample size of the study comprises of all 15 deposit money banks listed at the Nigerian Stock Exchange as at 31st April, 2017. The source of data for the study is secondary only extracted from the audited financial statements of the sampled banks. The study used longitudinal balanced panel data using multiple regressions to examine the model of the study. The model specification incorporates liquidity risk variables and profitability variable. The liquidity risk variables included in the existing models comprise long-term liquidity risk, short-term liquidity risk and liquidity risk exposure while the profitability was proxy with return on assets.

The model of interest for this study is discussed under static and the model is specified below:

$$ROA_{it} = \pi_0 + \lambda_1 LTR_{it} + \lambda_2 STR_{it} + \lambda_3 LRE_{it} + \varepsilon_{it} \dots \dots \dots 3.1$$

This is moderately consistent with the panel data regression model. Where  $ROA_{it}$  represents return on assets,  $LTR_{it}$  represents long-term liquidity risk,  $STR_{it}$  represents short-term liquidity risk,  $LRE_{it}$  represents liquidity risk exposure,  $\varepsilon$  represents error term,  $\lambda_1$ -  $\lambda_3$

represents coefficient of independent variables  $t$  represents time covered and  $i$  represents listed deposit money banks. The variables used in this study are defined in table 3.1 in the appendix. The study conducted a robustness tests such as multicollinearity, correlation matrix and heteroscedasticity, in order to improve the validity of all statistical inferences of the study.

#### 4. Result and Discussion

Table 4.1 reveals the mean, standard deviation, minimum and maximum values of the variables employed in the study. The mean values of  $roa$ ,  $ltr$ ,  $str$ , and  $lre$  are, .0229641, 1.379032, 1.092857, and .2273991 respectively. The common feature of these variables is that they all have positive mean values. This means each of the variables displays increasing tendency throughout the sampling period. The average or mean value of return on total asset is approximately .022; while that of long-term liquidity risk is 1.38, short-term risk liquidity is 1.09 and liquidity risk exposure is .227. This is overt that same profitability is declared by banks in a situation of long-term and short-term liquidity risk. Another interested characteristic of return on asset is that it ranges between -.5313 and .0817. This has explicitly revealed that there are situation where banks did not record profitability but loss of -.5313 from their banking operation and the maximum profitability recorded during the period of investigation in this study is .0817. This highest profitability was declared in 2009 by Unity Bank Plc. while the minimum loss was realized by Wema Bank Plc. in 2008. In a different token, long-term liquidity risk ranges between .8402 and 7.129. By this range, it simply implies that there is fluctuation in the long-term liquidity risk in the banking sector. The short-term risk ranges from 1.1281 to 6.3708 and the liquidity risk exposure ranges from-.7638413 to .222484. However, the most volatile variable is short-term liquidity risk with a value of .6104183.

Pearson correlation coefficients are used and the interpretation follow Guilford rule of thumb which is  $< 0.2$  is a negligible correlation,  $0.2$  to  $0.4$  is low correlation,  $0.4$  to  $0.7$  is a moderate correlation,  $0.7$  to  $0.9$  is a high correlation,  $> 0.9$  is a very high correlation. The result shows that the correlation between the independent variables and dependent variable used in the model is generally small. The largest correlation coefficients exist between the short-term and long-term liquidity risk (67.06%). The result shows that profitability (measured by return on assets) positively correlated to long- term liquidity risk, short-term liquidity risk and liquidity risk exposure. Also, the correlation matrices reveal that long-term liquidity risk positively correlated to short-term liquidity risk but negatively correlated with liquidity risk exposure. More so, it is shown that both short and long term liquidity risk are negatively correlated with liquidity risk exposure. The correlation matrix reveals that no explanatory variables are perfectly correlated. This means there is absence of multicollinearity problem in our model. This was confirmed by Variance Inflation Factors (VIF) and Tolerance Values (TV). The result is presented in the table 4.3 in the appendix and reveals that two explanatory variable are not perfectly correlated. This means there is absence of multicollinearity problem in our model. This was confirmed by Variance Inflation Factors (VIF) which is less than 10 and Tolerance Values (TV) which is less than 1. Breusch-Pagan-Goldfrey Test was adopted to test for existence of heteroscedasticity across the range of variables. The result presented in the appendix (table 4.4) found that there is no heteroscedasticity since the P-value is 0.0103 which is less than 5%.

[4] specified that there are broadly two classes of panel estimator approaches that can be employed in financial research: fixed effects models and random effects models. Thus, to determine whether the fixed effects are necessary or not this study run the Hausman

specification test as recommended by [4]. The result show that the random effect model is appropriate since the p-value is greater than 0.05 and this is in line with the decision rule. Thus, the study reported the random effect model as follow.

The regression result shows that the  $R^2$  value is 26.10% which indicates that the dependent variable (profitability) is well explained by the independent variables (long-term risk, short-term risk and liquidity risk exposure). Thus, these variables collectively influence profitability of Deposit Money Banks in Nigeria. The regression, the p-value of Wald chi2 (3) confirm the fitness of the model. Also, the coefficient of ltr is .003 approximately and the corresponding z value is 2.25 in absolute term, while the critical z statistic at 5 percent is 1.64. Therefore, the long-term liquidity risk has positively and significantly influenced the profitability of Deposit Money Banks. Obviously, by implication an increase in the long-term liquidity risk induces high profitability. This does not conform to the finding of [6] and this is not in tandem with a priori expectation or paradigm but the paradox is infixed in the Nigerian banking system. The plausible reason for this could be adduced to the fact that unavailability of long-term loan facility granted by Deposit Money Banks ushers in reasonable interest rate at the opportunity cost of meeting short-term obligation. Short-term liquidity risk displays a positive parameter but insignificant at 5 percent influence on the profitability of Deposit Money Banks. This conforms to the finding of [6]. The explanation for this could be as a result of ability of Deposit Money Banks to raise the required funds by selling assets at a reasonable price or increase securitization and liabilities within the shortest period of time. Liquidity risk exposure appears insignificant and negatively influenced profitability of Deposit Money Banks. This conforms to the findings of Saunders and Cornett [15]. The explanation for this could be as a result that Deposit Money Banks are exposed to some relative level of liquidity risk, due to the nature of their cash flow requirements to service customers on a daily basis, but the degree differs due to the nature of their portfolios and daily cash requirements, among others.

## 5. Conclusion and Recommendations

The study concluded that the magnitude of effect liquidity risk on profitability of deposit money banks does not follow specific pattern and persistent of long-term liquidity risk could erode depositors' confidence in the security of their funds. In line with this conclusion, the following recommendations are made in this study: The management of Deposit Money Banks should maintain moderate cash at hand in order to forestall problem of illiquidity and reduce the liquidity risk. This will not send a wrong signal to the depositors and enhance management ability to react to unexpected expenses and investment opportunity. Also, management should strike a balance between cash holdings and the marginal benefit of holding the cash and this will be at equilibrium with the marginal cost to avoid agency problems, reduce transaction costs, and give room for competitive advantages when unexpected negative changes in cash flows occur. However one of the limitations of the study is the use of static model due to the nature and availability of data. Thus, further researchers should adopt more robust statistical analysis such as Co-integration, Vector error correction among others in order to capture the long-run and short-run relationship between the dependent and independent variables.

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## Appendix

**Table 3.1: Measurement of Variables and A priori Expectation**

Variables	Types	Measurements	Source	A priori
Profitability: Measured by ROA	Dependent			
Long-Term Liquidity Risk	Independent	Ratio of Liquid assets to Deposits	Ferrouhi (2014)	-
Short-Term Liquidity Risk	Independent	Ratio of Liquid assets to Short term liabilities	Ferrouhi (2014)	+
Liquidity Risk exposure	Control	Ratio of financing gap to total assets	Ferrouhi (2014)	+/-

**Source: Researcher compilation, (2018).**

**Table 4.1: Descriptive Statistics**

Variables	Mean	Std. Dev.	Min	Max
Roa	.0080979	.0630787	-.5313	.0817
Ltr	1.379032	.5292289	.8402389	7.129984
Str	1.092857	.6104183	1.1281	6.37086
Lre	.2273991	.1601368	-.7638413	.222484

*Note: roa, ltr, str, and lre are ellipsis for long-term risk, short-term risk and liquidity risk exposure.*

**Source: Researcher computation from STATA output, (2018)**

**Table 4.2 Correlation Analysis**

Variables	Roa	ltr	str	lre
Roa	1.0000			
Ltr	0.0437	1.0000		
Str	0.0457	0.6706	1.0000	
Lre	0.0184	-0.0388	-0.0992	1.0000

**Source: Researcher computation from STATA output, (2018)**

**Table 4.3: Multicollinearity Test**

Variables	VIF	1/VIF
Str	1.83	0.544974
Ltr	1.82	0.549557
Lre	1.01	0.888774
Mean VIF	1.56	

**Source: Researcher computation from STATA output, (2018)**

**Table 4.3 Heteroskedasticity Test**

Statistics	values
chi2(1)	366.42
Prob > chi2	0.0103

**Source: Researcher computation from STATA output, (2018)**

**Table 4.5 Hausman Test**

Statistics	Value
chi2(4)	0.06
Prob>chi2	0.0958

**Source: Researcher computation from STATA output, (2018)**

**Table 4.6 Dependent Variables: Return on Assets**

Variables	Coefficients	Std. Error	Z-statistics	Prob.
Ltr	.0027602**	.0133755	-2.25	0.037
Str	.0034841	.0116389	0.30	0.765
Lre	-.00751	.0368111	-0.20	0.838
Constant	-.001224	.0178416	-0.07	0.945
R-square	0.2610			
Wald chi2(3)	0.44			
Prob > chi2	0.045			

*Note: The critical z-statistic at 5%=1.64, at 1%=2.33; \* and \*\* denote significant at 1% and 5% respectively.*

**Source: Researcher computation from STATA output, (2018)**