LIQUIDITY RISK AND FINANCIAL PERFORMANCE OF DEPOSIT MONEY BANKS IN NIGERIA

Muhammed Tahir Dahiru
Department of Accounting
Ahmadu Bello University, Zaria-Nigeria
mtahir101@yahoo.com

Nuhu Aisha Mohammed
Department of Accounting
Ahmadu Bello University, Zaria-Nigeria

Abstract
The Nigerian banking crisis in the post consolidation era has been attributed to risks that were not properly managed by many banks. Bank’s liquidity is one the major factors that determine success or failure of the banks in reaching its goals, and dramatic and sudden changes in the bank liquidity can lead to financial crisis and bankruptcy. This study investigated the impact of liquidity risk on the financial performance of Deposit Money Banks (DMBs) in Nigeria. Using Yamane sample size method, data were randomly collected from Eleven (11) Nigerian banks covering the period of 2005 to 2013. The dependent variables used in this study was net interest margin (NIM) as measure of financial performance while five liquidity risk proxies were used as independent variables. The study examines which of the five liquidity risk variables exert great influence on the financial performance of DMBs in Nigeria. Using correlation and ex post facto research design, it was found that there is negative relationship between four liquidity risk buckets and financial performance of DMBs in Nigeria but only total liquid assets to liabilities is significant at 1% level. On the other hand, it was found that there is a significant positive relationship between total loan to total deposit as measure of liquidity risk and financial performance of DMBs in Nigeria. The study recommends that DMBs should make adequate provision for liquidity to meet up with depositors’ withdrawal demands at any given time. While shareholders and management should be mindful of the bank’s policy of granting loans to customers because it will affect their liquidity position which in turn have great impact in financial performance of DMBs.

Key words: liquidity risk, risk appetite, risk tolerance and financial performance

1. Introduction
The Nigerian banking has witnessed dramatic losses which are majorly balance sheet risk that is suddenly reported on capitalized bank financial statements. This is because ten deposit money banks (DMBs) were discovered by the Central banks of Nigeria (CBN) in its first and second around “stress test” to be in serious risk problem due to their inability of balance sheet to absorb shocks (risks) associated with intermediary role in the economy. Liquidity is crucial to the ongoing viability of any bank, as illiquidity or over liquidity can have adverse effects on even well capitalized banks.

The concern of this study is the liquidity risks in Nigeria DMBs, with particular reference to reconcile the conflicting requirements of bank liquidity risk (both illiquidity and over liquidity are undesirable to banking sector) and profitability arising from the conflicting desires of the two major providers of the bank resources; shareholders and depositors. The shareholders desire
maximum profitability as a return on their capital (which may force banks to hold little liquid asset because of the quest to make profitable investment), while the depositors opt for a maximum liquidity as a guarantee for their safety and ability of the bank to pay money on demand.

In Nigeria few studies are conducted on liquidity risk (Adebayo, David, & Samuel, 2011; Uremadu, 2012) in the area. The unexplored area that this study wants to address is the use of different proxies to connote liquidity risk and it enhances our understanding on how the different liquidity risk proxies impacted on the financial performance of deposit money banks in Nigeria. However, the directions of previous research findings on liquidity risk and bank profitability are mixed. Thus, (Molyneux &Thornton, 1992; Barth, Caprio, &Levine, 2003) found positive association and (Bourke, 1989; Demirgüç-Kunt & Huizinga, 1999; Kosmidou, 2005; Kosmidou, 2008) resulted to negative relationship. These finding may vary in Nigerian banking industry because of difference in the period economies and environments within which the studies are conducted.

Liquidity risk is the outcome from the disparity involving the maturities of the two sides of the balance sheet. It may arise from maturity mismatches where liabilities have a shorter tenor than assets. In other words, liquidity risk refers to the possibility that depositors will withdraw deposits from a bank in excess of its ability to obtain those funds except at considerably higher than normal costs. A sudden rise in the borrowers’ demands above the expected level can lead to shortages of cash or liquid marketable assets.

This disparity either results in an excess of cash that ought to be invested or result in a deficiency of cash that ought to be funded. The depositors may have good incentives to withdraw their deposits while not sufficient funds will be left in the bank, if they feel banks are encountering financial difficulties. Moreover, a bank’s deteriorating liquidity position is an important indicator of potential bankruptcy, and whether it is solvent or not, it is not cover by this research.

Recent research related to liquidity risk management requires banks to have sufficient liquidity to meet up with depositors and investors demand of funds. That bank creates liquidity by transforming illiquid loans into demand deposit which is given to investors in the forms of credits lines and loans commitment to invest in the markets of securities hence creating markets liquidity. Ford (2009) as cited by Xu (2012) argued that stress testing in analyzing the future possibility of liquidity exposure will help banks to mitigate the liquidity risk and ensure stability in financial performance of banks. Liquidity risk is a balance sheet risk that concern with the activities of banks on both sides of balance sheet. On the asset side, it enhances the flow of cash by lending it to the deficit unit, whereas the surplus unit saves its money on the liability side (Diamond &Rajan, 2001: Arif & Anees 2012)

The intermediary role of the bank’s exposure it to liquidity risk, that is the risk a bank may not meet its obligations (Jerinson, 2008) as the depositors may call their funds at an inconvenient time, causing sudden sales of assets at lower price (Diamond &Rajan, 2001), negatively affecting financial performance of the banks (Chaplin, Emblow & Michael, 2000)

Where crisis develops in a bank as a result of other problems such as deterioration in asset quality, the time available to the bank to address the problem will be determined by its liquidity. Therefore,
the optimization between financial performance and liquidity risk is the most vital activities of banks. The main objective of the study is to determine the effects of different types of liquidity risks on financial performance of deposit money banks in Nigeria. To achieve the above objective, the following hypothesis is formulated

\[ H_{01} = \text{Liquidity risk has not significant impact on financial performance of deposit money banks in Nigeria.} \]

The study investigates the impact of various types of liquidity risks on the financial performance of deposit money banks between 2005 and 2013 in order to sustain the stakeholders and depositors’ confidence in the banking industry. The choice of the period is important to the banking industry because it is post consolidation era, and it will indicate whether recapitalization of banks has really improved the resilience of Nigerian banks to various types of liquidity risks proxies. The study utilized secondary data that are obtained from financial statements of selected banks and financial ratios of risks and accounting based performance measures are used. The study is delimited by considering only impact of liquidity risk on the financial performance of deposit money banks in Nigeria. The research is not intended to cover other financial risks, off balance sheet risks, risks management. But it concentrates on balance sheet risks and the discussion considered only liquidity risk and financial performance DMBs.

The second section of the paper provides an overview of related literature and the third section presents the methodology used in the study. The fourth section provides the results and its discussion. The last section provides a conclusion and recommendations.

2.1 Review of Related Literature

This section focuses on the review relevant and related literature. The review is divided into four parts. The first part is concerned with the conceptual definition of liquidity risk. The second portion concentrates on the measurement of liquidity risk in the banks. The third section dwells on empirical review of existing literature on the relationship between different liquidity risks and financial performance. The fourth section discusses the theory that underpins the study and its model build- up. This part review theoretical literature on the concept of liquidity and liquidity risk to set the stage for detail discussion on liquidity risk.

Liquidity has been a source of worry to the management of banks due to the uncertainty of the future. Liquidity is a financial term that means the amount of capital that is available for investment. This is because the financial institutions that do most investments prefer using borrowed money. High liquidity means there is a lot of capital because interest rates are low, and so capital is easily available.

The term liquidity is often used in multiple contexts. An asset’s liquidity can be used to describe how quickly, easily and costly it is to convert that asset into cash (Berger & Bouwman, 2008). Liquidity can also be described as the amount of cash or near cash assets a company has; the more liquid assets, the higher a company’s liquidity. According to Xu (2011) bank liquidity refers to a bank’s ability to match its deposit withdrawals and pay off liabilities as they become due. Kroszner (2008) defines liquidity as the ability to fund increase in marketable securities and meet obligations as they become due. Some studies posit that liquidity and solvency are the heavenly twins of
banking (Charles, 2008), frequently indistinguishable. An illiquid bank can rapidly become insolvent. In the context of this work, liquidity is defined as the ability of a bank to fund increases in assets and meet obligations as its come due, without incurring unacceptable losses. Both illiquidity and excessive liquidity are undesirable and often described as liquidity risk.

Liquidity risk has many definitions in the literature; however, most of the definitions of liquidity risk concentrate on the counterparty to a transaction. In this sense the term means the risk inherent in the fact that the counterparty may not be able to pay or settle the transaction even if they are in good financial standing, because of a lack of liquidity (Petria & Petria, 2009). According to Adebayo et al (2011) liquidity risk is the ability of a bank to fund increases in assets and meet obligation as they come due, without incurring unacceptable losses. The fundamental role of banks in the maturity transformation of short-term deposit into long-term loans makes banks inherently vulnerable to liquidity risk.

While, Ariffin (2012) argued liquidity risk means risk that arises from maturity mismatches whereby liabilities have a shorter tenor than assets. Also, Banque de France Financial stability Report (BFFSR, p.47) refers to liquidity risk as the inability of the bank to manage its liquidity position in order to cover mismatch between future cash outflow and cash inflow. In the context of this study, it defines liquidity risk as the risk of losing earnings and capital gain due to an inability to meet obligations (liabilities) in a timely manner when they become due.

The literature has documented the sources of liquidity risk in banking business. On the liability side, there is uncertainty with regards to the amount of withdrawals of deposits or the renewal of rolled-over on the inter-bank loans. This is especially so when the bank is under suspicion of insolvency, when there is an aggregate liquidity shortage or when the economy suffers from a macroeconomic shock. On the assets side, there is also some uncertainty on the volume of new requests for loans that a bank will receive in the future. Although, the bank could refuse to grant new loans, it would lead to the loss of profit opportunities. It could also be detrimental to the borrowing firm if it is credit is rationed and has no any other options.

Liquidity risk for a bank is especially prevalent as it is easy for a bank to lose its liquidity because depositors can withdraw funds when they choose. In addition to depositors, banks face another liquidity risk in which their cash reserves can be strained by fulfilling obligations to companies that have previously established loan commitments, called credit lines, that can be borrowed from the bank when needed (Gatev, Schuermann & Strahan, 2007).

According to Chaudhry (1991) the bank will become exposed to liquidity risk due to these loan commitments because of the possibility that many customers may decide to borrow from the bank at the same time. This will be true in the event that alternative sources of funds may be costlier or simply not available. In order to satisfy this unexpected need of funds, banks may have to compete for funds aggressively. This will raise their funding costs.

Shoeck (2002) argued that the fundamental role of banks in the maturity transformation of short-term deposits into long-term loans makes banks inherently vulnerable to liquidity risk, both of an institution-specific nature and that which affects markets as a whole. Liquidity risk arises if a bank has to pay a premium over market value in order to fund its assets (Brewer and Lee 1986). It is in view of this, that liquidity risk management becomes imperative for banks. Vanders, Vossen and
Vaness (2010) define liquidity risk management as the ability of bank to own sufficient liquidity or cash to meet up with unexpected demand from depositors so that bank can continue to perform its duties. Beaver, Kettler, and Scholes (1970) also argued that liquidity risk is reduced if a bank holds greater levels of current assets. Evidently, current assets have less volatile return than long-term assets. Jahankhani and Morgan (1980) however argued that banks that have greater holdings of short-term liabilities (deposits and purchased funds), are potentially exposed to liquidity problems if asset quality declines. Jara and Winkler (2005), in their study of Chile’s banking sector argued that difference in asset composition and the growing presence of institutional investors in their funding structure serve as factors that increase liquidity risk.

### 2.3 Proxies for Measuring Liquidity Risk

Besides internal liquidity measurement of bank’s risk management purpose, there are also some external liquidity measurements for the purpose of analysis bank’s liquidity risk management from marketing point of view since internal daily data from bank are not easily accessed for investors and analysts. Two main methods were identified in the literature for measuring liquidity risk namely; quantitative method and qualitative methods. This study used the quantitative method in measuring liquidity risk. Quantitative method focuses on the maturity mismatch of balance sheet items of assets and liabilities which is otherwise known as liquidity gap. Banks use this method to measure liquidity need under going concern and stress market condition.

#### Deviation of Liquidity Assets to Liabilities as Measure of Liquidity Risk

This ratio measures the ability of a bank to pay its short-term obligations when they become due. Higher ratio; generally ratios closer to or greater than 1 are more desirable. Sanya, Mitchell and Kantengwa (2012) used this ratio as measure of liquidity risk; they further explained that short duration of assets and liabilities in the Rwandan banking system makes the monitoring of this ratio particularly important. Also, Arifin (2012) used this ratio liquidity asset to liabilities as measure of liquidity risk and found that it has a positive relationship to ROA whereas it has indicated negative relation to ROE. Hakim & Neaime (2012) use the variable as measure of liquidity risk in Egypt and Lebanon, they found positive but insignificant across banks which seem to have discernible impact on financial performance. In another study conducted by Raziqa (2013) using Indonesian conventional banks data found that liquidity risk has significant positive relationship with both ROE and ROA while it has negative relationship with NIM. Elsiefy (2013) used the same ratio as measure of liquidity risk and found insignificant negative relationship with ROE, ROA, NIM and RORWA.

#### Difference of Total Assets and Liabilities to Total Asset as Measure of Liquidity Risk

Financial gap ratio introduced by Saunders and Cornet (2007) is used in this study. They expressed that liquidity risk criterion is determined based on financial gap. Bank managers mostly assume core deposits as stable source of funds which can permanently finance the supply of banking loans. Generally, core deposits are regarded as loan resources with the least cost. Financial gap is defined as the difference between loan and bank's core deposits. If financial gap is positive, the bank should fill this gap by its cash funds through selling cash assets and borrowing from money market. Therefore, financial gap can be estimated by subtracting the borrowed funds from the cash assets. This financial gap represents financial needs of the bank after selling its cash assets. When the economy is under stagnation and financial market increasingly demands for Cash funds, it is when the banks are more exposed on liquidity risk. Therefore in this study, it seems that financial gap is
a more appropriate alternative for liquidity risk of the bank. For standardization of financial gap, the variable of financial gap is divided by total asset.

Sohami (2013) found liquidity risk has significant positive relationship profitability of bank using Malaysian data. This ratio as measure of liquidity risk was applied by Tabari et al (2013) in Iranian banks and found significant negative relationship with ROE. Arif and Anees (2012) using Pakistani banking system found a significant negative relationship between liquidity gap and performance.

**Difference of Total Deposit and Loan to Total Deposit as Measure of Liquidity Risk**

Liquidity gaps arising due to inadequate funding pose a formidable threat to the solvency of an institution. Banks are aware of the need to devise appropriate contingency funding plans in order to combat these gaps and ensure their status as a going concern. This ratio as measure of liquidity risk was used by Tabari et al (2013) in Iran and found significant negative relationship with ROE. Sohami (2013) found liquidity risk has significant positive relationship profitability of bank using Malaysian data. Similarly, Arif and Anees (2012) using Pakistani banking system found a significant negative relationship between liquidity gap and financial performance of banks.

**Total Loan to Total Deposit Portfolio as Measure of Liquidity Risk**

For bank’s liquidity structure analysis, loan to deposit ratio shows the level of pressure bank has to meet its general obligations to its depositors. In this study, loans and deposits are from both private customers and other banks and financial institutions. Normally, total loans of bank should be little less than total deposits; otherwise bank needs to borrow extra money in debt security market with higher interest rate charges. When the landings (due from customers and banks) are generally higher than borrowings (due to customers and banks), it indicates that bank’s interest rate of receivables must be more than payable to debt security borrowing. On the other hand, if this ratio is much lower than 1, it indicates that normally bank has no enough interest receivables from its business lines and has to face the stress of match up with depositors’ obligations. Loan to deposit as a proxy for liquidity risk measure the extent in which bank is funding its illiquid assets with stable liabilities. The lower ratio means banks dependence more on deposit to finance loan. The higher the ratio the lower the liquidity risk and the lower the opportunity for profit. Liquid assets are used to measure the size of available cash and near cash assets to meet the withdrawal demand. This demand could be demand for loans withdrawals of demand deposits and opportunities for investments in securities. Failure to provide adequate liquidity to meet the demands of depositors or creditors can cause a shutdown of a bank within a short period. Kumar, Harsha, Anand and Dhruva (2012) used this ratio in India as measure of liquidity risk. Similarly, Sanya et al (2012) used same proxies to measure liquidity risk in Rwanda. Furthermore, Khouri, (2011) studied 43 commercial banks operating in the 6 of the Gulf Cooperation Council (GCC) countries over the period 1998-2008. It was found that the ratio liquid assets to deposits are negatively related to ROA and statistically significant, while it is positively related to ROE. The negative result is consistent with the findings of Molyneux and Thorton (1992) and Guru et al. (1999) who find a negative relationship between bank profitability and the level of liquid assets held by the bank.

Loan to deposit ratio is the most commonly used liquidity ratio by both banks and analyst. Basically, it measures the liquidity condition of the bank. For a listed bank, there are pressures
from shareholders to see profit from bank’s operation. Generally, with higher LD ratio, the more likely the bank is relying on borrowed funds. If receivables from loans are delayed or withdrawals from deposit side exceeds new deposit significantly over a short term of period, bank will take more financial stress by having excessive loans and more risky to meet depositors’ obligations by selling an amount of loans at loss. Xu (2011) using quoted European banks found a positive relationship between loan to deposit as measure of liquidity and ROA. Similar results were reported in the study of Dietrich & Wanzenried (2011); Valverde & Fernandez. (2007) and Bourke (1989). Elsiefy (2013) used the same ratio as measure of liquidity risk and found insignificant negative relationship with ROE, ROA, NIM and RORWA.

**Loan to Total Assets Portfolio as Measure of Liquidity Risk**
This ratio is a good supplement for L/A ratio, which indicates the proportion of total assets a bank has invested for loans. Theoretically, the higher ratio it is, the higher profits are generated from banks loan investments but also with higher exposure to liquidity risks. Another indicator shows the degree of liquidity risk at level of structure, L/A ratio shows the basic concept of which bank is bearing higher liquidity risk. Loan to Asset ratio is also an important ratio which measures the liquidity of a bank. It measure liquidity of the bank in terms of bank’s total assets. It shows the proportion of total assets of the bank which have invested for loans. The higher LA ratio is the less liquidity of the bank and at the same time, higher potential profitability the bank can enjoy with exposure to liquidity risk. Hoseininanssah et al (2012) they use same proxies in Iran and found significant negative relationship with efficiency of banks. Xu (2011) using quoted European banks reported negative relationship between loan to total asset as measure of liquidity and ROE and NIM. This relationship is similar with the one displayed in the study of Kosmidou et al (2005); Kosmidou (2008); Molyneux & Thornton .(1992).Elsiefy (2013) used the same ratio as measure of liquidity risk and found insignificant negative relationship with ROE, ROA,NIM  and RORWA.

**Cash to Total Asset Portfolio as Measure of Liquidity Risk**
As one of the most important short term liquidity risk indicator for commercial banks, cash position ratio here shows the confidence of bank match up obligations to all depositors without time delay. Cash is the most liquid asset hold by the bank, but does not create any interest or earnings at the same time. A bank could keep its cash account match with obligation from liquidity exposure by estimating the liquidity gap between loans and deposits. The cash position ratio measures how well banks can match their short term obligations without curtailing credit business. The higher the cash position ratio is the lower liquidity risk. Hoseininanssah et al (2012) they use same proxies in Iran and found insignificant positive relationship with efficiency of banks. Akhtar et al (2011) they use this nexus as measure of liquidity risk in Pakistan found significant positive relationship between liquidity risk and ROA while it had shown significant relationship with ROE. Xu (2011) using quoted European banks found negative relationship between cash to total asset as measure of liquidity and ROE and NIM. This relationship is similar with the one displayed in the study of Kosmidou et al (2005); Kosmidou (2008); Molyneux & Thornton .(1992). Sohami(2013) using Malaysian banks found liquidity risk has significant positive relationship profitability.

### 2.5 Theoretical Framework and Model Build Up
The theoretical underpinnings that guide this study are discussed below:
**Risk-Return Theory**
Banking is both a risk-taking and profit-making business, and bank activities should return profits commensurate with their risk. Although this theory is intellectually sound and almost universally accepted by bankers and regulators, but banks have had difficulty implementing it in Nigeria. Traditional theory of risk return can be applied under the condition of risk. The theory posits that the higher the risk the higher the return and vice versa. This suggests that banks virtually all circumstances are expected to behave rationally. Therefore, conventional economic wisdom suggests that risk-return is positive (Brealey & Myers, 1981). Existing research studies have largely supported a positive risk return relationship.

Given that performance will depend on level of risk (high or low). The higher the risk, the higher will be the financial performance and vice versa. This postulation is true when the banks risk appetite is lower than the risk tolerance.

**Risk Sensitivity Theory**
Risk sensitivity theory provides an account on how reference point conceptualized as minimal acceptable requirement or need may affect risky choice (Stephen 1981, Stephen & Krebs 1986). According to the theory, decision makers should prefer high risk option in situation of high need of performance when low risk options are unlikely to meet the financial performance. The need of performance refers to the disparity between deposit money banks.

In the course of modeling of financial performance and risk, the theory of risk-return is used. The conceptual framework of the theory postulated that the higher the risk the higher the financial performance, if the risk appetite of the bank is lower than the risk tolerance. But, if the risk appetite of the bank is higher than the risk tolerance, the theory postulated that the higher risk the lower is the financial performance. Therefore, firm performance is function of risk given as:

Financial performance = F(Risk)……………………………….i

Risk is defined as uncertainty, that is, as the deviation from an expected Outcome. Risk is represented by amount of exposure;

\[
\text{Amount of exposure (Risk)} = \text{actual value} - \text{expected value (means)} = \delta^2 X
\]

Where \(\delta\) = Deviation in the variables and \(X\) = variable

Risk is inherent to the business of banks that causes tremendous change in financial performance of deposit money banks in Nigeria. Following the Risk-Return Hypothesis, the model expressed the desire relationship as;

\[
\Delta PF_{it} = \alpha_{it} + \beta_1(X)_{it} + \mu_{it} \ldots\ldots\ldots\ldots..ii
\]

Where; \(PF\) = Financial performance, \(X\) = various liquidity risk proxies, \(\beta\) = Parameters of explanatory variable of various independent variable, \(\alpha\) = Intercept, \(\mu\) = Error term \(\Delta\) = changes and \(\delta^2\) = deviation

From the equation 2, the financial performance can be measured using ANIM which is modeled endogenously. While major risk inherent to the business of banks is Liquidity Risk which is
modeled exogenously. If it is hypothesized that bank problem is related to the conversion of liquid asset into cash at higher cost as result of increase of banks obligation (liabilities). It is expressed as $\Delta LA/\Delta L$ where by deviation liquid asset ($\Delta LA$) occurred as result of deviation from liabilities ($\Delta L$). This will affect banks financial performance adversely. If the depositors start withdrawing the deposit s from the banks, it will create a liquidity trap for the banks (Jeanne & Svensson, 2007: Kumar, 2008) for forcing bank to sale it marketable assets at lower price or borrow fund from central bank and interbank market at higher cost (Diamond and Rajan, 2001) Under this condition, the banks are said to be experiencing liquidity risk as modeled below;

$$P_{Fi} = \alpha_{it} + \beta_1 (\Delta LA/\Delta L)_{it} + \mu_i$$ \hspace{1cm} iii

If the banks also experience liquidity risk as result of liquidity gap of corporate lending which may poses a challenge to maintain the required liquidity position to satisfy the demand of the depositors (Akhtar, 2007). It will give rise to the serious liquidity risk in the banks because these loans are mostly long term in nature (Kashyap, Rajan & Stein, 2002) and the loan repayment process may slowdown during the period of poor production in the economy. Basel III required banks to have a “liquidity covering ratio” of levels because of it short term effect on the performance of banks (Basel Committee on Banking Supervision, 2010). The liquidity risk model will be improved from equation (3) to numerically capture this condition as;

$$P_{Fi} = \alpha_{it} + \beta_1 (\Delta LA/\Delta L)_{it} + \beta_2 (TD-TL/\Delta TD)_{it} + \mu_i$$ \hspace{1cm} iv

One of the prime of liquidity risk is the immaturity mismatch between asset and liabilities (Brunner meter & Yogo, 2009). This mismatch can be measured with help of maturity gap between assets and liabilities (Falconer, 2001: plochan 2007). Basel III required banks to have a “net stable funding” of 100% because of its long term effect on the performance of banks (BCBS, 2010). The model defined by Equation (4) will be enhanced to incorporate long term liquidity gap and it will be treated mathematically as;

$$P_{Fi} = \alpha_{it} + \beta_1 (\Delta LA/\Delta L)_{it} + \beta_2 (TD-TL/\Delta TD)_{it} + \beta_3 (TA- L/\Delta TA)_{it} + \mu_i$$ \hspace{1cm} v

If the liquidity problem of bank has to do with mismatch in the balance sheet items of deposit and loan that lead to shortest of funds or excess of fund and it causes higher or lesser financial performance of banks. Balance sheet structure can provide an important insight on banks’ liquidity risk. More specifically, the ratio between credit granted and deposits taken from customers provides a broad structural characterization of banks’ main funding risks (Jeanne & Svensson, 2007: Kumar, 2008). The model is given by;

$$P_{Fi} = \alpha_{it} + \beta_1 (\Delta LA/\Delta L)_{it} + \beta_2 (TD-TL/\Delta TD)_{it} + \beta_3 (TA- L/\Delta TA)_{it} + \beta_4 (\Delta TL/\Delta TD)_{it} + \mu_i$$ \hspace{1cm} vi

Every bank tries to keep sufficient fund to meet the unexpected demands from depositors (Majid, 2003) but maintaining the cash expensive because of the loss opportunity (Holmstrom & Trole, 2000). The banks maintains of large cash may not only lose opportunities in the market but also have to bear the cost associated with keeping large cash. If the bank also experiences this liquidity risk, it will integrate in the liquidity risk model mathematically as:
PF_{it} = \alpha_{it} + \beta_1(\Delta L_A/\Delta L)_{it} + \beta_2(TD-TL/\Delta TD)_{it} + \beta_3(TA-L/LTA)_{it} + \beta_4(\Delta TL/\Delta TD)_{it} + \beta_4(\Delta C/\Delta TA)_{it} + \mu_i 

Finally, based on the risk sensitivity theory, the study will conduct sensitivity analysis to identify the most sensitive proxies of various liquidity risks. The most sensitive variables will be used in liquidity decision making to optimize the risk appetite and risk tolerance of deposit money banks in Nigeria.

3. Methodology and Models

In this research work, multi regression model and correlation research design are used to address the research problems. Moreover, the purpose of regression is to establish the impact of liquidity risk proxies on financial performance of deposit money banks in Nigeria. While, correlation research design is employed to explain the relationship between liquidity risk and financial performance of deposit money banks in Nigeria. Data are sourced from published financial reports of deposit money Banks in Nigeria for the period of Nine (9) years (2005 to 2013). The population of this study is made up of all the Deposit Money Banks of the Nigerian banking sector and they are 25 in number as at the year ended 31st December, 2005. The sample size of the study is 11 banks drawn from the defined population and it is arrived at by using Yamane (1967) adjusted sample size formula, which is represented thus:

\[ n = \frac{n_0}{1 + (n_0 - 1)/N} \]

Where:
\( n \) = Adjusted Sample Size
\( n_0 \) = Sample size prior to Adjustment
\( e^2 \) = Level of precision
\( N \) = Population Size

A 90% Confidence level is used and \( P = 0.1 \) are assumed.

On substituting the value of \( N=25 \) and \( e=0.1 \), we have \( n_0 = 25/(1+25(0.1)^2) = 20 \). On substituting the value of \( n_0 \) in the adjusted sample size formula we have \( n = 20/(1 + (20-1)/25) = 11.3333 \), in which case we have decided to take the nearest number to the sample size figure. Simple random sampling is a basic sampling design adopted in selecting the sample; this is because it allows equal representation. The randomly selected sample banks are Access Bank, Guaranty Trust Bank, Fidelity Bank, First City Monument Bank, Ibtc Bank, Sky Bank, United Bank For Africa, Zenith Bank, First Bank, Diamond Bank And Union Bank Of Nigeria.

A balanced panel data of 9 years of deposit money banks are used under the study, to examine the relationship between dependent variables that is financial performance and independent variables that is various liquidity risks. The study uses five (5) proxies for both financial performance and liquidity risks. Based on the aforementioned proxies, liquidity risk sensitivity analysis is conducted to identify the most influence proxies on the financial performance of deposit money banks in Nigeria. Liquidity risk sensitivity is used to examine which of the risk variables exert greater influence on the various financial performance deposit money banks compare to other variables. It could be used as a basis for taking effect decision for determine the risk appetite and risk tolerance of deposit money banks in Nigeria by relating the financial performance to different liquidity risk variables. Therefore, the research uses the multiple regression sensitivity analysis models as a backdrop for its model specification;
Regression models

\[ dNIM = F((\Delta LA/\Delta L), (TD-TL/\Delta TD), (TA-L/\Delta TA), (\Delta TL/\Delta TD), (\Delta C/\Delta TA)) \]  

\[ dNIM_t = \alpha + \beta_1(\Delta LA/\Delta L)_t + \beta_2(TD-TL/\Delta TD)_t + \beta_3(TA-L/\Delta TA)_t + \beta_4(\Delta TL/\Delta TD)_t + \mu_i \]

Table 1: Definition and Measurement of Variables:

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Operational definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>dNIM</td>
<td>Deviation in (Interest Income-changes of Expenses) / Deviation in average interest bearing assets</td>
</tr>
<tr>
<td>Independent Variables</td>
<td>Meaning Of Liquidity Risk Proxies</td>
</tr>
<tr>
<td>DLIQ</td>
<td>Deviation in Liquid assets to Deviation in liabilities</td>
</tr>
<tr>
<td>TDITTD</td>
<td>Difference of total deposit and loan to Deviation in total deposit</td>
</tr>
<tr>
<td>TALT</td>
<td>Difference of total assets and liabilities to Deviation in total asset</td>
</tr>
<tr>
<td>TLTD</td>
<td>Deviation in Total loan to deviation total deposit</td>
</tr>
<tr>
<td>CTA</td>
<td>Cash to total asset</td>
</tr>
<tr>
<td>Coefficient &amp; Constant</td>
<td>Meaning Of Constant And Coefficient Of Parameter</td>
</tr>
<tr>
<td>U</td>
<td>Error term</td>
</tr>
<tr>
<td>( \beta_1 ) to ( \beta_5 )</td>
<td>Parameters of explanatory variable of various dependent variable</td>
</tr>
<tr>
<td>( \Delta )</td>
<td>Deviation from the expected (means)</td>
</tr>
</tbody>
</table>

Sources: different literature reviewed by the author

4. Results and Discussion of Findings

This section of the study is devoted to presenting the results of the analysis performed on the data collected to test the propositions made in the study and provide solution to research problem. Analyses were carried out with the aid of the Statistical Package of Stata (Stata 12.0). The summary of the diagnostic test and regression result are given below;

In this study normality of the regression models’ residuals is tested using inferential methods to ensure there is no evidence for outliers in both data and its residuals. Inferential method of Shapiro-Wilk, revealed that the data is normally distributed.

4.2 Regresssion Results
In order to ensure that the results of the study are robust, several diagnostics test were performed namely hetroscendasticity test, multicollinearity test and normality test. This test is conducted to check whether the variability of error terms is constant. The choice decision between ordinary least square model and generalized least square model (fixed and random effect model) is based on this test. The present of hetroscendasticity signifies that the variation of the residual of error terms is not constant and it affects the inferences in respect of bête coefficient, coefficient of determination and f-statistics of the study. The result reveals that there is not presence of hetroscendasticity because the probability of the chi square is greater than 5%.this provides us with enough evidence to accept the hypothesis that the data are homoscendastic, hence the use of ordinary least square model for testing the hypothesis of the study.

In attempting to detect multicollinearity, we check whether there is a significant correlation among the independent variables which may mislead the result of the study. From the result of the study, the estimated VIF values were small (much less than 10, the rule of thumb) with average of 1.07 indicating an absence of significant multicollinearity among explanatory variables used in the table 4.2 regression result.

The empirical evidence revealed that there is positive relationship between financial performance and liquidity risk. The coefficient of total loan to total deposit (TLTD) as measure of liquidity risk showed a positive relationship to financial performance of deposit money banks in Nigeria. Moreover, the p-value coefficient of the total loan to total deposit is statistically significant at 1% level and it account for 16.73% variation in financial performance. This is result is consistent with priori research of Xu (2011) using Europeans banks and Sanya (2012) using Gulf Cooperation Council. Who found that total loan to total deposit had positive relationship with financial performance of banks. The result also provides empirical support to for risk-return theory. That is,
the higher the liquidity risk the higher the return and vice versa. This result indicated that there was an attempt by the Nigerian banks to judiciously using deposit in profitable investment in short run but it has not be optimized to the latter because the risk appetite is lesser than the risk tolerance of DMBs. In contrast to this finding some studies that documented negative relationship between total loans to total deposit as proxies for liquidity risk (Sanya, 2012; Kumar et al. 2012 & Elsiefy, 2013). Practically, deposit money banks have been keeping the funds to meet-up with depositors demand of small and medium withdrawals at the expense of extending loans to customers that will generate profit for shareholders.

While the total liquid assets to liabilities (DLIQ) as proxies for liquidity risk showed a negative relationship to financial performance of deposit money banks in Nigeria. The p-value coefficient of the total liquid assets to liabilities is statistically significant at 1% level and it account for 13.38% variation in financial performance but it is statistically significant at 1%. This result is in line with findings of (Kantegwa, 2012; Elsiefy, 2013; Rasiqa, 2013). This empirical result has shown the risk appetite is greater than the risk tolerance of DMBs. In the long run DMBs experience serious liquidity risk that may force the banks to sales the liquid asset at lower price or borrow from CBN or other banks at higher cost which will affect its profitability. In contrast to this findings (Ariffin, 2012; Hakim & Neaime, 2012) documented that liquidity risk has positive relationship with financial performance of banks. Practically, deposit money banks have been extending loans to generate profit for shareholders at the expense of depositors’ demands huge withdrawals.

TALT, TDTLD and CTA as proxies for liquidity risk have shown a negative relationship to financial performance of deposit money banks and it is insignificant at 10% level. These findings are in line with those obtained as a priori (Arif & Anee 2013; Tabari 2013; Hoseininanssah,2013; Xu,2011) found negative relationship between liquidity risk and financial performance of banks. These have shown that the risk appetite is greater than the risk tolerance, even though it not significant. In contrast to that other studies documented positive relationship between liquidity risk and financial performance of banks (Aktar et al. 2011; Khouri, 2011; Elsiefy 2013). Practically, deposit money banks have been extending loans to generate profit for shareholders at the expense of depositors’ demands slightly above the banks risk tolerance.

The R² and adjusted R² values which indicate the explanatory power of the independent variables are 0.70 and 0.69 respectively. This means that 70% of the variation in financial performance of deposit money banks is explained by the variation in the liquidity risk, while 30% of the variation in financial performance is explained by the variation in the other factors. Model is well specified because it is significant at 1% level.

5. Conclusion and Recommendations
Based on the above result, the study concluded that total loan to total deposit (TLTD) as measure of liquidity risk is the most influence to financial performance of deposit money banks in Nigeria. This suggests that investors, depositors and management of deposit money banks should always watch the liquidity risk proxies before making their savings and investment decisions. Banks that make adequate provision for liquidity will meet depositors’ withdrawal demands at any given time. While shareholders should mindful of the bank policy of granting loans to customers because it will affect their liquidity position which will in turn have great impact in financial performance of DMBs.
Also, liquidity risk and profitability in banks are two sensitive issues in the operations of DMBs, it is concluded that both illiquidity and excess liquidity are "financial diseases" that can easily erode the profit base of a bank as they affect bank’s attempt to attain high profitability level. The pursuit of high profit without consideration to the liquidity level can cause great illiquidity, which reduces the customers' patronage and loyalty. Therefore, DMBs should aim at optimize both their profit level and liquidity level (where risk appetite equates with risk tolerance).

Based on the critical evaluation of the above findings, study recommends the followings:

i. Since the survival of DMBs depend on liquidity and profitability level, they should not solely concentrate on the profit maximization concept but should also adopt measures that will ensure effective liquidity level. The measures will help to minimize or avoid cases of excessive and deficient liquidity as they effects operation of DMBs.

ii. DMBs should not keep excessive liquidity as a provision for unexpected withdrawal demands of the customers, the commercial banks should find it reasonable to adopt other measures of meeting such requirements, which can include borrowing and discounting bills. In addition, the surplus funds of the commercial banks should be seasonally invested in short-term instruments of the money market.

iii. DMBs should schedule the maturity periods of their secondary reserve assets to correspond to the period in which the funds will be needed.

iv. The DMBs should create a customer forum where their customers will be educated on varieties of deposits and the operational requirements of each of them. A situation where the customers operate any of the deposits as required, the DMBs will be able to estimate the liquidity level to be maintained.

References


Hosseininassab E Yavari K., Mehregan N., Khosshsima R., (2012) effect of risk parameters (credit, operational liquidity and Market risk) on banking system efficiency (studying 15 top banks of irans) journal of basic applied science research 2(20) pp 5466-5577
Kumar, V. (2008), “Why liquidity is important for banks”, available at: www.gtnews.com/article/7362.cfm#request.location# (accessed May 9, 2010).
Musakwa FT (2013) measuring funding liquidity risk Wit Business School University of Thewitwaterstand Johannesburg South Africa.
Sanya, S. Mitchell, W. and Kantengwa, A. (2012) Prudential Liquidity Regulation in Developing Countries: A Case Study of Rwanda International Monetary Fund
Sohaimi A. A. (2013) liquidity risk and performance of banking system in Malaysia, *Luqman Daffie Institute Johor, Malaysia*


Tabari NY, Ahmadi M., Emami M. (2013) the effect of liquidity risk on the performance of commercial banks international research journal of applied and basic sciences available online at [www.irjabs.com](http://www.irjabs.com)


