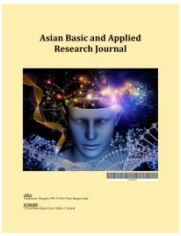

Asian Basic and Applied Research Journal

Volume 7, Issue 1, Page 1-14, 2023; Article no.ABAARJ.1208

Firm Characteristics and Liquidity Transformation: Evidence from Commercial Banks in Nigeria

Malgit Amos Akims [a*], Kanang Amos Akims [b] and Amos Amushe Akims [c]

[a] Department of Public Policy and Administration, Kenyatta University, Nairobi, Kenya.
[b] Department of Economics, Faculty of Social Sciences, University of Jos, Jos, Nigeria.
[c] Threshold Farms Enterprises, Rayfield, Jos, Plateau State, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

Received: 21/10/2022
Accepted: 30/12/2022
Published: 05/01/2023

ABSTRACT

Liquidity transformation is one of the main concerns of commercial banks since it is crucial for their existence. In carrying out financial intermediation role, banks are often faced with issues relating to liquidity transformation, hence exposed to the likelihood of bank runs. The liquidity levels of commercial banks in Nigeria have over time been characterized by a fluctuating trend. The current study sought to examine the effect of firm characteristics on liquidity transformation with focus on commercial banks in Nigeria. The relationship between firm characteristics and liquidity transformation was underpinned by Financial Intermediation Theory, Market Power Theory, Efficiency Structure Theory and Capital Buffer Theory. Causal research design was adopted and based on purposive sampling of seventeen commercial banks that fully operated in Nigeria for the period 2010 to 2017, only fifteen of these banks were covered due to unavailability of data. Panel regression analysis was applied and the study found that bank size and capital adequacy had insignificant effect on liquidity transformation of commercial banks in Nigeria. It was further established that management efficiency (β=0.0003, p=0.001) and earnings ability (β=-0.3301, p=0.000) had significant effect on liquidity transformation of commercial banks in Nigeria. The study recommends that bank management should strive towards the minimization of operational expenses while maximizing revenue so as to ensure a smooth financial intermediation process. The study also recommends that income generated from the financial intermediation role of banks should be properly managed with a relative share of it channeled towards further intermediation

**Corresponding author: Email: malgitakims@gmail.com;*

activities; this in turn will increase liquidity levels in view of a growing net interest margin. Notably, bank size and capital adequacy had insignificant effect on liquidity transformation of commercial banks in Nigeria. Due to these findings, further studies can be done on the effect of bank size and capital adequacy on liquidity transformation of commercial banks in Nigeria for a longer time frame. Other firm characteristics may also be considered in view of the unexplained 38.57 percent variation in liquidity transformation.

Keywords: Firm characteristics; bank size; capital adequacy; management efficiency; earnings ability; liquidity transformation; commercial banks.

1. INTRODUCTION

Commercial banks globally perform significant intermediation roles of accepting funds in the form of deposits from the public while transforming such funds into loans to borrowers [1]. Liquidity transformation traditionally stands as the preeminent function of commercial banks, however also the primary source of susceptibility which in turn serves as the rationale for their protection through a public safety net (usually in the form of deposit insurance) [2]. Before the occurrence of the 2007/2009 global financial crisis, bank regulation was primarily focused on capital requirements. However, during the period of the crisis, several banks (despite holding adequate capital levels) were faced with significant liquidity issues [3]. Notably, liquidity transformation serves as the major channel by which banks influence economic development [4]. In response to the liquidity problems, global liquidity standards were introduced by the Basel Committee which aimed at reducing risks emanating from excessive liquidity transformation. The crisis also led to central banks increasing the scope and size of lending activity for purposes of safeguarding financial stability while supporting the real economy [3].

In the United Kingdom, since the crisis the Bank of England (BoE) significantly expanded its Sterling Monetary Framework facilities so as to ensure that banks are offered effective liquidity issuance, hence enhancing financial stability and facilitating monetary policy transmission by safeguarding market liquidity [5,6]. Bank regulators in the United States of America since then implemented the Liquidity Coverage Ratio (LCR) requirement which mandates that banks with total assets worth more than $50 billion to hold high-quality liquid portfolio of at least as large as the total net cash outflows which is expected over a 30-day stress period from the year 2013, hence serving as one of the most important regulatory reforms in the post-crisis banking system [3]. Similarly and in response to the liquidity crisis, South African banks increased their liquid assets holdings. Luvuno [7] stressed the need for South African banks to enhance deposit-taking ability while tightening their loan-underwriting criteria (credit policies) as well as put in place proactive collection strategies.

In Nigeria, the financial sector is dominated by commercial banks, thus, implying that the process of financial intermediation will also be skewed and largely dependent on these institutions. Additionally, the banking industry is based on an oligopolistic market structure as few large banks dominate and control the industry. The ability of a bank to meet its financial obligations when due is important for continued operations [8]. Liquidity transformation itself is considered the primary source of economic welfare contribution attributed to banks. However, it also stands as their primary source of risk. As such, financial transactions or commitments by banks have resulting implications for their liquidity levels [9]. Banks therefore should at a reasonable cost have readily available or immediately expendable funds at the time those funds are needed. This is as the lack of adequate liquidity is often associated with bank collapse. In line with financial intermediation theory, banks play two central roles in the economy which are liquidity creation and risk transformation [10].

Commercial banks notably serve as a channel by which monetary policies are executed by the Central Bank. However, in carrying out the role of maturity transformation of short-term deposits into long-term loans, commercial banks are inherently exposed to liquidity problems which can have underlying multiplier effect on the financial sector as a whole [11]. Conversely, holding of excess liquid assets by banks that are non-earning assets which include non-interest bearing deposits and cash can be detrimental to profitability. As such, striking a balance between the two by satisfying profitability target while

meeting the financial demands of customers by maintaining optimum level of liquidity remains paramount [8]. Through the transformation of liquid liabilities into illiquid assets, commercial banks facilitate production and investments while contributing to economic growth.

With respect to the banking sector, liquidity entails the availability of funds or the assurance that funds will be readily available with on and off balance sheet commitments upon maturity. The commitments are fulfilled through the ability of banking institutions to convert their assets into cash without incurring losses. This shows that a mismatch between the assets and liabilities has a resulting effect on banks' capital structure fragility. The major reasons as to why banking institutions are considered fragile is due to their role of maturity transformation as well as provision of insurance regarding the potential liquidity needs of depositors [10]. The liquidity of banks is documented to be dependent on firm characteristics which are influenced by the individual behaviour of banks. Firm characteristics are individual bank attributes which are influenced by the internal decisions of boards and management, therefore within the scope of banks. These factors differ from bank to bank and they include but not limited to management efficiency, bank size, earnings ability and capital adequacy.

1.1 Statement of the Problem

Commercial banks are the most vital component of the financial system due to their ability of offering a wide range of services which includes the provision of liquidity and safekeeping of savings for depositors [12,13,14]. Additionally, depositors are provided with an avenue of having interest income on excess funds deposited in banks. For borrowers, apart from having the opportunities of accessing future income for purposes of consumption, they are similarly provided with funds for investment purposes [15,16]. As such, the role of liquidity transformation (transforming illiquid assets into liquid assets) performed by banks cannot be overemphasized. Commercial banks however, are able to perform this role effectively when they hold an adequate level of liquidity.

Commercial banks carry out significant activities on both sides of their balance sheets. With respect to the asset side, banks provide loans to illiquid borrowers while on the liability side; they function in providing liquidity to customers on demand [8]. In carrying out these activities, banks are often faced with issues relating to liquidity transformation, hence exposed to the likelihood of bank runs. In general perspective, the higher the liquidity transformation of banks (which is desired with a view of obtaining increased earnings), the higher the chances of incurring losses due to disposing of assets in view of the liquidity demands of customers [11]. The liquidity levels of commercial banks in Nigeria have over time been characterized by a fluctuating trend. As reported by the Central Bank of Nigeria, the year 2010 had liquidity level at 30.425% while an increase was witnessed in 2011 at 42%. In the year 2012, liquidity was reported at 49.719% and in 2013 at 63.205%. A decrease in the liquidity level was however witnessed in the year 2014 which was reported at 38.325%. Slight increases in liquidity levels for Nigeria were recorded at 42.347%, 45.95% and 54.79% in the years 2015, 2016 and 2017 respectively. In view of the important role of liquidity transformation of the banking sector which in turn contributes to economic growth and development, the fluctuating liquidity trends of commercial banks in Nigeria formed the basis for this study.

Literature informs of some underlying linkages between firm characteristics and liquidity transformation. Theoretically, Market power theory supports the nexus between bank size and liquidity transformation. The postulations of capital buffer theory underpin capital adequacy and liquidity transformation relationships. The prepositions of efficiency structure theory support the underlying nexus between management efficiency and liquidity transformation. Financial intermediation theory emphasizes on the intermediation role performed by banking institutions which is dependent on liquidity. Empirically, Al-Khouri [10] established a positive and statistically significant relationship between capital (equity) and liquidity creation. The study further documented that bank size and the level of previous liquidity are significant in determining liquidity creation. Melese and Nyaundi [1] reported that bank size and capital adequacy had significant effects on liquidity of commercial banks in Kenya. Yimer [8] concluded that bank size and loan growth had significant negative impact on liquidity of Ethiopian private commercial banks. The research further established that profitability had significant positive impact on liquidity. Capital adequacy on the other hand had insignificant effect on liquidly. Agbo and Nwude [11] found that total capital

ratio and return on equity have negative and insignificant effect on liquidity of deposit money banks in Nigeria. Additionally, return on assets had positive and insignificant effect on liquidity of banks. Ojha [9] established that return on equity, return on assets and capital adequacy ratio had significant impact on liquidity of Nepali commercial banks. Ahmeti, Ahmeti and Ahmeti [17] documented that bank size and cost efficiency had positive and significant effect on liquidity risk with respect to commercial banks in Kosovo.

Despite the theoretical and empirical link between firm characteristics and liquidity transformation, there is lack of concrete evidence on the nexus between these variables. The above empirical studies contribute to existing literature on firm characteristics and liquidity transformation nexus. However, these studies are characterized by various research gaps with the studies largely focusing on other countries such as Ethiopia, Namibia and Kenya. Different countries are characterized by varying economic conditions while the banking sectors of such countries are guided by varying prudential regulations, hence limiting the applicability of findings from such studies to the context of Nigeria. The issue of liquidity transformation among commercial banks in the context of developing countries has remained largely unexplored and existing literature has provided evidence indicating that Nigeria is not an exception. The current study sought to examine the effect of firm characteristics on liquidity transformation with focus on commercial banks in Nigeria.

2. LITERATURE REVIEW

2.1 Theoretical Literature Review

Financial Intermediation Theory was introduced by Diamond [18]. The theory holds the assertion that banking institutions and other financial intermediaries are the major source of external funds to individuals and firms. Financial intermediaries carry out functions of middlemen in the economy, as such bringing about net cost savings for savers and borrowers of funds. Financial intermediaries have over time transformed beyond the traditional roles of transfer of funds from surplus to deficit units, to creating new financial products. Financial Intermediation Theory holds the view that information asymmetry emanates from the interactions between borrowers, lenders and the financial sector. Financial intermediaries however, are large thereby, leading to economies of scale in operations especially in credit worthiness analyzes regarding potential borrowers. Liquidity transformation is enhanced by financial intermediaries since easy access to funds is provided. Banking institutions are considered by borrowing firms and individual borrowers to be a more reliable funding source in comparison with individual sources of borrowing. Banks over time as a result of technology advancement have largely shifted from the traditional lending business models to new non-traditional business models, thereby, further offering financial services, key among them is insurance services, thus, higher capacity of sustaining competitive advantage in the financial sector.

Market Power Theory was propounded by Bhagwati in 1965. The theory rests on the structure-conduct performance and relative-market power hypotheses. Structure-conduct performance hypothesis holds the notion that a highly concentrated market is one which is characterized by high loan rates and low volume of deposits as a result of skewed or decreased competition. Relative-market power hypothesis holds the view that brand identification stands as a key feature of large banks, thereby, in turn stimulating prices while yielding earnings. The degree by which price levels of goods are influenced by firms through control of demand and supply of such goods is explained by Market Power Theory. This feature is further unique to the concept of imperfect competition where firms are characterized by varying degrees of market power through market share [19]. The market share of firms is a consequence of the underlying industry structure. Abnormal earnings are enjoyed by few firms with a composition of well-differentiated portfolio. Bank size reflects the market share of banks while also capturing economies and diseconomies of scale. Large banks therefore possess higher economies of scale and in turn higher liquidity transformation as a result of increased earnings. The nexus between bank size and liquidity transformation is captured by market power theory.

Efficiency Structure Theory as introduced by Demesetz in 1973 is based on two hypotheses. The scale efficiency and the X-efficiency with the former holding the view that effective operations are associated with lower costs and the latter postulating that the best-practice and lower bound cost curve can be attained through sound

practices by banks. The theory asserts that portfolio composition, shareholders' returns and earnings reflect the internal decisions carried out by the management of banks and their overall banking policy decisions. In view of the assertion of this theory, the operations of banks are impacted by external and internal attributes. How these attributes are addressed depends on the efficiency of management which in turn has implications on bank operations. The efficiency structure theory rests on the notion that the most favorable production level can be attained through economies of scale. Hence, maximum operational efficiency is attainable at an output level where all the available economies of scale are efficiently deployed. Operational expenses can be reduced by banks having well-experienced managers and modern operation technologies which ultimately bring about higher investment returns. Efficiency Structure Theory underpins the underlying linkages between management efficiency and liquidity transformation of commercial banks.

Capital Buffer Theory was propounded by Calem and Rob [20]. The theory holds the prediction that upon reaching the regulatory minimum capital ratio, a bank will likely have the incentive of boosting capital while reducing risk so as to avoid possible regulatory costs associated with breach of stipulated capital requirements. In view of this theory, banking institutions strive to hold more capital above the recommended level. Regulations regarding the creation of adequate capital buffers aim at reducing the procyclical nature of lending by advocating for the creation of countercyclical buffers. Additional capital held above the minimum level is the capital buffer and banks with low capital buffers strive towards raising more capital with the aim of rebuilding an appropriate capital buffer. This is as additional capital tends boost the capacity of banks towards absorbing adverse shocks, hence reducing the probability of bank collapse. Poorly capitalized financial institutions engage in highly risky ventures with a view of obtaining corresponding higher returns for purposes of increasing their capital levels. This may sometimes be detrimental to the liquidity transformation process of these institutions.

2.2 Empirical Literature Review

Al-Khouri [10] examined the effect of bank characteristics on liquidity transformation with focus on GCC Banks. The study established a positive and statistically significant relationship between capital (equity) and liquidity creation which is in line with literature that bank capital increases liquidity as it enhances its ability of absorbing risk. The findings therefore suggest that increasing capital ratio translates to corresponding increase in liquidity created by banks. The findings further reveal that bank size and previous liquidity level significantly determine the liquidity levels of banks. Findings of the study also indicate that profitability (return on assets) had a negative and significant relationship with the liquidity created by banks. This result can be an indication of either a rise in costs incurred by banks or a rise in the amount of unpaid credit by bank customers (loan losses). Despite contributing to literature on the nexus between firm characteristics and liquidity transformation, the focus of the study was GCC Banks.

Melese and Laximikantham [1] evaluated the determinants of liquidity of Ethiopian commercial banks. The study sought to assess the bank specific factors that affect liquidity. The study had a sample of ten (10) commercial banks covering the period 2007-2013. Based on panel regression analyses, findings indicate that profitability and capital adequacy had significant impacts on liquidity. Additionally, bank size had positive and significant impact on liquidity of Ethiopian commercial banks. Despite Ethiopia being in the same category of developing countries with Nigeria, varying economic conditions limit the generalizability of the study findings, thus the justification for carrying out a study for Nigeria, thereby addressing the contextual gap.

Nyaundi [21] analyzed the effects of capital adequacy requirements on liquidity while focusing on commercial banks in Kenya. Based on descriptive research design, all the commercial banks in Kenya which were forty three (43) in number formed the target population of the study. The study documented that bank size and capital adequacy had significant effects on liquidity of commercial banks in Kenya with size having the highest magnitude followed by capital adequacy. Despite the contributing of the study to existing empirical literature on firm characteristics and liquidity transformation, its applicability is limited to the context of Kenya which provided basis for carrying out the current study.

Sheefeni [12,13] assessed the bank-specific determinants of liquidity of commercial banks in Namibia. Quarterly data was used for the time

period 2001:Q1- 2014:Q2. Under the condition of stationary at levels, the ordinary least squares technique was applied in the estimation. The findings indicate that profitability (return on equity) had insignificant negative relationship with liquidity of commercial banks in Namibia. The study further documented that capital adequacy had insignificant positive relationship with liquidity of commercial banks in Namibia. Regardless of the non-significance, the direction of the relationship has practical implications for policy decision. The study provided additional insights on the nexus between firm characteristics and liquidity of commercial banks; however, in view of the varying regulatory guidelines in the financial sector of countries, findings of a study in Namibia cannot be directly applicable to Nigeria.

Yimer [8] evaluated the determinants of liquidity of commercial banks in Ethiopia with focus on selected Private Banks. The study sought to identify the determinants of liquidity of private commercial banks in Ethiopia. Data was collected from a sample of six private commercial banks in Ethiopia over the period 2000 to 2015. Liquidity was assessed using liquid asset to total asset, loan to deposit and liquid asset to deposit ratios. Based on panel regression analysis, it was concluded that bank size and loan growth had significant negative impact on liquidity. Profitability had significant positive impact on liquidity of Ethiopian private commercial banks. Capital adequacy on the other hand had insignificant effect on liquidly of Ethiopian private commercial banks. Despite the study contributing to existing literature on determinants of liquidity, it was focused on Private Banks in Ethiopia.

Agbo and Nwude [11] studied the effect of bank specific factors on liquidity of deposit money banks in Nigeria. The study focused on the time period 2001 to 2015. Ordinary least squares method was used after confirming the stationarity and normality of the time-series. Bank specific factors were proxied using impaired loans on total loans, total capital ratio, return on equity, interest expense over deposits, total banking assets over total banking sector assets and return on assets. Empirical findings reveal that total capital ratio and return on equity have negative and insignificant effect on liquidity of banks. Additionally, return on assets had positive and insignificant effect on liquidity of deposit money banks in Nigeria. Despite the previous study focusing on Nigeria, management efficiency which is a key firm characteristics was not considered.

Ojha [9] examined the impact of return on equity, return on assets and capital adequacy ratio on liquidity of Nepali commercial banks. It was established that return on equity, return on assets and capital adequacy ratio had significant impact on liquidity of commercial banks in Nepalese. Specifically, it was found that return on assets and return on equity had negative impact on liquidity of Nepali commercial banks, thereby, implying that higher return on assets and return on equity lead to the depletion of liquidity. It was further established that capital adequacy ratio had positive impact on liquidity of commercial banks in Nepalese, which implies that increases in capital adequacy ratio improves liquidity. The study successfully provided empirical evidence on the impact of various firm characteristics on liquidity of Nepali commercial banks. Notably, commercial banks in Nigeria are guided by varying prudential regulations which differ with those of Nepali commercial banks, thus, the justification for this study.

Safa, Ali, Ismail, Amin, Ali and Nor [22] studied the effect of cost efficiency on liquidity risk in banking with focus on Islamic banks and conventional banks for sixteen (16) selected OIC countries. While focusing on the period 1999 to 2013, two-stage analysis was carried out. Cost efficiency was computed using Data Envelopment Analysis (DEA) and the fixed effect model was applied in examining the determinants of liquidity risk. Empirical findings of the study indicate that cost efficiency is positively related to liquidity risk. The study further reported that other significant factors which predict liquidity risk were capital, profitability, credit risk, crisis and market concentration. The study further documented that the notion that Islamic banks as compared to the conventional banks have higher liquidity risk was weakly evidenced. These results also emphasize the importance of money market as a platform of managing exposures in banking associated with liquidity risk. The study contributes richly to existing body of literature on firm characteristics and liquidity transformation, however, the focus was Islamic banks and conventional banks in selected OIC countries.

Ahmeti et al. [17] analyzed the relationship between cost efficiency and liquidity risk based on a sample of commercial banks in Kosovo. The study utilized secondary data from a sample of

seven commercial banks in Kosovo for the time frame 2013 to 2020. Panel regression analysis was used and specifically fixed effect model (FEM) was estimated. The study was divided into two phases with the first determining cost efficiency based on DEA while the second reviewing liquidity risk factors. Liquidity risk was modeled as the dependent variable and other significant determinants such as asset quality and bank size were considered. It was documented that bank size and cost efficiency had positive and significant impact on liquidity risk of commercial banks. In view of the two models, bank size is substantial and positive, thus, implying that the larger the bank, the higher the liquidity risk. Apart from the previous study being centered on commercial banks in Kosovo, other important firm characteristics which include capital adequacy and earnings ability were isolated. Notably, these factors constitute two predictor variables of this study.

3. METHODOLOGY

The study was based on causal research design and purposive sampling design was adopted in view of the seventeen commercial banks which were fully operational in Nigeria within the study period, which is 2010 to 2017. Notably, only fifteen commercial banks were covered which was due to unavailability of data. Panel regression analysis was employed and the general model was adopted from Al-Khouri [10] who similarly examined firm characteristics and liquidity transformation relationships; the model is presented as follows:

$$Y_{it}=\beta_0+\beta X'_t+\varepsilon \quad (i)$$

Where:

Y_{it} = Liquidity Transformation
$_i$ = Commercial Bank
$_t$ = Time Period
X' =Vector of Firm Characteristics (Bank Size, Capital Adequacy, Management Efficiency and Earnings Ability) at time t
β = Coefficients
β_0 = Constant term
ε = Error term

Equation i above was further broken down into equation ii which was applied for estimation.

$$LT_{it}= \beta_0+ \beta_1 BS_{it}+\beta_2 CA_{it}+\beta_3 ME_{it}+\beta_4 EA_{it} +\varepsilon \quad (ii)$$

Where:

LT = Liquidity Transformation (Liquid Assets/Total Assets)
BS = Bank Size (Log of Total Assets)
CA = Capital Adequacy (Core Capital/Total Assets)
ME = Management Efficiency (Operating Revenue/Total Profit)
EA = Earnings Ability (Net Interest Margin)
β_1 to β_4 = Coefficients
i = Commercial Bank 1-15
t = Time period (2010-2017)
ε = Error term

4. RESEARCH FINDINGS AND DISCUSSIONS

This section presents the descriptive analysis and diagnostics tests carried out on the study data. It further documents the panel regression analysis which was applied in hypotheses testing.

4.1 Descriptive Analysis

This section presents the descriptive analysis of the study where the statistics on mean, standard deviation, minimum values, maximum values and total observations of the research variables are documented. The descriptive statistics are documented in Table 1.

The descriptive statistics as contained in Table 1 indicates that the total number of observations for each of the study variables stood at 120. Liquidity transformation had a mean of 0.2492 and standard deviation of 0.1293. Additionally, the minimum and maximum values for liquidity transformation over the study period were 0.0104 and 0.6436 respectively. Bank size had mean and standard deviation of 6.0655 and 0.3550 respectively. Also, minimum value of 5.3364 and maximum value of 6.8251 were established for bank size. Capital adequacy had mean of 0.0214 and standard deviation of 0.0122. The statistics indicate that capital adequacy had minimal fluctuations over the period 2010 to 2017 which is supported by minimum and maximum values of 0.0017 and 0.0739 respectively.

Table 1. Descriptive statistics

Variables	Obs	Mean	Std. Dev	Min	Max
Liquidity Transformation	120	0.2492	0.1293	0.0104	0.6436
Bank Size	120	6.0655	0.3550	5.3364	6.8251
Capital Adequacy	120	0.0214	0.0122	0.0017	0.0739
Management Efficiency	120	7.6581	20.6462	-106.1276	142.2290
Earnings Ability	120	0.3074	0.2004	0.0601	0.9114

Source: Study Data (2020)

The study established mean and standard deviation values of 7.6581 and 20.6462 respectively for management efficiency. Also, minimum value of -106.1276 and maximum value of 142.2290 were further found for management efficiency. These statistics indicate that over the study period, management efficiency had large variations. Earnings ability relatively fluctuated over the time scope of the study as indicated by mean and standard deviation values of 0.3074 and 0.2004 respectively. Minimum value of 0.0601 and maximum value of 0.9114 were further established for earnings ability.

4.2 Diagnostic Tests

Relevant diagnostic tests were carried out for the purpose of ensuring that the research data was fit for inferential analysis while ensuring that the best model was adopted for estimation. These tests include heteroscedasticity test, multicollinearity test, stationarity test and model specification test.

4.2.1 Heteroscedasticity test

The study conducted heteroscedasticity test to ascertain whether the error terms are correlated across observations. This is as the error term in a regression model is desired to be homoscedastic, that is, constant over time. Table 2 documents the results obtained from the heteroscedasticity test.

The Breusch-Pagan test was applied in assessing heteroscedasticity based on a null hypothesis stating that the residuals are homoscedastic. This test was guided by a threshold of 0.05 significance level. In view of the findings presented in Table 2, a p-value of 0.0001 was obtained. Consequently, the null hypothesis stating that the residuals are homoscedastic was rejected at 0.05 significance level. In addressing the seeming heteroscedasticity problem, robust standard error was applied. Robust standard error is a procedure used in obtaining unbiased standard errors when the residuals are not homoscedastic.

4.2.2 Multicollinearity test

The level of multicollinearity was assessed among the independent variables of the study and the results documented in Table 3.

The Variance Inflation Factor (VIF) Test procedure was applied and the threshold of 5 was used. The VIF of less than 5 is recommended to ensure low levels of multicollinearity [23]. The outcome of the VIF test is documented in Table 3. Table 3 indicates that the VIF values obtained for all the predictor variables are below the threshold of 5. It was therefore concluded that the multicollinearity levels among the predictors are minimal.

4.2.3 Stationarity test

In view of the time series component of panel data especially in relatively long time scope, the test for stationarity becomes necessary in order to avoid spurious regression results. Levin Lin Chu (LLC) unit root test was employed and the outcome is documented in Table 4.

Table 2. Heteroscedasticity test results

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity		
H_o: Constant variance		
Variable: fitted values		
chi2(15)	=	14.72
Prob> chi2	=	0.0001

Source: Study Data (2020)

Table 3. Multicollinearity test results

Variables	VIF	Conclusion
Bank Size	1.03	Low Multicollinearity
Capital Adequacy	1.02	Low Multicollinearity
Management Efficiency	1.02	Low Multicollinearity
Earnings Ability	1.02	Low Multicollinearity

Source: Study Data (2020)

Table 4. Stationarity test results

Variable	t-Statistic(adjusted)	P-value	Comment
Liquidity Transformation	-11.3272	0.0000	Stationary
Bank Size	-7.7751	0.0000	Stationary
Capital Adequacy	-17.4000	0.0000	Stationary
Management Efficiency	-79.9179	0.0000	Stationary
Earnings Ability	-9.4257	0.0000	Stationary

Source: Study Data (2020)

As documented in Table 4, the findings from the stationarity test indicate that all the research variables are stationary, hence the panels do not contain unit root which is desired in a panel regression analysis. The null hypothesis stating that the panels contain unit root was therefore rejected at 0.05 level of significance. The study therefore concluded that, all the variables under consideration are not characterized by unit root. Based on the postulations by Gujarati [24], it implies that the results obtained are not spurious.

4.2.4 Model specification test

In carrying out panel regression analysis, it is paramount to conduct a model specification test for purposes of selecting the most appropriate model for the study. This was done using the hausman specification test procedure and the results are presented in Table 5.

The hausman specification test was based on fixed effects and random effects models. The test was guided by a null hypothesis which stated that the random effect model is the preferred model. The results in Table 5 indicate a p-value of 0.0000 which entails the rejection of the null hypothesis; hence the fixed effect model was adopted.

4.3 Panel Regression Analysis

The inferential analysis of the study was based on panel regression technique which was utilized in testing the various null hypotheses of the study. The findings from the regression analysis are documented in Table 6.

With respect to the effect of firm characteristics on liquidity transformation of commercial banks in Nigeria, various null hypotheses were tested in view of the predictor variables namely bank size, capital adequacy, management efficiency and earnings ability. Table 6 indicates an R squared of 0.6143 which denotes that 61.43 percent of the variations in liquidity transformation of commercial banks in Nigeria are attributed to the selected firm characteristics of this study. In support of the importance of these firm characteristics in predicting liquidity transformation is the p-value of 0.0000 which indicates significance.

Table 5. Model specification test results

	(b)	(B)	(b-B)	Sqrt (diag(V_b-V_B))
	Fixed	Random	Difference	S.E.
Bank Size	-0.021984	-.0058707	-0.0161133	0.0327335
Capital Adequacy	1.198141	1.806177	-0.6080358	0.1658406
Management Efficiency	0.000334	0.0002132	0.0001208	.
Earnings Ability	-0.3300529	-0.4343844	0.1043314	0.0179356
chi2(4)	44.21			
Prob>chi2	0.0000	0.014	-0.005	0.002

Source: Study Data (2020)

Table 6. Panel regression results

Liquidity Transformation	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
Bank Size	-0.0220	0.0636	-0.35	0.735	-0.1585	0.1145
Capital Adequacy	1.1981	0.6979	1.72	0.108	-0.2987	2.6950
Management Efficiency	0.0003	0.0001	4.29	0.001	0.0002	0.0005
Earnings Ability	-0.3301	0.0362	-9.12	0.000	-0.4077	-0.2524
_cons	0.4440	0.4047	1.10	0.291	-0.4240	1.3120
R^2 =0.6143						
F (4, 14) =32.77						
Prob> F =0.0000						

Source: Study Data (2020)

4.4 Hypotheses Testing

The null hypotheses of the study were tested at 0.05 significance level. The criterion for the hypotheses testing is to reject the null hypothesis if p<0.05, alternatively, the null hypothesis is not rejected if p>0.05. The hypotheses testing were guided by the panel regression results as contained in Table 6.

H_{01}: Bank size has no significant effect on liquidity transformation of Commercial Banks in Nigeria

The study examined the effect of bank size on liquidity transformation of commercial banks in Nigeria. In view of this objective, a null hypothesis which stated that bank size has no significant effect on liquidity transformation of commercial banks in Nigeria was formulated and tested at 0.05 significance level. A p-value of 0.735 was obtained with respect to this objective. Hence, the null hypothesis which states that bank size has no significant effect on liquidity transformation of commercial banks in Nigeria was therefore upheld. A coefficient -0.0220 was further obtained which implies that bank size has a negative effect on liquidity transformation of commercial banks in Nigeria. The negative effect of bank size can be attributed to the status of 'too big to fail' of large banks that leads to less motivation for holding liquid assets as there is the believe that during periods of difficulty, they will not be ignored and there will be a standing facility of Lender of Last Resort. The negative effect of bank size implies that the larger the bank size, the less its liquidity transformation and the larger the bank size, the lower its financial stability since liquidity also serves as a measure of bank stability.

In as much as this study focused on liquidity transformation and not profitability, the findings however negate the prepositions of market power theory. The theory supports a positive nexus between a growing bank size (market share) and profitability and notably profits in the banking sector are generated largely through liquidity transformation. Despite the economies of scale advantage accrued to a growing bank size, the absence of accompanying structures and operational mechanisms make it detrimental to the liquidity transformation process of commercial banks. The bureaucracies associated with a large bank size often lead to its adverse effects on liquidity transformation. The findings of this study in terms of significance largely vary with those of existing empirical studies reviewed such as Al-Khouri [10], Melese and Laximikantham [1], Nyaundi [21] and Yimer [8] who reported that bank size had significant effect on liquidity of banks. The variation however can be attributed to the discrepancies in underlying economic conditions of countries with each country having unique features.

H_{02}: Capital adequacy has no significant effect on liquidity transformation of Commercial Banks in Nigeria

The study evaluated the effect of capital adequacy on liquidity transformation of commercial banks in Nigeria. In reference to this objective, a null hypothesis which stated that capital adequacy has no significant effect on liquidity transformation of commercial banks in Nigeria was formulated and tested at 0.05 significance level. The findings from the panel regression analysis indicate a p-value of 0.108, hence; the null hypothesis which states that capital adequacy has no significant effect on liquidity transformation of commercial banks in Nigeria was not rejected. A corresponding coefficient of 1.1981 was obtained which implies that capital adequacy has a positive effect on liquidity transformation of commercial banks in Nigeria. The positive capital

adequacy and liquidity transformation nexus however can be linked to the underlying benefit of capital adequacy. Higher capital levels provide banks with the enablement to cushion against external shocks hence, ensuring smooth liquidity transformation through financial intermediation.

Notably, capital establishes liquidity for banking institutions since deposits are more susceptible to bank runs. In view of this result, higher capital base provides banks with greater ability of diversifying business operations, hence in turn enhancing their capacity to withstand risks. The study findings are therefore supported by the underpinnings of capital buffer theory. Similarly, the findings with respect to capital adequacy and liquidity transformation are supported by empirical literature. Sheefeni [12],13], Yimer [8] and Agbo and Nwude [11] established that capital adequacy had insignificant effect on liquidity of commercial banks.

H_{03}: Management efficiency has no significant effect on liquidity transformation of Commercial Banks in Nigeria

The study assessed the effect of management efficiency on liquidity transformation of commercial banks in Nigeria. With regards to this objective, a null hypothesis stating that management efficiency has no significant effect on liquidity transformation of commercial banks in Nigeria was formulated and tested at 0.05 significance level. Based on the panel regression analysis, a p-value of 0.001 was found in view of this objective. As such, the null hypothesis which states that management efficiency has no significant effect on liquidity transformation of commercial banks in Nigeria was rejected. A coefficient 0.0003 was also obtained thereby indicating that management efficiency has a positive effect on liquidity transformation of commercial banks in Nigeria. This indicates that the liquidity transformation of commercial banks increases with an increasing level of management efficiency.

The study findings with respect to management efficiency and liquidity transformation are supported by the assertions of efficiency structure theory. Management efficiency entails the minimization of operational expenses while maximizing revenue, hence its significance in determining liquidity transformation. An efficient management of resources leads to lower operating costs thereby smoothening intermediation activities which ultimately guarantee high liquidity levels of commercial banks. The significant positive management efficiency and liquidity transformation relationship is supported by Safa *et al*. [22] who reported that cost efficiency is positively and significantly related to liquidity. Additionally, Ahmeti et al. [17] documented that cost efficiency had positive and significant impact on liquidity of commercial banks.

H_{04}: Earnings ability has no significant effect on liquidity transformation of Commercial Banks in Nigeria

The study examined the effect of earnings ability on liquidity transformation of commercial banks in Nigeria. Consequently, a null hypothesis which stated that earnings ability has no significant effect on liquidity transformation of commercial banks in Nigeria was formulated and tested at 0.05 significance level. Empirical findings in Table 6 indicate a p-value of 0.000 and a coefficient of -0.3301 with regards to this objective. The null hypothesis which states that earnings ability has no significant effect on liquidity transformation of commercial banks in Nigeria was rejected. This implies that earnings ability as measured by net interest margin is significant in determining the liquidity transformation of commercial banks in Nigeria. The negative coefficient indicates that earnings ability has an inverse relationship with liquidity transformation of commercial banks in Nigeria. Despite net interest margin reflecting returns from the financial intermediation activities of banks, its increase does not necessarily translate to higher liquidity levels especially in a situation whereby a portion of realized earnings are channeled into other profit generating activities rather than wholly to the traditional lending system.

The results of the study with regards to earnings ability and liquidity transformation are in line with those of previous studies. Al-Khouri [10]) found that profitability (return on assets) had a negative and significant relationship with the liquidity created by banks. Similarly, Melese and Laximikantham [1] established that profitability had significant impacts on liquidity of Ethiopian commercial banks. Also, Yimer [8] reported that profitability had significant positive impact on liquidity of Ethiopian private commercial banks. In addition, Ojha [9] established that return on equity and return on assets had significant negative impact on liquidity of commercial banks

in Nepalese. Furthermore, Safa et al. [22] documented that profitability (earnings) had significant effect on liquidity risk [25].

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Due to the financial intermediation role performed by commercial banks, having optimum liquidity level remains crucial. In view of the findings obtained, it was concluded that bank size had insignificant effect on liquidity transformation of commercial banks in Nigeria. Growing bank sizes are often associated with bureaucratic conditions, thereby adversely affecting the liquidity transformation of commercial banks. The study also concluded that capital adequacy had insignificant effect on liquidity transformation of commercial banks in Nigeria. Despite the underlying benefit of higher capital levels with regards to providing more enablement to cushion against external shocks, this may be countered by the fact that increasing capital base in view of capital requirements limits the liquidity transformation process of commercial banks. As such, the insignificant capital adequacy and liquidity transformation nexus with respect to commercial banks in Nigeria is not misplaced.

The study further concluded that management efficiency has significant effect on liquidity transformation of commercial banks in Nigeria. Management efficiency entails the minimization of operational expenses while maximizing revenue hence its significance in determining liquidity transformation. This implies that the more efficient the managers are, the higher the liquidity transformation ability of commercial banks. An efficient management of resources leads to lower operating costs thereby smoothening intermediation activities which ultimately guarantee high liquidity levels of commercial banks. Lastly, it was concluded that earnings ability has significant effect on liquidity transformation of commercial banks in Nigeria. This indicates that higher earnings ability results in lower liquidity transformation process. In view of this outcome, the study further concludes that as commercial banks generate higher net interest margin from the financial intermediation process, they tend to diversify towards other profit generating ventures by considering other investment opportunities rather than channeling the entire earnings generated into liquidity transformation.

5.2 Policy Recommendations

The recommendations of the study are provided in view of the firm characteristics which significantly predict the liquidity transformation of commercial banks in Nigeria. The study concluded that management efficiency is one of the key predictors of liquidity transformation of commercial banks in Nigeria. The study therefore recommends that bank management should strive towards the minimization of operational expenses while maximizing revenue so as to ensure a smooth financial intermediation process. It is imperative for commercial banks to have joint management of efficiency and liquidity transformation while indicating set objectives for the two variables.

It was also concluded that earnings ability is a significant determinant of liquidity transformation of commercial banks in Nigeria. Liquidity management in the banking sector is informed by the trade-off between risk and returns. Aggressive search of high profitable investments may lead to the depletion of liquidity levels (as supported by the status of higher risk higher returns) which may potentially lead to bank runs. Despite this, holding of excess liquidity levels may imply a situation of underinvestment in profitable investment opportunities. The negative effect of earnings ability on liquidity transformation signifies the need to have banking behavior with regards to investment activities closely monitored. Hence, with regards to the underlying importance of adequate liquidity levels to commercial banks, the study recommends that income generated from the financial intermediation role of banks should be properly managed with a relative share of it channeled towards further intermediation activities; this in turn will increase liquidity levels in view of a growing net interest margin. This can be achieved through effective liquidity management based on earnings and liquidity objectives, therefore having an adequate balance (or combination) of the two.

5.3 Contribution to Knowledge

The study contributes to existing body of knowledge in several ways. The study has documented a comprehensive theoretical

framework based on various theoretical underpinnings with regards to the nexus between firm characteristics and liquidity transformation. A robust panel regression empirical model is further presented which in turn contributes to literature and which can be adopted in other researches relating to firm characteristics and liquidity transformation. The study further contributes to knowledge by documenting empirical evidence with respect to firm characteristics and liquidity transformation.

5.4 Limitations and Suggestions for Further Studies

The findings of the study are limited to the firm characteristics that were considered which are bank size, capital adequacy, management efficiency and earnings ability for the period 2010 to 2017. Notably, bank size and capital adequacy had insignificant effect on liquidity transformation of commercial banks in Nigeria. In view of these findings, the study suggests that additional research can be done on the effect of bank size and capital adequacy on liquidity transformation of commercial banks in Nigeria for a longer time frame. Other firm characteristics may also be considered in view of the unexplained 38.57 percent variation in liquidity transformation as indicated by the panel regression model.

COMPETING INTERESTS

Authors have declared that they have no known competing financial interests or non-financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

1. Melese N, Laximikantham. Determinants of banks liquidity: empirical evidence on Ethiopian commercial banks. J Econ Sustain Dev. 2015;6(15):36-46.
2. Distinguin I, Roulet C, Tarazi A. Bank regulatory capital and liquidity: Evidence from US and European publicly traded banks. J Banking Fin. 2013;37(9): 3295-317.
   DOI: 10.1016/j.jbankfin.2013.04.027
3. Sundaresan SM, Xiao K. Liquidity regulation and banks: theory and evidence. Available at SSRN 4020511. SSRN Journal; 2022.
   DOI: 10.2139/ssrn.4020511
4. Bawuah IB. Institutions, Capital control Policy, and Liquidity Creation in Sub-Saharan Africa; 2022.
5. Farag M, Harland D, Nixon D. Bank Capital and liquidity. Bank Engl Q Bull. 2013;Q3.
6. De Roure C, McLaren N. Liquidity transformation, collateral assets and counterparties. Cent Bank Rev. 2021; 21(4):119-29.
   DOI: 10.1016/j.cbrev.2021.09.001
7. Luvuno TI. Determinants of commercial bank liquidity in South Africa [masters dissertation]; submitted to University of South Africa; 2018.
8. Yimer MS. Determinants of liquidity in commercial banks of Ethiopia: The case of selected private banks [an MSc thesis]; Submitted to Addis Ababa University; 2016
9. Ojha PR. Macroeconomics and bank-specific factors affecting liquidity: A study of Nepali commercial banks. J Bus Soc Sci. 2018;2(1):79-87.
   DOI: 10.3126/jbss.v2i1.22830
10. Al-Khouri R. Bank characteristics and liquidity transformation: The case of GCC banks. Int J Econ Fin. 2012;4(12): 114-20.
    DOI: 10.5539/ijef.v4n12p114
11. Agbo EI, Nwude EC. Bank specific factors and the liquidity of commercial banks: Evidence from Nigeria. Transylvanian Rev. 2018;26(25):6659-71.
12. Sheefeni J, PS. The impact of bank-specific determinants on commercial banks' liquidity in Namibia. Bus Manag Econ Res. 2016;2(8):155-62.
13. Sheefeni J, PS, Nyambe J. M. Macroeconomic determinants of commercial banks' liquidity in Namibia. Eur J Bus Econ Acc. 2016;4(5):19-30.
14. Akims MA, Akims K, A. Prudential regulations and profitability of commercial banks listed at the Nairobi securities exchange, Kenya. IOSR JEF (IOSR-JEF). 2019;10(6):68-74.
15. Yüksel S, Mukhtarov S, Mammadov E, Özsari M. Determinants of profitability in the banking sector: An analysis of post-Soviet countries. Economies. 2018;6(3):41.
    DOI: 10.3390/economies6030041
16. Akims MA. Role of commercial banks in economic growth and development: A theoretical approach. IOSR J Humanit Soc Sci. 2022;27(12):16-8.
17. Ahmeti Y, Ahmeti A, Ahmeti S. The impact of cost efficiency on liquidity risk in the

banking sector: evidence from Kosovo. Cuad Econ. 2022;45(127):113-9.
18. Diamond DW. Financial intermediation and delegated monitoring. Rev Econ Stud. 1984;51(3):393-414.
DOI: 10.2307/2297430
19. Genchev E. Effects of market share on the Bank's profitability. Rev Appl Socio Econ Res. 2012;3(1):87-95.
20. Calem PS, Rob R. The impact of capital-based regulation on bank risk – taking: A dynamic model, Board of Governors of the Federal Reserve System. Fin Econ Discussion Series 96/12 (February). 1996;36.
21. Nyaundi DN. The effects of capital adequacy requirements on liquidity of commercial banks in Kenya. MBA project Submitted to University of Nairobi; 2015.
22. Safa M, Ali MH, Ismail A, Amin IM, Ali MH, Nor SM. Cost efficiency and liquidity risk in banking: new evidence from OIC countries. Int J Bus Manag Sci. 2018;8(2):255-76.
23. Field P. Discovering statistics using SPSS. 2nd ed; London; sage; 2009.
24. Gujarati D. Basic econometrics. 4th ed. McGraw-Hill. New York. 2003;638-40.
25. Central Bank of Nigeria, Nigeria > Banking Indicators: Commercial Banks > Nigeria Commercial Banks: Liquidity Ratio: Actual.