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THE IMPACT OF LIQUIDITY MANAGEMENT ON FINANCIAL PERFORMANCE OF DEPOSIT MONEY BANKS IN WEST AFRICA

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Abstract. *This study investigates the effect of liquidity management on financial performance of deposit money banks (DMBs) by considering the banking sector of selected countries of the West African Monetary Zone (WAMZ). Aggregate banking sector data for the four selected economies were used from 1991 to 2020. The panel data regression analysis is also adopted for the empirical analysis after a statistical evaluation of the datasets are performed. The results from the empirical analysis reveal that reducing the cash to deposit ratio is the most efficient liquidity management strategy that may deliver enhanced performance for the DMBs among the sampled countries. Moreover, it was found that loans and advances to total assets have significant impact on financial performance of DMBs in West African countries. The ratio of loans and advances to total assets is limited to return on equity. There is also evidence that the ratio of loans and advances to deposit does not have a significant effect on financial performance of DMBs in West African countries. There is need for banks in the selected countries to monitor their deposit mobilization capacity since it has shown to have major implications on the liquidity management strategies in the banking sectors for the selected countries.*

Key words: liquidity management, financial performance, deposit money bank and panel regression.

JEL Classification: H62, L25, G21

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1. INTRODUCTION

The banking sector globally is a major player in the financial system of any country, and has undergone profound innovation and technical changes which have determined their growth, profitability and competitiveness in recent times. The profitable operations of banks are essential for the hitch free operation of the financial system of any country, (Thevaruban, 2017). Increasing profit at the expense of liquidity can cause serious problems for banks, hence, a trade-off between the two contradictory objectives of liquidity and profitability needs to be struck. Liquidity management involves the planning and controlling of the demand and supply of the amount of liquid funds available to meet the banks' immediate needs without distorting the banks' regular operations and financial performance (Agbada & Osuji, 2013).

The global financial crisis of 2008 made Basel committee for bank supervision, as a financial body to advocate for the active management of liquidity (Marozva, 2015). In order to prevent any loss of confidence and trust that may lead to a bank run, banks have ensured they generate enough profit to meet the financial obligation of their clients and depositors (Idowu, Essien & Adegboyega, 2017). The relationship between funds liquidity profitability of DMBs is well documented in literature such as: Agbada and Osuji (2013), Bassey and Moses (2015), Okaro and Nwakoby (2016), Marozva (2015).

According to World Bank (2006:25) "there is need to undertake deeper analysis of financial sector performance in sub-Sahara Africa; where performance has not been impressive, as this would provide more information on commercial banking system in the sub-region". Besides, the selected countries (Nigeria, Ghana, Gambia and Sierra Leone) possess identical financial system frameworks based on the West African Monetary Zone (WAMZ), they also constitute the Anglophone (English speaking) countries in that sub-region. Also, the banking sector in these countries in recent past (though at different time) experienced strategic restructuring (consolidation) of their financial system toward enhancing their performance and meeting their stakeholders' needs. The practical contributions of this study cannot be overemphasized as it harps on the role of liquidity management on the financial performance of deposit taking institutions with specialized cross-country data set for the West African sub-region. Most importantly, in measuring the liquidity management factors, the study includes both loans and advances-related (Loan and Advances to Deposits [LAD] and Loan and Advances to Total Assets [LNA]) and other liquidity and cash-related factors (Cash to Total deposits [CTD] and Liquid Assets to total Assets [LTA]) as relevant in the analysis. Thus, the study contributes to the literature on the liquidity-performance argument by providing an expanded set of factors in the empirical analysis.

This study seeks to examine how the financial performance of banks in selected West African countries is influenced by various liquidity management factors using panel data regression analysis for the empirical analysis, after a statistical evaluation of the datasets was performed. Hence, the null hypothesis of this study is specified as follows:

Ho: Liquidity management does not have significant impact on the financial performance of Deposit Money Banks in West Africa.

The other sections of this paper are in the following order: We review extant literatures in section two while the research methods adopted for the study were discussed in section three. The presentation and interpretation of data analysis was covered in section four while section five contains the summary of major findings, recommendations and conclusion.

2. LITERATURE REVIEW

2.1. Conceptual Review

Financial Performance: Financial performance explains the difference between banks' operating expenses and income (Bassey & Moses, 2015). It explains how well a bank manages its assets, liabilities and earned revenues for the financial interest of its stakeholders: these outcomes are seen in the bank's financial performance. The overall evaluation of DMBs in relation to financial performance greatly influences their continuous growth (Bikker, 2008). Every business needs continuous return on investment for long term growth and survival as argued by Agbada and Osuji (2013).

Liquidity: Liquidity is the capacity to retire current financial obligations as they come due. It depends on the capacity of a company's cash plus near cash assets to offset any awaiting current liabilities. Bank's liquidity can be described "as the ability of bank to offset its current primary cash commitments, as at when due". For the operational activities of any deposit money bank to run smoothly, optimum liquidity must be maintained. It depends on the quantity of cash and near cash (quasi cash) to offset any awaiting current liabilities. The continuous process to maintain the availability of cash with little or no cost in line with the cash reserve requirement specified by the federal monetary authority is known as liquidity management. It is the quantity of liquid cash (or quasi cash) available to offset short term maturing deposits and contractual obligation. The inflows and outflows of liquidity in the economy by banks at a desired level without affecting profits generated in known as liquidity management (Agbada & Osuji 2013). It was argued by Eljelly (2004) that when current assets and liabilities are planned and controlled in such a way that it eliminates default risk requirement and reducing investment in these assets is known as effective liquidity management.

2.2. Liquidity Management and bank Performance

One main goal of DMBs includes maximizing revenue because of their shareholders as well as the staff and management of the organization because profit maximization is a primary objective of any bank. The financial sector is the pillar and bedrock of any viable country, and this is the reason why bank failure should not be an option. To avoid bank failure, liquidity must be maximizing to meet current liabilities as they come due. A bank that over maximize liquidity, sacrifices liquidity and reduces the profit of the bank because the idle fund cannot generate investment returns.

Liquidity is one of the drivers of deposit money banks profitability, hence must be maintained to ensure the financial health of banks. A bank that maintains a high level of liquidity provides sufficient funds to lend, improve on the return on interest generated from operations as well as financial performance. But poor liquidity planning and control reduce the financial performance of DMBs. The overall financial performance of these DMBs is important for the smooth operation of the financial system of any country. Therefore, liquidity management is important for a bank to sustain steady cash inflow so as to boost its financial performance for fair shareholders returns.

Bank customers are majorly interested in banks' ability to meet their primary responsibility of paying deposits whenever withdrawal is made, which is usually done within short or no notice (Bassey & Moses, 2015). Effective liquidity management helps the bank to have more operational funds in the short-run to satisfy the needs of its

depositors, other creditors and loan customers, thereby maintaining public confidence and boosting economic activities. The concept of liquidity management has not been treated with kid gloves by banks management because it helps to determine the solvency or insolvency of the organization.

Figures in accounting are irrelevant except when they convey some important financial information, hence for liquidity management statistics to make sense to the financial analyst, it must be related to other variables; in this case banks quantitative performance can be used to make qualitative judgment. Bank liquidity is commonly estimated by the current ratio, which is the ratio between the balance sheet current assets and liabilities. But excess liquidity is not good for the financial health of any bank because idle assets do not earn any return. When liquidity is related to financial performance, they are inversely related, meaning that as liquidity increases, there will be reduction in financial performance. Hence the reason to sustain a maximum level of adequate cash that will maximize the profitability of the bank.

2.3. Empirical Review

In Nigeria, Bassey and Moses (2015) investigated the relationship between liquidity and performance of DMBs from 2010-2012. The panel data was estimated with OLS techniques and the findings suggested that a statistically significant relationship exists amongst liquidity ratio and performance. In Ghana, Nkegbe and Ustarz (2015) examined determinants of banks' profitability in Ghana from the period 2000 – 2010 using trend analysis with cross sectional data. The result revealed an inverse trend in banks profitability during the period covered by the study.

Song'e (2015) reveals a direct links between financial performance and liquidity variables, when a study was carried out to examine the linkage between liquidity and profitability of deposit taking Saccos in Nairobi county between the period 2010 – 2014. The secondary data collected from 27 deposit Saccos was analysed with regression analysis. In Nigeria, Duruechi, Ojiegbe and Otiwu (2016) measured the effectiveness of liquidity management and banks performance from 1999-2014. Time series data was analysed with some preliminary tests and diagnostic tests. The result revealed the presence of dual and long-term relationship between liquidity management and banks performance. Okaro and Nwakoby (2016) assessed how DMBs are affected by liquidity management from (2000-2015). The secondary data was analysed with the OLS regression and the result revealed that an increase in liquidity ratio leads to decrease in banks' profitability. DMBs should adopt other measures of meeting depositor's demand at the expense of holding excess liquid cash. The shiftability theory and anticipated income theory are recommended here. Salim and Mohamed (2016) investigated the impact of liquidity management on financial performance in Omani banking sector from 2010-2014. The study concluded that a significant relationship exists between the measures of liquidity and bank's ROA and ROE.

Thevaruban (2017) investigated the factors influencing banks profitability in Sri Lanka from the year 2012 to 2016. The study employed multiple regression analysis and Pearson correlation test to analyse the secondary data. The findings of the study established a significant relationship between liquidity and profitability of commercial banks in Sri Lanka. Hence higher liquidity in DMBs enhances the availability of adequate funds to generate loans, thereby leading to higher financial performance. Hasanovic and

Latic (2017) identified determinants of excess liquidity in Bosnia & Herzegovina (B&H) banking sector from 2006 – 2015 using the Generalised Method of Moment (GMM). The results suggested bank non-performance loans as an important factor of excess liquidity amongst internal factors. Mucheru, Shukla and Kibachia (2017) revealed a positive relationship between cash management and financial performance of commercial banks when they determined the effect of liquidity management on the financial performance of commercial banks in Rwanda from 2014 to 2016. The secondary data was analysed with multiple regression and it was concluded that excess liquidity will lead to reduction in banks' income and profit.

In Nigeria, Edem (2017) studied liquidity management and profitability of DMBs between the period 1986 and2011. The 24 DMBs operating in the country were the sample size, using linear regression. The analyzed results revealed a direct relationship between liquidity management and ROA, and a significant relationship between liquidity management and performance of DMBs, hence optimum liquidity should be kept to maximize returns.

Idowu, Essien and Adegboyega (2017) examined liquidity management and banks performance in Nigeria between the period 2006 and 2015, using a sample size of four DMBs. The study analyzed the data with Pearson correlation coefficient with ROA and ROE as measures of performance and liquidity ratios as explanatory variables. The findings showed that bank liquidity has significant relationship on ROE and ROA. Onyekwelu, Chukwuani and Onyeka (2016) appraised the effect of liquidity management on financial performance of deposit money banks in Nigeria from 2007 to 2016. Using multiple regression, the results show direct and significant relationship between liquidity and financial performance. Shah, Khan, Shah and Tahir (2018) investigated determinants of banks liquidity in Pakistan from 2007-2016.The sample size was 23 banks operating in the country. Panel regression technique was used to estimate the relevant data. The findings indicate that an insignificant relationship exists between liquidity and profitability. Bayoud, Sifouh, and Chemlal (2018) examined the factors of financial Moroccan banks performance between the period 2004 and2016. The fully modified ordinary least squares (FMOLS) method was used to analyze the co-integrated panel data. The findings show that a set of internal variables explain the financial performance of banks.

Wuave, Yua and Yua (2020) established that positive and significant relationship exists between liquidity and profitability of DMBs in Nigeria from 2010 to 2018 when data was analyzed with panel regression analysis. Adewusi and Adeleke (2020) concluded that banks' performance is significantly influenced by liquidity risk management in Nigeria from 2013 to 2017 when pooled regression was used as analytical technique. Sathyamoorthi, Mapharing and Dzimiri (2020) studied the effect of liquidity management on the profitability of banks in Botswana from 2011 to 2019. The correlation and regression analyses show that liquidity management has significant positive influence on the profitability of Botswana banks.

Hacini Boulenfad and Dahou (2021) study revealed that liquidity risk management has negative impact on Saudi Arabian banks' performance (ROE) from 2002 to 2019 with the use of panel data analysis technique. Dahiyat, Weshah and Aldahiyate (2021) employed ROA and EPS as performance variables in their study of the impact of liquidity on the financial performance of Jordanian manufacturing firms from 2010 to 2019. The study results show a statistically significant impact of liquidity on financial performance.

From these empirical reviews, it is evident that most studies such as Bassey and Moses (2015), Duruechi et al (2016), Thevaruban (2017), Onyekwelu et al (2016), Sathyamoorthi et al (2020) and Adewusi et al (2020) have examined liquidity management and financial performance of DMBs of an individual country. However, to the best of the researchers' knowledge, no study has been done on a group of West African countries. Hence this study differs from those above in that it specifically assesses the effect of liquidity management on financial performance of DMBs in selected West African Countries for the period 1991 to 2020.

3. METHODOLOGY

The study adopts the casual and historical research designs. Its causal nature is hinged on how to explore the cause and effect linkage between the liquidity management and profitability as specified in the models over a time scope of 1991-2020. The population and sample of this study constitute all DMBs in the Gambia, Ghana, Nigeria and Sierra Leone from 1991-2020. The main source of the data was annual financial reports submitted to the selected countries Central banks, hence aggregate and countrywide data for each country were adopted for this study. The sample consists of all DMBs (Gambia [13], Ghana [24], Nigeria [20] and Sierra Leone [12]) that had been in operation from 1991 to 2020.

3.1. Model Specification

In order to provide an analytical basis to test the empirical validation, this study will adopt one of the banks liquidity and performance model by Bassey and Moses (2015). The mathematical form of the mode is given as:

$$ROE_{it} = f\ (CRR_{it,}\ LTA_{it,}\ LAD_{it},\ CTD_{it},\ LNA_{it}) \quad (1)$$

Where:
ROE, = Return on equity of banks in period t
CRR, = Current ratio i.e. current asset to current liability
LTA, = Liquid assets to total assets ratio
LAD, = Loans and advances to deposits ratio
CTD, = Cash to total deposit ration
LNA, = Loan and advances to total assets ratio

However, due to the nature of DMBs whose stock in trade is cash deposited by their customers, CRR and CTD in the model above are essentially one and the same type of liquidity measure. Thus CRR will be removed from the model. Also, to take cognizance of the heterogeneous nature of the banks to be included in this study, Bank size (BSIZE) (measure as shareholders' fund) will introduced into equation (1) above as control variable. From the foregoing, the mathematical model for this study is specified as:

$$ROE = f(CTD, LTA, LAD, LNA \text{ and } BSZ) \quad (2)$$

However, for the purpose of comparison, this study adopts two distinct measures of profitability "Return on Equity (ROE) and Return on Asset (ROA)". Hence, equation 2 is specified in its econometrics form using the two performance measures as:

$$ROE_{it} = \alpha_0 + \lambda_1 CTD_{it} + \lambda_2 LTA_{it} + \lambda_3 LAD_{it} + \lambda_4 LNA_{it} + \lambda_5 BSZ_{it} + \varepsilon_{it.} \quad (3)$$

$$ROA_{it} = \phi_0 + \beta_1 CTD_{it} + \beta_2 LTA_{it} + \beta_3 LAD_{it} + \beta_4 LNA_{it} + \beta_5 BSZ_{it} + U_{it} \quad (4)$$

α_0, ϕ_0 =constant term,
λ_1 - λ_5 and $\beta_1 - \beta_5$ = coefficients to be estimated.
ε and U = error term.
i, t = bank ***i***, time ***t***.

The a priori expectation are given as: λ_1 & $\beta_1 < 0$; $\lambda_2 < 0$; λ_3 & $\beta_3 > 0$; λ_4 & $\beta_4 > 0$ and λ_5 & λ_5 & $\beta_5 > 0$.

3.2. Data Analysis Techniques

The analytical technique that was applied to estimate models (3 and 4) is the panel regression to minimize the effect of aggregation bias and estimate both time series and cross sectional data. Other tests that were conducted are cross-section dependence test, unit root and co-integration tests for stationarity of data.

4. Data Analysis and Interpretation

4.1. Descriptive Statistics

Table 1 Descriptive Statistics

Variable	Mean	Max.	Min.	Std. Dev.	Skewness	Kurt.	J-B	Prob
ROA	3.25	8.71	-1.04	2.03	0.43	2.89	3.73	0.15
ROE	30.86	93.82	-8.67	20.35	0.77	3.21	10.14	0.01
LTA	6.11	12.43	0.99	3.14	-0.08	1.87	6.51	0.04
LNA	21.02	65.98	2.14	14.80	0.71	2.38	12.11	0.00
LAD	52.13	88.98	20.94	16.22	0.14	1.99	5.46	0.07
CTD	38.35	87.86	1.74	25.52	0.09	2.06	4.61	0.10
BSIZE	19.81	43.40	2.50	10.55	0.23	2.14	4.75	0.09

Source: Authors' computation E-view 10.0,2021.

The summary statistics for the datasets are also reported in Table 1. Average ROA is 3.25 percent while average ROE is 30.86 percent. This implies that there is almost a ten-fold size of ROE over that of ROA among the banks in the WAMZ sub-region. Average liquidity ratio (LTA) is 6.11 percent, suggesting that only about 6 percent of assets among the banks is liquid. This is not an impressive level, and the regulators need to encourage the banking system to improve on liquidity in terms of asset size. The other measure of direct liquidity (CTD) however has an average ratio of 38.35, indicating that the CTD is high. The LDR is over 52 percent, which puts the banks at a higher risk when there are defaults. The standard deviations of the variables are low, indicating the reported mean values are all representative of the banking systems of the selected countries. Figure 1 shows the correlation chart between the two dependent variables. It shows a very steep positive slope between the variables, indicating that profitability among the banks for the countries have similar characteristics in terms of direction of movement. When banks' ROA is rising, the ROE is also simultaneously increasing. The shape of the chart appears to be a positive exponential curve, indicating that

higher levels of increases in ROA are linked to faster increases in ROE and vice versa for the banking systems of the four countries.

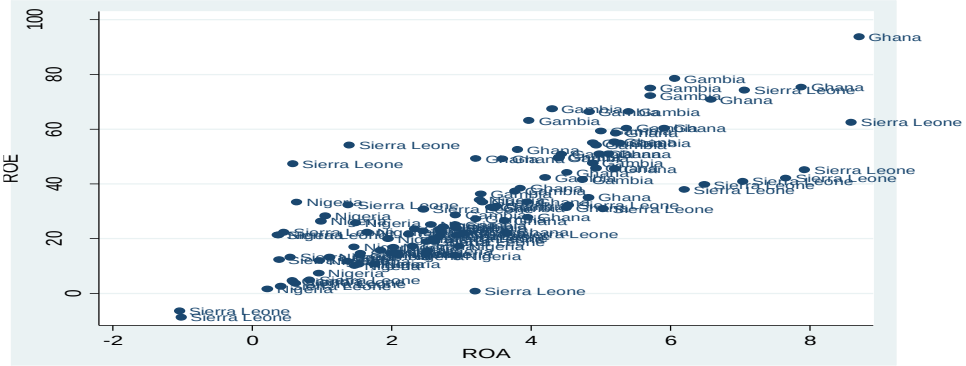

Fig. 1 Relationship between ROA and ROE
Source: Authors' computations, Eview 10.0, 2021.

4.2. Correlation Analysis

Table 2 Correlation Matrix

Variable	LTA	LNA	LAD	CTD
LNA	-0.633			
	(0.000)			
LAD	-0.519	0.395		
	(0.000)	(0.000)		
CTD	0.727	-0.445	-0.594	
	(0.000)	(0.000)	(0.000)	
BSIZE	0.514	-0.020	-0.397	0.437
	(0.000)	(0.842)	(0.000)	(0.000)

Source: Authors' computation, E-view 10.0, 2021.

From the correlation matrix in Table 2, it is seen that the relationships among the explanatory variables are strong in either direction. Essentially, none of the correlation coefficients is too large to elicit multicollinearity problems in the estimation of the models in the study.

A strong positive correlation is noted between LTA and BSIZE, suggesting that the level of liquidity in the banking systems for the countries is positively related with cash to deposit ratio and the bank size. Thus, banks with larger deposits are more liquid and bigger banks also exhibit higher levels of liquidity. On the other hand, LTA is negatively related to LNA and LAD, indicating that banks with bigger loans and advances ratios tend to be limited in terms of liquidity. Thus, the analysis shows that deposits and size matter for better liquidity systems, while loans tend to depreciate liquidity within the banks. This calls for better management of deposits and loans in order to ensure that liquidity is maintained among the banks in the countries. There is also a positive correlation between LNA and LAD and between bank size and CTD. This is to be expected since loan size and deposits appear to be attractive within the banking sectors of the selected countries.

4.3. Stationarity Tests

Table 3 Stationarity Tests Results

Variable	Homogenous Unit Root Process		Heterogeneous Unit Root Process				Remarks
	Intercept and Trend						
	LLC		IPS		ADF-Fisher		
	I(0)	*I*(1)	*I*(0)	*I*(1)	*I*(0)	*I*(1)	
ROA	-0.742	-6.914	-1.330	-8.030	13.471	66.67	Stationary
ROE	-0.379	-3.514	-0.504	-5.419	8.576	43.86	Stationary
CTD	-0.899	-6.282	-0.654	-6.702	1.566	54.53	Stationary
LAD	-0.242	-6.616	-0.657	-6.453	2.525	52.70	Stationary
LNA	0.993	-6.228	1.352	-6.890	7.431	57.25	Stationary
LTA	0.626	-5.516	0.049	-7.239	6.763	59.95	Stationary
BSIZE	-0.235	-5.708	0.612	-5.487	5.960	44.53	Stationary

Note: ** and * indicate significant at 1% and 5 % levels respectively;
IPS = Im, Pesaran & Shin; LLC = Levin, Lin & Chu
Source: Estimated by the Authors

The stationarity properties of the data were examined using three distinct tests "Levin, Lin and Chu (LLC), Im, Pesaran and Shin and the Augmented Dickey-Fuller tests". This is to enable us identify and understand the homogenous and heterogeneous characteristics of the cross sectional data. The tests results are presented in Table 3

4.4. Cointegration Test

Table 4 Panel Cointegration Tests Results

ROA Equation							
	Within-dimension				Between-dimension		*Kao*
	Unweighted		Weighted				
	Statistic	Prob.	Statistic	Prob.	Statistic	Prob	-3.37 (0.00)
Panel v-Statistic	-6.59	0.16	-9.57	0.12			
Panel rho-Statistic	10.34	0.033	10.439	0.01	13.94	0.03	
Panel PP-Statistic	-20.89	0	-29.44	0	-42.5	0	
Panel ADF-Statistic	-18.35	0	-23.38	0	-47.77	0	

ROE Equation							
	Within-dimension				Between-dimension		*Kao*
	Unweighted		Weighted				-5.04 (0.00)
	Statistic	Prob.	Statistic	Prob.	Statistic	Prob	
Panel v-Statistic	-6.6	0.06	-9.95	0.16			
Panel rho-Statistic	9.86	0.03	10.16	0.04	13.73	0.04	
Panel PP-Statistic	-23.1	0	-33.07	0	-44.41	0	
Panel ADF-Statistic	-28.09	0	-35.48	0	-48.89	0	

Source: Authors' computations, Eview 10.0, 2021.

Table 4 displays the results of the Pedroni and Kao panel co-integration tests. The coefficients of the IPS and Augmented Dickey Fuller test statistics are significant at the 5 percent level which is also supported by Kao panel cointegration test. The Kao residual cointegration test shown in Table 4 shows that the null hypothesis of no co-integration can be rejected for each of the equations. Thus, the cointegration tests results show that there are strong long run relationships among the variables in the study. The panel estimation framework can therefore be employed in the empirical analysis.

Table 5 Hausman Test for Cross-Section Random Effects

Model	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
ROA	5.34	6	0.5006
ROE	7.89	6	0.667

Source: Authors' computations, Eview 10.0, 2021

For the traditional panel data analysis procedure there is need to select between the fixed effects or random effects models as the best representation of the relationships. From the test results in Table 5, the Chi-Square statistic is not significant at any level, thereby rejecting the fixed-effects estimation technique. This implies we adopt the Random Effects for the estimation.

Table 6 Liquidity Management and Bank Performance

Variable	*Dep variable = ROA*			*Dep. variable = ROE*		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
C	4.578	4.135	0.000	37.258	3.725	0.000
LTA	0.139	2.357	0.037	1.002	1.025	0.308
CTD	0.016	2.048	0.043	0.301	3.230	0.002
LAD	-0.015	-1.265	0.209	0.032	0.263	0.793
LNA	-0.014	-0.866	0.389	0.190	3.302	0.001
BSIZE	-0.088	-3.993	0.000	-1.012	-4.981	0.000
Adj R-sq	0.230			0.348		
F-stat	8.119			11.654		

Source: Authors' computations, Eview 10.0, 2021

The random effect estimates for examining how financial performance are impacted by liquidity management of the banking systems among WAMZ countries is analyzed in this section. In the results shown in Table 6, the adjusted R-squared values are 0.23 and 0.348, indicating that a significant proportion of the dependent variables were effectively explained in the models. More importantly, the significant F-test indicates that the dependent variable was significantly related to all independent variables and that bank performances are influenced by liquidity dynamics.

The relevance and effectiveness of each of the explanatory variables in terms of influencing changes in performance indicators are evaluated by considering the coefficients of the explanatory variables in terms of signs and significance. In the results, the coefficient of LTA is significant at the 5 percent level for the ROA equation but fails the significance test in the ROE equation. This indicates that liquidity ratio only matters for operational efficiency of the banks but not in explaining the direction of market

outcomes of the banks. The coefficient of LTA in the ROA equation is positive and shows that increase in the liquidity of the banks in relation to assets significantly boosts return on asset of the banks. Thus, banks are essentially better off when they allow more of their asset base to be more liquid. This may effectively promote the capacity of banks to lend and perform core intermediary functions in the financial system. The coefficient of the other direct liquidity variable (CTD) is significant in both the ROA and ROE equations, suggesting that rising cash to deposit ratios effectively influences overall performances of the banking system among WAMZ countries. For the loan related variables, the results in Table 6 show that the coefficient of LNA (loan to asset ratio) fails the significance test in the ROA equation but passes the test in the ROE equation. This indicates that when loans increase in relation to assets in the banks, the return on equity improves. Thus, shareholders' funds are better managed by expanding loans in the banks in relation to assets. On the other hand, loans to deposit ratio (LAD) fails the significance test for both ROA and ROE equations. This implies that loans do not expand financial performance among WAMZ banking sectors over time. The coefficient of bank size is negative in both equations and suggests that bigger banks tend to perform less among WAMZ countries.

Test of Hypothesis: From the results in Table 6, the coefficient of the direct liquidity variable Cash to Total Deposit (CTD) is significant in both the ROA and ROE equations. We can sufficiently reject the null hypothesis that liquidity management does have significant impact on the financial performance of Deposit Money Banks in West Africa.

Diagnostic Tests: The post-estimation tests are carried out to examine the significance of estimations conducted in this study. The "Variance Inflation Factor (VIF)" test was conducted to ascertain the existence of a linear relationship among the variables. The results of the VIF are reported in Table 7. Theoretically, "Variance inflation factors (VIF)" ranges from 1 upwards. The results from Table 7 show that all the variables have variance inflation ratio of less than 10 for each of the countries. This is a critical condition for observing the absence of multicollinearity in the estimates. The VIF results complement those reported in the correlation matrix in Table II and suggest absence of multicollinearity in the models of the study.

Table 7 Variance Inflation Factor (VIF) Test for MultiCollinearity

Statistics	ROA		ROE		LNA		LTA	
	Max |z|	Prob.	Max |z|	Prob.	Max |z|	Prob.	Max |z|	Prob.
ROA equation								
Gambia	2.56	0.04	1.96	0.19	1.35	0.54	1.18	0.66
Ghana	11.3	0.00	2.02	0.16	2.34	0.07	3.30	0.00
Nigeria	1.00	0.79	1.54	0.41	0.62	0.95	6.25	0.00
Sierra Leone	0.25	1.00	2.44	0.06	1.76	0.28	3.50	0.00
ROE equation								
Gambia	1.32	0.56	1.2	0.65	1.35	0.54	4.03	0.01
Ghana	1.83	0.24	1.84	0.24	2.01	0.17	1.08	0.32
Nigeria	1.75	0.29	0.96	0.81	0.9	0.84	2.99	0.19
Sierra Leone	2.19	0.11	1.16	0.68	1.51	0.43	0.93	0.33

* Probability approximation using studentized maximum modulus
with parameter value 14 and infinite degrees of freedom
Source: Authors' computations, Eview 10.0, 2021

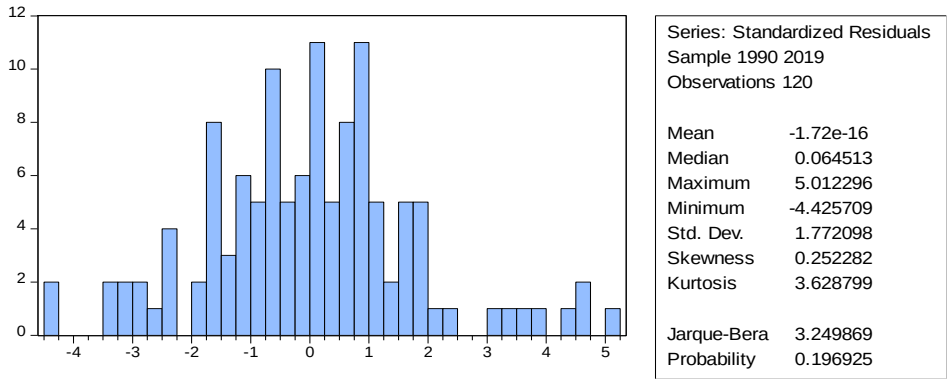

Fig. 2 Normality test for ROA equation

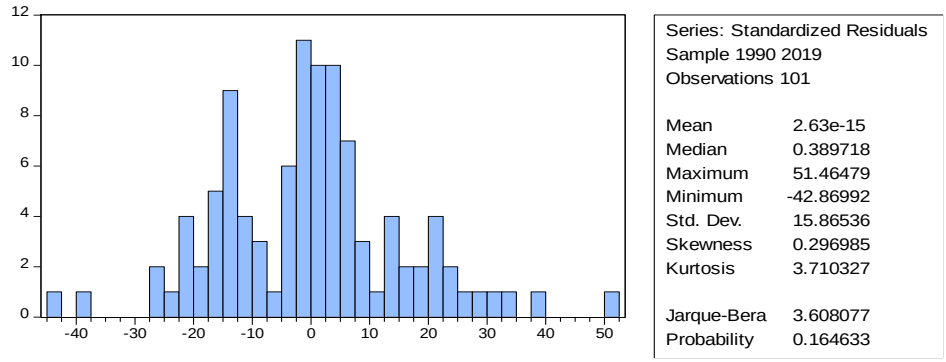

Fig. 3 Normality test for ROE equation

The tests of normality for the probability function of the estimated models are also conducted. Figures 2 and 3 show the histogram plot of the errors or residuals in the estimates, which is used to measure the probability density of the residual estimates. Clearly, the charts show that the distribution of the estimate errors or residuals is non-normal, given the bell-like shape of the diagram. This is also demonstrated by the J-B statistic values of 3.25 (pr = 0.196) for ROA and 3.61 (pr = 0.164) for ROE which both fail the significance tests. This therefore implies that even though the data sets were not normally distributed, the estimated equations pass the normality conditions for the residuals. This further improves on the robustness of the estimates in the study.

5.1. Findings

The results found in the empirical analysis of this study provide basic background for the evaluation of the roles of liquidity management patterns on bank performance. First, the study has shown that liquidity management of banks, in terms of cash management, generally plays strong roles in explaining performance of the banking sectors among the selected West African countries. Apparently, efficient liquidity management patterns are likely to yield positive effects that both improves overall efficiency of the banks and also

boosts long term performance. This line of findings is also shown in previous studies by Adewusi et al., (2020) and Wuave et al., (2020).

The role of liquidity in the performance of banks among the selected countries in the study has also been shown to essentially vary on the basis of the performance term. Although previous studies have indicated that liquidity matters, in general terms, for the overall performance of banks among several African and developing country economies (Ferrouhi, 2014; Song'e, 2015), our study has demonstrated that this may not fully be the case for the West African countries. The findings from the study indicate that liquidity ratio does not explain the direction of market outcomes of the banks. Thus, liquidity of banks for the WAMZ economies is more related to the immediate efficiency of banking activities.

Moreover, the cash to deposit ratio was found to significantly impact on return on equity among the West African DMBs. Apparently, cash management that favours more liquid holdings against the pattern of deposits presents more facilities for the banks to maintain more efficient banking functions. Rising cash holdings to deposits ratio aids in the servicing of net withdrawals from customer as well as facilitating other activities like customers drawing from their deposit (checking and savings) accounts (Biswal & Gopalakrishna, 2014; Goel & Kumar, 2016). This outcome confirms the work of Bassey & Moses (2015) and Agbada & Osuji (2013) who found that cash-dominated strategies significantly influence banks' profitability. From the empirical analysis, there is evidence that the ratio of liquid assets to total assets does not have any meaningful effect on ROE. This indicates that overload of cash in the system tends to weaken operational efficiency in the short run among the banks. Indeed, indicating that increasing cash reserves in the short run will limit market performance of the banks in WAMZ (Biswal & Gopalakrishna, 2014). The results are also in agreement with previous findings concerning the role of liquid asset management in the banking system (Kagoyire & Shukla, 2016; Wadike, Abuba & Wokoma, 2017).

The study also found that the ratio of loans and advances to deposit does not have a significant impact on financial performance of DMBs in West Africa. This is based on the insignificant effects of loans and advances to deposit ratio on return on equity in the study. This implies that the lending habits of the banks are essentially not efficient in terms of promoting their profit earnings. In this direction, loan strategies that focus on managing customers' deposits will not yield ultimate performance outcomes. This outcome may be largely linked to the financial climate in many developing economies, where credit management involves more unique strategies for banks that seek to excel (Alobari et al., 2018; Olaoye & Fajuyagbe, 2020). The ratio of loans and advances to total assets has significant impact on the financial performance of DMBs in West Africa. The findings in this direction support the findings of Sathyamoorthi et al. (2020) with significant and positive effect on ROE.

Finally, there is also evidence in the study that shareholders' funds are better managed by expanding loans in the banks in relation to assets. This outcome is feasible given that loan activitiy is a major segment of banking activities, among the banking systems of the WAMZ economies (Bassey & Moses, 2015; Nkegbe & Ustarz, 2015). The focus of shareholders is on building assets and critical aspects of the financial management of the firms. Hence, they would always pursue activities that improve on loan management in terms of minimizing loan default and weak application of the loan systems for the banks. Hence, return on equity, which is related to the stimulation of shareholder's funds is more related to loan management strategies that are efficiently targeted in line with overall liquidity management of the banks. This finding is also in line with the outcomes of previous studies (Taiwo et al., 2017; Tuffour, Owusu & Ofori-Boateng, 2018; Kafidipe et al., 2021).

5.2. Recommendations and Conclusion

The results obtained in the study provide effective background for policy directions. These policy recommendations from the study therefore include:

The Central Monetary Authority should seek to maintain cash balances that are optimal for the banking system. The action of the monetary authority to always tend to push the banks into more lending systems, need to be checked given that our study has shown that overt loan activities may hamper bank performance in the long run among the West African economies. In meeting short term cash requirements of customers, banks in the sub-region need to evolve innovative measures that do not put pressure on the cash reserve systems. For instance, rather than holding excessive liquidity, commercial banks may employ the system of borrowing and discounting bills. Finally, management of the surplus funds (usually in form of cash) needs to improve and focus more on investing in short-term instruments on a seasonal basis. Furthermore, when funding, sourcing by banks is concentrated in the wholesale markets, then the risks of liquidity shocks tend to be more concentrated both for individual banks and within the banking system. In the same vein, "heavy dependence on inter banking funding tends to expose banks to unmanageable risks once confidence weakens".

This study has shown that indeed, liquidity management that relates to loan and cash management is critical for ensuring improvements in performance for the banks in the sampled countries. It is shown that loans and other liquidity management is more strategic and efficient when deposits of the banks are taken into cognizance. This is because the managers realize that the interactions among lending, cash positions portend much risk to the banking sector which require constant consideration. It is also clear from the study that risks that require efficient liquidity management among the banking sectors of the selected countries are relatively high and appear to be rising. Essentially, managing risk in banks is a crucial issue which requires expertise knowledge with strategic liquidity management solutions that can minimize its ravaging effects on the banking operations. There is also the need for banks in the selected countries to monitor their deposit mobilization capacity and asset base since these elements have been shown to have major implications on the liquidity management strategies in the banking sectors of the selected countries. The panel regression analysis used in this study is not without its limitations and one of such limitations comes from the possible over parameterization of the regressors which could weaken the significance of the model. However, this was addressed by using suitable lag length criteria to choose appropriate lag length for the study. But for further research in this topic, the use of advanced econometric methods and expanding the scope of the study to cover the Sub-Saharan African countries is recommended.

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UTICAJ UPRAVLJANJA LIKVIDNOŠĆU NA FINANSIJSKE PERFORMANSE DEPOZITNIH BANAKA U ZAPADNOJ AFRICI

Ovaj rad istražuje efekte upravljanja likvidnošću na finansijske performanse depozitnih banaka novca baveći se bankovnim sektorom odabranih zemalja u okviru monetarne zone zapadne Afrike (WAMZ). Uzeti su zbirni podaci bankovnog sektora za četiri odabrane zamlje za period od 1991 do 2020. Regresiona analiza panel podataka je takođe usvojena za empirijsku analizu nakon što je izvršena statistička procena skupova podataka. Rezultati empirijske analize oktrivaju da je smanjenje razmere gotovine i depozita najefikasnija strategija upravljanja likvidnošću koja može da dovede do poboljšanja performansi banaka u proučavanim zemljama. Štaviše, ustanovljeno je da krediti i plasmani u ukupnu aktivu imaju značajnog uticaja na finansijske performanse banaka u Zapadnoafričkim zemljama. Odnos kredita i avansa u ukupnoj aktivi ograničen je na prinos na kapital. Ima dokaza i da odnos kredita i avansa za deposit nema značajnog uticaja na finansijske performanse depozitnih banaka u Zapadnoafričkim zemljama. Postoji potreba da banke u odabranim zemljama prate svoje kapacitete za mobilizaciju depozita jer se pokazalo da to ima značajnog uticaja na strategije upravljanja likvidnošću u bankovnom sektoru odabranih zemalja.

Ključne reči: *upravljanje likvidnošću, finansijske performanse, depozitne banke novca i panel regresija*