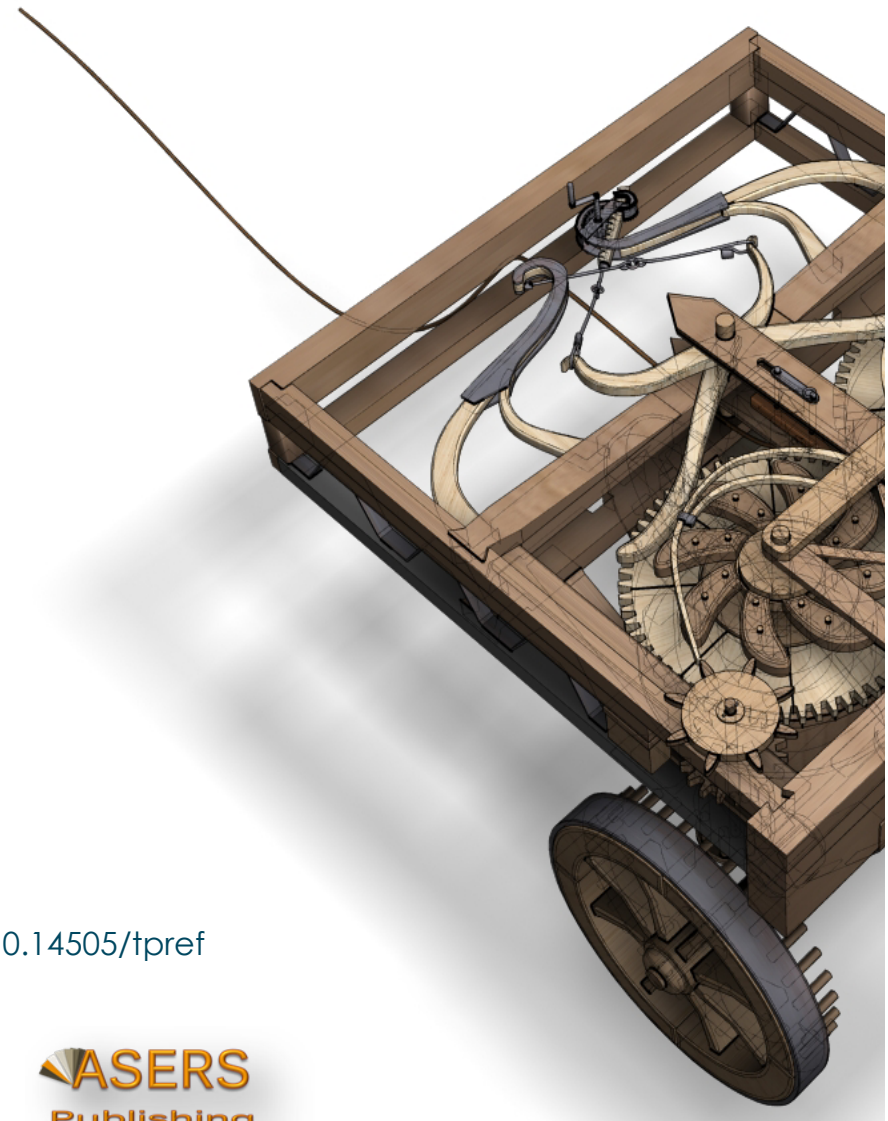
Theoretical and Practical Research in Economic Fields



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Moderating Effect of Board Characteristics on the Association between Asset Liability Management and Financial Performance of Commercial Banks in Nigeria

Oluwafemi Philip AKINSELURE
Accounting Programme
College of Management and Social Sciences
Bowen University, Nigeria
Corresponding author: akinselure.oluwafemi@bowen.edu.ng

Tajudeen John AYOOLA
Accounting Department
Faculty of Management and Accounting
Obafemi Awolowo University, Nigeria
alabiayoolaaca@oauife.edu.ng

Olateju Dolapo AREGBESOLA
Accounting Programme
College of Management and Social Sciences
Bowen University, Nigeria
dolapo.aregbesola@bowen.edu.ng

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Abstract: Asset liability management and consistent improvement in financial performance are the responsibility of the Board of Directors of commercial banks, yet studies on the impact of asset liability management on the financial performance of commercial banks in Sub-Saharan Africa have excluded board characteristics variable from their statistical model. This study examines the moderating effect of board characteristics and asset liability management on the financial performance of commercial banks in Nigeria. Commercial banks. It was based on secondary data, obtained from annual reports of commercial banks in Nigeria, the study covered the period starting from 2012 to 2021 and it purposively selected eleven (11) commercial banks out of fourteen (14) commercial banks in Nigeria. The statistical analysis was done using LASSO (Least Absolute Shrinkage Selection Operator). The findings of the study revealed that the moderating effect of board characteristics and asset liability management had a statistically significant impact on the financial performance of commercial banks in Nigeria because the p-values (0.04;0.03,0.02,0.01, and 0.005) obtained using LASSO were less than the 5% statistical threshold used in this study. The study concluded that the board of directors of commercial banks in Nigeria should ensure that they appoint board members who have expertise and experience in the establishment of asset liability management since its interaction with board characteristics showed a statistically significant impact on the financial performance of the bank.

Keywords: financial performance; commercial banks; asset liability management; board characteristic.

JEL Classification: G21; G10; C10; C58; E44.

Introduction

Commercial banks in Nigeria (also called deposit money banks) play a central role in the country's economic development because, without their funding strategies, industrial growth will be impossible (Ilmiani and Meliza, 2022). Furthermore, the National Bureau of Statistics (2024) in Nigeria reported, that the contribution of the service sector, which also comprise of the banking industries, resulted in the growth of the gross domestic product (GDP) to ₦58,865,142.27 million in nominal terms, indicating a year-on-year nominal growth of 14.86%. This performance was higher than the first quarter of 2023 which stood at ₦51,242,151.21 million. The strategic role of the banking industry in the service sector is one of the major reasons stakeholders attach so much importance to its financial performance. In an ideal situation, the financial performance of banks should be at its optimal. However, in the last decade, some banks have reported unstable financial

performance, while other banks reported losses. Extensive studies have been conducted on the financial performance of commercial banks revolving majorly on the determinant of financial performance. However, one of the understudied factors, that may impact financial performance in the banking sector and has not been critically examined is asset liability management. Existing studies on the impact of asset liability management on financial performance emphasised a mixed relationship and inconclusive between both variables. Since, some of these studies (Abebe 2022, Wike *et al.* (2024), established that both positive and negative associations exist between asset liability management and financial performance.

The inconclusive results between asset liability management and financial performance may be attributable to the non-consideration of board characteristics as a moderator in the statistical model of existing studies, despite the strategic role of the board. Theoretically, the resource dependence and upper echelon theories position the board as an important resource that can strengthen or diminish the financial performance of the banks, as well as generate innovative ideas for strategic direction and execution. Therefore, the novelty of this study is that it seeks to contribute to knowledge by introducing board characteristics as a moderator in the association between asset liability management and financial performance. Existing studies (*e.g.*, Kazeem and Adeoye 2020; Isamail, *et al.* 2023; Wike, *et al.* 2024), only focus on the effect of asset liability management on financial performance of banks.

The manuscript is structured as follows: Section 2 presents the literature review and hypotheses. Section 3 describes the methodology Section 4 Research results Section 5 Discussion 6, Conclusion and further reading.

1. Literature Review

Asset Liability Management entails risk quantification and deliberate decision-making focused on the minimisation of risk and maximization of profit (Dsouza, *et al.* 2022) It is a management risk strategy focused on strengthening the shareholder's wealth by reducing risk and maximizing the return of the shareholders, thereby, enhancing the financial performance of the bank (Neves, *et al.* 2020). The board of directors of the banks can sustain the improvement of shareholder's wealth by ensuring the assets and liabilities of the shareholders are invested in only safe investment, thereby, protecting the capital of the shareholders from sudden economic crises (Dewasurendra, *et al.* 2019; Barmuta, *et al.* 2018; Almaqtari, *et al.* 2019). Asset liability management can also be defined as the management of the assets and liability of the bank by the board of the bank (Choudhry 2011), This also means that it is the responsibility of the board of the bank. Asset liability management was measured in this study using Liquidity risk, credit risk and interest rate risk. Liquidity risk was represented by customers' deposits, credit risk was represented by loans and advances of the bank while Interest rate risk was determined using the prevailing interest rate of the bank. The study of Novickytėa and Petraitytė (2014) also used only customer deposits, loans, and leverage, to represent asset liability management. Furthermore, the studies of (Lysiak, *et al.* 2022; Li, *et al.* 2022; Chen, *et al.* 2022) established that the board of commercial banks are responsible for determining the optimal risk management strategy, which is also a subset of asset liability management since, this will help to minimise liquidity risk, credit risk and interest rate risk of the bank and will help to mitigate sudden financial crisis that could erode the wealth of the shareholders.

Performance measurement is a highly fundamental factor that must be considered by financial institutions because it helps them survive the highly competitive environment where currently operate and also creates rapid opportunities for them to their performance (Surjan and Srivastava, 2019). Performance can be defined as a business's capacity to generate optimal returns. Banks introduce measures to improve their financial performance because of the risky nature of their business (Wonglimpiyarat, 2014). Financial performance is defined as the result of measuring the financial performance of an organisation in monetary terms. The financial performance is measured in this study using return on asset. Return on assets is a financial metric that indicates how well an organisation has utilised its earnings to fund its assets. It is the most commonly used in studies relating to asset liability management because it holistically addresses the fundamentals of corporate performance and the operational capacity of the bank (Issah, *et al*, 2017; Al-Matari *et al.* 2014). However, other asset-liability management studies adopted return on equity to measure financial performance. But, Issah *et al.* (2017), further, reinterred that return on asset is more suitable than the return on equity used by some other asset-liability management studies because the return on equity can be easily manipulated through financial engineering, particularly the equity components of the return of equity's formula, Although, (Mcclure, *et al.* 2021) opinned that even though the return on assets is not the only optimal financial ratio for the financial performance of an organisation the appropriate , It is the most dependable, effective, and extensively used financial indicator for determining performance.

The board is the apex organ in the banking industry. The experience and expertise of the board members may determine the extent of improvement in the financial performance of the bank (Ogan, and Kornom-gbaraba 2024). The metrics used for board characteristics in this study include; board size (Wokeh 2018), board independence (Ebire *et al.* 2024) and board gender diversity (Chuma and Yahaya 2024). Chen (2024) opined that weakness in the board characteristics of a financial institution was the main cause of the 2008 financial crisis. Wokeh (2018) posited that a large board size is less effective than a small one. In this study, it is computed based on the total number of directors.

Furthermore, as regards board independence, Ebire *et al.* (2024) documented that the higher the proportion of independent board members the more improved the financial performance of the banks, however. Ebire *et al. (*2024) showed that the presence of an independent director has a negative effect on the financial performance of the organisation while (Liu, *et al.* 2015) confirmed that a negative relationship exists between independent director and financial performance. Whereas (Mohapatra, 2016) confirmed that no relationship exists between independent boards and financial performance. In this study board independence is shown as a ratio of the number of executive directors/to the number of executive and non-executive directors. Similarly, according to the study of Chuma and Yahaya (2024), it was established that the existence of a balance between the male and female gender on the board of directors often creates more opportunities to increase the financial performance of the bank. In this study, it is obtained by dividing the number of female directors by the total number of board members (that is, both male and female board members).

Bank size can be described as the bank's capacity to earn and maintain a profit over a period of time (Almazari, 2014, Teimet *et al.* 2019), It is one of the control variables considered in this study because it certainly affects financial performance, asset liability management, and board characteristics. However, existing literature on bank size, showed that the relationship between bank size and financial performance as well as asset liability management is mixed because Alfadhli, M and Alali, M (2021) opined that a insignificant relationship exists between bank size and financial performance while Siebenbrunner *et al.* 2017 documented that the effect of bank size on financial performance and risk management, which is also a major part of asset liability management is positive. It is measured in this study, with a logarithm of the total asset and this was supported by the study of Mester (2010) claimed that bank size is calculated as a logarithm of total assets. Financial leverage is defined as the use of debt to finance business operations, it is preferred by most businesses because its inclusion in a given capital structure mix produces a lower weighted average cost of capital, thus improving the bank's returns and consequently leading to improvement in the financial performance. It is also one of the control variables in this study, it is measured in this study using the ratio of liabilities to assets. Niresh and Velnampy, (2012) opined that most bank managers depend on leverage to smoothly carry out their operations because it often has longer repayment terms thus creating room for financial improvement. Furthermore, Santos *et al.* (2023) posited that debt financing opens up several opportunities for financial institutions, some of which include stable interest rates, tax deductions and enhanced financial performance.

Board characteristics is a corporate governance mechanism that ensures the board of directors of deposit money banks minimises risk and uncertainty by adopting best practices in asset liability management policies thus, causing an improvement to the financial performance of the banks (Lysiak *et al.* 2022; Dsouza *et al.* 2022). This also implies that it will be non-scientific to explain the relationship between asset liability management and financial performance without considering the board characteristics element since it is the board of directors of the bank that is responsible for establishing the asset liability management which eventually gives direction to the financial performance of the commercial bank. This was also in tandem with the study of Ogan and Kornom-gbaraba (2024) who established that the board of directors of commercial banks are responsible for putting in place an asset liability management structure that will mitigate risk and uncertainties in the bank's operation thus improving the financial performance of banks, It is important to see the association between board characteristic, asset liability management and financial performance because asset liability management is the prerequisite for the stability and continued improvement in the financial performance of financial institutions (Mulyungi and Mukasinayobye 2017; Ajibola 2016), However, existing studies (*e.g.* Dsouza *et al.* 2022; Neves *et al.* 2020; Dewasurendra *et al.* 2019*;* Barmuta *et al.* 2019; Almaqtari *et al.* 2019) examining the effect of asset liability management on the financial performance of banks have not included board characteristics variable in their statistical model. To this end, the hypothesis for this study is formulated as follows:

H1: Board characteristics have no moderating role in the association between asset liability management and the financial performance of deposit money banks in Nigeria.

2. Methodology

The research adopted panel data, covering the period from 2012 to 2021. This period was chosen because Nigeria effectively adopted the International financial reporting standard in 2012. Also, the study encompassed all the twenty-three (23) quoted banks as of 31st December 2021 (CBN, 2021). These twenty-three (23) banks comprised fourteen (14) publicly listed banks and nine (9) privately listed banks. However, out of these twenty-three (23) banks, only eleven (11) were purposively chosen for this study, based on the following three (3) criteria. (i) The selected banks had complete annual reports from 2012 to 2021 on their official websites, (ii) the annual reports of the selected banks were presented using the domestic currency (Naira), and (iii) the selected banks were publicly quoted companies. Furthermore, the statistical analysis of the study was based on Descriptive and Inferential statistics. The Descriptive statistics included; mean, median, standard deviation, maximum and minimum while the inferential statistics included LASSO (Least absolute shrinkage and selection operator) variable reduction technique. Pairwise Correlation, Breusch-Pagan test, Panel Cross-section Heteroskedasticity

LR Test, Arellano-Bond Serial Correlation Test, and Hausman test, According to Tibshirani, (1996), this LASSO statistical technique ensures regularisation of variables and accurate variable selection which eventually lead to accurate statistical discussion of results technique. This was also supported by the study of Kumar, (2023), who emphasised that the LASSO statistical technique eliminates some variables in a model because they may contain some outlier values that may affect the correct interpretation of statistical results.

Table 1. Measurement of Variables

S/N	Variable Name	Measurement/ Indicators/proxy	A priori Expectation	Sources
1.	Financial performance (Return on Asset).	It was represented by return on asset which was obtained with the ratio of profit after tax to total assets.	Positive	Kazeem and Adeoye (2020)
2.	Liquidity risk	It was represented by the customer's deposit from .2012-2020.	Negative	Kazeem and Adeoye (2020)
3.	Interest rate risk	It was represented by the interest rate of deposit money banks starting from 2012 to 2020	Positive	Kazeem and Adeoye (2020)
4.	Credit risk	It was represented by loans and advances from 2012 to 2020.	Positive	Kazeem and Adeoye (2020)
5.	Board Characteristics	It was represented by i. Board size (this was the addition of both Executive and non-executive Directors shown under the corporate governance section of the various deposit money banks). ii. Board gender Diversity (This was derived by dividing the number of female directors by the total number of directors in the bank).	positive Positive	Ogan and Kornom-gbaraba (2024)
	Board Characteristics(Continuation)	iii. bboard meetings (This refers to the number of meetings held by the board of directors, shown under the cooperate governance section in the annual report) iv. Board independence (This was derived by dividing the number of Non-executive director by the total number of directors in the banks)	positive positive	Ogan and Kornom-gbaraba (2024)
6.	Leverage	It was represented by the ratio of the total liabilities to total asset	Positive	Niresh and Velnampy (2012)

Source: Literature review

Data for asset liability management, board characteristics and financial performance were obtained from annual reports of banks, and this was similar to the approach adopted in the studies of (Ajibola 2016; Njogo *et al.* 2014; Onaolapo and Adegoke 2020), While data on control variables were also obtained from the bank's annual report and World Bank Development Indicator Database available on the internet (WDI 2015). The statistical model to examine the moderating effect of asset liability management, board characteristics and financial performance of Nigeria banks adopted for this study is stated as follows

$$ROA_{it} = \beta_0 + \beta_1 LQR_{it} * \beta_2 GEN_{it} + \beta_3 LQR_{it} * \beta_4 BSIZ_{it} + \beta_5 LQR_{it} * \beta_6 DEPD_{it} + \beta_7 LQR_{it} * \beta_8 MEET_{it} + \beta_9 CRR * \beta_{10} BMEET + \beta_{11} CRR * \beta_{12} GEN + \beta_{13} DEPD * + \beta_{14} CRR + \beta_{15} INT * \beta_{16} BMEET + \beta_{17} INT * \beta_{17} GEN + \beta_{18} DEPD * \beta_{19} INT + \beta_{20} LEV_{it} + \beta_{21} BkSZ + e_{it}$$

Where:

- ROA means the return on an asset which represents the financial performance

- $LQR_{it} * GEN_{it}$ means liquidity risk interacted with board gender diversity

- $LQR_{it} * DEPD_{it}$ means liquidity risk interacted with board independence

- $LQR_{it} * MEET_{it}$ means liquidity risk interacted with board meetings

- *LQR_{it} * BSIZ means liquidity risk interacted with board size*
- *CRR_{it} * GEN means credit risk interacted with board gender diversity*
- *CRR_{it} * $\beta_2 BSIZ_{it}$ means credit risk interacted with board size*
- *CRR_{it} * $MEET_{it}$ means credit risk interacted with board meetings*
- *CRR_{it} * $DEPD_{it}$ means credit risk interacted with board independence*
- *CRR_{it} * GEN_{it} means interest rate risk interacted with board gender diversity*
- *$INTRR_{it}$ * $BSIZ_{it}$ means interest rate risk interacted with board size*
- *$INTRR_{it}$ * $DEPD_{it}$ means interest rate risk interacted with board independence*
- *$INTRR_{it}$ * $MEET_{it}$ means interest rate risk interacted with board meetings*
- *$INTRR_{it}$ * GEN_{it} means interest rate risk interacted with board gender diversity*
- *BkSZ means Bank size (Control Variable) represented by the natural logarithm of total asset*
- *LEV means leverage (Control Variable) represented by Total liability / Total Asset*
- *β_0 means Intercept*
- *β_1 to β_{20} = Regression Coefficient.*
- *i = Individual deposit money banks used in the study*
- *t = Time frame in the study*

4. Regression Results

The result of the descriptive statistics conducted on the variables used in achieving the objective of this study, which was, to evaluate the moderating/interactive effect of asset liability management, board characteristics and financial performance of commercial banks in Nigeria are reported in this section. Table 1 contains the descriptive statistics of the variables such as the mean, median, standard deviation, minimum and maximum. The statistics aided the study in assessing the quality of the data and identifying the presence of outliers which might affect the robustness of the model. The average value for return on asset was 0.01609 and the standard deviation was 0.0199. This implied that the mean of return on assets of the banks had close variation to the standard deviation. The maximum return on asset was 0.061307 and the least was -0.110538, the median of 0.013594 indicated that more than 50% of the bank return of asset clustered around the mean because the value of the mean and median were almost the same.

Furthermore, the liquidity risk (LQR) of the banks reported an average of 27.85 and a standard deviation of 1.9751. While the maximum was 34.24 and the minimum was 22.394. The log of the loans and advances showed that most of the banks were less exposed to liquidity risk because the mean and the standard deviation were close in value. This also implied that the banks had a holistic liquidity risk strategy which helped them to minimize their exposure to liquidity challenges. The financial leverage of the banks showed that on average the ratio of debt to asset was 0.8705 the minimum ratio was 0.00063 and the maximum was 3. The Bank size reports an average of 28.4780 and a standard deviation of 1.6987. The maximum was 35.282 and the minimum was 25,62. The interest rate on average was 8.233 and the maximum was 13.5961. The lowest interest rate was 0.4459. The standard deviation of the interest rate was 3.112. The credit risk and log of business growth report an average of 27.45021 and 24.87029 respectively. The lowest CRR was 22.37423 and the maximum was 33.78002. The log of business growth was 19.03982 and the maximum was 31.20932. The result of the normality test showed that all the variables were not normally distributed with p-values less than 0.05.

Furthermore, Table 1, also, showed that the board size (BSIZ) of the banks showed an average of 13.745 and a standard deviation of 2.928. The maximum was 20.00 and the minimum was 6.000. Board independence of the banks reports an average of 0.5778 and a standard deviation of 0.0923. The maximum was 0.9090. The financial leverage of the banks showed that on average the ratio of debt to asset was 0.8705 the minimum ratio was 0.00063 and the maximum was 3. The Bank size reports an average of 28.4780 and a standard deviation of 1.6987. The maximum was 35.282 and the minimum was 25,62. Gender diversity on average was 0.2199 and the maximum was 0.4545. The board meeting had an average of 5.8818 and a median of 5.000. This showed that on average the bank's board held 5 meetings. The variable of INF reported an average of 12.3660 and a standard deviation of 3.1120. The minimum of INF was 8.060 and the maximum of the INF was 16.950. The log of business growth was 19.03982 and the maximum was 31.20932.

4.1 Pairwise Correlation Result

Tables 2 and 3 presented the pairwise correlation of the variables used in assessing the effect of asset liability management, board characteristics and financial performance of banks in Nigeria. The correlation analysis was carried out among the independent variables of the study to ascertain the degree of independence of the explanatory variables. The

result revealed that the independent variables included in the study exhibited weak correlations with each other, which implies that all the independent variables are very suitable for the model. This is in tandem with the study of Damodar (2004), who posited that the correlation coefficient among regressors will be suitable for regression analysis if it does not exceed a benchmark value of 0.80. LASSO (Least Absolute Shrinkage and Selector Operator), Pairwise Correlation, Breusch-Pagan test, Panel Cross-section Heteroskedasticity LR Test, Arellano-Bond Serial Correlation Test and Hausman test Result for the Interactive Effect of Board Characteristics and Asset Liability Management on Financial Performance of Banks in Nigeria.

Table 4 shows the regression outputs of the interactive effect of board characteristics and asset liability management on the financial performance of deposit money banks in Nigeria. The study adopted LASSO (*i.e.* least absolute shrinkage and selection operator) by incorporating it with the backward elimination method. The result revealed that board meetings, board gender diversity and board independence were the only proxies of board characteristics selected by the LASSO statistical technique, these three variables then interacted with variables representing asset liability management (liquidity risk, interest rate risk, credit risk) to produce a statistically significant effect on financial performance of the bank. Also, according to Kumar (2023), the LASSO statistical technique eliminates some variables in a model because they may contain some outlier values that may affect the correct interpretation of statistical results.

Furthermore, the findings showed that the regression model produced an R-squared value of 65.8% which implied that the dependent variable was adequately accounted for by the independent variable. The f-value of 8.5922, showed that the independent variable was jointly significant at 5%. The result further revealed that board meetings positively interacted with credit risk to affect the financial performance of the banks since the P-valued (0.03) obtained was less than 5%, Also interest rate risk positively interacted with board meetings because the result of the P-value was (0.03) and this was also less than the 5% statistical threshold used for this study. This also implied that the higher the number of board meetings held by the board of directors the more effective the asset liability management, as well as, financial performance of the bank since, the board meeting often create an opportunity for the directors to critically, professionally review and evaluate activities of the bank and align themselves with shareholders interest over some time, although this might not always translate to improvement in interest rate risk and credit risk management (Allegrini and Greco 2013). Furthermore, Gender diversity and credit risk showed positive interaction with the financial performance of the banks because the p-value (0.02) that was less than the 5% statistical threshold used in this study. This is in agreement with the study of (Garba and Abubakar, 2014) who confirmed that the presence of female board members will enhance the bank's financial performance as well as asset liability management.

Table 2. Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
ROA	0.016	0.0135	0.0613	-0.1105	0.0199	110
BSIZ	13.7454	14	20	6	2.9286	110
DEPD	0.5778	0.5893	0.909	0.1666	0.0923	110
GEN	0.2199	0.2085	0.4545	0.0555	0.0786	110
BMEET	5.8818	5	16	1	2.3451	110
LQR	27.85545	27.78851	34.24457	22.39474	1.975101	110
INT	8.233726	6.455521	13.59615	4.522189	3.133655	110
CRR	27.45021	27.27761	33.78002	22.37423	1.700678	110
LEV	0.8705	0.8676	3.0074	0.0006	0.3422	110
LGBGWT	24.8702	24.8913	31.2093	19.0398	2.3065	110
INF	12.366	12.155	16.95	8.06	3.112	110
BKSZ	28.478	28.2231	35.2827	25.6282	1.6987	110

Source: Author's Computation, 2023.

Similarly, board independence another proxy of board characteristics revealed a significant interaction with the liquidity risk and credit risk. Since the p-values (0.01 and 0.005) obtained using LASSO were less than the 5% statistical threshold used for this study. This statement was corroborated by the studies of (Abu *et al.* 2016; Muller 2014) who emphasised that increases in the number of independent board members expose the banks to professional expertise which causes improvement in the asset liability management structure as well as the financial performance of the bank. Thus, it can be inferred that the interaction of board characteristics and asset liability management has a statistically significant influence on the financial performance of the bank. This is in agreement with the studies of (Bathula 2008; Javed *et al.*

2013) who emphasised that the board of director have a statistically significant influence on asset liability management and the financial performance of the bank. Furthermore, the result of the Arellano-Bond Serial Correlation Test Panel Cross-section Heteroskedasticity Likelihood Ratio Test and Breusch-Pagan Test revealed that the model residual value failed to violate the assumption of no serial correlation and heteroskedasticity of a least square regression model. Also, the Hausman test, confirmed that the Redundant Fixed Effects Test is the most appropriate for the study, since its P-value (*i.e.* 0.00000) was less than the 5% statistical threshold used for this study.

Table 3. Correlation Matrix for asset liability management and control variables

Correlation									
Probability	ROA	BSIZ	DEPD	GEN	BMEET	LEV	LGBGWT	BKSZ	INF
ROA (r)	1.0000								

BSIZ (r)	-0.0258	1.0000							
(p-value)	(0.7883)	-----							
DEPD (r)	0.0119	-0.0723	1.0000						
(p-value)	(0.9017)	(0.4526)	-----						
GEN (r)	-0.0784	-0.2065	-0.0211	1.0000					
(p-value)	(0.4154)	(0.0304)	(0.8265)	-----					
BMEET(r)	-0.0765	0.3188	0.0319	0.0308	1.0000				
(p-value)	(0.4266)	(0.0007)	(0.7402)	(0.7489)	-----				
LEV (r)	-0.0096	0.1394	-0.0004	-0.0004	-0.0772	1.0000			
(p-value)	(0.9207)	(0.1461)	0.9960	(0.9966)	(0.4223)	-----			
LGBGWT (r)	-0.0259	0.0047	-0.0898	-0.2146	0.1061	-0.0205	1.0000		
(p-value)	(0.7878)	(0.9611)	(0.3504)	(0.0243)	(0.2697)	(0.8315)	-----		
BKSZ (r)	0.0700	0.2328	-0.0695	-0.3029	-0.1208	0.3859	0.0624	1.0000	
(p-value)	(0.4668)	(0.0144)	(0.4706)	(0.0013)	(0.2086)	(0.0000)	(0.5172)	-----	
INF (r)	-0.0055	0.0537	0.0229	0.0171	-0.1025	0.1413	-0.1061	0.1294	1.0000
(p-value)	(0.9537)	(0.5768)	(0.8116)	(0.8589)	(0.2862)	(0.1407)	(0.2699)	(0.1777)	-----

Source: Author's Computation, 2023.

Where (r)= correlation coefficient value, p-value= probability value, LEV= Financial leverage, LGBGWT= Bank growth, BKSZ= Bank Size INF=Inflation, BMEET=Board Meeting, GEN=Gender, BSIZ=Board Size ROA=Return on asset, DEPD= Board dependence.

Table 4. Correlation result for board characteristics and control variables

Correlation								
Probability	ROA	LQR	LEV	BKSZ	INF	INT	CRR	LGBGWT
ROA	1.0000							

LQR (r)	-0.0230	1.0000						
(p-value)	(0.8110)	-----						
LEV (r)	-0.0096	0.0281	1.0000					
(p-value)	(0.9206)	(0.7704)	-----					
BKSZ(r)	0.0699	-0.0300	0.3859	1.0000				
(p-value)	(0.4679)	(0.7555)	(0.0000)	-----				
INF (r)	-0.0057	0.1407	0.1413	0.1294	1.0000			
(p-value)	(0.9527)	(0.1426)	(0.1407)	(0.1777)	-----			
INT (r)	0.1018	0.0680	-0.0626	0.0755	0.0861	1.0000		
(p-value)	(0.2896)	(0.4799)	(0.5155)	(0.4329)	(0.3708)	-----		
CRR (r)	-0.0440	0.3594	0.0131	-0.1550	0.003844	-0.1087	1.0000	
(p-value)	(0.6475)	(0.0000)	(0.8913)	(0.1059)	(0.9682)	(0.2579)	-----	
LGBGWT(r)	-0.0262	-0.0499	0.0086	0.0569	0.0333	-0.0804	-0.1558	1.0000
(p-value)	(0.7851)	(0.6045)	(0.9285)	(0.5545)	(0.7294)	(0.4034)	(0.1040)	-----

Source: Author's Computation, 2023.

Where ROA**=** Return on asset LGBGWT=Bank growth CRR= Credit risk INT =Interest rate INF = Inflation BKSZ = Bank size LEV = Financial leverage LQR = Liquidity risk, (r) = Correlation coefficient, (p-value) = probability value

Table 5. LASSO Result showing the interaction of asset liability management board characteristics and financial performance of banks in Nigeria.

	Pooled OLS			Fixed Effect			Random Effect Model		
	Coef.	t-value	p-value	Coef.	t-value	p-value	Coef.	t-value	p-value
BMEET*LQR	0.0820	0.812372	0.4185	0.075644	1.016295	0.3122	0.082067	1.134121	0.2595
CRR*BMEET	-0.0888	-0.881092	0.3804	-0.083419	-2.124061	0.0361	-0.088811	-1.230059	0.2216
INT*BMEET	0.0192	0.780309	0.4371	0.022461	2.201587	0.0300	0.019248	1.089359	0.2786
GEN*LQR	-0.0344	-0.019126	0.9848	1.551450	1.169406	0.2454	-0.034424	-0.026700	0.9788
CRR*GEN	-0.1058	-0.058095	0.9538	-1.639584	-2.225834	0.0283	-0.105894	-0.081105	0.9355
INT*GEN	1.0059	1.587895	0.1155	0.356119	0.748975	0.4558	1.005931	2.216798	0.0289
DEPD*LQR	-2.2982	-1.922373	0.0574	-2.289601	-2.525409	0.0133	-2.298286	-2.683749	0.0085
DEPD*CRR	2.6155	2.220845	0.0286	2.530643	2.837613	0.0056	2.615550	3.100434	0.0025
DEPD*INT	-0.4318	-1.248917	0.2146	-0.213808	-0.804790	0.4231	-0.431892	-1.743563	0.0843
LEV	-0.0439	-0.084977	0.9325	1.217936	2.569813	0.0118	-0.043962	-0.118634	0.9058
C	-1.6719	-1.187362	0.2379	-1.839035	-1.513522	0.1337	-1.671955	-1.657630	0.1006
R-squared	0.2602			0.6588			0.2602		
Adjusted R-squared	0.1855			0.5821			0.1855		
F-statistic	3.4836			8.5922			3.4836		
Prob(F-statistic)	0.0005			0.0000			0.0005		

Source: Author's Computation, 2023.

5. Discussion

The findings of this study revealed that the moderating effect of board characteristics on asset liability management and financial performance of deposit money banks was statistically significant since the result of the LASSO statistical technique showed that some of the variables representing asset liability management and board characteristics (*e.g.* interest rate risk and board meeting) had a statistically significant effect on the financial performance of the banks. This was supported by the output of the LASSO statistical technique which gave a p-value (p=0.0300) that was less than 5% level of significance. The implication of this is that that increase in board meetings provided the board members with the opportunity to discuss proactively the success of the bank. This narrative was in tandem with the view of (Allegrini and Greco 2013), who emphasised that an increase in board meetings leads to professional evaluation of the previous performance of the banks, to maximise the interest of the shareholders.

Conclusion and Further Research

The main goal of this study is to advance knowledge about the moderating effect of, board characteristics on asset liability management and financial performance of banks in Nigeria. It statistically established that the interaction of the proxies of board characteristics (board gender diversity, board independence and board meeting), as well as the proxy of asset liability management (credit risk, liquidity risk and interest rate risk), analysed using the LASSO (least absolute shrinkage and selection operator) statistical technique, produced a statistically significant effect on the financial performance of banks.

The study further concluded that since, this study has statistically shown that the board of director has significant impact on the asset liability management policy as well as financial performance of the banks. The Chairman of the bank and the other board members must ensure that they attend seminar that enhance their ability to effectively and efficiently manage the asset liability management policies and structure of the bank.

The study suggested that further research should be conducted on other countries in Sub-Saharan Africa, since the conclusion was only based on data obtained from Nigeria.

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Credit Authorship Contribution Statement

Oluwafemi Philip Akinselure: Conceptualization, investigation, Methodology, Project administration, Software formal analysis, Writing - original draft, Supervision, Data curation, Validation, Writing-review and editing, Visualisation, funding acquisition
Tajudeen John Ayoola: Conceptualization, investigation, Methodology, Project administration, Software formal analysis, Writing - original draft, Supervision, Data curation, Validation, Writing-review and editing, Visualisation, funding acquisition.
Olateju Dolapo Aregbesola: Conceptualization, investigation, Methodology, Project administration, Software formal analysis, Writing - original draft, Supervision, Validation, Writing-review and editing, Visualisation, funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of use of Generative AI and AI-Assisted Technologies

The authors declare that they have not used generative AI (a type of artificial intelligence technology that can produce various types of content including text, imagery, audio and synthetic data.

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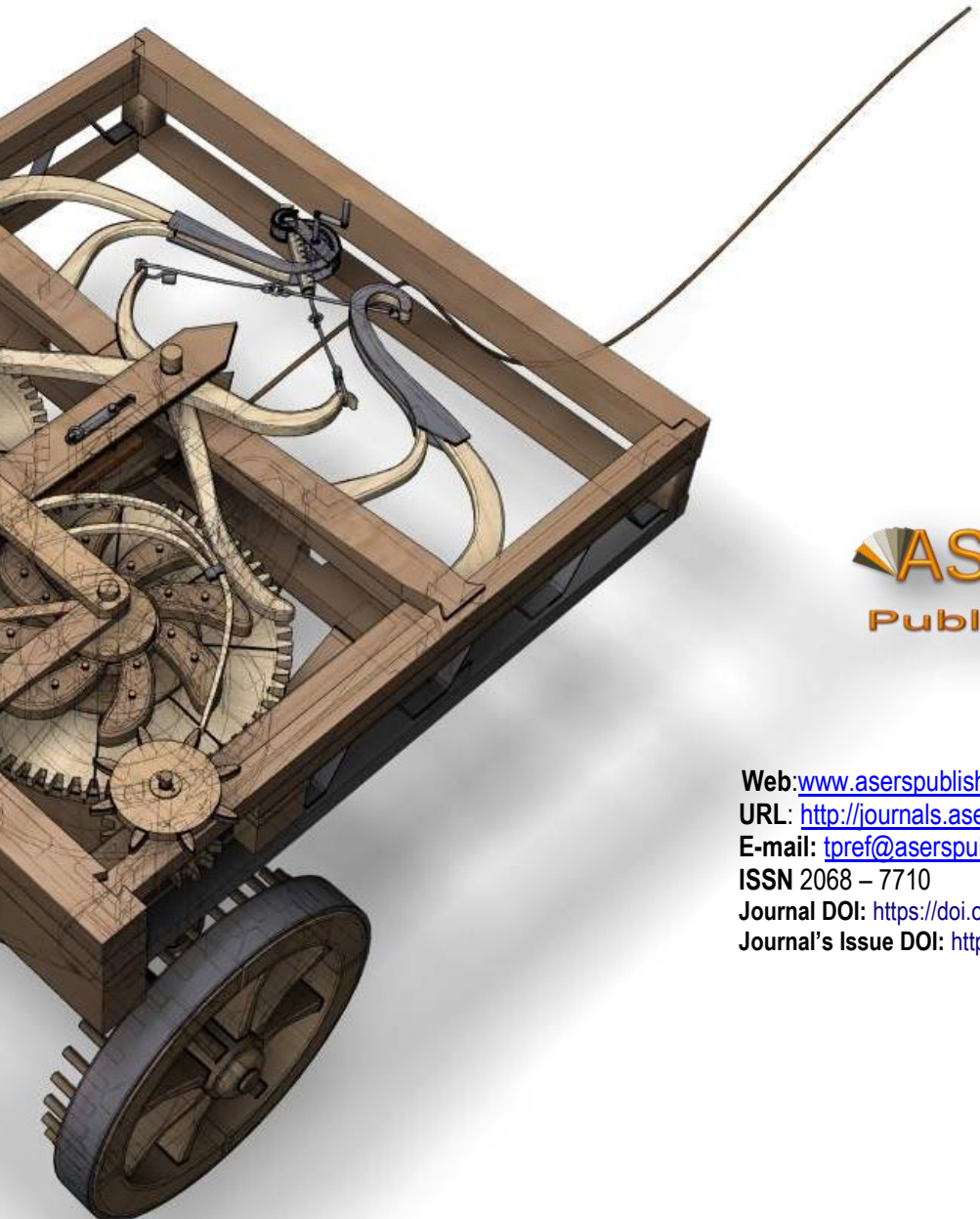

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