

## Assets and Liability Management and Return on Equity of Quoted Commercial Banks in Nigeria

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### **Abstract**

*This study examined the relationship between assets and liability management and return on equity of quoted commercial banks from 2013-2023. Cross sectional data were sourced from annual reports of the quoted commercial banks. Return on equity was proxy for dependent variable while liquidity management, assets management, liability management and credit management were proxies for independent variables. Panel data regression was used as data analysis methods. Findings of the study revealed that the fixed effect model shows that the independent variable explains 89 percent variation on the return on equity. The F-statistics and the F-Probability validates that the model is significant. The beta coefficient showed that all the independent variables have positive effect on return on equity except liquidity management. From the findings, the study conclude that assets and liability management has significant relationship with return on equity of the quoted commercial banks in Nigeria. The study recommends that regular review of asset liability management policies and tools should be done by the bank's board of directors to ensure that they are in line with market developments in Asset liability management process. Banks management should comply with cash reserve requirements, which help them to avoid insolvency and maintain sustainability profitability.*

**Keywords:** Assets - Liability Management, Return on Equity, Commercial Banks, Nigeria

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### **INTRODUCTION**

The objective of assets and liability management is to manage risk and not eliminate it. Risks and rewards go hand in hand. The objectives do not limit the scope of the assets and liability management functionality to mere risk assessment, but expanded the process to the taking on of risks that might conceivably result in an increase in economic value of the balance sheet. Apart from managing the risks, assets and liability management enhances the net worth of the institution through opportunistic positioning of the balance sheet. Banks engage in assets and liability management to achieve three main goals; to ensure high profitability, to maintain desired liquidity level and to ensure security. Assets and liability management enables the firm to balance between its liabilities and assets. This in turn minimizes financial risks and hence improves profitability. The primary goal of assets and liability management is to produce a high quality, stable, large, and growing flow of net interest income. This goal is accomplished by achieving the maximum combination and level of assets, liabilities and financial risk.

The history of asset and liability management dates back to the introduction of the modern banking sector, characterized by the provision of a wide range of financial services, which

emerged under various types of banking regulation. However, the insurance industry is sometimes seen as having originated the introduction of asset-liability management in parallel with the banking sector (Eshna Verma, 2019). Indeed, banks started lending and initially had a variety of low-cost funds in the form of deposits. Therefore, they focused on asset management, which is concerned with the effective management of existing and new assets in order to maximise the value of the business. Over time, there was a rapid change in the banking industry, with diversification of the bank's investment portfolio, higher demand for loans and increased competition in the fund market. As a result, the bank is beginning to develop a new strategy (e.g. asset/liability management) to efficiently utilise its assets and liabilities and maximize net interest income. Banks differ from non-bank financial institutions in that they take deposits and provide liquidity services to their depositors through check writing, ATMs, and other transaction services such as wire transfers, bill payments, etc; (Suresh & Zhenyu, 2014). These services are not provided to the people for free because the main aim of any commercial bank is basically earning and maximization of profit (Faroog & Khan 2012). Banks take deposits from those with excess liquidity and lend to those in need of money.

The stability of commercial banks as a whole in the economy depends on proper asset liability management structures. Better assets liability management has the tendency to absorb risks and shocks that commercial banks face (Makau & Memba 2014, Ngerebo-a, & Lucky, 2016). Commercial banks incur costs for their liabilities and earn income from their assets. Thus, profitability of banks is directly affected by management of their assets and liabilities (Sayeed & Hogue 2010). According to Charumathi (2008) banks are always aiming at maximizing profitability at the same time trying to ensure sufficient liquidity to repose confidence in the minds of the depositors on their ability in servicing the deposits by making timely payment of interest and returning them on due dates as well as meeting all other liability commitments as agreed upon.

A bank's assets typically have much longer maturities than its liabilities. Thus, customers are due to repay their bank loans (the bank's assets) over a long period of time, whereas depositors and investors in a bank may in many cases withdraw their money (the bank's funding) at a much shorter notice or even on demand. Given this maturity mismatch' between assets and liabilities, a continuing challenge for banks is to ensure that new funding replaces maturing funding in similar amounts and in a timely manner in order to continue to support a relatively stable pool of assets, (Beau, et al, 2014; Lucky & Nwosi, 2015).

Furthermore, the reliance on wholesale deposits poses a threat not only to the profitability of banks but also to the stability of the entire banking system at large. This is because wholesale funding is usually considered to be expensive and volatile. Beau et al, (2014) stated that wholesale investors are typically more focused on obtaining a return from their investment in the bank, just as they would if they had invested in any other type of business than desiring safe-keeping services, while retail depositors do not. Majority of these regulations are however skewed towards regulating the asset side of commercial banks' balance sheets, with the only exception being the foreign currency exposure Limit regulations which focuses on both asset and liability sides. The problem is that it is not entirely clear how the CBN new regulations affected banks asset and liability management strategies and their performance at large. Factors that determine commercial banks performance has well been examined but the effect assets liability management is lacking in literature. Therefore this study examined the relationship

between assets liability management and return on equity of quoted commercial banks in Nigeria.

## LITERATURE REVIEW

### Asset Liability Management

Asset liability management, ALM, is defined by different scholars like Gup and Brooks (1993), Zawalinska (1999), and Charumathi (2008). Charumathi (2008) defined ALM as a dynamic process of planning, organizing, coordinating, and controlling the assets and liabilities; their mixes, volume, maturities, yield, and costs in order to achieve a specified net interest income (NII). In other words, it deals with the optimal investment of assets in view of meeting current goals and future liabilities. It is related to the management of the risks associated with liquidity mismatch, interest rates and foreign exchange movements.

Therefore, ALM is concerned with an attempt to match assets and liabilities in terms of maturity and interest rate sensitivity to minimize interest rate and liquidity risks (Zawalinska, 1999). It is therefore appropriate for institutions (banks, finance companies, leasing companies, insurance companies, and others) to focus on asset-liability management when they face financial risks of different types. Asset liability management includes not only a formalization of this understanding, but also a way to quantify and manage these risks. Further, even in the absence of a formal asset liability management program, the understanding of these concepts is of value to an institution as it provides a truer picture of the risk/reward trade-off in which the institution is engaged (Fabozzi and Kanishi, 1991).

As part of an investment strategy in financial accounting, ALM is the activity of controlling financial risks brought on by discrepancies between assets and liabilities. Asset allocation and management, equities, interest rate, and credit risk management are all included. An ALM strategy frequently matches assets passively with liabilities (completely hedged) and fully manages surpluses. Njogo (2014) ALM is the process through which a company manages its balance sheet to account for various risks, including interest rate and liquidity risk. Asset and liability management is used to access and minimize some of these risks by making the right decisions. It is used to identify and control risk encountered by organizations while managing risks. They added that finance, capital planning, profit planning, and growth projection are also included in the scope of asset liability management functions. Harold described asset-liability management (ALM) as a proactive process involving the joint and concurrent management of assets and liabilities to measure, monitor, and control the effects of fluctuating interest rates on income, asset values, liquidity, and regulatory capital in the John Bricks & Associates report from 2014. In the banking area, different authors try to study the determinants of commercial banks financial performance. Most recently, Ramlall (2009) and Alper and Anbar (2011) found that bank financial performance can be hindered by both internal and external factors. Internal factors are related to bank management which encompasses the ALM culture of the bank and external determinants are factors which reflect the economic and legal environment that affect the operation and performance of commercial banks.

### Capital Adequacy Management

Capital refers to the amount of equity to absorb any loss that the bank may experience it is the major component of financial sector to meet their short and long term obligation, (Kosmidou, 2009). and also capital is one of the factors that affect the level of bank profitability, the capital

structure of banks is highly regulated because most of bank failure is reduced by capital and it prevent from financial loss because capital is the financial strength of a bank (Kamau, 2009, Lucky, 2017), Capital adequacy is the capital expected to maintain balance with the risks exposure of the financial institution such as credit risk, market risk and operational risk, in order to absorb the potential losses and protect the financial institution's debt holder. Meeting statutory minimum capital requirement is the key factor in deciding the capital adequacy, and maintaining an adequate level of capital is a critical element (Akani & Lucky, 2016).

There is a general agreement that capital requirement is required to reduce moral hazard the debate is on how much capital is enough ,bankers believes that its difficult to acquire additional equity and higher requirement restrict their competitiveness and that high capital leads to failure because a firm with high capital is risk averse which means they are afraid of risk and they did not take risk and profitable investment opportunity also .because always highly profitable business is risky, however mostly highly capitalized banks has lower cost of bankruptcy and vice versa, lower need external funding or finance which is difficult (Koch, 1995). The regulatory authorities has set specific measure of the capital adequacy position of Banks, which is the ratio the Capital adequacy Ratio (CAR), the directive clearly set out the computation mechanism and the conversion factors for both on and off-balance sheet items and strictly set for all banks not to maintain their capital level below 8% of their risk weighted assets.

### **Liquidity Management**

Liquidity refers to the ability of an institution to meet demands for funds. Liquidity management means ensuring that the institution maintains sufficient cash and liquid assets to satisfy client demand for loans and savings withdrawals, and to pay the institution's expenses. Liquidity management involves a daily analysis and detailed estimation of the size and timing of cash inflows and outflows over the coming days and weeks to minimize the risk that savers will be unable to access their deposits in the moments they demand them.

In order to manage liquidity, an institution must have a management information system in place manual or computerized that is sufficient to generate the information needed to make realistic growth and liquidity projections. Liquidity management, ensuring that the institution maintains sufficient cash plus liquid assets to meet withdrawal and disbursement demands and pay expenses, is essential in savings mobilization. A savings institution must have effective liquidity and asset liability management in order to ensure that low cost funds will always be available for savers when they demand repayment of their funds deposited (Monnie, 2003). It is necessary to maintain public trust and confidence by ensuring that banks have sufficient level of liquidity at all times there is a need to maintain liquidity requirement consistent with reserve requirement of banks, it is essential to ensure that banks properly manage their liquidity.

### **Asset Quality Management**

A bank asset is another variable that affect the profitability of banks, loan is the major asset of commercial bank and major source of income, the quality of loan portfolio has direct effect on bank profitability, The highest risk facing a bank is the losses derived from delinquent loans (Dang &Uyen, 2011). Thus, nonperforming loan ratios are the best proxies for asset quality. Different types of financial ratios used to study the performances of banks by different scholars. It is the major concern of all commercial banks to keep the amount of nonperforming loans to

low level. This is so because high nonperforming loan affects the profitability of the bank. Thus, low nonperforming loans to total loans shows that the good health of the portfolio a bank. The lower the ratio the better the bank performing (Sangmi & Tabassum, 2010).

Asset quality is a sign for the liquidation of a bank, the bank insufficient asset quality means it will have increase its bad debt losses, Non-performing loan and Profitability are inversely related the bank should maintain credit risk management and safeguard the bank's asset to minimize the risk and to be profitable and stable in the business, As cited in (Anjili,2014) credit risk is one of the factor that affect the Profitability of banks because credit risk is depend on the quality of asset in the bank .so the quality of asset is determined by the level of risk .poor asset quality and low level of liquidity are the major causes of bank failure.

### **Income Management**

Uzhegova (2010) stated that the decline of interest in the bank forces the bank to find another source of finance or source of revenue this concept of revenue leads to portfolio theory which states that the firm can minimize the risk by diversifying their portfolio there is a debate about the benefit and cost of diversification in banking some believes that diversification provide stable income and also noted that as a result of activity diversification, the economies of scale and scope caused through the joint production of financial activities leads to increase in the efficiency of banking organizations, The product mix reduces the risk because income from other sources is not related to the original source so diversification should provide to income and stable profit.

Senyo,et al (2015) stated that The conventional wisdom in the banking industry is that earnings from fee-based products are more stable than loan-based earnings, and that feebased activities reduce bank risk via diversification, in fact interest income remains highest contributor to bank Profits non-interest sources of revenue play an augmenting role in times where there are short falls in interest revenue. (DeYoung and Rice 2004), banks are increasingly exploiting nontraditional source of generating income, to the extent that in recent times, almost half of banks' incomes in the US are obtained from nontraditional activities and this reflects not only a diversification of banks into nontraditional activities, but also a shift in the way banks earn money.

### **Return on Equity**

Return on equity is another measure of firm performance that shows how well a company has used the capital from its shareholders to generate profits. Investors use ROE as a measure of how well a company is using its money. Evidently, numerous empirical studies have employed this measure in quest to observe the predicted relationship between financial structure and firm performance (Tze- Sam and Heng, 2011; Zeitun and Tian, 2007; Onalapo and Kajola, 2010; Kajola 2008; Zeitun, 2009; Skopljak and Luo, 2012; Khan, 2012)

That is;  $ROE = \frac{\text{Profit before Interest and Tax}}{\text{Shareholders' Funds}}$

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### **Liability Management Theory**

Redington, (1952) and Haynes & Kirton, (1952) are well-known supporters of the philosophy of liability management. They examined the assets and liabilities of a life insurance fund as well as the financial structure of a life office in general. Their specific issue was how to allocate the assets in a way that made them as susceptible to external factors (usually the effects of

changes in the market rate of interest) that affect both as possible as the liabilities. Redington (1952) adopted the word immunization to specify the investment of the assets in such a way that the business is immune to general change in the rate of interest". Haynes & Kirton (1952) used the insulation in a similar way. It is amazing how essential findings were shared by both authors. In their key findings, both writers concurred. According to this approach, reserve funds may be borrowed on the money market as needed. According to the notion, a bank can maintain reserves by accumulating more liabilities against itself from other sources. These sources include issuing time deposits, borrowing from other commercial banks, borrowing from the central bank, raising capital through the sale of shares, and reinvested earnings. This theory acknowledges that a bank's asset structures have a significant role to play in supplying it with the liquidity it requires. The strategy is seen as being more aggressive than the other approaches since it increases the chances of generating money to carry out appealing investments.

Theory since the early 1960s, the loan portfolios of commercial banks have been affected by the emergence of a new theory, which became known as the liability-management theory. This is one of the important liquidity management theories and says that there is no need to follow old liquidity norms like maintaining liquid assets, liquid investments etc. Lately, banks have focused on liabilities side of the balance sheet. According to this theory, banks can satisfy liquidity needs by borrowing in the money and capital markets. The fundamental contribution of this theory was to consider both sides of a bank's balance sheet as sources of liquidity (Emmanuel, 1997). Guthua (2012), (Koch and McDonald, 2003) stated that today banks use both assets and liabilities to meet liquidity needs. Available sources of liquidity are identified and compared to expected needs by a bank's Asset and liability management committee (ALCO). Key considerations include maintaining high asset quality and a strong capital base that both reduces liquidity needs and improves a bank's access to funds at low cost. There is a short run trade-off between liquidity and profitability. In the long-run, if management is successful in managing liquidity, then, long-term earnings will exceed other banks earnings, as will the capital and overall liquidity.

### **Empirical Review**

Anjili (2014) conducted a study to examine the effect of asset and liability management on the financial performance of commercial banks in Kenya. The study covered the period 2004 to 2013. He found that all the CAMEL factors, being capital adequacy, asset quality, management efficiency, Earnings, and liquidity, had a statistically significant impact on the financial performance. He therefore recommended policies that would encourage banks to diversify their revenue sources, reduce operational costs, minimize credit risk, and minimize liquidity holdings.

Owusa and Abdul (2020) employed the Statistical Cost Accounting (SCA) model to examine the relationship between profit and Asset-Liability Management (ALM) structure of 27 banks in Ghana over the period 2007–2015. The findings confirm the central hypothesis of the SCA model and provide evidence that profitability is linked to balance sheet items in Ghana. It also documents evidence that domestic banks have higher rate of return on assets than foreign banks over the study period. In addition, high profit banks were observed to have higher rate of return on assets as well as higher rate of cost on liabilities than low profit banks. These findings provide useful insights to bank management through the identification of the assets items that generate highest return on bank profitability.

Onaolapo and Adegoke (2021) examined the impact of Asset Liability Management (ALM) on financial performance of deposit money banks in Nigeria using time series annual data from

2005-2018. Data on asset liability management was proxied with loan and advance, non-performing loan, demand deposit and borrowing while performance was proxied with return on asset and return on investment. Expost facto research design was used for the study. Data from audited annual reports of fourteen listed deposit money banks were used and the data were analyzed using panel data regression analysis. The study found that asset liability management exerts both positive and negative effect on return on asset and return on investment of listed deposit money banks in Nigeria. It further revealed that loan and advance and bank size have positive effect on return on asset while, nonperforming loan exhibit negative effect on return on asset of deposit money banks in Nigeria. The study also found that demand deposit, borrowing and bank size exerts positive effect on return on investment of deposit money banks while, increase in bank size exhibits negative effect on return on investment of deposit money banks in Nigeria. The study concludes that adequate attention must be placed on loan and advance, non-performing loan, demand deposit and borrowings of deposit money banks in Nigeria to facilitate and guarantee better asset liability management. The study therefore recommends that a comprehensive Asset Liability Management policy framework should be put in place by every deposit money banks which should be adequately driven by a very dynamic and proactive asset liability management committee (ALCO) constituted by the board with specific roles of regularly probing the appropriate mix of assets and liabilities that maximizes banks profitability so as to consistently enhance performance and create value for the shareholders.

Madhushani and Perera (2021) examined the impact of assets liability management on the financial performance of the licensed commercial banks in Sri Lanka. Capital adequacy ratio (CAR), Non-performing loan ratio (NPL), Income diversification ratio (IDR), Liquidity ratio (LR) and Operational efficiency ratio (OER) were used as assets liability indicators while return on assets (ROA) and return on equity (ROE) used as the financial performance indicators. This study uses secondary sources to collect data such as published annual report of licensed commercial banks and central bank web site from financial year 2011 to 2020. All 24 licensed commercial banks in Sri Lanka were used for the study. It was found that there is a significant impact from the operational efficiency, income diversification and liquidity ratios on the financial performances and also significant negative impact from the NPL ratio and CAR ratio on the financial performances of the licensed commercial banks in Sri Lanka. The findings will be useful for shareholders, creditors, depositors, managers and further investors to choose the best opportunity for their investment and regulators to make and govern the policy and regulations.

Olowokudejo and Akindipe (2022) looked at certain best practices in asset-liability management and how they affected the performance of the insurance business between 2011 and 2021 while taking into consideration the particular characteristics of the Nigerian economy. Data on total corporate assets, shareholder's funds, and profit after tax for the time period were taken from the annual reports and digest of the Nigerian Insurers Association (NIA). The results of the data's stationarity test showed that the data are stationary at the 1%, 5%, and 10% levels of significance. The determined probability (Fstatistic) value of 0.000922 from the ordinary least squares regression is less than the 0.05 significant value, indicating that the data are significantly significant. According to the calculated linear coefficient of determination ( $R^2 = 0.825737$ ), the shareholder's fund and total assets of the chosen enterprises account for 82.5737 percent of the profit after tax. According to the study's findings, asset-liability management and the financial success of insurance businesses in Nigeria are related.

Adegbie and Dada (2018) studied the management of risk assets, liquidity, and sustainable performance in Nigerian deposit money banks. They used survey research as well as ex-post factor analysis. While secondary data were utilized to examine the managers' activities, primary data were used to gather respondents' perspectives. The results demonstrated that risk asset management, liquidity management, and sustainable performance are all closely related in Nigerian deposit money banks. They also found that non-compliance with the CBN's specified cash balance requirement has a significant negative impact on the profitability of Nigerian deposit money banks, non-performing loans have a significant negative impact on the assets of deposit money banks in Nigeria, low cash deposits have a significant negative impact on deposit money banks in Nigeria's capital, and inadequate liquidity management has a significant negative impact on dividend payments. The study came to the conclusion that the banking industry's ability to sustain performance depends on good risk asset management and liquidity management. According to the study, in order to ensure financial stability and sustainability, banks should implement effective and high-quality risk asset and liquidity management.

Isaac and Akinwunmi (2018) considered the distinctive characteristics of the Nigerian economy while examining key best practices in asset-liability management and their impact on bank performance. The liability management theory and portfolio theory served as the study's foundation. The use of secondary data sources was investigated while presenting the situation's facts. The Central Bank of Nigeria Bulletin, bank financial reports, data on shareholders' funds, total assets (independent variables), and profit after tax (dependent variable) of listed deposit money banks in Nigeria were used to evaluate the data using the Ordinary Least Square Linear Regression model. The outcome demonstrates a favorable relationship between profitability and shareholders' funds as well as a substantial relationship between profitability and total assets. The study demonstrates a strong correlation between asset-liability management and bank performance (measured in terms of profitability). The study found that effective asset-liability management has a major impact on profitability and recommended, among other things, that banks use excess resource optimization, which underscores the need to maximize assets on hand to fulfill liabilities that are becoming more complex.

Folajimi, Asaolu and Enyi (2018) investigated how assets and liabilities management can help the Nigerian banking industry resolve its problems. The analysis showed that there is inadequate asset and liability management, weak investment strategies, banks that expand their assets faster than their liabilities, banks that used depositor money to buy assets, and banks that disregarded the monetary policies of the Central Bank of Nigeria. In order to manage assets and liabilities in the sector effectively, the study advised, among other things, that the industry, regulators, and supervisory agents establish a good and sound investment policy.

Anchori (2018) looked at how ALM affected the noninterest revenue structure of DMBs in Nigeria from 2011 to 2015. Findings demonstrated that banks' asset liability management has an effect on how much noninterest income contributes to their overall performance. The greatest source of non-interest revenue, according to analyses of non-interest income, is foreign exchange fees, followed by fees related to lending. Additionally, the Central Bank of Nigeria's decision to lower Commission on Turnover from 5 mille to 1 mille (now replaced by account maintenance) did not at this time reduce non-interest revenue. He came to the conclusion that the size of the bank had no beneficial effect on noninterest income. His findings have serious ramifications, including the possibility that huge Deposit Money institutions are missing out on opportunities to create noninterest income. Therefore, in order to increase their non-interest income, major DMBs should not underuse their assets.



Kebede (2014) conducted an empirical study on private commercial banks in Ethiopia to determine the impact of National Bank Regulation on their performance. Three regulatory factors, namely reserve requirement, credit cap, and bill purchases, which affect bank's performance were selected and analyzed. The results showed that both bill purchases and credit cap have negative and statistically significant impact on banks profitability while reserve requirement also had a negative impact which is however statistically insignificant.

### **Literature Gap**

From the review of the relevant literature relating to impact of asset liability management on bank performance, it's possible to see the existence of knowledge gap, The results of the empirical findings confirms to the hypothesis of the study which predicts the existence of a positive relationship between asset liability management and profitability of commercial banks in Ethiopia and also Literature has confirmed that poor management of assets and liabilities exposes the firm into financial risks that might impact negatively on the profitability of the firm. The firm should therefore work towards achieving a proper match between assets and liabilities. This is also consistent with the theories of the study which shows that firms that maintain a proper fit between their assets and liabilities achieve profitability as compared to those firms that do not effectively balance their assets and liabilities. However, in Nigeria there are limited studies of assets and liability management on the profitability of deposit money banks

To the best of my knowledge, there have not been materials on the impact Asset Liability management on financial performance of Commercial banks in Nigeria. Most literature have examined impact of ALM on Interest Income structure of banks; this study deviates from existing literature by examining the impact of ALM on financial performance structure of commercial banks the study examines trends in financial performance and the extent to which financial performance relates with banks' aggregate performance which entails measuring financial performance on return on assets and also includes analyzing banks' asset liability management using returns on asset and loan to deposit ratios as proxies to determine the extent to which financial performance is a significant component of banks' aggregate performance.

DeYoung (2004) examined a number of empirical links between bank noninterest income, business strategies, market conditions, technological change and financial performance. He stated that the empirical impact of ALM on Financial performance deserves further research. Boyd and De Nicolo (2005) and Boyd, De Nicolo, and Jalal (2009) find changes in loan-to-deposit ratios proxy for changes in market structure within banking sectors. Obrimah (2016) finds loan to deposit ratios to outperform total assets at predicting loan performance. All of these studies predict loan-to-deposit ratios are market structure variables that are outcomes or proxies for banks' asset liability management.

## **METHODOLOGY**

This study used quasi experimental research design approach for the data analysis. This approach combines theoretical consideration (a prior criterion) with the empirical observation and extract maximum information from the available data. It enables us therefore to observe the effects of explanatory variables on the dependent variables. The two types of data collection method are the primary and the secondary data source from published material such as Central

Bank of Nigeria Statistical Bulletin and annual report which is known as secondary data. The data in this study were sourced from the financial statement of banks and Central Bank of Nigeria Statistical Bulletin.

### Model Specification

$$\text{ROE} = f(\text{LIQM}, \text{AM}, \text{IVM}, \text{LM}) \quad (2)$$

Transforming equation 1 to econometrics form, we have:

$$\text{ROE} = \alpha_0 + \alpha_1\text{LIQM} + \alpha_2\text{AM} + \alpha_3\text{CM} + \alpha_4\text{LM} + \mu \quad (3)$$

### Where:

ROE = Return on equity

LIQM = Liquidity management

AM = Assets management

CM = Capital management

LM = Liability management

$\alpha_0, \beta_0, \chi_0$  = Regression Intercept

$\mu$  = Error term

### A-priori Expectation of the Result

The elasticity parameter also known as the a-priori expectation of the variables proposes that an increase in the independent variables financial innovation will increase bank profit, and increase in performing loans will increase profit. Therefore it can be mathematical stated as follows:  $-\alpha_1, \alpha_2 < 0, \alpha_3 > 0$ .

### Data Analysis Method

The method of data analysis to be used in this study was the panel data multiple linear regressions using Ordinary Least Square (OLS) method. The study adopts the panel data method of data analyses which involve the fixed effect, the random effect and the Hausman Test. This approach, which is a quantitative technique, includes tables and the test of the hypotheses formulated by using ordinary least square regression analysis at 5% level of significance. To arrive at a result that will not lead to spurious regressions, the study will test for stationarity at different levels in the variables making up the model. Other tests that will be carried out on the model include test of Normality, Durbin Watson Test of serial correlation, test of heteroskedasticity and test of model specification so as to achieve the objectives of our study as well as answer the research question and hypotheses. Moreover, in order to undertake a statistical evaluation of our analytical model, so as to determine the reliability of the results obtained and the coefficient of correlation (r) of the regression, the coefficient of determination ( $r^2$ ), the student T-test and F-test will be employed.

## ANALYSIS AND DISCUSSIONS OF FINDINGS

**Table 1: Choice of the appropriate model**

Redundant Fixed Effects Tests			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.637258	(13,122)	0.0838
Cross-section Chi-square	22.513416	13	0.0479
Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	32.006244	4	0.0008

Source: Computed from E-view statistical package

To make a choice between the fixed effects model and the random effects model, we utilized the Hausman test as shown in the table above. The hypotheses of the test are as follows: The fixed effects model is more appropriate than the random effects model. As the result found that the results of this test were significant (p-value = 0.0008 and 0.0465). Hence, we reject the null hypothesis and conclude that the fixed effects model is the most appropriate of the three models.

**Table 2: Assets Management and Return on Equity of Commercial Banks**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQM	0.042286	0.030800	2.372932	0.0003
AM	0.021068	0.030986	4.679909	0.0000
LM	-0.029099	0.030784	-0.945262	0.3464
CM	0.024987	0.030396	4.822040	0.0000
C	11.50897	0.857467	13.42207	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.890287	Mean dependent var		13.08821
Adjusted R-squared	0.777458	S.D. dependent var		3.213415
S.E. of regression	3.086454	Akaike info criterion		5.211444
Sum squared resid	1162.196	Schwarz criterion		5.589655
Log likelihood	-346.8011	Hannan-Quinn criter.		5.365138
F-statistic	8.686513	Durbin-Watson stat		2.240948
Prob(F-statistic)	0.000009			

Source: Computed from E-view statistical package

The fixed effect model shows that the independent variable explains 89 percent variation in the return on equity. The F-statistics and the F-Probability validate that the model is significant. The  $\beta$  coefficient shows that all the independent variables have positive effect on return on equity except investment management.

**Table 3: Assets Management and Profitability of Commercial Banks**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQM	0.037905	0.030341	1.249329	0.0037
AM	0.023231	0.030279	0.767204	0.4443
LM	-0.028126	0.030019	-0.936965	0.3504
CM	0.026597	0.030111	0.883290	0.3786
C	11.51252	0.887166	12.97674	0.0000
Effects Specification				

		S.D.	Rho
Cross-section random		1.038718	0.1017
Idiosyncratic random		3.086454	0.8983
Weighted Statistics			
R-squared	0.553819	Mean dependent var	8.962433
Adjusted R-squared	0.325784	S.D. dependent var	3.092163
S.E. of regression	3.052039	Sum squared resid	1257.517
F-statistic	1.919697	Durbin-Watson stat	2.087787
Prob(F-statistic)	0.110690		
Unweighted Statistics			
R-squared	0.348834	Mean dependent var	13.08821
Sum squared resid	1365.226	Durbin-Watson stat	1.939459

Source: Computed from E-view statistical package

From the random effect model, the independent variables can explain 55 percent variation in the return on equity. The F-Statistics and F-Probability rejects significance of the model. The  $\beta$  coefficient shows that all the independent variables have positive effect on return on equity except investment management. The T-Statistics and probability value prove that liquidity management is significant while the other variables are not significant in the model.

**Table 4: Test of Unit Root**

Method	Statistic	Prob.**	Cross- sections	Obs
Null: Unit root (assumes common unit root process)				
<b>Series: D(ROE)</b>				
Levin, Lin & Chu t*	-6.81702	0.0000	14	98
Im, Pesaran and Shin W-stat	-2.98509	0.0014	14	98
ADF - Fisher Chi-square	60.0767	0.0004	14	98
PP - Fisher Chi-square	116.634	0.0000	14	112
<b>Series: LIQM</b>				
Levin, Lin & Chu t*	-18.2336	0.0000	11	88
Im, Pesaran and Shin W-stat	-14.5913	0.0000	11	88
ADF - Fisher Chi-square	167.673	0.0000	11	88
PP - Fisher Chi-square	258.408	0.0000	11	99
<b>Series: D(AM)</b>				
Levin, Lin & Chu t*	-5.56776	0.0000	14	98
Im, Pesaran and Shin W-stat	-2.88844	0.0019	14	98
ADF - Fisher Chi-square	57.6057	0.0008	14	98
PP - Fisher Chi-square	313.063	0.0000	14	112
<b>Series: D(CM)</b>				
Levin, Lin & Chu t*	-6.02873	0.0000	14	98
Im, Pesaran and Shin W-stat	-2.24376	0.0124	14	98
ADF - Fisher Chi-square	49.1869	0.0080	14	98
PP - Fisher Chi-square	85.2379	0.0000	14	112
<b>Series: D(LM)</b>				
Levin, Lin & Chu t*	-7.23939	0.0000	14	98
Im, Pesaran and Shin W-stat	-2.15623	0.0155	14	98
ADF - Fisher Chi-square	48.0189	0.0107	14	98
PP - Fisher Chi-square	159.523	0.0000	14	112

Source: computed from E-view 9.0

As a starting point of panel stationarity analysis, we employ the first generation panel unit root tests which allow for cross-sectional independence between variables. As displayed in Table 4 the results suggest that the assets and liability management and return on equity of quoted commercial banks null hypothesis is be rejected by all the first generation tests (LLC, IPS, ADF and PP Fisher). Furthermore, the results of the panel unit root tests confirm that the variables are stationary at level. Table 4 presents the results of the tests at first difference for IPS test in constant and constant plus time trend. We can see that for all series the null hypothesis of unit root test is rejected at both one percent and five percent levels of significance. Hence, based on IPS test, there is strong evidence that all the series are in fact integrated of orders one. We can conclude that the results of panel unit root test (IPS test) reported support the hypothesis of a unit root in all variables across among the variables, as well as the hypothesis of zero order integration in first differences. Even at one percent significance level, we found that all tests statistics in both with and without trends significantly confirm that all series strongly reject the unit root null. Given the result of IPS test, it is possible to apply panel cointegration method in order to test for the existence of the stable long-run relation among the variables.

**Table 5: Panel Cointegration Test**

Alternative hypothesis: common AR coefs. (within-dimension)

	<u>Statistic</u>	<u>Prob.</u>	Weighted	<u>Prob.</u>
Panel v-Statistic	-5.140551	0.0030	-2.260859	0.0481
Panel rho-Statistic	3.776564	0.0419	3.656993	0.0399
Panel PP-Statistic	-6.674640	0.0200	3.622896	0.0333
Panel ADF-Statistic	6.350032	0.0015	2.738654	0.0469
Alternative hypothesis: individual AR coefs. (between-dimension)				
	<u>Statistic</u>	<u>Prob.</u>		
Group rho-Statistic	5.528640	0.0000		
Group PP-Statistic	4.935520	0.8252		
Group ADF-Statistic	4.059837	0.0000		

Source: computed from E-view 9.0

The next step is to test whether the variables are cointegrated using Pedroni's (1999, 2001, 2004). This is to investigate whether long-run steady state or cointegration exist among the variables and to confirm what Coiteux and Olivier (2000) state that the panel cointegration tests have much higher testing power than conventional cointegration test. Since the variables are found to be integrated in the same order I (1), we continue with the panel cointegration tests proposed by Pedroni (1999, 2004). Cointegrations are carried out for constant and constant plus time trend and the summary of the results of cointegrations analyses are presented in table 5. In constant level, we found that the seven statistics reject null hypothesis of no cointegration at the five percent level of significance for the ADF statistic and group  $\rho$  -statistic, while the group -ADF is significant at one percent level.

### Discussion of Findings

The findings in this study show that liquidity management of loans and advances and customer management has a positive and statistically significant influence on banks' profitability measured by return on equity. Results for banks' AML strategies variable show a positive but statistically insignificant influence on banks performance. The results corroborate the findings of Landskroner and Paroush (2011) that high level of liquidity a bank holds, that is a bank's holding of a stock of high quality liquid assets (liquidity warehouse), indicates a capacity to

meet liquidity needs and take advantage of business opportunities. However, such assets are generally associated with lower returns; thus, too much liquidity will reduce profitability. The results also corresponds and consistent with the findings reported by Habtamu (2012), and Thornton and Philip (1992). However contradicts findings of Boadi (2015) and Kosmidou (2008), who found that commercial banks profitability responds positively to changes in the banks' liquidity positions. In the case of Kosmidou (2008), contradiction may be brought by the fact that he used a measure of Liquidity ratio different from what the researcher has used. He used liquid assets to customer and short term funding, while the researcher used liquid assets to total assets.

Liability management has a negative and statistically significant influence on banks return on equity. This indicates that holding of high levels of investment will have a negative effect on banks' profitability. So with all other factors held constant, an increase in bank investment held by banks will lead to a decrease in banks profitability. The study however contradicts findings of Kosmidou (2008) and Alkassim (2005), who found a positive and significant impact of capital on ROA. This contradiction might be explained by the fact that though both researchers still used capital adequacy ratio as one of the proxies of regulatory variables, they calculated the ratio as equity to total assets while the researcher used the International Monetary Fund (IMF) calculation of total qualifying capital to risk weighted assets.

However, from the assets Management, the findings in this study show that, all the variables have negative effect on the return on equity of Nigeria commercial banks. This implies that increase on the liability of commercial bank will lead to significant decrease on the profitability of commercial banks in Nigeria. This finding contradict the objectives of bank management and bank management theories such as commercial loans theory, shiftability theory the negative effect of the variables can be traced to insider dealing in the banking sector, poor management policies such as assets and liability mismatch. This findings confirm the findings of Landskroner and Paroush (2011) that high level of liquidity a bank holds, that is a bank's holding of a stock of high quality liquid assets (liquidity warehouse), indicates a capacity to meet liquidity needs and take advantage of business opportunities. However, such assets are generally associated with lower returns; thus, too much liquidity will reduce profitability. However, the findings contradicts findings of Boadi (2015) and Kosmidou (2008), who found that commercial banks profitability responds positively to changes in the banks' liquidity positions. In the case of Kosmidou (2008), contradiction may be brought by the fact that he used a measure of Liquidity ratio different from what the researcher has used. He used liquid assets to customer and short term funding, while the researcher used liquid assets to total assets and the findings of Kosmidou (2008) and Alkassim (2005), who found a positive and significant impact of capital on ROA. This contradiction might be explained by the fact that though both researchers still used capital adequacy ratio as one of the proxies of regulatory variables, they calculated the ratio as equity to total assets while the researcher used the International Monetary Fund (IMF) calculation of total qualifying capital to risk weighted assets.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusion

From the fixed effect results in the model, the result found that the independent variable explains 89 percent variation on the return on equity. The F-statistics and the F-Probability validates that the model is significant. The  $\beta$  coefficient shows that all the independent variables

have positive effect on return on equity except investment management. From the random effect model, the study found that, the independent variables explain 55 percent variation on the return on equity. The F-Statistics and F-Probability rejects significant of the model. The  $\beta$  coefficient shows that all the independent variables have positive effect on return on equity except investment management. The T-Statistics and probability value prove that liquidity management is significant while other variable are not significant in the model. The findings of the study proved assets management explained 55 percent variation in return on equity of the quoted commercial banks within the periods covered in this study. This implies that 45 percent is explained by other factors not captured in the regression model. The predictor variables under assets management found that liquidity management, management of assets and liability have significant relationship with return on equity of the quoted commercial banks in Nigeria. From the above we conclude that assets management has significant relationship with profitability of commercial banks in Nigeria.

### Recommendations

- i. The researcher recommends that in Nigeria commercial banks can achieve higher levels of profitability if they can improve on their assets liability management strategies and hold appropriate mix of assets and liabilities.
- ii. Regular review of asset liability management policies and tools should be done by the bank's board of directors to ensure that they are in line with market developments in Asset liability management process.
- iii. On the regulatory side, as indicated by the results that holding of too much customer deposit lead to lower profitability, management of commercial banks should formulate measures of managing customer deposit to avert the negative effect on profitability.
- iv. The study found that cash management have positive and significant effect on profitability, banks management should comply with cash reserve requirements, which help them to avoid insolvency and maintain sustainability profitability.
- v. The regulatory authorities should ensure tight monitoring of the activities of the banks to avoid financial distress. This will also guarantee transparency in their financial reporting to the stakeholders in the banking industry.

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