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The determinants of the Nigerian listed financial institutions' financial performance: A review of the CAMELS framework

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Abstract

This study evaluates the financial performance determinants of Nigerian listed financial institutions (NLFIs) using the CAMELS framework, a multidimensional approach that holistically assesses financial institutions. The research identifies key factors affecting financial performance, spanning seven years (2012–2018). The study aims to provide insights into how capital adequacy, asset quality, management quality, earnings quality, liquidity, and sensitivity impact performance, ultimately offering recommendations for regulatory improvements and adherence to prudential standards. The research employs panel data analysis of NLFIs from 2012 to 2018. Using pooled ordinary least squares (POLS), the study identifies key determinants of financial performance. The two-step system generalized method of moments (SYS-GMM) is applied for robustness to address heteroskedasticity and endogeneity concerns. These methods assess the impact of CAMELS variables (CA, AQ, MQ, EQ, LIQ, SENT) on financial performance while ensuring reliable and generalizable findings. The results reveal that capital adequacy (CA), asset quality (AQ), liquidity (LIQ), and sensitivity (SENT) are consistent and significant determinants of NLFIs' financial performance. Management quality (MQ) is insignificant in POLS but becomes significant in SYS-GMM analysis, while earnings quality (EQ) shifts to insignificance. The findings highlight the importance of minimum standards for CA, AQ, and LIQ compliance while emphasizing the need to develop similar benchmarks for MQ, EQ, and SENT. This study contributes to the limited literature on CAMELS-based financial performance evaluation in developing economies, particularly in Africa. It provides novel insights into the financial performance of NLFIs, emphasizing the importance of regulatory compliance with minimum standards and suggesting enhancements for management quality, earnings quality, and sensitivity measures. The findings are valuable for policymakers, regulators, and financial practitioners aiming to improve the stability and performance of Nigeria's financial sector.

Keywords: Africa, CAMELS framework, Developing countries, Financial institutions, Financial performance, Nigeria.

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1. Introduction

For more than five decades, the Nigerian financial industry has contributed eminently towards the sustainability of the country's economy [1]. In 2020, the Nigerian financial sector accounted for 3.11% of the nation's aggregate nominal GDP [2]. The key players in the Nigerian financial industry are the Nigerian financial institutions (NFIs), the pivotal actors that foster economic growth and development in Nigeria [3]. On the other hand, as both macro and micro-prudential policies are pivotal in strengthening the CA and LIQ requirements of FIs [4] the Central Bank of Nigeria (CBN) has been striving hard to enhance both the macro and micro-prudential policies in the country's financial industry. For instance, the CBN increased the minimum capital base of banks from ₦2 billion (equivalent to approximately USD 16 million) to ₦25 billion (equivalent to approximately USD 200 million) with full effect from 31st December 2005, consolidated 25 well-capitalized banks (from a total of 89 banks through mergers and acquisitions), and introduced ₦620 billion (equivalent to approximately USD 4.1 billion) as bailout funds in 2009 [3, 5]. The CBN further set minimum standards for the DMBs' CA, AQ, and LIQ at 10%, 5%, and 30%, respectively [6]. Nevertheless, a recent report by the Nigerian Deposit Insurance Corporation (NDIC) has shown persistent FP challenges in the NFIs as a result of poor CA, AQ and LIQ [6]. These FP challenges led to the collapse of 53 DMBs, 325 micro-finance banks, and 51 mortgage banks, totalling 429 collapsed FIs. In addition, from 2013 to 2018, the NFIs suffered high credit risks and recorded substantial non-performing loans amounting to ₦7.6 trillion (equivalent to USD 21 billion, approximately) [6].

Thus, the persistent challenges in the NFIs' FP imply the existence of other attributable factors apart from the poor CA, AQ, and LIQ that contribute to the challenges. In the same vein, documented evidence has shown that MQ [7]. EQ [8, 9] and SENT [10, 11] are micro-economic variables and components of the CAMELS framework affecting and determining FIs' FP. The CAMELS framework is a robust and multidimensional framework that gives a holistic assessment of the FIs' FP [12-14]. Likewise, the International Monetary Fund (IMF), as one of the reputable global financial regulatory bodies, recommends using the CAMELS framework as a robust and multidimensional framework for assessing the FIs' FP [14, 15]. On the other hand, measuring the FIs' FP using univariate financial ratios such as return on asset (ROA), return on equity (ROE), return on sales (ROS), stock return, dividend yield and the price-earnings ratio leads to weak assessments and spurious results [16, 17]. The FIs are the most strategic component of every country's economy [18]. Therefore, this study aims to evaluate the determinants of FP of the NLFIs using the CAMELS framework. This study considers the CAMELS framework as the multivariate measurement of the FP, while its six components (CA, AQ, MQ, EQ, LIQ, and SENT) are the determinants of the FP. This study also considers the CAMELS framework in evaluating the FP of all the NLFIs, which consists of banks and non-banking financial institutions (NBFIs) such as insurance companies (ICs). Furthermore, this study uses static (POLS) and dynamic (SYS-GMM) estimation models for robustness checks and control for endogeneity and heteroskedasticity.

The POLS results from this study show that the NLFIs' CA, AQ, EQ, LIQ, and SENT are strong determinants of their FP. The results also show that the NLFIs' CA, AQ, and LIQ enhance their FP, while EQ and SENT deteriorate the FP. Furthermore, controlling for both heteroskedasticity and endogeneity using the two-step SYS-GMM further affirms that the NLFIs' CA, AQ, and LIQ are the strong and positive determinants of their FP. The results further show that the NLFIs' MQ and SENT strongly and positively determine their FP.

This study is structured into five sections. After the introduction in Section 1, Section 2 addresses the literature review. Section 3 describes the methodology, while Section 4 presents and discusses the results. Lastly, the conclusion and implications are provided in Section 5.

2. Literature Review

2.1. Financial Performance (FP)

FP is grounded on three bases: accounting, marketing, and perceptual [19-21]. These three bases of the FP enable and simplify the process of using univariate financial ratios in evaluating the FP by categorizing the univariate financial ratios into appropriate groups [19, 20, 22]. Hence, the accounting base of the FP constitutes univariate financial ratios that explain the historical financial position of business entities [23]. Nevertheless, Accounting-based financial ratios are criticized for being susceptible to manipulation by managers to present favorable financial positions [24]. On the other hand, the univariate financial ratios from the marketing base of the FP explain the relationship between returns and investments [25]. The univariate financial ratios also give a detailed account of investors' returns, which are not under accounting [25]. Besides, the perceptual base of the FP surveys is based on respondents' ratings of business entities' financial position [19].

Moreover, documented evidence in the literature has shown that the univariate financial ratios from both accounting and marketing bases of the FP are the most widely used in evaluating the FP of business entities [26, 27]. However, the univariate financial ratios used in assessing the FIs' FP are criticized due to the multidimensionality of the FIs and their strategic positions in every nation's economy [17]. Hence, a robust and multidimensional model such as the CAMELS framework, which constitutes and incorporates multiple univariate financial ratios into a unified composite score for evaluating the FIs' FP, is required [15].

2.1.1. CAMELS Framework

The CAMEL framework is an acronym of CA, AQ, MQ, EQ, and LIQ that was designed for on-site assessment of the FP of banking financial institutions (BFIs) in the US in 1979, prior to the development of the CAMELS framework [12, 28]. Subsequently, the CAMEL framework is used as a multidimensional measurement of the BFIs' financial soundness Echekoba et al. [13] and a monitoring and assessment system that gives an account of the BFIs' financial healthiness and soundness [12]. However, due to the market risk exposure of the BFIs, an improved version of the CAMEL framework, known as the CAMELS framework, was developed in 1996 [29]. The CAMELS framework consists of an additional dimension, SENT, that aims to assess the exposure of market risks by the BFIs [12].

The CAMELS framework has been widely adopted by financial regulatory authorities, financial analysts, and researchers in assessing and evaluating the FP of BFIs globally [13]. In the same vein, the financial regulatory bodies such as the IMF [15] and the CBN [6] have adopted the CAMELS framework in assessing and evaluating the financial performance of the BFIs, which is further considered a valuable framework for financial system stability [29]. On the other hand, recent studies have extended the CAMELS framework in assessing and evaluating the FP of the NBFIs [12]. For instance, the studies of Akter, et al. [12]; Thilakam and Saravana [30] and Yakob et al. [31] use both frameworks (that is, the CAMEL framework and CAMELS framework) in assessing and evaluating the FP of the NBFIs. Therefore, the CAMELS framework is robust in determining and evaluating the FP of the BFIs and the NBFIs [12].

2.2. Determinants of Financial

2.2.1. Capital Adequacy (CA)

CA indicates unforeseen financial dangers that the BFIs could encounter in the future [18]. CA also reflects the financial strength of the BFIs [32]. Likewise, CA is a financial indicator showing the soundness and healthiness of the BFIs' financial position [33]. CA is also a sophisticated tool that assists the BFIs in offsetting their liabilities, especially during financial crises [33]. The relevance of banks' capital adequacy mandates the Basel Committee of G10 to formulate universal standards for managing and setting up a minimum threshold of the capital adequacy known as the "Basel Capital Accord" [34]. In addition, an updated version of Basel II, Basel III, is also formulated in response to the 2007 and 2008 financial crises [35].

On the other hand, prior studies find a positive association between the CA of the BFIs and FP, whereby an increase in the BFIs' CA leads to an increase in FP [36-38]. However, some studies find that an increase in the CA of the BFIs leads to a decrease in FP [7, 11, 39]. This decrease in FP implies a negative association between the CA of the BFIs and FP. Therefore, the CA of the BFIs is a determinant of FP in a mixed direction [7, 39].

2.2.2. Asset Quality (AQ)

One of the most significant challenges the BFIs face is the risk of credit loss or default payments by their borrowers or loan takers, resulting in huge non-performing loans [29]. Credit risk affects the BFIs' EQ, affecting their profitability and FP [40]. Higher credit risk of the BFIs also reduces their profitability and sequentially affects their FP [41, 42]. Besides, the credit risk of loan loss could be lowered by monitoring and managing the levels of loans to avoid many non-performing loans above the official minimum threshold and improve the level of the BFIs' AQ [18].

On the other hand, empirical evidence shows that the AQ of the BFIs is positively associated with FP [43, 44]. Impliedly, an increase in the BFIs' AQ increases FP. Nevertheless, some studies find a negative relationship between the BFIs' AQ and FP [45, 46]. This negative relation means an increase in the AQ of the BFIs leads to a decrease in FP. In addition, evidence has also shown a neutral relationship between credit risk as a proxy for AQ of the BFIs and FP [7]. This neutral relationship indicates no relationship between the BFIs' AQ and FP. Hence, the AQ of the BFIs is a determinant of FP, but with mixed relationships [45].

2.2.3. Management Quality (MQ)

MQ measures the efficiency of the BFIs' management in achieving their profit and wealth maximization objectives [18]. MQ also measures the effectiveness and efficiency of utilizing an organization's resources [47]. The efficacy of the BFIs' management in reducing operational costs and increasing productivity, with the sole aim of profit maximization, depends on their MQ [42]. The ability of the BFIs' management to make strategic decisions towards their growth and development in terms of revenue, profits and shareholders' wealth also signifies the level of their MQ [18]. The efficiency of the BFIs' management also leads to growth and development. The BFIs with efficient and proactive management try to control their lending mechanism, which reduces their operational cost and improves their FP [42].

Documented evidence has shown that the MQ of the BFIs is positively associated with FP [41]. This positive association implies that an increase in the MQ of the BFIs increases FP. However, some studies find a negative association between the MQ of the BFIs and FP [48-50]. This negative association means an increase in the BFIs' MQ decreases FP. Similarly, the cost-to-income ratio as a proxy to the BFIs' MQ is negatively associated with FP [11]. An increase in the cost-to-income ratio

of the BFIs increases financial performance (FP). Nevertheless, some studies find a neutral relationship between the market quality (MQ) of the BFIs and financial performance (FP) [51]. Impliedly, the BFIs' MQ does not affect FP. Thus, the MQ of the BFIs is a determinant of FP, but with mixed relationships [50].

2.2.4. Earnings Quality (EQ)

EQ refers to the strategies used by the BFIs in profit maximization from owners' equity and the total assets in their possession [22, 52]. EQ is a managerial tool or mechanism that managers use in a business organization to smooth out income [9]. The profitability of the BFIs depends on their EQ [18]. Similarly, the EQ portrays the profitability level of BFIs [53]. The sustainability of the BFIs' profitability also depends on their EQ mechanism [29]. Furthermore, all factors responsible for generating and sustaining profits within the BFIs are associated with the EQ [54]. EQ is a driver for achieving effective BFIs' FP [55]. On the other hand, ROA and ROE are the two ratios that are most used in the EQ of BFIs [32]. Obtaining positive ROA and ROE is also a signal to the BFIs' financial soundness, while negative ROA and ROE are a warning signal of financial instability and the BFIs' problems [32]. Thus, a higher positive EQ indicates the BFIs' effectiveness in utilizing their assets and liabilities [55]. This higher positive value of EQ means higher BFIs' FP. In contrast, a higher negative value of EQ indicates poor BFI's FP.

On the other hand, evidence has shown a positive association between the EQ of the BFIs and FP [56]. This positive association means that an increase in EQ of the BFIs increases FP. However, some studies find a negative association between the BFIs' EQ and FP [8, 57]. This negative association implies that an increase in the BFIs' EQ decreases FP. Therefore, the EQ of the BFIs determines the FP, but in a mixed direction [8].

2.2.5. Liquidity (LIQ)

LIQ measures the BFIs' ability to pay back their short and current liabilities, Ishaq et al. [18]. The financial ability of the BFIs to meet their financial obligations also reflects the level of their LIQ [4]. Meeting the demand of the deposit holders of the BFIs could only be achieved with enough LIQ [58]. Ideally, the BFIs have to reduce the level of issuing loans from depositors' funds to have sufficient LIQ to meet the financial demands of the deposit holders [59]. Furthermore, reducing loan issuance from the depositors' funds will enable the BFIs to reduce their LIQ risk [11]. LIQ risk entails the ratio of the difference between the total amount of loans issued from depositors' funds to the total depositors' funds [11].

Previous studies have shown a positive association between the BFIs' LIQ and FP [60, 61]. This positive association means an increase in the LIQ of the BFIs increases FP. However, some studies find a negative relationship between LIQ and FP of the BFIs [37, 39]. This negative relationship also means that an increase in the BFIs' LIQ decreases FP. Nevertheless, some studies also find a neutral relationship between LIQ and FP of the BFIs [10]. This neutral relationship implies that the BFIs' LIQ does not affect FP. Hence, LIQ is a determinant of the BFIs' FP, but without a unique direction of the association between the LIQ and FP of the BFIs [10].

2.2.6. Sensitivity (SENT)

SENT deals with market risk exposure faced by the BFIs due to changes in the market and economic parameters such as interest rate, exchange rate, and inflation [62, 63]. It is affirmed that the BFIs face market risk exposure due to fluctuations in the interest rate and exchange rate [53]. Market risk due to changes in interest rate, exchange rate, and the general price caused by inflation could negatively affect the BFIs' FP [64]. Fluctuations in interest rate, exchange rate, price of commodities, and price of investible securities also affect the BFIs' CA and EQ [63]. The chances are that the BFIs with more debts than receivables from foreign operations would suffer more market risk in a period of interest and exchange rate fluctuations [53]. Thus, the quantum of market risk faced by the BFIs has necessitated the Basel Committee to formulate a financial regulatory framework known as Basel II for managing and reducing the severity of the risk exposure [62].

Prior studies have shown a positive association between SENT of the BFIs and FP [65, 66]. This means that an increase in the BFIs' SENT increases FP. However, some studies find a negative association between the BFIs' SENT and FP [67]. This negative association implies an increase in the SENT of the BFIs decreases FP. There is also evidence of a neutral association between the SENT of the BFIs and FP [11]. Moreover, this neutral association also implies that the SENT of the BFIs does not affect FP. Therefore, the SENT of the BFIs determines the FP, but in a mixed direction [67].

From the foregoing, and to the researcher's knowledge, no single past study within and outside Nigeria has studied the CAMELS framework holistically in assessing the determinants of FIs' financial performance (FP). Most past studies used the framework to measure FP or studied some of its components. In addition, in past studies, single univariate financial ratios have been used to measure the FP of FIs. The CAMELS framework has also been extensively studied within the banking financial institutions (BFIs), with little consideration given to NBFIs such as the ICs. Thus, this study used a holistic approach in using the framework to assess the determinants of the NLFIs' FP.

3. Methodology

3.1. Population and Sample

The population of this study consists of 57 of the NLFIs in the Nigerian Stock Exchange (NSE) as of 31st December 2018 (NSE, 2019). The population comprises 16 DMBs, seven mortgage banks, two microfinance banks, 28 ICs, and four leasing and funds administrators. On the other hand, the sample of this study is drawn based on judgmental sampling, making a total of 37 NLFIs on the NSE before 2012, which have published annual reports for 7 years from 2012 to 2018. The 37 samples consist of 14 DMBs and 23 ICs. Hence, the study uses 259 sample-year observations (37*7 years).

3.2. Method of Data Collection

Panel data for 7 years (from 2012 to 2018) is extracted and used from the annual reports of the 37 sampled NLFIs. The extracted data from the annual reports measures the FP, the six components of the CAMELS framework (CA, AQ, MQ, EQ, LIQ, and SENT), firm size (FSIZE), firm age (FAGE), and CEO tenure (CEOT). Additionally, the World Development Indicators (WDIs) serve as the source of data for measuring GDP and inflation (INFL) [68].

3.3. Measurement of Variables

3.3.1. Dependent Variable

As shown in Table 1, FP is the dependent variable of this study, which is measured by the average score of the CAMELS framework from its six components (CA, AQ, MQ, EQ, LIQ, and SENT) [69, 70].

3.3.2. Independent Variables

This study uses six independent variables, which are CA, AQ, MQ, EQ, LIQ, and SENT. As shown in Table 1, CA is measured by the ratio of total debt to total assets [29]. AQ is measured by the ratio of total investment to total assets [71]. MQ is measured by the ratio of operating expenses to the total assets [72, 73]. EQ is measured by the ratio of profit after tax to total assets [69]. LIQ is measured by the ratio of liquid assets to total assets [69], and SENT is measured by the ratio of total assets to sector assets [53, 73].

3.3.3. Control Variables

A total of 5 control variables are used in this study, which are FSIZE, FAGE, CEOT, GDP, and INFL. As further shown in Table 1, FSIZE is measured by the logarithm (log) of total assets [42]. FAGE is measured by the log of FAGE [74]. CEOT is measured by the number of years a CEO is in office [75]. GDP is measured by GDP per capita [68] and INFL is measured by annual inflation rate [68].

3.4. Method of Data Analysis

This study uses the POLS for static regression estimation models and the two-step SYS-GMM for dynamic estimation models. The two-step SYS-GMM estimation models are used due to the problem of endogeneity [14]. The two-step SYS-GMM estimation models are further used for robustness tests, to control for endogeneity, and to control for heteroskedasticity in the static regression estimation models [14, 76-78]. Thus, the following specification models are developed and used:

$$FP_{it} = \beta_0 + \beta_1 DFP_{it} + \beta_2 FSIZE_{it} + \beta_3 FAGE_{it} + \beta_4 CEOT_{it} + \beta_5 GDP_{it} + \beta_6 INFL_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

$$FP_{it} = \beta_0 + \beta_1 FP_{it-1} + \beta_2 DFP_{it} + \beta_3 FSIZE_{it} + \beta_4 FAGE_{it} + \beta_5 CEOT_{it} + \beta_{56} GDP_{it} + \beta_7 INFL_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

Whereby I represent the financial institutions; t represents a period, β_0 represents intercept (constant); FP_{it} represents financial performance in me in time t; DFP_{it} represents the determinant of the FP in I in time t that will be substituted from the six components of the CAMELS (CA, AQ, MQ, EQ, LIQ, and SENT); $FSIZE_{it}$ represents the firm size in I in time t; $FAGE_{it}$ represents firm age in I in time t; $CEOT_{it}$ represents CEO tenure in I in time t; GDP_{it} represents GDP in I in time t; $INFL_{it}$ represents inflation in I in time t; μ_i represents unobservable heterogeneity; ε_{it} represents error term. Furthermore, the addition of $\beta_1 FP_{it-1}$ in the model (2) is based on Arellano and Bover [76] SYS-GMM dynamic estimator, which serves as an instrumental variable to the model and represents a 1-year lagged dependent variable in I in time t.

Table 1.
Measurement of Variables.

S/N	Variable	Definition	Measurement
1.	Independent Variable:	CA.	Total debt/ Total asset.
		AQ.	Total investment/ Total asset.
		MQ.	Operating expenses/ Total assets.
		EQ.	Profit after tax / Total asset.
		LIQ.	Liquid asset/ Total asset.
		SENT.	Total asset/ Sector asset.
	Dependent Variable:		
2.	FP	Average score of the six components of the CAMELS Framework.	((CA + AQ + MQ + EQ + LIQ + SENT)/ 6).
	Control Variable:		
3.	FSIZE	Measures the size of a firm.	Log of Total assets.
4.	FAGE	Measures the age of a firm.	Log of (Current year – Year of incorporation).
5.	CEOT	Measures the years of a CEO's office.	The CEO's years in office.
6.	GDP	Measure economic growth.	GDP per capita.
7.	INFL	Measures the prices of commodities per annum.	Annual inflation rate.

4. Results and Discussion

4.1. Results

From Table 2, the mean FP of the NLFIs is low (0.303), which indicates an average low FP. The mean scores of CA (0.773), AQ (0.199), and LIQ (0.665) of the NLFIs are below the BFIs' minimum thresholds of 10, five scores, and 30 scores, respectively. Likewise, the mean scores of MQ (0.139), EQ (0.003), and SENT (0.040) of the NLFIs are positive but low. On the other hand, the mean scores of the NLFIs' FSIZE, FAGE, and CEOT are ₦912.000 billion, 38.270 years, and 4.492 years, respectively. The mean scores of Nigeria's GDP and INFL are USD2,553.639 and 11.723%, respectively.

Table 2.
Descriptive Statistics.

Variable	Mean	Std. Dev.	Min	Max
FP	0.303	0.100	0.116	0.943
CA	0.773	0.564	0.109	5.061
AQ	0.199	0.147	0.003	0.754
MQ	0.139	0.123	0.020	0.684
EQ	0.003	0.100	-0.692	0.208
LIQ	0.665	0.221	0.150	0.964
SENT	0.040	0.035	0.001	0.159
FSIZE	912.000	1650.000	1.790	10800.000
FAGE	38.270	23.878	5.000	124.000
CEOT	4.492	2.926	1.000	17.000
GDP PER	2553.639	459.155	1968.560	3222.690
INFL	11.723	3.176	8.062	16.524

Note: Table 2 presents descriptive statistics of the variables in this study. The source of Table 2 is extracted from Stata 14.

As shown in Table 3, the correlation coefficients for FP as the dependent variable with all the regressors lie between -0.368 and 0.898, whereby a strong correlation between the FP and CA exists. Amongst the regressors, the correlations between the regressors lie within -0.872 and 0.559, whereby a moderate correlation of -0.605 exists between MQ and SENT. A moderate correlation of 0.559 also exists between LIQ and SENT. In addition, a strong correlation of -0.872 exists between GDP and INFL. Hence, this study proceeds with a multicollinearity test, as shown in Table 4.

Table 3.
Correlation Matrix.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. FP	1.000											
2.CA	0.898	1.000										
3. AQ	0.348	0.446	1.000									
4. MQ	-0.023	-0.051	0.112	1.000								
5. EQ	-0.368	-0.409	-0.189	-0.264	1.000							
6. LIQ	0.211	-0.006	-0.412	-0.458	0.326	1.000						
7. SENT	0.182	0.109	-0.134	-0.605	0.347	0.559	1.000					
8. FSIZE	-0.106	-0.129	-0.071	0.273	0.039	-0.089	-0.100	1.000				
9. FAGE	-0.001	0.069	0.108	-0.279	0.042	-0.040	0.282	-0.197	1.000			
10. CEOT	0.161	0.171	-0.078	0.086	0.045	0.164	0.178	0.033	0.141	1.000		
11. GDP	-0.015	-0.083	0.081	0.075	0.101	0.054	0.106	-0.003	-0.101	-0.169	1.000	
12. INFL	-0.006	0.045	-0.060	-0.032	-0.097	-0.065	-0.098	0.017	0.062	0.076	-0.872	1.000

Note: The source of Table 3 is Stata 14.

On the other hand, as shown in Table 4, the multicollinearity test shows the variance inflation factor (VIF) lies within 1.02 and 4.46, while the tolerance value (1/VIF) lies within 0.23 and 0.98. Thus, all the VIF and 1/VIF values are less than 10 and above 0.1, respectively, as the cut-off points [79, 80]. Therefore, these TV and VIF values imply the absence of multicollinearity.

Table 4.
Multicollinearity Test.

Variable	VIF	1/VIF
CA	1.05	0.95
AQ	1.03	0.97
MQ	1.18	0.85
EQ	1.02	0.98
LIQ	1.05	0.95
SENT	1.15	0.87
FSIZE	1.10	0.95
FAGE	1.15	0.93
CEOT	1.11	0.93
GDP	4.46	0.23
INFL	4.31	0.23

Note: The source of Table 4 is Stata 14.

The POLS results, as shown in Table 5, show that from the main variables of interest across model 1a to model 1f, there is a positive relationship between CA (β = 0.460); AQ (β = 0.102); LIQ (β = 0.118); and SENT (β = 0.053) with the FP of the NLFIs at 1% level. This positive relationship implies a 1% increase in the CA, AQ, and LIQ of the NLFIs, which leads to an increase in their FP by 0.406%, 0.102%, and 0.118%, respectively. In comparison, a decrease of 0.053% in the FP is expected due to a 1% rise in SENT due to the inverse relationship between the SENT and the total asset-to-sector asset ratio [73]. Furthermore, a negative relationship is documented between EQ (β = -0.308) and the FP of the NLFIs, which means a 1% rise in EQ decreases the FP by 0.308%. However, an insignificant relationship has been recorded between the MQ and FP of the NLFIs.

From the control variables, FSIZE has a negative relationship with the FP of the NLFIs at a 10% level across models 1b to 1f. This negative relationship has also been found between FAGE and the FP of NLFIs at a 5% level in model 1a. In addition, a positive relationship is found between the CEOT and the FP of the NLFIs at a 1% level from model 1b to model 1d, while the positive relationship is at a 5% level across model 1e to model 1f. Nevertheless, FSIZE and CEOT are insignificantly related to the FP of the NLFIs in model 1a, while FAGE is insignificantly related to the FP across models 1b to 1f. Furthermore, an insignificant relationship has been documented between Nigeria's GDP and inflation with the FP of NLFIs.

On the other hand, the R-Square that indicates the variance explained was found to be 81.4%, 17.2%, 4.4%, 18.1%, 7.1%, and 6.7%, respectively, across models 1a to 1f. In addition, except for model 1b, which fails to reject the null hypothesis of constant variance at P-value > 0.05, all the other five models are found to have heteroskedasticity problems by rejecting the null hypothesis of constant variance at P-value < 0.05. Hence, this study proceeds with the dynamic estimation using the SYS-GMM to correct heteroskedasticity problems. The SYS-GMM is also used in resolving the endogeneity problems between the FP and its determinants [76].

Table 5.
Results of POLS Estimation Models: Determinants of FP of the NLFIs.

Variables	Model 1a (CA)	Model 1b (AQ)	Model 1c (MQ)	Model 1d (EQ)	Model 1e (LIQ)	Model 1f (SENT)
Regressors	0.460***	0.102***	-0.008	-0.308***	0.118***	0.053***
	(0.014)	(0.016)	(0.025)	(0.047)	(0.041)	(0.020)
FSIZE	-0.001	-0.031*	-0.035*	-0.030*	-0.030*	-0.033*
	(0.008)	(0.017)	(0.019)	(0.017)	(0.019)	(0.019)
FAGE	-0.029**	-0.043	-0.025	-0.013	-0.016	-0.044
	(0.013)	(0.028)	(0.030)	(0.027)	(0.029)	(0.030)
CEOT	0.014	0.104***	0.091***	0.100***	0.071**	0.073**
	(0.015)	(0.031)	(0.034)	(0.031)	(0.033)	(0.033)
GDP	0.123	-0.087	-0.018	0.035	-0.041	-0.084
	(0.089)	(0.188)	(0.203)	(0.187)	(0.199)	(0.200)
INFL	0.025	-0.043	-0.026	-0.036	-0.026	-0.041
	(0.059)	(0.125)	(0.135)	(0.125)	(0.133)	(0.133)
Constant	-1.984**	-0.125	-0.954	-1.515	-0.717	-0.106
	(0.836)	(1.763)	(1.909)	(1.753)	(1.865)	(1.890)
No. of Obs	259	259	259	259	259	259
R-square	0.814	0.172	0.041	0.181	0.071	0.067
Breusch-Pagan / Cook-Weisberg test	0.000	0.234	0.0012	0.009	0.000	0.000

Note: All variables have been transformed into natural logarithms due to data normality problems. ***, **, and * represent 1%, 5%, and 10% respectively. The values in ( ) are standard errors, while Obs means the number of observations. The source of Table 5 is extracted from Stata 14.

The two-step SYS-GMM results, as shown in Table 6, indicate that the FPt-1 (the lagged dependent variable) across the 6 models is positive and significant at a 1% level, which demonstrates the appropriateness and dynamics of the 6 models. The positivity of the FPt-1 also indicates a direct relationship between previous and future FP of the NLFIs across the 6 models. Furthermore, all six models pass post-estimation diagnostic tests across the Sargan test for overidentification restrictions and the Abad test for both first-order (AR (1)) and second-order (AR (2)) serial correlations, which further attests to the appropriateness, dynamics, and validity of the instruments and results of the six models.

From the variables of interest in Table 6, a positive relationship has been found between CA (β = 0.399), AQ (β = 0.066), MQ (β = 0.156), and LIQ (β = 0.047) with the FP of the NLFIs at 1% level. As implied by the positive relationship, a 1% increase in the CA, AQ, MQ, and LIQ leads to a corresponding increase in the FP of the NLFIs by 0.399%, 0.066%, 0.156%, and 0.047%, respectively. Similarly, a negative relationship is found between SENT (β = 0.042) and the FP of the NLFIs at a 1% level. As implied by the inverse relationship between SENT and the total asset-to-sector asset ratio [73] a 1% increase in SENT has a corresponding 0.042% increase in the FP of the NLFIs. In contrast, an insignificant relationship is recorded between EQ and FP of the NLFIs.

Table 6.
Results of Two-Step SYS-GMM Estimation Models: Determinants of FP of the NLFIs.

Variables	Model 2a (CA)	Model 2b (AQ)	Model 2c (MQ)	Model 2d (EQ)	Model 2e (LIQ)	Model 2f (SENT)
FP_{t-1}	0.434***	0.897***	0.893***	0.924***	0.863***	0.949***
	(0.041)	(0.020)	(0.021)	(0.028)	(0.021)	(0.010)
Regressors	0.399***	0.066***	0.156***	0.005	0.047***	-0.042***
	(0.023)	(0.007)	(0.018)	(0.013)	(0.011)	(0.010)
FSIZE	-0.010***	-0.005	-0.010**	-0.009*	-0.011**	-0.010**
	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
FAGE	0.022	0.002	0.070***	-0.049***	-0.059***	-0.002
	(0.027)	(0.015)	(0.017)	(0.016)	(0.016)	(0.014)
CEOT	0.008	0.024*	0.001	0.026***	0.032**	0.029***
	(0.010)	(0.014)	(0.010)	(0.010)	(0.012)	(0.009)
GDP	-0.013	-0.128***	-0.237***	-0.167***	-0.151***	-0.134***
	(0.029)	(0.026)	(0.053)	(0.030)	(0.033)	(0.028)
INFL	-0.045**	-0.045**	-0.114***	-0.075***	-0.061***	-0.072***
	(0.019)	(0.019)	(0.028)	(0.018)	(0.017)	(0.017)
Constant	-0.380	1.098***	2.168***	1.562***	1.384***	1.024***
	(0.299)	(0.228)	(0.498)	(0.303)	(0.335)	(0.261)
No. of Obs.	222	222	222	222	222	222
Sargan Test (P-Value)	0.442	0.327	0.454	0.411	0.455	0.194
AR (1) Serial Correlation	0.001	0.035	0.046	0.060	0.076	0.050
AR (2) Serial Correlation	0.441	0.740	0.611	0.605	0.634	0.441

Note: All variables have been transformed into natural logarithms due to data normality problems. ***, **, and * represent 1%, 5%, and 10% respectively. The values in ( ) are standard errors, while Obs means the number of observations. The source of Table 6 is extracted from Stata 14.

From the control variables in Table 6, a negative relationship has been found between FSIZE and the FP of the NLFIs at a 1% level in model 2a, while at a 5% level in model 2c, model 2e, and model 2f, and 10% level in model 2d. Likewise, a negative relationship is documented between FAGE and FP of the NLFIs at a 1% level in both model 2d and model 2e. In contrast, a positive in model 2c is found between FAGE and the FP of the NLFIs at a 1% level. This positive relationship is also found between the CEOT and the FP of the NLFIs at 1% level in model 2d and model 2f, while at 10% level and 5% level in model 2b and model 2e, respectively. Nevertheless, an insignificant relationship is found between FSIZE and FAGE with the FP of the NLFIs in model 2b, while the insignificant relationship in model 2a is between FAGE and CEOT with the FP. Similarly, an insignificant relationship is only found between the CEOT and FP of the NLFIs in model 2c.

The control variables further show a negative relationship between Nigeria's GDP and the FP of the NLFIs at a 1% level across models 2b to 2f. The negative relationship is also documented between Nigeria's INFL and the FP of the NLFIs at 55 levels in both model 2a and model 2b and at a 1% level from model 2c to model 2f. Conversely, an insignificant relationship is recorded in Model 2a between Nigeria's GDP and the FP of the NLFIs.

4.2. Discussion

This study's empirical evidence is derived from the POLS and the two-step SYS-GMM estimation models. The two-step SYS-GMM estimation models are used in this study to control problems of both heteroskedasticity and endogeneity [73]. Thus, the empirical evidence found in this study affirms that the NLFIs' CA, AQ, and LIQ are strong and positive determinants of their FP. This empirical evidence on CA Alharbi [36], AQ Barus et al. [43] and LIQ Chen and Liao [60] as strong and positive determinants of the NLFIs' FP is in line with the literature. Furthermore, the empirical evidence from the POLS estimation model shows that the NLFIs' MQ is insignificantly related to their FP, which further agrees with the literature [13]. After the control of both heteroskedasticity and endogeneity problems using the two-step SYS-GMM

estimation model, the NLFIs' MQ is found to be a strong and positive determinant of their FP, which further agrees with the literature [41]. Hence, the NLFIs' MQ, as a strong and positive determinant of their FP, is influenced by the control of both heteroskedasticity and endogeneity problems using the two-step SYS-GMM estimation model.

On the other hand, the empirical evidence shows that NLFI's EQ is a strong and negative determinant of their FP from the POLS estimation model but is insignificant after controlling for heteroskedasticity and endogeneity problems using the two-step SYS-GMM. This implies that the EQ, as a strong and negative determinant of the NLFIs, is affected by both the heteroskedasticity and the endogeneity problems. Nevertheless, the empirical evidence on the NLFI's EQ as a strong and negative determinant of their FP is supported by prior studies [57].

In addition, due to the inverse effect of the ratio of total asset to sector asset on SENT Roman and Şargu [73] the empirical evidence shows that the NLFIs' SENT is a strong negative determinant of their FP when using the POLS estimation model, but it is strong and positive when both heteroskedasticity and endogeneity problems are controlled using the two-step SYS-GMM estimation model. The pieces of empirical evidence on the NLFIs' SENT being a strong negative determinant [67] and a strong positive determinant [65] of their FP are in line with the literature. Therefore, heteroskedasticity and endogeneity determine the direction of the NLFIs' SENT as a strong determinant of their FP.

5. Conclusion and Implications

This study aims to evaluate the determinants of financial performance (FP) of NLFIs using the CAMELS framework. Most previous studies consider the CAMELS framework to measure FP only. As a result, previous studies have widely used the CAMELS framework to evaluate and measure the financial performance of only banking financial institutions (BFIs).

The findings of this study reveal that when the POLS estimation models are used, the NLFIs' CA, AQ, and LIQ are strong determinants of their FP with positive effects, while both their EQ and SENT affect the FP negatively. The findings further reveal that when both the heteroskedasticity and endogeneity are controlled using the SYS-GMM estimation models, the NLFIs' CA, AQ, and LIQ are affirmed as the strong and positive determinants of their FP. In addition, both the NLFIs' MQ and SENT determine their FP positively. However, both the NLFIs' MQ and EQ are found to relate insignificantly to their FP when the POLS and SYS-GMM estimation models are used, respectively.

The findings of this study have numerous implications. Firstly, the CAMELS framework is robust and multidimensional, taking multiple univariate financial ratios into a single composite score, which evaluates the FIs' FP. Secondly, the CAMELS framework reveals the effectiveness of the minimum standards of CA, AQ, and LIQ set by the CBN towards FP, which further enhances both the macro and micro-prudential policies in the Nigerian financial industry. Thirdly, the CAMELS framework extends the supervisory scope of the NDIC from the BFIs to the NBFIs, such as the ICs. Fourthly and methodologically, heteroskedasticity and endogeneity are attributable factors that affect the assessment of the determinants of the FIs' FP. Thus, the CBN should establish minimum standards on MQ, EQ, and SENT, which will cover and regulate the six components of the CAMELS framework in the Nigerian financial industry. On the other hand, conducting future research in developing countries from Africa (other than Nigeria) and globally could also produce noteworthy findings on the relevance of the CAMELS framework within the BFIs and NBFIs like the ICs.

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