

Influence of Firms' Characteristics-Profitability Nexus on Banks in Nigeria: Application of Panel Long-Run and Short-Run Analysis

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Abstract

The modeling of bank profitability has become an interest of study in many financial studies. This is because profitability is measure of efficient use of resources and financial health of many banks. To this end, many studies have investigated the effect of firm attributes on the financial performance of banks, including in Nigeria. With the unresolved issues still surrounding this area of study in Nigeria, this study embarked on reinvestigating the relationship between firms' characteristics and profitability by considering twelve (12) selected Deposit Money Banks (DMBs) in Nigeria from 2012 to 2021. The data used were sourced from the financial statements of the selected banks. The study applied the Panel Autoregressive Distributed Lag (PARDL) and the Random Effect Model (REM) to estimate both long-run and short-run parameters. With several considerations, the results of both the PARDL and REM were homogeneous. The empirical finding revealed that size of banks and board size had significant negative effects on bank performance, while the effect of financial leverage were positively insignificant. With these, the study recommended that banks that desire to boost profitability needs to reduce their board size and proportion of fixed assets, while it is safe to increase debt asset.

Keywords: Bank Profitability, Board Size, Firms' Characteristics, Financial Leverage

1. Introduction

The profitability of firms is a critical aspect that reflects the overall health and success of a business. It is a measure of how well a company uses its resources to generate profits and create value for its stakeholders. Analyzing the profitability of firms provides valuable insights into their operational efficiency, profitability, liquidity, solvency, and growth potential. Investors, creditors, analysts, and other stakeholders use profitability metrics to assess the financial health of a firm and make informed decisions about investing or lending money to the company (Yua, Daniel & Epor, 2023). The profitability of deposit money banks in Nigeria holds significant importance for various stakeholders, including investors, regulators, policymakers, and the general public. Deposit money banks play a crucial role in the Nigerian economy by mobilizing savings from individuals and businesses and channeling these funds towards productive investments. The

profitability of these banks serves as a key indicator of the overall health and stability of the banking sector and the broader economy (Ukpabi, Calistus, & Abdul-Maliq, 2021).

Going by the results of several corporate failures around the globe, researchers have attempted to provide an explanation to the factors affecting financial performance and leading to such corporate failure. Following, there have been several stance trying to explain how well to determine the profitability of banks. One of the most prominent determinants of bank profitability is firm characteristics. The theory of the growth of the firm fundamentally provides explanation to how banking firms grow and develop over time through internal resources and capabilities rather than external factors alone (Ahmad, Hassan & Ladan, 2022). According to Penrose, a firm's growth is driven by its ability to efficiently utilize its own resources, especially managerial resources, to exploit opportunities in its environment. This is where the characteristics of the banking firms come in. no matter the homogeneous concept, firm differ in the compositions of size, board and leverage.

The relationship between firm characteristics and financial performance in banks in Nigeria is a dynamic and complex topic that has garnered significant attention from researchers (Audu, Uba & Ekpa, 2022; Gbadebo, 2022; Jubril & Idris, 2022; Hassan et al., 2022; Oyewobi & Lawal, 2021; Zayol, Akpa, Tsegba & Gberindyer, 2021). One key reason for the increasing focus on firm characteristics and profitability is the desire to uncover the underlying mechanisms that drive financial success or failure. By examining factors such as firm size, industry concentration, capital structure, innovation capabilities, managerial quality, and corporate governance practices, patterns and relationships that shed light on why some firms outperform others can be identified. This knowledge can inform investment strategies, regulatory policies, and management practices aimed at enhancing firm performance and sustainability (Jubril & Idris, 2022). Moreover, the interest is informed by the need to identify potential risks and vulnerabilities in the business environment (Ahmad, Hassan & Ladan, 2022). By understanding how different factors impact a firm's ability to generate profits and create value for shareholders, stakeholders can better assess the overall health and resilience of companies operating in various industries. This information is particularly valuable in times of economic uncertainty or market volatility when firms face heightened challenges and need to adapt quickly to changing conditions.

In Nigeria, the chances of success improve substantially when their characteristics are deployed and used efficiently, and equally when their corporate attributes are not used efficient. By this stance, the chances of failure and success becomes very strategic. This is because the banking industry is of particular interest because of the catalytic roles of banks in any economy (Yua, Daniel & Epor, 2023), in the face intense competition. Size is one of the key firm characteristics that can significantly influence the performance of banks in Nigeria. Larger banks often have economies of scale that allow them to operate more efficiently and offer a wider range of products and services to their customers (Nangih, Turakpe & Effe-Nnamdi, 2023). In Nigeria, the size of a bank can impact its ability to compete effectively in a crowded market with numerous players vying for market share (Nworie & Mba, 2022). The size of the board shows the number of both executive and non-executive members that constitute the board of directors. It is been reported that board size exerts significant influence on Nigerian banks. Again, financial leverage, being the

magnitude of debt or the degree to which banking firms utilize debt in the capital structure, can certainly increase banks' return on equity and earnings per share in Nigeria. This is due to the fact that banks, like other firms, are not diluting the shareholder's earnings through their financing (Abubakar, Maishanu, Mohammed & Abubakar, 2021).

Similarly, since the profitability of banks is directly related to its firm attributes, financial experts study the relationship between firm characteristics and financial performance in order to validate or dispute the growth of the firm theory. However, empirical studies have not reached a consensus about the relationship between firm characteristics and profitability. This study is therefore, an attempt to contribute to the empirical studies by investigating the relationship between firm characteristics and profitability using selected Deposit Money Banks in Nigeria.

Firm characteristics have been identified by prior research to have effect on financial performance. However, prior empirical studies on the subject matter have revealed some empirical weaknesses as identified below. First, extant literature has espoused mixed results, suggesting that research on the phenomenon of interest is yet to be concluded. The studies include those of Ahmad, Hassan and Ladan (2022), Taiwo, Festus and Ajao (2022), Oyewobi and Lawal (2021), Nangih, Turakpe and Effe-Nnamdi (2023), Jubril and Idris (2022), Gbadebo (2022) and Ezechukwu and Amahalu (2017). There is therefore, a need for further research on the subject matter following the inconsistent results of prior studies. Another area of concern for this study is the dearth of empirical studies on the effect of firm characteristics on the profitability of listed banks in the Nigerian banking sector. What is mostly found in the literatures are studies across other different manufacturing firms (Ahmad, Hassan and Ladan, 2022) and insurance firms (Abubakar, Isah & Usman, 2018) in Nigeria. Most of the studies found in Nigeria on the subject matter have been on other sectors of the Nigerian Exchange Group thereby, ignoring banks in the banking sector.

Also, the paucity of prior empirical studies on the subject matter with respect to banking firm-specific characteristics to ascertain their composite effect on profitability informed the decision to carry out this study. The effects of these attributes is important because it is expected to have a more robust effect on the financial performance of banking firms. This study therefore, is aimed at addressing these concerns by examining the effect of Firms' Characteristics on Banks' Profitability in Nigeria.

This current study therefore fills a study gap by examining the influence of firm attributes through board size, firm size and financial leverage on financial performance of Deposit Money Banks (DMBs) in Nigeria. The investigation of these variables makes this study unique from prior studies in Nigeria. The study will use a panel of twelve (12) selected banking firms in Nigeria, including Access bank, First Bank of Nigeria, Fidelity Bank, First City Monument Bank, Guaranty Trust Bank, Sterling Bank, Stanbic Bank, Union Bank, United Bank for Africa, Unity Bank, Wema Bank, and Zenith Bank. Aside, the study uses a more recent data from 2012 to 2021.

Conducting research on the effect of firm attributes on financial performance of listed DMBs will enlighten the managers and the shareholders of banking firms of how to overcome some of the issues related to profitability (Adugu, Soomiyol & Yua). The study will be of utmost importance to policy makers (board of directors) in developing countries because it would provide policy

recommendations to the various stakeholders in the banking sector, using the findings from the Nigerian experience as a benchmark to conclude on the efficacy of firm characteristics on profitability of banking sector. This paper, when successfully completed will enable decision makers (Executive and Non-Executive Directors) to make good and effective decisions on issues of profitability in commercial banks. Also, it will be an eye opener for shareholders on the impact board size, firm size and financial leverage have in making good and effective decisions, especially profitability of deposit money banks, Ordue, Yua, Ityavyar, Tarnongo, (2024).

The remaining parts of this paper is organised in the following order: Literature review will be done in section 2, where conceptual, theoretical and empirical reviews are done. Section 3 will deal with data and methodology for analysis. Section 4 will be on results and analysis, while section 5 will discuss the results, conclusion on the results and recommendations.

2. Literature Review

2.1 Conceptual Review

In the first instance, all most banks in Nigeria are profit-oriented firms. Bank profitability refers to the ability of a bank to generate profits from its operations and investments. It is a crucial aspect of a bank's performance as it indicates the efficiency and effectiveness of its business model. Profitability is essential for banks to sustain their operations, attract investors, and maintain stability in the financial market. Bank profitability is a crucial aspect of the financial industry, as it directly impacts the stability and growth of banks. Return on Assets (ROA) is the most common financial ratio that measures a company's profitability by evaluating how efficiently it generates profits from its assets (Nangih, Turakpe & Effe-Nnamdi, 2023). In the context of banks, ROA is a crucial metric used to assess the effectiveness of utilizing assets to generate earnings. ROA is expressed as a percentage and provides insights into how effectively a bank is using its assets to generate profits. A higher ROA indicates that a bank is more efficient in generating earnings from its asset base, while a lower ROA suggests inefficiency in asset utilization.

Contextually, bank profitability is determined by firm characteristics. Bank firm characteristics refer to the unique attributes and features that define a particular bank or financial institution (Taiwo, Festus & Ajao, 2022). These characteristics can include various aspects such as size, ownership structure, business model, geographical presence, financial performance, risk management practices, regulatory compliance, customer base, product offerings, technological capabilities, and organizational culture. According to Dioha, Mohammed, and Okpanachi (2018), firm qualities play a significant role in determining profitability, which means they have the potential to impact a company's financial success. In terms of leverage, the amount of external debt a company utilises in financing its assets explains what financial leverage is (Nworie & Mba, 2022; Abdulkarim, Mohammed, Mohammed & Abubakar, 2019). Given its vital function in the firm, leverage's significance as a gauge of ongoing financial health should not be misunderstood (Masika & Simiyu, 2018). A high debt-to-equity ratio typically denotes an active use of debt to finance a company's expansion. Because of the added interest expense, earnings may become variable as a result of this. The likelihood of a default or bankruptcy may rise if the company's interest expense increases excessively. Companies that need to make significant capital

investments, such as manufacturing and utility companies, can need to apply for more loans than other types of businesses.

In the context of the Nigerian banking sector, firm size refers to the total assets, capitalization, market share, and overall scale of operations of a bank (Nyamiobo et al., 2018). The size of a bank can significantly impact its competitiveness, risk profile, efficiency, and ability to innovate. Because of economies of scale, which are present in the conventional neo-classical conception of the firm, a firm's size indicates its strength (Omenyo & Muturi, 2019). As a result, larger banks benefit from economies of scale and can create goods at significantly cheaper costs than smaller businesses (Nworie & Mba, 2022). This idea predicts that firm size and profitability will positively correlate (Nangih, Turakpe & Effe-Nnamdi, 2023). A bank's size has a variety of effects on its financial performance. On the other hand, smaller banks may focus on niche markets or specific customer segments where they can compete effectively based on personalized service or specialized offerings.

By extension, it is important to stress that bank board size plays a significant role in determining profitability (Audu, Uba & Ekpa, 2022). The term "board size" refers to the number of directors appointed to a company's board, with no legal requirement (Audu, Uba & Ekpa, 2022, Lankwagh, Tsegba, Mike, Yua, 2023). According to the Nigerian Code of Corporate Governance (2018), the board should be large enough to effectively carry out its duties, oversee, monitor, direct, and control the company's activities, and understand its scale and complexity. The composition and size of a bank's board of directors can impact its strategic decision-making processes and overall governance structure. Research has shown that larger boards may lead to more diverse perspectives and expertise, which can positively influence the strategic direction of the bank. However, larger boards may also face challenges related to coordination and communication among members, potentially leading to inefficiencies in decision-making processes.

In essence, bank board size, bank size, and financial leverage are critical determinants of profitability in the banking sector. Effective governance practices related to board composition and size can enhance decision-making processes and support long-term profitability goals. Bank size influences economies of scale and revenue opportunities but also poses challenges related to complexity and regulatory compliance. Financial leverage can amplify returns but also increase risk exposure if not managed prudently. By understanding how these factors interact and impact profitability, stakeholders can make informed decisions to promote sustainable growth and stability in the banking industry.

2.2 Theoretical Review

The firm characteristics and profitability relationship have been predicated on several theories. In the first instance, the agency theory, as propounded by Jensen and Meckling (1976), tries to explain the relationship between the principal (shareholders) and the agent (manager). The Agency theory posits that conflicts of interest between shareholders (principals) and managers (agents) can lead to behaviors that prioritize managerial self-interest over shareholder value maximization. These conflicts can manifest in various ways within banks, such as excessive risk-taking, poor decision-making, lack of transparency, and inadequate monitoring mechanisms. According to Nworie and

Mba (2022), higher leverage is expected to lower agency costs, reduce inefficiency and therefore, lead to an improvement in a firm's performance. The agency theorists opined that leverage firms are better for shareholders, as debt level can be used as a mechanism in monitoring the managers (Ibrahim & Abubakar, 2019). Further, the Resource-based theory (RBT), proposed by Penrose in 1959 and Pfeffer and Salancik (1978), which Wernerfelt further expanded in 1984, identifies a firm's strategic advantages by assessing its unique characteristics. Dioha, Ahmed, and Okpanachi (2018) describe an organization's assets, talents, capabilities, and intangibles. The idea claims that a firm's resources combine to develop organizational strengths, allowing it to gain above-average profitability.

The growth of the firm theory, also known as Penrose Theory, was developed by Edith Penrose in 1959. This theory focuses on how firms grow and develop over time through internal resources and capabilities rather than external factors alone. According to Penrose, a firm's growth is driven by its ability to efficiently utilize its resources, especially managerial resources, to exploit opportunities in its environment. The theory is first developed as a theory of internal growth, i.e. growth without merger and acquisition. The focus then shifts from the internal resources of the firm to the impact of particular types of external conditions as firms grow larger, and to the situation of small compared to large firms. This theory explores various factors that influence a firm's decision to grow, such as economies of scale, market demand, technological advancements, and competitive pressures.

This study is framed on the theory of the growth of the firm. When applying the growth of the firm theory to the firm characteristics and bank profitability relationship in the Nigerian banking sector, several key insights emerge. Firstly, the theory emphasizes that firms grow by leveraging their internal resources effectively. In the context of Nigerian banks, this implies that institutions with strong managerial capabilities and efficient resource allocation to allocate debts are more likely to achieve sustainable growth and profitability (Nworie & Mba, 2022, Utor, Yua, & Epor, 2023). Secondly, the growth of the firm theory highlights the importance of organizational resource accumulation in driving firm growth. In Nigeria's dynamic banking industry, banking firms that acquire and invest more and more assets are better positioned to adapt to changing market conditions and enhance their competitiveness (Okoba & Chukwu, 2023). Moreover, the growth of the firm theory underscores the significance of strategic board decision-making in shaping a firm's trajectory (Nangih, Turakpe & Effe-Nnamdi, 2023; Okoba & Chukwu, 2023; Ahmad, Hassan & Ladan, 2022; Gbadebo, 2022). Nigerian banks that align their growth strategies with market opportunities while mitigating risks effectively are more likely to outperform their competitors and sustain long-term profitability.

2.3 Empirical Review

Okoba and Chukwu (2023) examined the relationship between firm characteristics and social sustainability performance disclosures in Nigeria and data were sourced from the published annual reports of the sampled companies for the period under review 2015-2021. Panel data extracted were analysed using multiple regression technique. Findings from the study reveal that firm size has a positive and significant effect on financial performance, while liquidity and leverage had insignificant effect on financial performance. Diriyai and Korolo (2023) examined the relationship

between firm characteristics structure and financial reporting quality of quoted industrial goods companies in Nigeria for the relevant years considered (2015-2020). Ordinary least squares (OLS) regression techniques were used to examine the relationship between the variables. The study found that company size and liquidity significantly boosted the quality of financial reporting while firm age and leverage were insignificant to the quality of financial reporting of listed industrial goods companies in Nigeria.

Lodikero, Soyinka and Falaye (2023) examined the relationship between firm characteristics and corporate social responsibility disclosure of listed industrial goods companies in Nigeria. The annual reports for the periods, 2013 to 2022, were utilized. The study adopted the use of the panel least square regression method as well correlational technique. The findings revealed an insignificant relationship between stakeholder power, media exposure, foreign ownership, and corporate social responsibility disclosure. Nangih, Turakpe and Effe-Nnamdi (2023) examined the relationship between firm characteristics and financial performance from Nigeria's listed consumer goods sector from 2013 to 2022 and analyzed using descriptive, correlation and panel regression techniques. The findings showed that firm age had a negative, though insignificant effect on EPS. Relatedly, firm age was also found to have a significant negative effect on the ROA of the consumer goods firms. In contrast, firm size (FSIZ) was found to have a positive and significant effect on EPS. Lastly, it was found that FSIZ has a significant negative effect on the return on assets of consumer goods firms in Nigeria.

Nworie and Mba (2022) modeled the effect firm characteristics have on the financial performance of food and beverages companies listed on Nigerian exchange group. Purposive sample of five (5) listed food and beverages firms was used in the study obtained from the annual reports of sampled companies from 2012 to 2021 reporting periods. Panel Fixed Effect Model was utilized, and findings revealed that firm size was insignificant to the return on assets of listed food and beverages firms in Nigeria, firm age and firm leverage had significant negative effect. Taiwo, Festus and Ajao (2022) examined the relationship between firms' attributes and financial performance of quoted companies from Nigeria. A sample size of 111 was purposively determined for the study. Multistage techniques (stratification and quota) were utilized in selecting the 111 firms studied. Secondary data extracted from the published audited financial statements for 10-year period (2011–2020) were used for the study. With multiple regression technique, the study found that firms' attributes had joint significant effect on Net Profit Margin and on Capital Employed Performance, prompting the study to conclude that firms' attributes drive the achievement of optimal corporate financial performance.

Ahmad, Hassan and Ladan (2022) examined the relationship between firm characteristic and financial performance in Nigeria with a moderating effect of some key monetary variables of fifteen (15) listed consumer goods manufacturing firms in Nigeria using annual panel dataset from 2004 to 2020. The study used fixed and random effects regressions as techniques of data analysis. The results of this study are: (i) without moderators, there is a positive and significant relationship between capital structure, managerial efficiency and firm size and financial performance; (ii) while with moderators, capital structure and firm size exerted significant negative effect on financial performance but the effects from dividend and managerial efficiency were significantly

supportive. Aribaba, Ahmodu, Afolabi, Egbewole, Salaam and Adesunloro (2022) examined the relationship between firm characteristics and financial performance of twelve (12) listed oil and gas companies in Nigeria between the periods 2015 – 2019. The pooled least square technique was used to investigate the empirical relationship of the variables. The regression result revealed that there is a negative relationship between Firm Size and Ownership Impetrated on financial performance, while Financial Leverage and Firm Age showed a positive relationship on the financial performance of listed oil and gas companies in Nigeria.

Audu, Uba and Ekpa (2022) used a Dual-Model Approach to investigate the relationship between board characteristics and firm performance of selected insurance companies listed in Nigerian exchange group from 2012-2020. With the random regression method, the study found that board size has insignificant positive effect on Tobin Q, but a significant positive effect on ROA; while, board nationality diversity has a significant negative effect on Tobin Q, but an insignificant positive effect on ROA. Gbadebo (2022) examined the relationship between firm's characteristics and firm performance of non-financial companies in Nigeria. The study looked at information from businesses' annual reports over a period of 11 years using the Generalized Method of Moments (GMM) estimate (2010-2020). The study used size, growth rate, financial leverage, liquidity, free cash flow, business risk, tangibility of assets and value-added productivity (VAP). The GMM estimator found that firm size, liquidity, and assets tangibility have positive and statistically significant relationships with VAP.

Jubril and Idris (2022) examined the relationship between firms attributes and financial performance of quoted conglomerates companies in Nigeria data were sourced through the published annual reports of the sampled companies for the period under review 2015-2021. Panel data extracted were analysed using multiple regression technique. Findings from the study reveal that firm size has a positive and significant effect on financial performance, the effects from liquidity and leverage were insignificant. Hassan et al. (2022) investigated the influence of financial leverage on financial performance of selected listed consumer-goods firms in Nigeria. Study used the multiple linear regression, and found that financial leverage has a significant positive effect on financial performance (ROA).

Oyewobi and Lawal (2021) examined the influence of board size on financial performance of listed deposit money banks in Nigeria. The study made use of the random effect model board size has negative significant effect on return on asset. Zayol, Akpa, Tsegba and Gberindyer (2021) examined the relationship between firm characteristics and corporate environmental disclosure by less-sensitive listed companies in Nigeria for the period of 2009 to 2018. Panel regression was used in analyzing the data. The findings of the study revealed that environmental disclosure by less-sensitive listed companies in Nigeria is low, while age of the firm and leverage significantly boosted the level of corporate environmental disclosure and firm size and size of audit firm were insignificantly related to environmental disclosure.

Omenyo and Muturi (2019) investigated the effect of firm size on financial performance of manufacturing firms listed in Nairobi Stock Exchange. The study made use of the multiple linear regression, and firm size has an insignificant positive effect on financial performance. Ibrahim and Abubakar (2019) examined the relationship between firm characteristics and financial reporting

quality of listed consumer goods companies in Nigeria from 2008-2017. The fixed effect regression result discovered that leverage has significant negative effect on financial reporting quality on listed consumer goods companies in Nigeria, but firm size, board size, institutional shareholding, profitability and liquidity has no significant effect on financial reporting quality of listed consumer goods companies in Nigeria. Abubakar, Sulaiman and Haruna (2018) examined the influence of firms characteristics on financial performance of listed insurance companies in Nigeria. The data for the study were collected from the annual reports and accounts of Insurance companies quoted in the Nigeria Stock Exchange (NSE) within the period of 2007 and 2016. The results of the study revealed that liquidity and Age have significant negative impact on financial performance of insurance companies in Nigeria.

Nyamiobo et al. (2018) investigated the effect of firm characteristics on financial performance of listed firms at the Nairobi Securities Exchange. The study made use of the multiple linear regression, and revealed that company age, company size, leverage and liquidity have a significant positive effect on financial performance proxied with ROA. Ajao and Ogieriakhi (2018) examined the relationship between firm specific factors and the performance of insurance firms in Nigeria. The study used the panel regression techniques based on fixed effect model, and found that firm size has a significant negative effect on ROA, while firm age has a significant positive effect on ROA. The study further revealed that leverage has an insignificant positive effect on ROA.

Chepngetich and Simiyu (2018) examined the influence of firm's characteristic on financial performance of insurance firms in Kenya. The study used the random effect model and revealed that firm size has an inverse effect on return on equity of insurance companies while firm age has a significant positive effect on return on equity. Dioha et al. (2018) investigated the influence of firm characteristics on profitability of listed consumer goods companies in Nigeria Random effect model Firm size, sales growth and leverage have significant effects on profitability. In contrast, firm age and liquidity does not significantly affect profitability of listed consumer goods companies in Nigeria.

Abubakar et al. (2018) examined the effect of firm's characteristics and financial performance of listed insurance companies in Nigeria. With the robust linear regression model, the study found that firm size has a significant positive effect on ROE, while firm's age and liquidity have a significant negative effect on ROE. Masika (2018) investigated the influence of firm characteristics on the financial performance of Deposit taking saving and credit cooperatives societies licensed by SASRA in Nairobi County. With the fixed effect estimator, the study found that firm size, leverage, firm growth, firm liquidity and financial performance (proxy by ROA) of deposit taking SACCOs in Kenya are positively and significantly related. Onyekwelu et al. (2018) examined the effect of firms' growth indicators on financial performance of selected firms in the oil and gas sector of the Nigeria Stock Exchange with the multiple regressions technique. The study found that firm size has an insignificant negative effect on Return on Assets. Ezechukwu and Amahalu (2017) investigated the effect of firm characteristics on financial performance of quoted deposit money banks in Nigeria. The study used the Pearson coefficient of correlation and ordinary least square (OLS), and established that firm characteristics (proxied by firm Size) have a positive and statistically significant effect on financial performance.

3. Data and Methodology

This study used an *ex-post facto* research design to solve the problem. An *ex-post facto* research design examines the statistical link between previous events or variables (Yua, Daniel & Epor, 2023; Nworie & Mba, 2022; Abdul-Maliq, 2006).

The current study looks at how firm characteristics affect the profitability of selected Deposit Money Banks (DMBs) from 2012 to 2021. The *ex-post facto* research design is therefore regarded acceptable for this study since it allows for the testing of historical links between or among factors that have already occurred, as well as the formation of predictions about these associations. The information from the website of the Central Bank of Nigeria (CBN) showed that there are a total of twenty-five DMBs in Nigeria. The purposive sampling approach was used to choose a sample of twelve (12) DMBs for the investigation as indicated in the table 1 below.

Table 1: Sample Size Presentation

S/N	Bank Name	Type of Institution	Date Licensed
1	Access Bank Plc	Commercial Bank	5th Feb, 2001 (previously licensed Dec. 19, 1988)
2	Fidelity Bank Plc	Commercial Bank	3rd January, 2006 (previously licensed July 16, 1999)
3	First Bank Nigeria Limited	Commercial Bank	3rd January, 2006 (previously licensed 15/08/1979)
4	First City Monument Bank Plc	Commercial Bank	3rd January, 2006 (previously August 11, 1983)
5	Guaranty Trust Bank Plc	Commercial Bank	3rd January, 2006 (previously licensed August 1, 1990)
6	Stanbic IBTC Bank Plc	Commercial Bank	3rd January, 2006 (previously December 13, 1983)
7	Sterling Bank Plc	Commercial Bank	3rd January, 2006
8	Union Bank of Nigeria Plc	Commercial Bank	2006 (licensed November 12, 1969)
9	United Bank For Africa Plc	Commercial Bank	3rd January, 2006 (previously licensed May 17, 1961)
10	Unity Bank Plc	Commercial Bank	3rd January 2006
11	Wema Bank Plc	Commercial Bank	3rd January 2006
12	Zenith Bank Plc	Commercial Bank	3rd January 2006 (previously licensed June 20, 1990)

Source: Central Bank of Nigeria (CBN), <https://www.cbn.gov.ng/supervision/inst-dm.asp>

Model Specification

This study builds on the earlier work of Nangih, Turakpe, and Effe-Nnamdi (2023), Jubril and Idris (2022), Nworie and Mba (2022), Oyewobi and Lawal (2021), Omenyo and Muturi (2019) and Nyamiobo, Muturi, Okibo and Olweny (2018) to examine the relationship between firm characteristics and profitability of DMBs in Nigeria. While the previous studies were did not consider banks, this study extends their frame to the Nigerian banking firms. Thus, the composite model from the previous studies will produce the operational model as below:

$$ROA = f(FSIZE, BSIZE, LEVR)$$

Where,

ROA - return on assets of individual banks, proxied by net income divided by assets
 FSIZ - firm size, proxied by natural logarithm of total assets
 BSIZ - board size, proxied by aggregate number of board of directors
 LEVR - financial leverage, proxied by debt to equity ratio

The data that are to be used were transformed individually to natural logarithms in order to improve the overall fitness of the model.

$$\ln ROA = f(\ln FSIZ, \ln BSIZ, \ln LEVR)$$

Technique of Data Analysis

Going by the objective of the study, we will need to estimate both the short-run and long-run estimates. We relied on the Panel Autoregressive Distributed Lag (PARDL) and the Random Effect Model (REM) approaches to estimate the parameters of financial leverage, bank board size and bank aggregate size. The choice of the two techniques of analysis was informed by the multicollinearity encountered with the combination of the regressors with the PARDL. However, the PARDL was instrumental for estimating the short-run parameters, while the regressors were separated to obtain the unbiased long-run estimates. In order to validate the results, we employed the REM to compare the results of the two models. So, for the PARDL, we will have three (3) models to estimate, while the REM, which had no case of multicollinearity will have one model.

Based on the data conditions described above, we will first of all specify the Panel Autoregressive Distributed Lag (PARDL). The PARDL technique was chosen to explore the short-run and long-run relationship between firm characteristics and profitability of DMBs in Nigeria. It is also appropriate for variables that are mixtures of I(0), I(1), or both I(0) and I(1) as well as for small sample size (Utor, Yua & Epor, 2023).

The panel unit root test, specifically the Levin, Lin & Chu technique, was utilized to test the variables in this study. If the absolute p-value of the Levin, Lin & Chu test is less than 5% of the critical value, it is determined that the tested variable is stationary or does not have unit roots. Conversely, if the p-value of the Levin, Lin & Chu test statistic is more than the 5% critical value, it is determined that the tested variable is non-stationary or has unit roots.

Before estimating the panel error correction model (PECM), it is required to first determine the presence of cointegration among the variables of interest. As a result, Pedroni (2004)'s panel Engle and Granger based cointegration test was used. The Pedroni cointegration takes the form shown below.

$$\Delta y_t = \alpha_i + \prod y_{it-1} + \sum_{j=1}^p \Gamma_j \Delta y_{it-j} + v_{it} \dots \dots \dots (3.2)$$

Where the absence of cointegration indicates that $\rho(\Pi) = 0$ and the presence of cointegration otherwise.

Once cointegration is established between firm characteristics and profitability of DMBs in Nigeria, the conditional long-run model in the PARDL can be specified as:

$$\text{LnROA}_t = \omega_0 + \omega_1 \text{LnBSIZ}_{t-i} + \epsilon_t \quad (3.3)$$

$$\text{LnROA}_t = \alpha_0 + \alpha_1 \text{LnFSIZ}_{t-i} + U_t \quad (3.4)$$

$$\text{LnROA}_t = \phi_0 + \phi_1 \text{LnBSIZ}_{t-i} + \epsilon_t \quad (3.5)$$

Where,

- $\omega_0, \alpha_0, \phi_0$ = intercept
 $\omega_i, \alpha_1, \phi_1$ = coefficients of long-run estimates
 $\epsilon_t, U_t, \epsilon_t$ = error term of long-run estimates

The short-run dynamic parameters are obtained next by estimating an error correction model associated with the long-run estimations. This is stated as follows:

$$\Delta \text{LnROA}_t = \alpha_0 + \beta_{1,i} \sum_{i=1}^a \Delta \text{LnROA}_{t-i} + \gamma_j \sum_j^b \Delta \text{LnBSIZ}_{t-j} + \phi_1 \text{ECT}_{t-1} + \mu_{1,t} \quad (3.6)$$

$$\Delta \text{LnROA}_t = \alpha_0 + \beta_{2,i} \sum_{i=1}^a \Delta \text{LnROA}_{t-i} + \delta_k \sum_k^c \Delta \text{LnFSIZ}_{t-k} + \phi_2 \text{ECT}_{t-1} + \mu_{1,t} \quad (3.7)$$

$$\Delta \text{LnROA}_t = \alpha_0 + \beta_{3,i} \sum_{i=1}^a \Delta \text{LnROA}_{t-i} + \theta_l \sum_l^d \Delta \text{LnLEVR}_{t-l} + \phi_3 \text{ECT}_{t-1} + \mu_{3,t} \quad (3.8)$$

Where,

- ECT = error correction term derived from equation (3.6-3.8), and
 ϕ = the speed of adjustment.

The error correction model indicates the time required to restore long-run equilibrium after a short-run shock, with the coefficient ϕ being negative and significant for the return to long-run equilibrium to be valid.

Secondly, for the REM, an objective decision between the REM and fixed effect model (FEM). The FEM is expressed as:

$$\text{LnROA}_{i,t} = \beta_1 + \alpha_i \sum_{i=1}^{N-1} \text{dummy}_i + \beta_2 \text{LnBSIZ}_{it} + \beta_3 \text{LnFSIZ}_{it} + \beta_4 \text{LnLEVR}_{it} + \mu_{it} \quad 3.9$$

The above stated FEM model is known to account for heterogeneity only in the intercept.

The REM is expressed as:

$$LnROA_{i,t} = \beta_{1t} + \beta_2 LnBSIZ_{it} + \beta_3 LnFSIZ_{it} + \beta_4 LnLEVR_{it} + \mu_{it} \quad 3.10$$

Where $\beta_{1t} = \beta_1 + \varepsilon_i$; and ε_i is endogenous-specific error term. So, 3.10 becomes

$$LnROA_{i,t} = \beta_1 + \beta_2 LnBSIZ_{it} + \beta_3 LnFSIZ_{it} + \beta_4 LnLEVR_{it} + \varepsilon_i + \mu_{it}$$

If the composite of $\varepsilon_i + \mu_{it} = \omega_i$. So, we get

$$LnROA_{i,t} = \beta_1 + \beta_2 LnBSIZ_{it} + \beta_3 LnFSIZ_{it} + \beta_4 LnLEVR_{it} + \omega_i \quad 3.11$$

Equation 3.11 becomes the REM. The choice between REM and FEM will be done by the Hausman test. The Hausman test is based upon the null hypothesis that REM is more appropriate, while the alternative hypothesis is that FEM is more appropriate.

4. Analysis and Results

The study examines data gathered by researchers, with an emphasis on the profitability of DMBs in Nigeria. Return on Assets (LnROA) is the dependent variable, whereas the independent variables are firm size (LnFSIZ), board size (LnBSIZ) and financial leverage (LnLEVR). Because of the multicollinearity, there were no control variables used, and the variables were represented in natural log forms with a "Ln" prefix.

Table 3 shows the correlation matrix for the variables in order to investigate the correlation that exists among variables. The findings indicate a negative link between bank profitability (ROA) with firm size and board size, while the linear association between bank profitability and financial leverage turned out positive.

Table 3: Correlation Matrix of the Variables

Correlation Probability	ROA	LNFSIZ	LEVR	BSIZ
ROA	1.000000 -----			
LNFSIZ	-0.269968 0.0029	1.000000 -----		
LEVR	0.022972 0.8033	-0.122592 0.1822	1.000000 -----	
BSIZ	-0.235987 0.0095	0.321876 0.0003	0.072337 0.4324	1.000000 -----

Source: Researcher's Computation using EViews

On the significance, the association between bank profitability and board size and bank size was statistically significant, while the positive association between bank profitability and financial leverage was not significant. Apart from the association between firm size and leverage, that was inverse in nature, the size of the banks and board tends to be positively associated. Meaning that bank assets grew, the board size was also increased.

The Hausman test can be used to differentiate between fixed effects model and random effects model in panel analysis. In this case, Random effects (RE) is preferred under the null hypothesis due to higher efficiency, while under the alternative Fixed effects (FE) is at least as consistent and thus preferred.

Table 4: Correlated Random Effects - Hausman Test

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	1.210258	3	0.7505

Source: Researcher's Computation using EViews

Results of the Hausman test in table 4 reveal that outcome of which model, between REM and FEM, is more appropriate. From the test, the insignificance of the probability value shows that the null hypothesis (that is, REM is more appropriate) is not rejected, so estimates of the REM will be used to validate that of PARDL.

Panel Unit Root Tests

The study determined the order of integration of the firm characteristics and bank profitability variables, the study relied on the Levin, Lin & Chu panel unit root tests to do it. The null hypothesis is that the variable has unit root.

Table 5: Panel Unit Root Test

Variables	Levin, Lin & Chu t*: Levels		Levin, Lin & Chu t*: First Difference		Order of Integration
	Test Statistic	p-values	Test Statistic	p-values	
LnROA	-8.0550	0.0000***			I(0)
LnFSIZ	2.53567	0.9944	-8.6761	0.0000***	I(1)
LnLEVR	-10.7204	0.0000***			I(0)
LnBSIZ	-2.2640	0.0118**			I(0)

*, **, *** are significance at 10%, 5% and 1%

Source: Researcher's Computation using EViews

The unit root test results indicate that the three of the variables (bank profitability, financial leverage and bank board size) had p-values less than 0.05 at levels, confirming the rejection of the null hypothesis for nonstationary series at a 0.05 significance level. On the other hand, the firm size variable had p-value greater than 0.05 at levels, confirming the acceptance of null hypothesis for nonstationary series at a 0.05 significance level. However, after initial differencing, firm size variable became stationary, resulting in I(1) data. This makes the data series a mixed order or integration, that is I(0) and I(1).

To evaluate the long-run relationship between firm characteristics and bank profitability, the study employs the panel autoregressive distributed lags estimation technique. Order one, I(0), and order zero are used to integrate the variables. The next step is to establish the variables' cointegration. Popular empirical practices using PARDL do not require panel limits testing, but this work seeks to be more empirical by validating the claim with alternative cointegration tests, such as the Pedroni cointegration test.

Panel Cointegration Test

The panel unit root test results suggest a potential long-term relationship, prompting the use of Pedroni's cointegration test. This reliable test has two main dimensions (within and between) and eleven test statistics, all based on the null hypothesis of no cointegration. Recall that we have three (3) models to estimate with PARDL approach, so there will be thirty-three (33) test statistics to evaluate for long-run relationship. That is eleven each for the three models.

Tables 6 show the cointegration test findings for the DMBs' firm characteristics-bank profitability model.

Table 6: Pedroni Residual Cointegration Tests for firm characteristics and bank profitability model

Dimention	$LnROA = f(LnBSIZ)$		$LnROA = f(LnFSIZ)$		$LnROA = f(LnLEVR)$	
within-dimension						
Panel v-Statistic	-1.7042	0.9558	4.0716	0.0000	-0.5391	0.7051
Panel rho-Statistic	0.7921	0.7859	0.9828	0.8372	0.9985	0.8410
Panel PP-Statistic	-4.3185	0.0000***	-	0.0003***	-3.7441	0.0001***
Panel ADF-Statistic	-4.2692	0.0000***	-	0.0001***	-3.8745	0.0001***
within-dimension: Weighted						
Panel v-Statistic	-1.9789	0.9761	-1.132	0.8712	-1.8823	0.9701
Panel rho-Statistic	0.5133	0.6962	0.6338	0.7369	0.9901	0.8390
Panel PP-Statistic	-5.4487	0.0000***	-	0.0000***	-5.1428	0.0000***

Panel ADF-Statistic between- dimension	-5.3326	0.0000***	-	5.7559	0.0000***	-5.8806	0.0000***
Group rho-Statistic	1.9076	0.9718	2.1440	0.9840	2.141794	0.9839	
Group PP-Statistic	-5.1626	0.0000***	-	4.4243	0.0000***	-6.3881	0.0000***
Group ADF-Statistic	-5.2693	0.0000***	-	5.0079	0.0000***	-6.4109	0.0000***

Note: *, **, *** are significance at 10%, 5% and 1% respectively

Source: Researcher's Computation using EViews

The study revealed that there was strong evidence of cointegration in the firm characteristics and bank profitability relationship models, when each individual firm characteristics variables are considered against bank profitability. The results reject the null hypothesis of no cointegration in six out of each eleven models, given that their p-values were less than 0.05.

“The decision to cointegrate is an art rather than a science” (Utor, Yua & Epor, 2023). If at least one test statistic indicates cointegration, the null hypothesis should be rejected until the error correction model reveals otherwise. If the ECT coefficient is less than unit, negative and statistically significant, Pedroni tests can be used to validate the long-term association) (Utor, Yua & Epor, 2023).

Short-run Panel ARDL and Error Correction Model Estimations

The study examines the short-run results of the Error Correction Model, based on PMG estimators, after establishing a long-run relationship between firm characteristics and bank performance. The short-run error correction term (ECT) must be smaller than one, statistically significant, and negative for a legitimate long-run connection, indicating that a departure from long-run equilibrium leads to a return to equilibrium.

Table 7: Short-run and long-run model estimates for firm characteristics and bank profitability

Short Run Estimation			Long Run Estimation			Random Effects Model		
Variable	Coefficient	prob.	Variable	Coefficient	prob.	Variable	Coefficient	prob.
ECM	-0.7260	0.0000***	LNBSIZ	-2.0349	0.0000***	LNBSIZ	-2.1360	0.0000***
D(LNBSIZ)	0.4972	0.5982				LNFSIZ	-0.7347	0.0000***
D(LNBSIZ(-1))	0.8853	0.2593				LNLEVR	0.0230	0.7414
C	-2.3151	0.0091				C	12.5872	0.0008
ECM	-0.5992	0.0002***	LNFSIZ	-0.4214	0.0000***			
D(LNFSIZ)	0.3693	0.7058						
D(LNFSIZ(-1))	-0.8211	0.4355						
C	-0.1136	0.8766						
ECM	-0.7237	0.0000***	LNLEVR	0.0931	0.0987*			
D(LNLEVR)	-0.0220	0.9178						
C	-6.1520	0.0000						

Note: *, **, *** are significance at 10%, 5% and 1% respectively

Source: Researcher's Computation using EViews

The short-run findings of the firm characteristics and bank profitability model show significant negative error correction terms (ECTs) of -0.7260, -0.5992 and -0.7237, indicating that 72.60%, 59.92% and 72.37% of deviations from the long-run equilibrium are restored in the board size-bank profitability, firm size-bank profitability and financial leverage-bank profitability models, respectively. Based on the short-term relationship between firm characteristics and bank profitability in Nigeria, the short-run findings showed only changes in financial leverage impacted on bank profitability in Nigeria. This means that most decisions on firm characteristics and done for long-run expectation.

For the long-run models, the study relied on comparing the outcome of both PARDL and REM to validate the estimated outcomes. For both PARDL and REM results of table 7, empirical results revealed that the board size of banks has negative and significant effect on bank profitability in Nigeria. This is because both PARDL and REM produced negative coefficients for board size (that is, $\beta = -2.0349$; $\beta = -2.1360$) and associated probability values (that is, $p = 0.0000$; $p = 0.0000$) that were less than the 0.05 significance level. The similarities in outcomes further validates the decision to separate the variables leading to the estimation of PARDL. These outcomes inform us to conclude that board size have significant negative effect on bank profitability in Nigeria. Again, both PARDL and REM results revealed that firm size of banks exerts negative and significant

effect on bank profitability in Nigeria. This is because both PARDL and REM produced negative coefficients for firm size (that is, $\beta = -0.4214$; $\beta = -0.7343$) and associated probability values (that is, $p = 0.0000$; $p = 0.0000$) that were less than the 0.05 significance level. These outcomes inform us to conclude that firm size have significant negative effect on bank profitability in Nigeria.

Finally, the result shows that there is a positive and insignificant relationship between financial leverage and bank profitability in Nigeria. The result means that a single unit increase in financial leverage leads to increase of 0.0931 and 0.0230 units in bank profitability from the PARDL and REM models, respectively. Since the computed probability values of financial leverage (that is, $p = 0.0987$; $p = 0.7414$) are greater than the critical test level of 0.05 (i.e., $P > 0.05$), we reject the null hypothesis and conclude that financial leverage has no significant influence on bank profitability in Nigeria.

5. Conclusion and Recommendations

Findings

According to the study, bank profitability responds significantly negative to board size, meaning that as board size increases, bank profitability tends to drop in Nigeria, an vice versa. This finding disagrees with those of Audu, Uba and Ekpa (2022) and Ibrahim and Abubakar (2019) who found no significant effect from board size on the performance of insurance companies and consumer goods firms, respectively. However, our study's finding agrees with Oyewobi and Lawal (2021) who examined the influence of board size on financial performance of listed deposit money banks in Nigeria, and found with the random effect model that board size has negative significant effect on return on asset. This is further reiterating the peculiarities of study findings on sector-specific. That our result contrasted with those obtained from the other sectors means that banks have their peculiarities from other sectors. The size of the board of directors can have a significant impact on the profitability of Deposit Money Banks (DMBs) in Nigeria. One reason why a large board size can be detrimental to the profitability of DMBs in Nigeria is the concern for decision-making efficiency. A larger board size can lead to slower decision-making processes as more individuals are involved in the decision-making process. This can result in delays in implementing strategic decisions, which can hinder the bank's ability to respond quickly to market changes and opportunities. There could also be the risk of groupthink. In a large board, there is a higher risk of groupthink, where dissenting opinions are suppressed, and critical thinking is limited. This can lead to poor decision-making and a lack of innovation within the organization.

Again, the study findings also revealed that firm size had significant negative effect on bank profitability. This is in contrasts with Okoba and Chukwu (2023) who found that firm size has a positive and significant effect on financial performance, as well as Nangih, Turakpe and Effenamdi (2023) who revealed that firm size positive and significant influenced the earnings per share of consumer goods firms. One of the reasons why firm size can be detrimental to the profitability of DMBs in Nigeria is the issue of increased operating costs. Larger firms often have higher operating costs due to their size and complexity. This can include expenses related to infrastructure, technology, human resources, and compliance. In the case of DMBs in Nigeria, these increased operating costs can eat into profits and reduce overall profitability. Also, Large

firms may face challenges related to market concentration. In the case of DMBs in Nigeria, a few large banks dominate the market, making it difficult for smaller or medium-sized banks to compete effectively. This can limit opportunities for growth and profitability.

Finally, financial leverage was found to exert positive and insignificant effect on bank profitability in Nigeria. The positive effect Aribaba et al. (2022) and Hassan et al. (2022) who found that financial leverage showed a positive relationship on the financial performance of listed oil and gas and consumer-goods firms in Nigeria. This means that financial leverage have the potentials to increase the profitability of DMBs, even though it is not enough for bank profitability. One reason for this is the tax benefit. Interest payments on borrowed funds are tax-deductible expenses for DMBs in Nigeria. This can result in lower tax liabilities and higher after-tax profits, ultimately boosting profitability. Because of this evidential benefit, DMBs in Nigeria are advised to take advantage of utilizing debt capital for profit drive. Leveraging debt can provide DMBs with the necessary funds to expand their operations, enter new markets, or invest in innovative technologies. This growth can lead to increased revenue streams and enhanced profitability over time.

Conclusions

Using the Panel Autoregressive Distributed Lag (PARDL) and Random Effect model (REM) modeling technique, the study sought to investigate the impact of firm characteristics on the profitability of Deposit Money Banks (DMBs) in Nigeria. The choice of the two alternative technique of analysis is to validate the outcome from PARDL having resorted to separate the variables to operationalize three models. The study included twelve Nigerian DMBs, including Access bank, First Bank of Nigeria, Fidelity Bank, First City Monument Bank, Guaranty Trust Bank, Sterling Bank, Stanbic Bank, Union Bank, United Bank for Africa, Unity Bank, Wema Bank, and Zenith Bank from 2012 to 2021. The dependent variable was return on assets (ROA) which represented bank profitability. To provide complete insights, the study analyzed 10 years of panel data and data stationarity. The firm characteristic variables are board size (BSIZ), firm size (FSIZ) and financial leverage (LEVR). The Pedroni Cointegration and ECM findings show a positive correlation between these variables. The study reveals that the sizes of board and the form have detrimental effect on bank profitability while financial leverage does not matter in bank profitability, although with potentials to drive it.

Policy Recommendations

The purpose of this research is to investigate the relationship between firm characteristics and the profitability of deposit money banks (DMBs). According to the study, focusing on increasing board size and firm size at the detriment of financial leverage can be harmful to the profitability of banks in Nigeria. The findings indicate that academics should use more contemporary estimation approaches as well as other indicators of firm characteristics and profits management. This could assist Nigerian banking sector enhance its financial performance.

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