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Board Heterogeneity and Firm Performance of Listed Non-Financial Companies in Nigeria

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Abstract
In Nigeria, existing studies on corporate governance concentrate heavily on single dimensions (often gender or board size) and frequently focus on financial firms. There is a paucity of comprehensive, multi-dimensional analyses of board heterogeneity's effects on firm performance specifically for listed non-financial firms in Nigeria using robust panel methods that address endogeneity and industry heterogeneity. This study examined the effect of board heterogeneity on the performance of 36 listed non-financial firms in Nigeria over a nine-year period (2014–2022), using secondary data and a panel least squares regression model. Diagnostic tests confirmed model robustness, with the random effects model selected based on the Hausman test. Results show that board ethnicity and educational heterogeneity have a significant positive effect on firm performance, while board gender heterogeneity has a significant negative effect. Board nationality showed a positive but insignificant relationship. The research investigates the effect of board heterogeneity on the performance of 36 listed non-financial firms in Nigeria, using Tobin's Q as a measure of firm performance. Exogenous variables include nationality, ethnicity, gender, and educational heterogeneity, with firm size and age as controls. The study recommends policy interventions to mandate minimum representation of minority ethnic groups on corporate boards to improve performance outcomes.

Keywords: Board Ethnicity, Board Heterogeneity, Firm Performance.

1. Introduction

Corporate governance has emerged as a critical determinant of firm performance and long-term sustainability, with the board of directors serving as the central mechanism through which governance objectives are realized (Liu & Fong, 2010). The board is primarily tasked with strategic oversight, managerial accountability, and the safeguarding of stakeholder interests (Kennon, 2011). One of the salient attributes of an effective board structure is board heterogeneity defined as the diversity in directors' demographic and cognitive characteristics, including gender, ethnicity, nationality, and educational background (Broome, Conley, & Krawiec, 2011). It is posited that diverse boards contribute to enhanced monitoring capabilities, richer decision-making processes, and more innovative problem-solving approaches (Carter, et al., 2010).
The relationship between board heterogeneity and firm performance

remains a subject of debate. While some studies suggest that board diversity leads to improved governance quality and financial outcomes (Cox & Blake, 1991; McLeod, et al.(1996), others argue that diversity may have little to no effect, or could even hinder board effectiveness due to challenges such as conflicting perspectives and coordination difficulties (Demsetz & Lehn, 1985; Dewatripont & Tirole, 1994). These divergent findings highlight the importance of further investigation, especially in emerging markets where local institutional and cultural contexts may shape how board diversity influences organizational outcomes.

Nevertheless, in the Nigerian corporate landscape, high-profile firm failures such as those of African Petroleum, Cadbury Plc., and Oceanic Bank have underscored the importance of effective board structures and governance mechanisms (Imade, 2019). In response, regulatory bodies such as the Central Bank of Nigeria (CBN), the Financial Reporting Council (FRC), and the Securities and Exchange Commission (SEC) have implemented governance reforms emphasizing the role of board heterogeneity in enhancing transparency, accountability, and firm performance (CBN, 2023; FRC, 2018; SEC, 2011). Despite these reforms, the empirical literature in Nigeria has yielded conflicting results. Some studies have reported a positive and statistically significant association between board heterogeneity and firm performance (Sanni, Olayiwola, & Aladejana, 2020; Mohammed & Kurawa, 2021; Benvolio & Ironkwe, 2022), while others have found no meaningful effect (Ogboi, 2018; Ujunwa, 2022). Also, there is limited use of methods that handle endogeneity.

This study seeks to contribute to the growing literature by empirically examining the effect of board heterogeneity on the performance of listed Nigerian firms. In contrast to prior studies that relied predominantly on accounting-based performance indicators such as return on assets (ROA) and return on equity (ROE), this research adopts Tobin's Q a market-based metric that reflects both internal efficiency and external investor perception. The study covers the period from 2014 to 2022 and focuses on firms across various sectors, thereby providing a broader and more contemporary assessment of corporate governance in Nigeria. By examining multiple dimensions of board heterogeneity namely, nationality, ethnicity, gender, and educational background this study provides nuanced insights into the role of board composition in shaping firm outcomes in emerging economies.

2. Literature review

Firm Performance

Financial Performance reflects a firm's ability to generate revenue and value for stakeholders using its assets (Atrill & McLaney, 2016). It indicates financial health over a period (Othuon et al., 2023) and is tied to effective strategy execution (Kakanda et al., 2016). Shareholders gauge performance by wealth growth (Berger & Patti, 2002), often measured via stock data or financial ratios like ROA and ROE (Kakanda et al., 2016).

Performance spans economic and organizational factors, with shareholder wealth maximization as a key goal (Shah et al., 2015). Metrics include sales growth, profitability, and Tobin's Q a market-based indicator of investment potential (Abdullah et al., 2021). Tobin's Q compares market value to asset replacement costs, signaling growth opportunities (Ishaq et al., 2021). Firm value is also assessed via EPS, PBV, or ROE (Adegbie et al., 2019; Hidayat et al.,

2019). Overall, financial performance is evaluated through profitability (ROA/ROE) and market metrics (Tobin's Q), reflecting operational efficiency and investor confidence.

Board Heterogeneity

Board heterogeneity refers to the diversity of board members in both observable attributes (e.g., gender, age, nationality) and non-observable attributes (e.g., education, expertise, values) (Kang et al., 2007; Nho et al., 2019). It encompasses demographic diversity such as gender, ethnicity, and age and cognitive diversity, including educational and professional backgrounds (Wang, 2023; Earley & Mosakowski, 2000). Such diversity enhances governance quality, decision-making, oversight, and firm performance (Shehata et al., 2017; Yussoff et al., 2018). Occupational and social heterogeneity also promote robust discussions and reduce bias during strategic deliberations (Van der Walt & Ingley, 2003; Li et al., 2014).

Board Nationality Heterogeneity

Board national heterogeneity refers to the presence of foreign nationals on a company's board, typically measured as the ratio of foreign directors to total board members (Ujunwa et al., 2022). It enhances firms' exposure to international markets, foreign expertise, and diverse advisory perspectives (Adams et al., 2009; Daniel et al., 2013). Foreign directors may improve board effectiveness through access to global networks, broader experience, and reinforcement of shareholder protection (Daniel, et al., 2020; Albaqali & Kukreja, 2018). However, challenges such as limited local knowledge and communication barriers may arise (Ali & Abubakar, 2020; Suleiman, 2014). Empirical evidence links nationality diversity to improved firm performance, internationalization, and operational efficiency (Rose et al., 2013; Estélyi & Nisar, 2016; Huijsmans, 2017).

Board Ethnicity Heterogeneity

Board ethnicity heterogeneity refers to differences among directors based on language, religion, culture, and physical characteristics (Horowitz, 1985). Such heterogeneity enhances problem-solving and decision-making by incorporating diverse stakeholder perspectives (Hong & Page, 2001; Hong & Page, 2004). Ethnically heterogeneous boards are better positioned to generate novel ideas and facilitate knowledge diffusion (Berliant & Fujita, 2008). Theoretical models suggest that complementary skills from diverse ethnic backgrounds can boost productivity (Alesina & La Ferrara, 2005). Empirical findings indicate a positive link between ethnic heterogeneity and firm performance (Carter et al., 2003; Erhardt et al., 2003; Ujunwa et al., 2012). In Nigeria, where over 250 ethnic groups exist, an ethnically diffused board may enhance board capital, contributing to legitimacy, resource access, and effective performance. However, ethnic heterogeneity may also cause emotional conflict that negatively affects outcomes (Ali & Abubakar, 2020; Akram, et al. 2020).

Board gender heterogeneity

Board gender heterogeneity refers to the proportion of female directors relative to the total board size (Ujunwa et al., 2022). Women's representation on corporate boards is increasingly seen as a driver of organizational value (Đặng et al., 2020). Female directors contribute unique perspectives, enhance sustainability discussions, and demonstrate greater responsibility and commitment to corporate social responsibility (Edem & Noor, 2014; Ibrahim & Angelidis, 2011; Onyali & Okerekeoti, 2018). Heterogeneous boards offer balanced viewpoints, improve stakeholder representation, and are linked to improved

performance (Carter et al., 2003; Huse & Solberg, 2006). Gender heterogeneity is also associated with independent thinking, as women are often less embedded in traditional boardroom networks (Carter et al., 2003). Shareholders may interpret increased female board presence as a sign of positive organizational change, boosting confidence and share value (Ryan & Haslam, 2005).

Board educational heterogeneity

Board educational heterogeneity refers to variations in the academic qualifications and educational backgrounds of directors, including levels such as diplomas, bachelor's, master's, and doctoral degrees (Magnanelli et al., 2021; Khan et al., 2023). This heterogeneity influences how directors think, solve problems, and engage in decision-making (Dahlin et al., 2005; Milliken & Martins, 1996). Boards composed of members with varied fields of study such as law, business, engineering, and the humanities can address complex issues more effectively and enhance strategic decision-making (Vo & Phan, 2013; Hillman & Dalziel, 2003). Rooted in Resource-Based View (RBV) theory, educational heterogeneity is viewed as a valuable organizational resource that enhances competitiveness and innovation (Barney, 1991; Barroso-Castro et al., 2017). Firms with educationally heterogeneous boards are more likely to embrace innovation, reduce risk aversion, and improve performance (Ruigrok et al., 2006; Bernile et al., 2017).

Theoretical Framework

Stakeholders Theory

Stakeholder theory expands the traditional agency view that boards exist solely to protect shareholder interests. It argues that firms must also consider the interests of other groups, including employees, customers, communities, the environment, and future generations (Freeman, 1984; Donaldson & Preston, 1995; Wheeler & Sillanpaa, 1997). Freeman (1984) broadly defines stakeholders as any group or individual affected by or capable of affecting the firm's objectives, while Clarkson (1994) offers a narrower view, focusing on those who assume voluntary risk. The theory emphasizes balancing competing interests and creating value for all stakeholders—not just shareholders (Freeman et al., 2004). Although some argue that maximizing shareholder value benefits all stakeholders (Sundaram & Inkpen, 2004), stakeholder theory insists that ethical responsibility, trust-building, and inclusive decision-making are essential for long-term success.

Empirical Review

Board Nationality Heterogeneity and Firms' Performance

Ezeigbo et al. (2024) examined the effect of corporate board heterogeneity on the financial performance of 42 listed Nigerian firms from 2012 to 2021. Firm performance was measured using Economic Value-Added Analysis (EVAA), and data were analyzed through descriptive statistics and multiple regression. The findings revealed that foreign director representation showed a significant positive influence on financial performance, suggesting that the inclusion of foreign directors may enhance firm decision-making and outcomes.

Abdullahi (2021) examined the effect of board diversity on financial performance of the Nigerian listed firms. The study utilised the balanced panel data of 70 firms for a period of 8 years (2012 to 2019) using a two-step system generalised method of moments (GMM) framework. This study indicates a positive and significant relationship of Foreign directors (FD), with financial performance of Nigerian listed. It recommends that firms should attach more value to constituting a smaller board size with a considerable number of female and

foreign directors to maximise their performance.

Innocent and Jacob (2021) examined the impact of board heterogeneity on the financial performance of Nigerian listed firms using ex-post facto design and multiple regression analysis from 2014 to 2018. The study found that nationality heterogeneity had no significant effect on firms' leverage ratios. However, factors such as criminal records, nationality, and gender influenced board appointments and ultimately firm performance. The authors suggest that increasing the presence of competent women in risk management roles may enhance financial stability.

Akram et al. (2020) examined the effect of board social heterogeneity social (gender and nationality) on firm performance in the non-financial sector of the Pakistan Stock Exchange between 2010 and 2016, using a sample of 375 firms. Grounded in agency theory, upper echelon theory, and the resource-based view, the study applied Blau's heterogeneity index and conducted analysis using ordinary least squares (OLS). The results showed that national heterogeneity, positively affected firm performance. The study suggests that firms can enhance profitability by leveraging certain dimensions of board diversity.

Ogboi et al. (2018) analyzed the impact of board diversity on corporate performance in 14 Nigerian listed Deposit Money Banks from 2011 to 2015. Using both accounting-based (ROA) and market-based (Tobin's q) proxies, they found that foreign directorship negatively affected market performance. The study suggested that boards should increase female representation and be cautious about hiring foreign nationals. However, the authors concluded there was insufficient evidence to oppose the appointment of foreign nationals due to the short duration and small sample size.

Ahmadu (2017) examined the impact of board diversity on financial performance in Nigerian listed deposit money banks from 2010 to 2014. Using descriptive statistics and panel regressions, the study found no significant effect of foreign directors on return on equity. It suggested that the presence of foreign directors on boards does not influence firm performance, despite some studies linking racial diversity to financial performance.

Ujunwa et al. (2012) studied the impact of board diversity on financial performance using panel data from 122 listed Nigerian companies between 1991 and 2008. They found that board nationality significantly influenced board effectiveness and had a positive correlation with corporate performance. The study recommended that practitioners and policymakers consider board diversity through the lenses of agency theory and stakeholders' theory.

$H0_1$: Board nationality heterogeneity has no significant effect on firms' performance of listed non-financial companies in Nigeria

Board Ethnicity Heterogeneity and Firms' Performance

Kabara and Modibbo (2020) examined the impact of racial and ethnic diversity on the performance of 67 publicly traded non-financial Nigerian firms from 2012 to 2017, using Tobin's Q and Return on Assets (ROA). The study found that while a diverse board improved Tobin's Q, it had no significant effect on ROA. A negative correlation was observed between Tobin's Q and racial diversity, but the link with ROA was not statistically significant. The study also noted that religious diversity had a minor negative impact on both Tobin's Q and ROA. It recommended prioritizing financial literacy, intellectual capacity, and consistency when forming boards.

Ogboi et al. (2018) studied 14 listed Nigerian DMBs from 2011 to 2015 to

assess the impact of board heterogeneity on corporate performance. Using fixed effect panel regression, they found that board diversity, particularly ethnic diversity, positively influenced financial performance (ROA). They also discovered that low leverage was linked to higher ROA, while a high Tobin's q correlated with lower ROA. Gender and ethnicity were the only diversity factors not significant in the analysis.

Omoye and Eriki (2013) examined board heterogeneity effects on firm performance in 96 Nigerian firms using OLS regression. Ethnic diversity showed weak positive links to ROI and Tobin's Q, while religious diversity had insignificant negative effects. The study prioritized financial literacy and expertise over unproven diversity traits. Findings suggested ethnic representation offers marginal benefits, but proven competencies matter more in board selection. Researchers advocated focusing on empirically validated qualifications rather than diversity alone.

Wellalage and Locke (2013) examined the link between board diversity and financial success for 198 Sri Lankan firms from 2006 to 2010. Using the generalized method of moments for panel data analysis, they found that greater board diversity was associated with improved financial performance.

Ujunwa et al. (2012) studied the impact of board diversity on financial performance using panel data from 122 listed Nigerian companies between 1991 and 2008. They found that board ethnicity significantly influenced performance. The study suggested that both agency theory and resource dependence theory should guide practitioners and policymakers when considering board composition.

Olaoti (2012) looked at the connection between diverse board of directors and strong financial results at five traditional banks covering 2005 to 2011. Businesses that catered primarily to the Hausa/Fulani, Yoruba, and Igbo groups each received a score of 3. To test their hypothesis, they used least squares regression, a common statistical technique. It was discovered that racial and cultural diversity greatly improved ROI. It was hoped that by increasing the board's cultural diversity, they might make more informed judgments and boost the company's bottom line.

$H0_2$: Board ethnicity heterogeneity has no significant effect on firms' performance of listed non-financial companies in Nigeria

Board Gender Heterogeneity and Firms Performance

Ezeigbo et al. (2024) investigated board heterogeneity in Nigerian firms and found no significant impact of board gender diversity (BOGD) on performance. Similarly, Innocent and Jacob (2021) reported that gender heterogeneity did not significantly affect leverage, though competence in risk management roles could enhance stability. Owolabi et al. (2021) also found positive effects of board independence, gender diversity, and size on profitability, though no significant link was established under the fixed effect model. Ilaboya and Ashakofe (2021) reported no significant relationship between internationalized boards and performance, with women's representation even negatively affecting outcomes.

In contrast, Abdullahi (2021) confirmed a positive and significant relationship between gender diversity and performance, recommending smaller boards with female directors. Onyekwere and Babangida (2022) found gender diversity improved ROA and ROE in Nigerian banks, while all-male boards performed poorly. Adesanmi et al. (2019) and Onyekwere et al. (2019) likewise showed that higher representation of women and independent directors boosted

bank profitability. Oyewale et al. (2016) also reported a positive relationship in Nigerian manufacturing firms, while Ahmadu (2017) concluded that more women on boards enhanced firm outcomes.

Across other contexts, Othuon et al. (2023) observed that female representation improved return on assets in Kenyan coffee processors, and Miangi (2016) showed workforce diversity enhanced growth on the Nairobi Stock Exchange. Sabo (2018), however, found no significant link between female board representation and profitability in Nigeria's structural materials industry. Similarly, Yadav and Chakraborty (2020) found higher women representation reduced Tobin's q in India, while Akram et al. (2020) reported negative effects of gender heterogeneity in Pakistan.

Some studies outside Nigeria produced mixed results: Simionescu et al. (2021) showed a positive correlation between gender diversity and ROI/profitability in U.S. IT firms, though top female executives had little effect. Yap et al. (2017) in Malaysia and Sabo (2018) in Nigeria found no significant evidence of gender diversity improving performance. Wellalage and Locke (2013) in Sri Lanka, Miangi (2016) in Kenya, and Oba and Fodio (2013) in Nigeria, however, confirmed that gender-diverse boards improved financial outcomes.

Overall, findings are mixed across contexts: while several studies (Abdullahi, 2021; Onyekwere & Babangida, 2022; Oyewale et al., 2016; Oba & Fodio, 2013) support a positive effect of gender diversity on firm performance, others (Ezeigbo et al., 2024; Innocent & Jacob, 2021; Ilaboya & Ashakofe, 2021; Yadav & Chakraborty, 2020; Akram et al., 2020) report insignificant or negative relationships.

$H0_3$: Board gender heterogeneity has no significant impact on firms' performance of listed non-financial companies in Nigeria.

Board Educational Heterogeneity and Firms Performance

Khan et al. (2023) examined the impact of board diversity on firm performance in Pakistan, using a panel random-effects model and generalized method of moments (GMM) across 188 non-financial firms listed on the Pakistan Stock Exchange from 2009 to 2020. The study found that educational level diversity positively influenced firm performance, while educational background diversity had a negative effect. The authors recommend that policymakers promote educational diversity with relevant backgrounds to enhance competitive performance.

Odero and Egessa (2023) evaluate the impact of board nationality and educational diversity on organizational performance. Using a qualitative approach, data from peer-reviewed articles (2010-2022) show that board diversity positively influences firm performance. The study suggests that policymakers should promote policies on board diversity, and firms should consider nationality and educational diversity when appointing board members.

Kabara et al. (2022) examines the impact of board gender and educational diversity on Nigerian Stock Exchange-listed companies' performance, using data from 67 firms over 2012–2019. The study finds a significant positive influence of education diversity on performance, supporting agency and resource dependence theories. The findings suggest that board diversification enhances firm performance and market value.

Innocent and Jacob (2021) explored board heterogeneity's effect on Nigerian firms' financial performance, using multiple regression analysis from 2014 to 2018. They found that education heterogeneity had no significant effect on leverage

ratios, but factors like nationality and gender impacted performance. The study suggests increasing competent women in risk management roles for improved stability.

Magnanelli et al. (2021) investigates tenure and educational diversity's effect on firm performance in 187 European firms from 2010 to 2018. Results show a positive impact of tenure diversity on performance, but no significant effect from educational diversity. The study recommends well-structured boards with knowledgeable members.

Emadeldeen et al. (2021) analyzes board diversity's effect on firm performance using data from the FTSE 350 (2000-2016). It finds that educational diversity negatively affects performance, suggesting that education level does not necessarily correlate with improved firm performance.

Nwaorgu and Iormbagah (2021) examine board diversity's impact on Nigerian firms' financial performance, using data from 2014 to 2018. The study reveals no significant effect from educational diversity but recommends admitting resourceful members to enhance decision-making and address agency issues.

Akram et al. (2020) studied the impact of board educational heterogeneity on firm performance in Pakistan's non-financial sector from 2010 to 2016. Using Blau's heterogeneity index, the study found a positive impact from most forms of educational diversity, except for finance-related backgrounds.

Fernandez-Temprano and Fernandez-Tejerina (2020) examined the impact of board diversity on firm performance in Spanish non-financial firms from 2005 to 2015. They discovered that while educational diversity negatively affected the performance of supervisory directors, it led to greater social value for the firms. The study suggests that the diversity of backgrounds among board members may improve the board's social contributions, even though it does not directly enhance financial performance. The authors conclude that firms should balance diversity to foster positive social outcomes while considering the potential trade-offs on performance.

Alfuma et al. (2020) analyzed the impact of board diversity on the performance of NGX-listed companies from 2013 to 2018, focusing on factors like educational background, gender, and occupation. The study found no significant correlation between educational diversity and financial success, which challenges the idea that a diverse board directly influences financial performance. However, the study did identify a negative relationship between educational diversity and market performance (measured by ROA), suggesting that while diversity can bring valuable perspectives, it may not always align with market success in the short term.

Akinwumi et al. (2010) examined the role of educational diversity in the performance of 53 Nigerian industrial firms listed on the Nigerian Stock Exchange between 2006 and 2015. Their study revealed that there was a significant correlation between educational diversity on boards and performance measures like Tobin's Q and return on assets (ROA). The findings suggest that having a diverse set of educational backgrounds among board members can lead to improved decision-making, which in turn enhances firm performance. This emphasizes the importance of board composition for achieving better corporate outcomes.

Wellalage and Locke (2013) investigated whether board diversity is associated with financial success in Sri Lankan companies, using data from 198 firms over the period of 2006 to 2010. The study found that boards with diversity in gender, race/ethnicity, age, education, and expertise were linked to better financial

performance. Their results suggest that a varied board brings a wider range of perspectives and experiences, which positively influences firm strategy and overall success. The study advocates for the promotion of diverse boards as a means to enhance financial performance and competitiveness.

Ho_4: Board educational heterogeneity has no significant impact on firms' performance of listed non-financial companies in Nigeria.

3. Methodology

The study used an ex post facto research design, which involves analyzing data from past events or conditions to understand relationships between variables without manipulation. The population for this study consists of publicly traded Nigerian non-financial companies as of December 2022. The year 2022 is adopted as the base year for this study because it represents a recent and stable period in Nigeria's corporate and economic environment following the disruptions caused by the COVID-19 pandemic (2020–2021)**.** By 2022, most listed non-financial companies had resumed normal operations, updated their governance structures, and published complete post-pandemic financial statements, providing reliable and comparable data for analysis. It includes companies from three key sectors: oil and gas (9 listed firms), consumer goods (21 listed firms), and industrial (13 listed firms), totaling 43 firms. These sectors were selected due to the enforcement of the Financial Reporting Council of Nigeria's (2018) Code of Corporate Governance and the International Integrated Reporting Framework (2011), both of which emphasize corporate diversity and inclusivity. The study employs a purposive sampling technique to select 36 listed non-financial companies based on the availability of data for the period 2014 to 2022. The selected companies are representative of the sectors under study, ensuring adequate coverage of the variables of interest. Data for this study will be collected from secondary sources, specifically the annual reports of listed non-financial companies from 2014 to 2022. This period is selected due to data availability and the implementation of the FRCN Code of Corporate Governance (2018) and the International Integrated Reporting Framework (2011). Secondary data will be sourced from industrial businesses, using the Nigeria Exchange Group and the annual reports of the selected companies.

Model Specification

Nwaorgu and Iormbagah (2021) econometric model will be adapted and modified for this investigation in the manner described below.

Mathematic model: Leverage ratio = f (Gender diversity + Educational diversity + Nationality diversity)

Econometric model:

$$LEVit = \alpha + \beta 1\, GDit + \beta 2\, EDit + \beta 3\, NDit + Uit \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where:

LEV = Financial performance (Gotten by dividing the total liability to total assets of the firm at a time)

GD= Gender diversity (number of female divide by the total number of male on the board)

ED= Educational diversity (Diversity Index for Educational Qualification). The parameters for estimating the diversity indexes are described below: The members of the board of firms were classified into 4 categories namely: members considered to have a qualification in accounting, business, economics and law. Using content analysis for each category; 1 is assigned under each categorized criteria if found and 0 if not found at a time. The number of possible categories is four (4). The

maximum diversity index will be 1 if the board members are equally distributed in the 4 categories and zero if non fall in any of the category using division rule.

ND= Nationality diversity (number of foreign nationals divided by the total number of board members) U= error term it = icross-section & t time β = Beta coefficient of the model.

The specific models will be as follows:

$$TOBINQ = ß_o + ß_1 BNAT + ß_2 BETH + ß_3 BGDIV + ß_4 BEDI + ß_5 FSIZE + ß_6 FAGE + \varepsilon i; \ldots\ldots\ldots (ii)$$

Where:

Dependent Variable

TOBINQ = (Market Value of total shares+Total debt)/Book Value of Assets

Independent Variables:

BNAT = Board Nationality Heterogeneity

BETH = Board Ethnicity Heterogeneity

BGDIV = Board Gender Heterogeneity

BEDI= Board Education Heterogeneity

Control Variables:

FSIZE= Firm Size

FAGE=Firm Age

ε= error term

$ß_{o=}$ Constant term

$ß_{1-}$ $ß_{6=}$ **coefficient**

t = time covered in this study (2014-2022)

$ß_{1-}$ $ß_{6>0}$

Operationalization of Variables

This study will use both independent and dependent variables. The dependent variable is firm performance, measured by Tobin's Q, calculated as the market value plus total liabilities divided by total assets, sourced from the companies' annual reports. The independent variables include Board Educational Heterogeneity (BED), Board Nationality Heterogeneity (BNAT), Board Ethnicity Heterogeneity (BETH), and Board Gender Heterogeneity (BGDIV). BNAT is determined by the percentage of non-Nigerian citizens on the board, while BETH is based on the presence of a minority ethnic group. BGDIV is measured by the ratio of women to men on the board. BED is assessed using content analysis, categorizing board members into accounting, business, economics, and law qualifications, assigning 1 if a member fits a category, and 0 otherwise. The maximum diversity index is 1 if the board is equally distributed across categories.

BEDIj= ∑t=1xij /nj

Where nj is the number of items for the jth firm.

xij =1 if ith item that is board members has accounting, economics, business and law qualification, 0 if ith item is does no have the categorized qualification, so that 0≤BEDIj ≤1 index for calculating BEDIj, please refer to the Appendix 4 in the appendixes.

The control variables used for the study include firm size measured as log of total assets and firm age which is the number of years from commencement of operations.

4. Result and Discussion

A panel regression analysis will be conducted on the data, utilizing descriptive statistics to characterize the variables. Pearson correlation was used to assess multicollinearity, while the Breusch-Godfrey LM test, VIF, and ARCH test was used to check for serial correlation, multicollinearity, and heteroskedasticity, respectively. E-Views 10 software was used for statistical analysis. Hypotheses will be tested using panel least squares regression to determine the acceptance or rejection of the null hypothesis.

Table 1: Descriptive Statistics

	TOBIN_Q	BNAT	BETH	BGDIV	BEDI	FSIZE	FAGE
Mean	3.279	0.182	0.725	0.178	0.687	16.885	28.469

Median	1.190	0.200	1.000	0.167	0.667	17.318	32.000
Maximum	83.616	0.625	1.000	0.667	1.000	21.595	62.000
Minimum	0.363	0.000	0.000	0.000	0.286	10.956	2.000
Std. Dev.	9.353	0.169	0.447	0.133	0.159	2.444	14.789
Skewness	6.039	0.510	-1.010	0.702	0.063	-0.333	-0.070
Kurtosis	41.062	2.395	2.019	3.744	2.420	2.313	2.119
Jarque-Bera	21526.860	18.970	68.023	34.105	4.759	12.342	10.746
Probability	0.000	0.000	0.000	0.000	0.093	0.002	0.005
Sum	1062.511	58.981	235.000	57.695	222.562	5470.863	9224.000
Sum Sq. Dev.	28256.830	9.210	64.552	5.722	8.135	1928.839	70648.690
Observations	324	324	324	324	324	324	324

Source: Researchers' Compilation (2025)

The mean value of TOBINQ is 3.279, indicating that, on average, firms' market value exceeds their book value by more than three times, with a significant variance as shown by the high standard deviation of 9.353. The kurtosis of 41.062 suggests a leptokurtic distribution with outliers, confirming considerable variability in firm performance.

Board nationality heterogeneity (BNAT) has a mean of 0.182, meaning that 18.2% of board members are foreign, with a platykurtic distribution (kurtosis of 2.395) and moderate right skewness, suggesting relatively consistent foreign representation across firms.

Board ethnicity heterogeneity (BETH) has a mean of 0.725, indicating that most boards have a significant presence of minority ethnic groups, with the distribution skewed negatively, showing greater diversity in the majority of firms.

Board gender diversity (BGDIV) averages at 0.178, with only about 18% of board members being women. The distribution is leptokurtic, highlighting a few firms with higher gender diversity.

Board education heterogeneity (BEDI) shows a mean of 0.687, implying that a majority of boards have members with diverse educational qualifications. The distribution is fairly symmetric, with a slight tendency toward normality, as indicated by a kurtosis of 2.420.

Firm size (FSIZE) has a mean of 16.885, suggesting that firms are generally of moderate size, with a platykurtic distribution and a small negative skew.

Firm age (FAGE) averages at 28.47, indicating that the firms in the study are generally well-established, with a near-normal distribution and low kurtosis.

These descriptive statistics indicate varying levels of diversity and performance, with some variables exhibiting skewed and leptokurtic distributions, while others show more normal or symmetric trends.

Table 2 Correlation Matrix

	TOBIN_Q	**BNAT**	**BETH**	**BGDIV**	**BED**	**FSIZE**	**FAGE**
TOBIN_Q	1.0000						
BNAT	-0.0392	1.0000					
BETH	0.0909	0.1478	1.0000				
BGDIV	-0.1490	-0.1617	0.2711	1.0000			
BEDI	0.1950	-0.0036	0.0575	0.1201	1.0000		
FSIZE	-0.3793	0.3791	0.1352	0.1116	-0.1740	1.0000	
FAGE	0.0985	0.2312	0.1258	0.0567	0.3015	-0.0775	1.0000

Source: Researchers' Compilation (2025)

Table 2 shows the correlation coefficients of the variables, where a coefficient of 1.000 for each variable indicates no multicollinearity. The correlation between

the independent variables and firm performance (TOBINQ) reveals that board nationality (-0.0392) and board gender diversity (-0.149) have a negative relationship with firm performance, while board ethnicity (0.091) and board education diversity (0.195) show a positive correlation. The control variables, firm size (-0.38) and firm age (0.098), exhibit negative and positive correlations with firm performance, respectively.

Multicollinearity Test

The Variance Inflation Factor (VIF) is used to assess the extent to which the variance of an independent variable is influenced by its correlation with other independent variables. A VIF of 1 indicates no correlation, values between 1 and 5 suggest moderate correlation, and values greater than 5 indicate high correlation. The VIF values are presented in Table 4.3 below.

Table 3 Variance Inflator Factor estimates

Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	19.17153	88.06868	NA
BNAT	10.59182	2.995496	1.383122
BETH	1.238092	4.125156	1.133145
BGDIV	14.74622	3.344318	1.196332
BEDI	9.953317	22.72267	1.147959
FSIZE	0.047646	63.70704	1.302993
FAGE	0.001206	5.699537	1.208304

Source Researchers' Compilation (2025)

The center variance inflation factor values of 1.383, 1.133, 1.196, 1.148, 1.303, 1.208, with respect to Board Nationality, Board Ethnicity (BETH), Board Gender Diversity (BGDIV), Board Educational Diversity (BEDI) and their values are less than 5 which implies that multicollinearity problem does not exist

Diagnostic Test

The Breusch-Godfrey serial correlation LM test checks for autocorrelation in regression errors; a P-value greater than 0.05 suggests no autocorrelation. The heteroskedasticity test examines if the independent variable properly explains the dependent variable while maintaining consistent variance. The ARCH test assesses if residuals show conditional heteroskedasticity, with a P-value greater than 0.05 indicating homoscedasticity.

Table 4 Diagnostic Test Estimates

Diagnostic test	P-value	Significance Level	Decision
Breusch-Godfrey Serial Correlation LM Test:	0.1631	0.05	No autocorrelation
Heteroskedasticity Test: ARCH	0.563	0.05	Homoskedastic

Source: Researcher's Computation (2025)

The Breusch Pagan LM test with P-value of 0.1631 and Heteroskedasticity ARCH test P-value of 0.563 is greater than the 0.05 level of significance indicate that there is no autocorrelation and the model is homoscedastic that is the explanatory variables can explain the dependent variables reliably.

Hausman test for fixed or random effect model

The study uses the P-value to determine the appropriate model: if the P-value exceeds the critical value, the null hypothesis of a random effect is accepted; otherwise, a fixed effect model is used. The random effect assumes that unique errors are uncorrelated with the regressors, distributing the error term randomly across the sample, impacting the dependent variable.

Table 5: Hausman correlated random effect test

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.505907	6	0.9978

Source: Researchers' Compilation (2025)

Table 5 indicates a fixed effect model will be used, as the Hausman test P-value of 0.9978 exceeds the critical value of 0.05. The random effect suggests that unique errors are uncorrelated with the regressors, allowing the error term to be distributed randomly across the sample, affecting the dependent variable.

Panel Least Square Regression Result

This method predicts the behavior of the endogenous variables, determining the line of best fit for accurate predictions. The acceptance or rejection of the null hypothesis will be based on the estimates.

Panel Least Squares Regression Estimates

Dependent Variable: TOBIN_Q

Method: Panel Least Squares

Variable	**Coefficient**	**Std. Error**	**Prob.**
C	21.07338	4.448662	0.0000
BNAT	3.021567	3.310602	0.3621
BETH	3.560254	1.132754	0.0018
BGDIV	-11.37949	4.078511	0.0056
BEDI	8.249184	3.198553	0.0104
FSIZE	-1.456799	0.221044	0.0000
FAGE	0.001127	0.035471	0.9747
R-squared	0.511336		
Adjusted R-squared	0.575604		
Log likelihood	-1145.147		
Durbin-Watson stat	2.123719		

Source: Researcher's compilation (2025)

The Durbin-Watson statistic of 2.123719 suggests no significant autocorrelation, supporting co-integration and the relationship between variables. The standard error controls heteroskedasticity, indicating consistent explanatory power. The log likelihood of -1145.147 shows a good model fit. The null hypothesis will

be rejected if the P-value is below 0.05, supporting the alternative hypothesis.

Hypothesis$_1$: *Board nationality heterogeneity has no significant effect on firms' performance of listed non-financial companies in Nigeria.*

Board nationality heterogeneity (BNAT) shows a positive but insignificant effect on firm performance, with a coefficient of 3.021567 and a P-value of 0.3621, greater than the 5% significance level. Thus, the null hypothesis is accepted, indicating that foreign nationals on the board do not significantly affect firm performance.

Hypothesis$_2$: *Board ethnicity heterogeneity has no significant effect on firms' performance of listed non-financial companies in Nigeria.*

Board ethnicity (BETH) shows a positive and significant effect on firm performance, with a coefficient of 3.560254 and a P-value of 0.0018, which is below the 0.05 significance level. This leads to the rejection of the null hypothesis, indicating that the presence of minority ethnic members on the board positively influences corporate performance. The study suggests that greater ethnic diversity on the board enhances firm performance.

Hypothesis$_3$: *Board gender has no significant effect on firms' performance of listed non-financial companies in Nigeria.*

Board gender heterogeneity (BGDIV) shows a negative but significant effect on firm performance, with a coefficient of -11.37949 and a P-value of 0.0056, which is less than the 0.05 significance level. This leads to the rejection of the null hypothesis, indicating that the presence of women on the board influences corporate performance.

Hypothesis$_4$: *Board educational heterogeneity has no significant effect on firms' performance of listed non-financial companies in Nigeria.*

Board educational diversity (BED) has a positive and significant effect on firm performance, with a coefficient of 8.249184 and a P-value of 0.0104. This leads to the rejection of the null hypothesis, suggesting that a board with members educated in accounting, business, economics, and law contributes to improved corporate performance.

Discussion of Findings

The study found that board nationality heterogeneity has a positive but insignificant impact on firm performance among listed non-financial firms in Nigeria. This result aligns with previous studies by Ilaboya and Ashakofe (2021), Ogboi et al. (2018), and Ahmadu (2017), which also found a non-significant impact, albeit with an inverse relationship. However, it contrasts with the findings of Jacob (2021) and Ujunwa et al. (2012), whose studies suggested a significant impact of foreign directors on firm performance in Nigeria. The outcome is consistent with the a priori expectation, supported by the resource dependency theory.

Board ethnicity heterogeneity, on the other hand, was found to have a positive and significant effect on firm performance, which aligns with the findings of Olaoti (2012), Ujunwa (2021), and Ogboi et al. (2018). This result contrasts with Kabara and Modibbo (2020), who reported an inverse and insignificant relationship, and Wallalage & Locke (2013), who found a negative relationship in Sri Lankan enterprises. The findings also align with the a priori expectations, supported by agency and resource dependency theories.

The study further revealed that board gender heterogeneity has an inverse but significant impact on firm performance. While the presence of women on the board enhances performance, the negative relationship suggests that fewer female board members may have more influence on performance decisions. These findings are in line with Owolabi et al. (2021) and

Onyekwere and Babangida (2022), who identified a significant impact of female board presence on firm performance in Nigeria. However, studies by Othuon et al. (2023) and Wallalage & Locke (2013) in Kenya and Sri Lanka, respectively, found a positive relationship, which contrasts with this study's findings. The study also diverges from the theoretical framework of resource dependency theory due to the male-dominated nature of the boards in the sample.

Finally, the study found that board educational diversity has a positive and significant effect on firm performance, aligning with the findings of Kabara et al. (2022) in Nigeria and Khan et al. (2023) in Pakistan. This finding contrasts with studies by Magnanelli et al. (2021) in European companies and Emadeldeen et al. (2021) in London-listed firms, which reported a negative and insignificant relationship. The study's results are also inconsistent with Alfuma et al. (2020), who found no relationship with educational diversity and firm performance in Nigeria. The results are in line with the theoretical expectations of resource dependency theory.

5. Conclusion and Recommendation

Conclusion

This study provides empirical evidence on how different dimensions of board heterogeneity influence the performance of listed non-financial firms in Nigeria. Unlike earlier research that focused mainly on single aspects of board composition or on financial institutions, this study adopts a multi-dimensional approach covering ethnicity, nationality, gender, and educational diversity over a nine-year period (2014–2022). The use of panel least squares regression and appropriate diagnostic tests ensured robust and reliable results.

Findings reveal that ethnic and educational diversity on boards enhance firm performance, suggesting that exposure to vary cultural and intellectual perspectives strengthens decision-making and strategic oversight. Conversely, gender diversity showed a negative effect, indicating that gender inclusion on Nigerian boards may not yet translate into performance gains possibly due to token representation or structural barriers limiting female directors' influence. Nationality diversity was found to have a positive but insignificant relationship with firm performance, implying that the benefits of foreign representation may depend on firm-specific contexts.

Overall, the study underscores the importance of board composition as a determinant of firm performance in Nigeria's non-financial sector. It concludes that board heterogeneity should be managed strategically rather than symbolically. The study therefore recommends policy interventions to ensure fair representation of minority ethnic groups and to strengthen the capacity of diverse board members to contribute effectively to governance and performance enhancement.

Recommendations

The study recommends that firms de-emphasize board nationality as a determinant of performance, instead integrating it with factors like ethnicity and education for greater impact. Ethnic heterogeneity should be prioritized, as it fosters diverse perspectives and inclusive governance. Gender diversity is encouraged through purposeful inclusion of female directors, ensuring meaningful contributions rather than token representation. Additionally, educational heterogeneity should be promoted by appointing directors with varied professional expertise (e.g., accounting, economics, law, business) to strengthen decision-making, strategy, and overall firm performance.

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