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# The Effect of the Board's Educational and Gender Diversity on the Firms' Performance: Evidence from Non-Financial Firms in Developing Country

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**Abstract:** Prior studies have analyzed board diversity (mostly in developed nations) using financial firms to measure demographic or cognitive characteristics in relation to firm performance. However, the current study attempted to fill the literature gap by evaluating both demographic and cognitive mechanisms in developing economies using non-financial firms in Nigeria. This study examined how board diversity in terms of the gender and educational level of directors affects the performance of Nigerian stock exchange companies. The study utilized a sample of 67 listed companies from the Nigerian stock exchange over eight years, from 2012 to 2019. A quantitative method using a deductive approach was adopted in conducting fixed effect and generalized method of moments (GMM) estimations for robust findings. The findings support the existence of a significant positive influence of both education and gender diversity on the companies' performance. These results are consistent with agency and resource dependence theoretical expectations. The outcomes add to the current debates on those types of regulatory setters calling for corporate board diversification. The findings would greatly benefit management in the directors' selection process as they revealed the importance of both education and gender diversity for better performance and enhancing market value. Thus, they contribute to the literature on the state of board diversity in developing countries.

**Keywords:** board diversity; gender diversity; education diversity; company performance; Nigeria



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## 1. Introduction

The disagreement has been made in many respects on whether gender and education diversity will improve the managerial key role of the oversight function [1]. Many criticisms have been reported on the failure of the directors to conduct the diligent supervision of management decisions. However, their major role as internal governance mechanisms is to protect investors' interests and maintain discipline among the managers [2]. Equally, many corporate financial crises worldwide have been attributed to the ineffectiveness of corporate governance attributes, such as gender diversity and education diversity [3]. According to Ferrari et al. [4], the adoption of board diversification could have been a good remedy for the financial crisis. In their part, Fidanowski, Simeonovski, and Mateska [5] established that firms are more profitable and overrated in the market when the boardroom constitutes well-educated members. In a similar vein, Ntim and Soobaroyen [6] argued that, when firms appoint women directors, they see an increase in firm value because of extra monitoring, which invariably reduces agency problems.

Consequently, the failure of major corporates such as Tyco, WorldCom, and Enron have encouraged policymakers to focus on corporate governance issues. It is also seen as essential to overcoming agency problems between managers and shareholders. The literature generally argues that stronger governance should increase shareholder value [7]. Most recently, however, the issue of gender and education diversity has received greater concerns, especially from policymakers, academics, and experts [8–11]. Likewise, in Nigeria, firms are facing a lot of pressure to uphold diversity in their boardrooms. The Society for Corporate Governance Nigeria (SCGN) suggested that extremely homogeneous boards lead to governance failures, which invariably result in considerable losses or profitability reduction [12]. The level of board diversity among Nigerian enterprises is still low compared to other nearby nations, especially regarding gender diversity, despite the expanding body of literature on the benefits of diversified boards. Men continue to dominate decision-making at both the domestic and organizational levels in developing nations, especially those in Sub-Saharan African areas such as Nigeria [13]. In fact, apart from a few Sub-Saharan African countries, such as Kenya and South Africa, legal institutions rarely support women at work [14]. This may explain why African countries are ranked low in the global gender index compiled by the World Economic Forum [15]. Hence, it is difficult to generalize the findings from studies based on advanced market economies with well-established institutions to developing country firms. In addition, understanding the economic consequences of board diversity might promote it among African firms.

However, prior studies utilized different proxies to assess the effect of board diversity on firm performance. Some scholars rely on a single characteristic such as gender [16,17], ethnic diversity [18,19], and several demographic attributes [20,21]. Among these attributes, few studies have focused on a specific diversity of non-observable traits, such as educational diversity [10,11]. To date, the results of various empirical studies on board diversity and firm financial performance proved inconclusive [22]. Many investigations indicated a positive association between board diversity and firm financial performance (the USA [23], South Africa [24], France [25], India [26], and the UK [27]). On the other hand, some researchers come up with contradictory results [7,28], and still, others do not find a link at all [29–31]. The reasons for this inconsistency identified in the literature include different theoretical backgrounds [21,32], analysis methods [33,34], and sample size and period [16,29].

Moreover, in their review article, Khatib et al. [10] suggested that, despite these improvements, the issue of board diversity remains unclear. Thus, this study employed both demographic characteristics, measured by gender, and cognitive characteristics measured by educational level, taking into account gaps identified in the literature. Hence, by providing full empirical results of the state of board diversity in Africa's most populous country, this study contributes to the literature on the state of board diversity in developing countries. As a result, research on board diversity in emerging economies, where empirical evidence is lacking, is critical in understanding the effect of gender and education diversity on business performance. Being a developing country, Nigeria accounts for almost one-fourth of Sub-Saharan Africa's population and is the world's 20th largest economy, with more than \$5900 billion and \$1 trillion in terms of nominal GDP and purchasing power parity, respectively, as of 2017. Furthermore, Nigeria is Africa's largest producer and holds the second-highest level of oil reserves on the continent, after Libya [35], and is 13th in the world in terms of oil production.

To this end, the main aim of this study was to investigate the effect of the board's educational and gender diversity on the firms' performance in Nigeria. After the preceding research period, many developments occurred in the Nigerian capital market. For instance, new corporate governance legislation was revised in 2016 and 2018. Despite many corporate governance reforms in Nigeria, the appointment of women to the corporate boardroom remains voluntary, so the board is not compelled to consider female gender representation as worthwhile. The voluntary nature of implementing the Nigerian corporate governance code makes an empirical study worth conducting.

Another motivation for this study was that gender diversity studies in Nigeria concentrate majorly in the financial sector. For example, Akpan and Amran [36] and Ujunwa, Nwakoby, and Ugbam [37] studied all the companies in the Nigerian stock market. Similarly, recent studies by Adesanmi et al. [38] studied deposit money banks, while Garba and Abubakar [39] conducted their study on Nigerian insurance companies. However, it became imperative to study the non-financial sector since they are subject to different corporate governance codes and statutory requirements that may considerably affect their accounting policies, disclosure decisions, and corporate governance structures in Nigeria.

This research also focused on Nigeria since many of its historical and ethnic backgrounds discourage women from engaging in either public or private services. As a result, this study contributes to the literature on board diversity, particularly in the African continent.

## 2. Review of Related Literature and Hypotheses

Board diversification has become critical in corporate governance studies [20,21]. It is critical to have highly diversified directors from both male and female genders with diverse talents, experience, and backgrounds because the boardroom is the firm's primary strategic decisions hub, where governance is implemented and risk is managed [2]. Additionally, many countries around the globe have lately implemented some form of necessary action toward board diversity [31,40]. Examples of this are Jordan and Malaysia (in 2012), Italy, Belgium, and Egypt (in 2016). However, according to Wellalage and Locke [2], despite growing awareness, companies in many countries, including industrialized nations, still have boards that are gender biased. In developing countries, particularly those in Sub-Saharan Africa such as Nigeria, men continue to predominate in decision-making at both the domestic and organizational levels [13].

### 2.1. Theoretical Background

The impact of board diversity on the company's performance has been well discussed in several interdisciplinary theories [2,11,26]. According to agency theory, firms with sound governance practices perform better than their counterparts because it requires intense supervision of managers' individualistic behaviour [41,42]. Based on this theory, board diversity reduces the agency problem as it improves board diversity. Although this theory is the dominating theoretical paradigm [43], it has been criticized since it does not make a simple forecast about the association between business value and boardroom demographic diversity. In fact, it has been reported that no single theory predicts the nature of the relationship between corporate board diversity and company performance [24,44]. For this issue, most of the research has applied multiple theories. Therefore, following the well-established literature [45], this study utilized a multiple-theoretical framework of agency argument complemented with other theoretical lenses (i.e., resource dependence theory) to explain board diversity effects, as they have been the primary foundation for the board of directors analysis till now [8]. In view of agency theory, the diversity of the board, which is part of its composition, has great benefits by being sensitive to ethical issues, bringing fresh perspectives on complex issues, behaving less opportunistically [45,46], and exerting superior monitoring skills and also increasing manager accountability [7].

Furthermore, the diversity of the boardroom is embedded in resource dependency theory. Based on this theoretical lens, organizations attempt to exert regulations over their environment by choosing the resources desired to survive [47]. The boardroom is, therefore, reflected as a link between the company and the critical resources that a firm needs from the external setting for superior performance. Thus, members with diverse skills, dissimilar cultural backgrounds, and different genders, among others, will perform as a strategic resource to the company, which may result in higher performance. Several studies have supported this theory, as it enhances the organization's connections with its stakeholders, such as customers and suppliers, and it may improve its reputation and value [2].

## 2.2. The Effect of Gender Diversity on Firm Performance

Gender has been defined as the percentage of females to males on the corporation board. However, one boardroom attribute that has attracted growing attention in the last decade is the gender diversity on the board [8,48]. This interest stems from the development of regulations worldwide advocating that female board participation be increased. Yet, despite the dramatic increase in the number of women pursuing managerial careers, women's representation on the board of directors is generally low, including in developed economies [2,27]. The debate on gender diversity on corporate boards is generally focused on the efficiency of the board's policy-setting role, which is significantly enhanced by the diversity of the boardroom [11,32]. This indicates that research has failed to provide a compelling argument for the inclusion of women on the firm board of directors.

Previous empirical studies on the influence of board diversity on company performance were inconsistent [49,50]. On the one hand, some studies reported the nexus of gender diversity and firm performance to be positive [9,20,21,24,25,27,40,51–53]. Several explanations have been suggested in the literature for these findings. Gender diversity provides for the representation of different stakeholders for equity and fairness [37]; the presence of women on boards improves governance quality [20,40] by helping the board to effectively fulfil its fiduciary obligations in accordance with owners' interests [7,25]. Erhardt et al. [23] argued that people of similar gender and ethnicity might be less critical of each other's ideas.

On the other hand, other studies reported negative and mixed results [2,7,16,17,28,29,31,33,34,37,48,50]. Great gender diversity may result in more conflicts, and thus decision-making may be more difficult and less effective [29]. Another possibility is that a larger number of women may result in over-monitoring. Further, women who are appointed to the board of directors might not be as competent as their male counterparts, but they are chosen because of family ties or a connection to the company [37]. This might be due to the policy pressure, where firms are encouraged to have more independent women directors [33]. Even more, others find no relationship at all [8,26,30,32,43,54–56]. One possible explanation for this can be that women may not feel comfortable on homogeneously male-dominated boards and have difficulties being heard and listened to on an equal basis with other board members; their contributions may not, therefore, be as exploited as they could be, given broader representation [54]. Hence, the role of women in the boardroom is underexplored. However, there is a strong appeal in the literature for researchers to address many of the uncertainties surrounding the effects of female directors on corporate boards. In response to this request, this study proposed an empirical test that examined the impact of women's presence, a critical mass of women's participation on the boards, on business performance. Based on the theoretical view and the above literature, it can be hypothesized that:

**Hypothesis 1.** *Gender diversity of the board is positively associated with the financial performance of firms.*

## 2.3. The Effect of Education Diversity on Firm Performance

Board diversity needs a balanced board composition made of directors from different professional fields [25]. Educational diverse boards are necessary where the boards have made conventional promises. Boards of directors want to improve company performance; thus, the capacity of board members should be one of the leading factors being considered.

There is limited literature on the impact of educational diversity on corporate performance [8]. However, the results of previous research are still controversial. On the one hand, the presence of educated directors on the board should enhance the extent of firm performance [9,25]. In addition, Aripin et al. [33] maintained that the knowledge and skills that one obtains from universities are very helpful in molding an individual to become an effective leader. Wellalage and Locke [2] argued that educational diversity may bring different perspectives to the boardroom. The detrimental impact of educational diversity implies that the individual desires among various educational groupings may lead to

conflicts [2]. In addition, Fernández-Temprano and Tejerina-Gaite [8] contended that educational variety among directors might result in a fragmented working environment with social barriers between groups with various backgrounds. Based on the above argument, the current study expects that more education diversity among directors in the Nigerian firms' boardroom will positively and significantly affect their financial performance. Thus:

**Hypothesis 2.** *Board education diversity is positively associated with the financial performance of firms.*

### 3. Research Methodology

#### 3.1. Data and Sample Selection

This study utilized a secondary source of data from the companies quoted in the Nigerian stock market to examine the financial reports of 67 non-financial companies over an 8-year period (2012 to 2019). The data extracted for eight years generated 536 firm-year observations. The data for independent, dependent, and control variables were all extracted from annual reports and stock exchange fact books, consistent with previous research such as Ntim [6]. The sample of 67 firms arrived after deducting 16 companies that did not provide financial reports as of 31 December 2019 and 39 firms without complete required data for this study from the total of 122 non-financial firms listed as of 31 December 2019. These firms were excluded from the sample due to the unavailability of the annual reports. Given that this information was not readily available from the published annual reports, these missing values could not be obtained feasibly from other sources. The exclusion of these firms from the sample is unlikely to affect the conclusions of this study on the basis that the remaining firm-year observations were still sufficient to construct a large sample. In addition, the non-financial firms used for this study were extracted from the following sectors of the Nigerian economy: Agricultural Goods, Conglomerate, Construction/Real Estate, Consumer Goods, Healthcare, ICT, Industrial Goods, Natural Resources, Oil and Gas, and Services as shown in Table 1 below:

**Table 1.** Samples Selection (Firms-year Observations).

Sector	No. Company	Freq. (Obs.)	Percent
Agricultural Goods	3	24	4.478
Conglomerate	5	40	7.463
Construction Industries	2	16	2.985
Consumer Goods	18	144	26.866
Healthcare	7	56	10.448
IT	2	16	2.985
Industrial-Goods	13	104	19.403
Natural Resources	2	16	2.985
Oil And Gas	7	56	10.448
Services	8	64	11.940
Total	67	536	100

Source: Nigerian Stock Exchange fact book 2019.

#### 3.2. Research Variables

This study measured firm performance using Tobin's Q, return on equity (ROE), and return of assets (ROA) as the dependent variable. According to Demsetz and Villalonga [57], Tobin's Q focuses on expectations of future performance, unlike ROE, which is centered on events that have already happened and thus presents a historical performance. Another reason why this research chose Tobin's Q is that it is less sensitive to management's choice of asset valuation principles compared to other accounting measures such as ROE [27].

Notwithstanding, ROE and ROA were also used in this research as an indicator of the management efficiency of utilizing firms' assets. Gender diversity and education were used as predictor variables, whereas some sets of variables that have been shown to have an impact in prior research, i.e., firm size, age, leverage, liquidity, and board size, were used as control variables to avoid biased results. Table 2 below depicts the measurement of the variables.



These variables were selected given their effects on the performance of firms operating in Nigerian market. Firm size was measured by the log of total assets. Past studies suggested a significant association between firm performance and size [58,59]. Firm age was also included in this study and was measured by the number of years of the firm since its establishment. It has commonly been reported that experienced firms are better equipped to strategize, which results in better performance. This argument was supported in many studies [29,58,60]. Financial leverage enhances the performance of corporates because it puts more pressure on executives to make value-maximizing decisions to keep their jobs, salaries, and perquisites. Researchers suggested that debt financing positively impacts firm performance [61,62]. In addition, board size was also included in the models to control the monitoring quality differences between firms. Board size is the most significant characteristic that has been evidenced to influence the effectiveness of the boards. The vast majority of prior evidence supports the notion that large-sized boards are related to greater firm performance [49,63]. Liquidity is measured by the current ratio of firms [64]. Due to its importance, Al-ahdal and Hashim [65] argued that it is crucial to be included in governance-performance studies. To control for the industry effect and year effect, dummy variables for industries and years were also included in the models.

**Table 2.** Operational definition of variable measurement.

Variables	Definition	References
	Dependent variable (financial performance)	
Tobin's Q	Ratio of total market value of the firm to total asset value of the firm.	[19,27,66]
ROE	Ratio of net income divided by shareholders' equity.	[67,68]
ROA	Ratio of net income divided by total assets.	[68,69]
	Independent variable (board diversity)	
Gender diversity (GD)	The proportion of female directors in the boardroom.	[27,70,71]
Education diversity (ED)	The proportion of directors on the board with the minimum of a bachelor's degree.	[33,72]
	Control variable	
Firm size (SIZE)	The natural logarithm of total assets.	[68]
Firm age (AGE)	The number of years of the firm since its establishment.	[68]
Leverage (LEV)	Ratio of total debts of the firm to total assets of the firm.	[44,50,66,73]
Liquidity (LIQ)	Measured on the basis of the current ratio, i.e., ratio of current assets to current liabilities.	[74]
Board size (BS)	Total number of directors on the board of the company.	[66]

### 3.3. Econometric Model

This study advocates that the panel data approach is appropriate to examine gender and education diversity as determinants of board diversity because it provides more informative data, more variability, less collinearity among the variables, more degrees of freedom, and more efficiency, and it accounts for more observable firm-level heterogeneity in individual-specific variables [75]. Panel data are better able to identify and measure effects that are simply not detectable in pure cross-section or pure time-series data. In this study, a pairwise correlation matrix as well as variance inflation factor (VIF) were examined in this research in testing for multicollinearity. Hausman tests were selected to choose among fixed and random effects models. The study specifically modeled the effect of gender and education diversity on the financial performance of Nigerian non-financial firms as follows:

$$\text{Firm performance}_{it} = \alpha_0 + \alpha_1 \text{Gender diversity}_{it} + \alpha_2 \text{Education diversity}_{it} + \sum_{i=2}^n \alpha_i \text{Controls}_{it} + \varepsilon_{it} \quad (1)$$

where firm performance is measured by ROA, ROE, and Tobin's Q for firm  $i$  at time  $t$  and are the dependent variables used as a firm performance proxy. The term  $\alpha_0$  is constant; gender and education diversity are independent variables. The control variables are firm size (SIZE), firm age (AGE), leverage (LEV), board size (BS), and liquidity (LIQ). The controls will help reduce any potential omitted variable bias. The last term  $\varepsilon_{it}$  is the model error for firm  $i$  at time  $t$ .

## 4. Results and Discussion

### 4.1. Descriptive Statistics Result

This study employed descriptive statistics to summarize, to report the behavior of the main variables of the listed Nigerian companies, and to permit the measurement of central tendency and dispersion. In Table 3, the mean Tobin's Q is 1.191 with a standard deviation of 7.716 (which implies a wide dispersion of Tobin's Q from both sides of the mean value) and a range of 0.28 to 81.74. Similarly, the average Return on Equity (ROE) is 0.737 with a standard deviation of 0.779 and a range of  $-2$  to 2.11. The table shows that the average board gender diversity is 0.113 with a standard deviation of 0.1465 and a range of 0 to 0.666. The average education diversity is 0.331, with a standard deviation of 0.263 and a range of 0 to 1. The table also indicates that the average board size (BS) of the sample firms is 9, while the minimum and maximum members of the boards are 4 and 19 members, respectively. The average leverage (LEV) ratio of total debts of the sampled firms to total assets is 0.234, while the minimum is 0 and the maximum is 8.12, similar to firms operating in India [74]. The average value of firm size and firm age are 7.251 and 13.285, respectively. Last but not least, the mean liquidity is 3.26, and the standard deviations (4.998) reflect the variation of firm liquidity in the listed Nigerian stock market firms.

**Table 3.** Descriptive statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Tobin's Q	536	1.191	7.716	0.28	81.74
ROA	536	0.737	1.11	$-2.12$	43.81
ROE	536	0.674	0.779	$-2$	2.11
GD	536	0.113	0.1465	0	0.666
ED	536	0.331	0.263	0	1
SIZE	536	7.251	1.999	4	19
AGE	536	13.285	1.71	9.28	18.067
LIQ	536	3.26	4.998	0.12	8.29
BS	536	9	2.532	4	19
Leverage	536	0.234	0.701	0	8.12

Source: Author calculation, based on data (2012–2019).

### 4.2. Testing for Multicollinearity

A pairwise correlation matrix was examined in this research in testing for multicollinearity. According to Hair et al. [76], the correlation between any pair of variables should not be greater than 0.80. Therefore, before undertaking the regression analysis, the correlations were computed among the model variables to explain the association between the dependent and independent variables, whether negative or positive. Table 4 below displays the results of the Pairwise correlation that comprised the effect of gender, education, firm size, age, board size, leverage, and liquidity on firms' performance. An array of the above matrix showing the correlations suggested a low correlation between almost all variables. Therefore, no special attention was needed when including the variables in the model since the highest correlation was 0.0489 between leverage and age, which is below the threshold. It should be noted that the high correlation between performance attributes did not affect the research result since they were tested in separate regression models.

**Table 4.** Correlation matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Tobin's Q	1.00									
(2) ROE	0.025	1.00								
(3) ROA	0.113	0.735	1.00							
(4) GD	−0.021	−0.016	0.086	1.00						
(5) ED	0.165	0.277	−0.150	−0.038	1.00					
(6) SIZE	0.069	0.206	0.221	0.082	−0.174	1.00				
(7) AGE	0.297	0.222	0.226	0.228	−0.016	0.406	1.00			
(8) BS	0.019	0.165	0.241	−0.245	0.1428	0.226	0.141	1.00		
(9) LEV	−0.005	−0.069	−0.100	0.003	0.087	0.258	0.489	−0.0660	1.00	
(10) LIQ	0.027	0.049	0.220	−0.058	−0.077	−0.051	−0.257	0.419	−0.333	1.00
VIF	-	-	-	1.072	1.233	1.682	1.092	2.259	1.526	3.423
Tolerance	-	-	-	0.933	0.811	0.594	0.916	0.121	0.655	0.119

Source: Author calculation, based on data (2012–2019).

The study employed the variance inflation factor (VIF) to check whether our model was suffering from a multicollinearity problem or not. The average VIF tends to be 1.675, which is less than the threshold limit, and all VIF values are less than 3.5. Here, the researcher predicted the absence of multicollinearity problems in the regression model.

#### 4.3. Regression Results and Discussion

This section reveals the analysis results and discussion part of this research. Table 5 below shows the fixed effect estimation results of all the independent and control variables and their impact on the firm's performance (Tobin's Q, ROA, and ROE). The essence of the three regression models is to show consistency in the statistical results or outcome. Following Khan and Zahid [77], this study also adopted an incremental methodology to ascertain the relationship between board diversity and firm performance. After applying the Hausman test (significant at 1%), the fixed-effect estimation was selected.

**Table 5.** The panel fixed-effects regression results.

Variables	Tobin's Q	Tobin's Q	ROE	ROE	ROA	ROA
GD		0.353 ** (0.802)		26.383 ** (2.264)		12.752 *** (2.33)
ED		0.635 ** (1.21)		17.214 ** (1.239)		19.358 *** (2.965)
BS	−0.017 * (−0.527)	−0.014 (−0.455)	−0.871 ** (−1.04)	−0.752 ** (−0.901)	−0.018 ** (−0.201)	−0.032 ** (−0.08)
SIZE	0.203 ** (1.991)	0.184 * (1.77)	6.385 ** (2.345)	7.134 ** (2.595)	6.532 *** (5.02)	6.727 *** (5.209)
AGE	−0.010 * (−0.565)	−0.047 (−0.063)	−0.136 ** (−0.419)	−0.065 * (−0.376)	−0.353 ** (−0.802)	−0.719 *** (−0.671)
LEV	−0.137 * (−0.394)	−0.075 (−0.213)	−4.144 *** (−4.77)	−3.513 *** (−4.696)	−2.053 *** (−2.725)	−1.41 *** (−2.851)
LIQ	0.002 ** (0.207)	0.004 *** (0.449)	0.514 ** (2.346)	0.592 * (2.631)	0.602 ** (5.744)	0.686 ** (6.493)
Constant	4.067 *** (2.961)	3.789 *** (2.707)	66.259 * (1.803)	72.598 * (1.956)	82.712 *** (4.709)	82.588 *** (4.737)
Sector	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
F-statistic	11.22 ***	10.19 **	10.17 ***	7.90 **	21.59 ***	17.44 ***
R-squared	0.218	0.287	0.236	0.357	0.251	0.342
Obs.	536	536	536	536	536	536
Hausman test		13.5769 ***		9.2834 ***		11.6336 ***

Note: \*\*\* Significant at  $p < 0.01$ , \*\* significant at  $p < 0.05$ , \* significant at  $p < 0.10$ ; t-values are in parentheses. The last row in the table reports results of the Hausman test for model specification/validity.

The use of these three alternative measures of firm performance indicates the consistency and stability of the results. Our results provide evidence relating to the relationship between gender diversity and firm performance. The empirical results show that having



women on Nigerian non-financial institutions' corporate boards has a significant positive relationship with their financial performance using Tobin's Q, ROE, and ROA as a measure of financial performance. This means an increase in gender mix may lead to an increase in firm performance. It can be deduced that the presence of women in the boardroom can influence decision-making, which in turn influences the firm performance, especially when they are given the opportunity to work with their male counterparts. This finding is consistent with previous empirical studies [9,27,40], which found a positive association between board gender diversity and performance. In addition, Garba and Abubakar [39] from Nigeria found a similar result of the positive relationship between gender diversity and Nigerian insurance companies' performance. Theoretically, it does support the agency theory that women on boards are argued to be more risk-averse than men [78]. Therefore, based on the empirical and theoretical evidence mentioned above, the hypothesis of this study (H1) was accepted, which proposes that board gender diversity has a positive influence on firms' financial performance.

In a similar vein, the analysis revealed that education diversity also has a positive significant (at a 5% level of significance for Tobin's Q and ROE, and at a 1% level of significance for ROA) influence on firm financial performance. This finding implies that the existence of directors with degrees and diverse knowledge on the board increases its performance. This result is consistent with the majority view of the previous empirical studies that support the notion that the director's knowledge is related to greater firm performance [43,49,54,55,63,79,80]. Thus, based on the above empirical evidence, Hypothesis (H2) was accepted, which proposes that board education diversity is positively associated with firms' financial performance. In addition, these results are consistent with agency and resource theoretical dependence expectations, where board members with diverse skills, dissimilar cultural backgrounds, and different genders, among others, will perform as a strategic resource to the company, which may result in higher performance.

The empirical results for the control variables indicate that firm size and liquidity level significantly positively influence the firm's performance. This implies that these factors are conclusive drivers of non-financial firms' performance in Nigeria. Firm age and leverage significantly negatively affect firm performance measured by ROA and ROE, consistent with the findings of Ehikioya [58] and Al-ahdal and Hashim [65]. Similarly, board size was found to have a negative effect on firm performance, but the effect was significant only in the ROE model. Some studies found that smaller boards work better in increasing firm performance than larger boards [81,82].

Overall, the results indicate that both gender and education diversity have a strong incentive to influence more financial performance of Nigerian firms. This finding raises an important board diversity issue from developing countries' perspectives, especially gender and education diversity. Maybe emphasis should be placed on the female directors and directors' educational background issues and business environment and their roles in the corporate governance framework. The results also highlight the importance of other factors such as board size, firm age, firm size, liquidity, and leverage, which are major predictors of firm performance in Nigeria.

#### 4.4. Robustness Checks

In the previous section, various alternative measures were used for firm performance, and the fixed-effect technique was applied to estimate the research models. As shown in Table 6, we re-estimated the model by using a two-step system generalized method of moments (GMM) estimator. This process was used to examine the sensitivity of the results in the baseline models (fixed effect results). The two-step system GMM is a superior estimator in the presence of random walk [83]. To verify the direction of causality and control the endogeneity bias, the lagged value of the independent variable was included, and the model accounted for the heteroscedasticity problem [84,85].

**Table 6.** The GMM estimation results.

Variables	(1)	(2)	(3)
	Tobin's Q	ROE	ROA
Lag Tobin's Q	(16.058) 0.248 ***		
Lag ROE		(12.265) 0.65 ***	
Lag ROA			(10.014) 0.418 ***
GD	(1.172) 0.222 **	(1.73) 12.78 *	(0.254) 0.715 *
ED	(11.424) 2.385 **	(2.619) 21.334 **	(4.466) 14.945 ***
BS	(−0.207) −0.003	(−3.41) −1.763 ***	(−0.634) −0.151 *
SIZE	(0.97) 0.037	(4.919) 5.867 ***	(4.603) 1.739 ***
AGE	(−0.153) −0.001	(−1.785) −0.415 *	(−2.988) −0.205 ***
LEV	(0.991) 0.372	(−4.201) −41.029 ***	(−1.866) −6.936 *
LIQ	(3.207) 0.029 ***	(.027) 0.005	(3.842) 0.273 *
Constant	(0.486) 0.215 **	(5.175) 48.445 ***	(4.359) 17.09 ***
F-statistic	21.37 ***	47.67 ***	49.59 ***
AR (1); <i>p</i> -value	0.036	0.000	0.041
AR (2); <i>p</i> -value	0.684	0.452	0.733
Sargan test; <i>p</i> -value	0.283	0.451	0.163
Hansen test; <i>p</i> -value	0.315	0.287	0.408
Sector	Yes	Yes	Yes
Year	Yes	Yes	Yes
Observations	536	536	536
No. of Instruments	12	14	12

Note: \*\*\* Significant at  $p < 0.01$ , \*\* significant at  $p < 0.05$ , \* significant at  $p < 0.10$ ; t-values are in parentheses. For AR (2): Represents the Arellano-Bond test, whose null hypothesis is that there is no second-order autocorrelation in the first difference. For the Sargan test: when *p*-values are closer to 1, this indicates that the instrumental variables are valid.

GMM is a common approach used to deal with endogeneity and uses the instrumental variables' regression method [86]. The idea is to find an instrument that is simultaneously correlated with its corresponding endogenous variables (board diversity) and uncorrelated with firm performance. Roodman [87] suggested that, when the study period is short relative to the number of individuals, consistent and efficient coefficients can be obtained using the endogenous variables' lagged levels as instruments. Therefore, the lagged variables of the endogenous variables were used in this study as well as the ethnic diversity of the board. The higher the ethnicity of directors on the board, the more diversity of the board in terms of gender, education, etc. Ethnically diverse boards are expected to provide better monitoring because boards consisting of directors from different ethnic groups and cultural backgrounds might ask more critical questions that would not come from directors with similar attributes [2,53]. Furthermore, Amin and Nor [28] found that ethnic diversity has no impact on firm performance, indicating that multi-racial citizens of Malaysia have long been together and blended in many aspects that encourage a similar way of thought and, thus, a lack of creativity to gain abnormal return for the firm. Hence, ethnic diversity is utilized as an instrumental variable as well as the lagged levels of the endogenous variables. Board ethnic diversity is measured by a value of '1' if there is more than one ethnic group present as the firm's directors or '0' otherwise.

In addition, the Hansen and Sargan tests for the instrument's validity and first and second-order serial correlation tests were conducted for each projected coefficient. The null hypothesis accepted for the Hansen and Sargan tests implies that instruments are valid, instruments do not have a correlation between them, and the error term is also different for all models. These tests help analyze whether the instrument variable is over-recognized, and they confirm that the instrumental variables are unrelated to the error term. Additionally, a high *p*-value of AR (1) and AR (2), which are GMM reliability specification tests for the identification of serial correlations that are applicable after estimating a dynamic model from panel data by the generalized method of moments (GMM), presents that the disturbances are not serially correlated in the models.

The regression results show that the null hypothesis for AR (1) was rejected because of the presence of first-order autocorrelation, and the null hypothesis for AR (2) was not rejected because of the absence of second-order correlation. The Sargan test and Hansen

test of over-identification of restrictions were not statistically significant, which implies the validity of the choice instruments. The validity of the choice instruments was further validated by the number of instruments, which were 12, 14, and 12. In addition, the coefficients of the lagged values of performance were close to unitary across the three models, which is consistent with Roodman's [88] recommendation that the estimated coefficient of the lagged dependent variables should point towards convergence by having a value less than one (absolute). This is also consistent with the steady-state assumption for instrument validity and firm performance studies that a company's previous performance influences the current performance [83].

The estimated models show that each variable, its coefficient, and its significant level did not change greatly from the baseline models. Therefore, the results remain unchanged after performing various robustness checks. Furthermore, the robustness analyses suggested that the results were stable and consistent with the main findings.

## 5. Conclusions

Recently, gender and educational level diversity are among the most imperative issues on policymakers' agendas that have enticed growing research interests. For instance, Spain has promulgated in its listing requirement that the gender proportion for female directors shall be 40% since 2015 [89]. Nonetheless, as many empirical investigations on board diversity concentrate on developed nations, their findings cannot be generalized to other developing nations due to disparity in their economic viability, legal effectiveness, and governance apparatuses bedeviling corporate board diversity among the nations. Against this background, this study empirically explored the effect of gender and education diversity on firms' performance. Using data from non-financial firms listed on the Nigerian stock exchange from 2012–2019, it was found that both gender and education diversity had a significant positive influence on the performance of the listed Nigerian firms in the presence of some important control variables. Therefore, it is concluded based on the findings of this study, which is supported by a panel data analysis, that the existence of directors with degrees and women participation in the boardroom has a positive and significant influence on the overall performance of the non-financial listed firms in Nigeria.

For policymakers, the study's results support a rising number of regulations calling for corporate board diversifications. Beyond the ethical and moral arguments motivating such regulations, the study's findings add economic arguments to this type of legislation. Therefore, it is recommended that a diverse board in terms of gender and educational level should be encouraged in the firms for better performance, which invariably boosts all shareholders' confidence and enhances their market value. In addition, the findings would greatly benefit management in the directors' selection process, as they revealed the importance of gender and education diversity. Hence, it is imperative that Nigerian firms access a pool of suitably qualified female nominees to fill boardroom positions so that progress in firm performance is defensible. In the same vein, governments should initiate policies that enhance women's participation in the workforce to change traditional views of the people, so that they can perform their roles on the corporate boards' diligently.

This study suffered some limitations, in which the secondary data were extracted manually from annual reports; primary data could provide further explanation on the governance practice in developing markets. In addition, it covered only the non-financial firms listed on the Nigerian stock exchange. Moreover, many board variables are missing, and the study did not differentiate boards with a single female director from those with more than one. Therefore, future research may consider exploring variables such as female directors' qualifications and experiences besides incorporating financial sector firms into the sample. In addition, the study did not consider the board independence, meetings, and audit committee attributes, which may have an important impact on the performance. In addition, this study considered a sample of all non-financial sectors, which may not be applicable to financial institutions. Further research may consider the financial sector or other enterprises. Finally, although the study controlled the year effect in the estimated

model, it did not consider the new regulation enforcement in Nigeria, which might need a few years to demonstrate favorable or desired consequences. Therefore, further studies could evaluate the pre- and post-new regulations.

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