



IMPACT OF BOARD CHARACTERISTICS ON RISK MANAGEMENT OF LISTED INDUSTRIAL GOODS COMPANIES IN NIGERIA

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Abstract

This study investigates the impact of board characteristics on risk management in listed industrial goods companies in Nigeria from 2020–2024, a period shaped, by inflation, and exchange rate volatility. The study employed panel data from seven firms, yielding 35 firm-year observations. Board characteristics examined include size, independence, gender diversity, financial expertise, and meeting frequency, while firm risk management was measured using leverage and earnings volatility. Data were analysed using descriptive statistics, correlation analysis, and panel regression models, the findings reveal that board independence enhances leverage, whereas gender diversity and financial expertise are associated with more conservative debt policies. Frequent board meetings reduce leverage but correspond with higher earnings volatility, suggesting a trade-off between oversight and operational stability. Firm size is negatively related to leverage but increases volatility, while firm age enhances stability. The results highlight the importance of board composition over numerical size. The study recommends strengthening independence, gender diversity, and financial expertise to improve governance and financial resilience in Nigeria's industrial goods sector.

Keywords: board characteristics, risk management, earning volatility, listed industrial goods companies

1. Introduction

Risk management is essential to business performance, as a company's success strongly depends on the board's approach to managing risks. This study examines the impact of board characteristics on risk management in the non-financial sector, with a focus on listed industrial goods companies in Nigeria. In the normal way of making business decisions, firms that belong to non-financial sector confront with numerous risks, particularly financial risks such as fluctuations in foreign exchange rates, interest rates and commodity prices (Phua et al., 2021).

Corporate governance mechanisms, particularly board characteristics, have become a central focus in understanding how firms manage risks in dynamic business environments. In Nigeria's industrial goods sector, listed companies operate in a high-risk environment characterized by fluctuating exchange rates, policy uncertainty, and market volatility (Owolabi et al., 2019). The board of directors, as the apex decision-making body,

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plays a critical role in shaping the risk appetite, oversight processes, and implementation of risk management strategies (Beasley et al., 2005).

Board characteristics such as board size, independence, gender diversity, financial expertise, and meeting frequency are considered key drivers of effective risk oversight (Pathan, 2009; Nwude et al., 2018). Risk management in this study is operationalized through two key financial indicators: leverage, capturing the firm's debt exposure, and earnings volatility, representing fluctuations in profitability due to market and operational shocks (Razak et al., 2019; Minton et al., 2014). Earnings volatility replaces an inherent business risk that can come from the firm's operations as well as the result of market shocks (Ghasemzadeh et al., 2021). Focusing on the 2020–2024 period—marked by the COVID-19 pandemic, supply chain disruptions, and inflationary pressures—this study provides timely insights into how board structures have influenced the resilience and adaptability of Nigerian industrial goods companies.

Previous research has used financial proxies such as leverage and earnings volatility to assess firms' exposure to financial and operational risks (Razak et al., 2019; Uwuigbe et al., 2017). However, empirical evidence on how these board attributes influence risk management in Nigeria's industrial goods sector remains limited. This study fills this gap by examining the relationship between board characteristics and risk management of listed industrial goods companies in Nigeria using leverage and earning volatility. This study measures risk management mainly through quantitative indicators, without considering qualitative aspects such as risk appetite statements, board risk culture, or oversight practices. Future studies could combine quantitative measures with content analysis of reports and interviews to provide a more complete view of risk management.

The main objective of this paper is to examine the impact of the board attributes on risk management of listed industrial sector in Nigeria. The specific objectives are to:

- (i) To assess the effect of board size on risk management of listed industrial goods companies in Nigeria;
- (ii) To determine the effect of board independence on risk management; of listed industrial goods companies in Nigeria;
- (iii) To examine the effect of board gender on risk management of listed industrial goods companies in Nigeria;
- (iv) To assess the effect of board financial expertise on risk management of listed industrial goods companies in Nigeria;
- (v) To examine the effect of board meetings on risk management of listed industrial goods companies in Nigeria;

2. Literature Review and Hypotheses Development

Board size

Board size influences decision-making efficiency and diversity of perspectives in risk oversight (Coles, et al., 2008). Larger boards may enhance monitoring but risk coordination challenges. In Nigeria's industrial goods companies, board size varies widely. Large boards, such as those of Dangote Cement Plc, tend to bring together diverse expertise in finance, engineering, operations, and legal matters, which can strengthen oversight of complex, capital-intensive projects (Coles et al 2008). Relatively Small boards are deemed to be more effective in monitoring because of reduced coordination costs and less free riding (Jenter et al.,2019).

Boards characterized by a larger size are assumed to have variation in skills, backgrounds, and expertise, contributing to relatively significant levels of performance (Abubakar et al., 2018). However, excessively large boards may face decision-making delays, especially in fast-moving risk situations like currency devaluation. In line with this literature this hypothesis is developed.

H₀₁: Board size does not significantly influence risk management of listed industrial goods companies in Nigeria

Board Independence

The Nigerian Code of Corporate Governance (NCCG, 2018) mandates that a significant proportion of board members be independent to reduce undue influence from major shareholders. Board independence has been linked to stronger monitoring and reduced risk exposure (Erkens et al., 2012). Although excessive independence may limit strategic flexibility.

Board independence is achieved when the quantity of independent non-executive directors is unrelated to the top executives or management of the firm (Mallinet al., 2015) based on this, the study developed this hypothesis to test the genuine of the relationship.

H₀₂: Board independence does not significantly influence risk management of listed industrial goods companies in Nigeria

Board Gender Diversity

Board gender diversity improves risk assessment through varied experiences and perspectives (Adams et al., 2009; Uwuigbe et al., 2017). While female representation on boards of Nigerian industrial goods companies is improving, it remains relatively low. Firms like Cutix Plc have integrated female directors into key committees, reflecting growing recognition of research that links gender diversity to improved risk assessment and stakeholder engagement (Adams et al., 2009; Uwuigbe et al., 2017).

H₀₃: Board gender diversity does not significantly influence risk management of listed industrial goods companies in Nigeria

Board Financial Expertise

Given the sector's capital-intensive nature, financial expertise is particularly crucial. Directors with accounting or banking experience can better evaluate funding options, hedge against interest rate fluctuations, and oversee complex supply chain financing arrangements (Minton et al., 2014).

Board financial expertise enhances the ability to interpret complex risk-related information, improving risk management effectiveness (Minton et al., 2014). Educational qualifications is a pillar of intelligence; this imply that more intelligent managers would outperform better than their counterparts. The expertise of directors in areas such as accounting, finance, consulting, and law immensely contributes to management in decision-making (Sarwar et al., 2018). Therefore, this study developed the hypothesis as thus:

H₀₄: Board financial expertise does not significantly influence risk management of listed industrial goods companies in Nigeria

Board Meeting Frequency

Board meeting frequency is an indicator of board diligence, allowing timely responses to emerging risks (Ntim et al., 2013; Ogbechie, 2012). Frequent board meetings are essential in Nigeria's industrial goods sector due to the unpredictability of regulatory

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changes and cost inputs. For instance, during the 2022 energy cost surge, some boards convened emergency meetings to approve alternative energy sourcing and renegotiate supply contracts (Ogbechie, 2012).

H₀₅: Board meeting frequency does not significantly influence risk management of listed industrial goods companies in Nigeria

Theoretical Framework

Agency Theory

Agency theory posits that conflicts arise between managers (agents) and shareholders (principals) due to divergent interests, which often result in agency costs (Jensen et al. 1976). An effective board plays a crucial role in reducing these conflicts by monitoring managerial actions and ensuring that decisions, particularly those related to risk management, align with shareholder interests. In this regard, board independence and financial expertise are especially important, as independent and knowledgeable directors are more likely to exercise unbiased oversight over risk related policies and practices (Fama et al. 1983). Within the industrial goods sector in Nigeria where weak governance mechanisms and limited literature on risk management persist the composition and quality of boards become vital in safeguarding firm value and promoting effective risk mitigation.

Resource Dependence Theory

Resource dependence theory posits that boards supply essential resources including expertise, external networks, and strategic guidance that strengthen organizational performance (Pfeffer et al., 1978). In line with this view, larger and more diverse boards are better positioned to identify potential threats and implement effective risk mitigation strategies. Recent studies also emphasize that board independence, diversity, and financial expertise enhance firms' capability to manage complex risks and improve governance outcomes (Hillman et al., 2003; Kor et al., 2008; Al-Matari, 2020). Thus, examining board characteristics provides critical insights into how firms in the industrial goods sector adopt effective risk management practices.

3. Methodology

Research Design

The study was conducted using an ex post facto research design. The study adopted a quantitative research design using panel data techniques to examine the impact of board characteristics on risk management of listed industrial goods companies in Nigeria. The analysis covered the period 2020–2024, focusing on firm-level governance and financial data. A causal research approach was employed to establish the relationship between independent variables (board characteristics) and dependent variables (risk management indicators).

Population and Sample of the Study

The population consisted of all thirteen (13) industrial goods companies listed on the Nigerian Exchange Group (NGX). A purposive sampling technique was applied to select only firms with complete financial statements for the study period. This yielded a final sample of seven (7) firms, resulting in 35 firm-year observations.

Sources of Data Collection

Secondary data were extracted from the annual reports and accounts of the sampled companies, as well as from the Nigerian Exchange Group database. Data on board size,

independence, gender diversity, financial expertise, board meetings, firm size, and firm age were compiled alongside financial measures of risk management.

Data Analysis Techniques

The data for this study were analyzed using both descriptive and inferential statistical techniques. Descriptive statistics such as mean, standard deviation, minimum, and maximum values were employed to summarize the characteristics of the variables and provide insight into their distribution. To examine the degree of association among the variables, a correlation matrix was constructed, which also helped in detecting potential multicollinearity issues.

In order to test the hypotheses, panel regression analysis was conducted using both the fixed effects model (FEM) and the random effects model (REM). The Hausman specification test was applied to determine the most appropriate model between FEM and REM. Furthermore, diagnostic tests for heteroskedasticity, autocorrelation, and multicollinearity were carried out to ensure the reliability and robustness of the results. All data analyses were performed using Stata 14, which is well-suited for handling panel data and provides efficient estimations for econometric analysis.

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Variable Measurement

Table 1

Variable Measurement

Variable	Nature of variable	Index	Measurement	Source
Independent (board characteristics)	Board size	BSIZE	Number of directors on the board at the end of the year	Okoye et al. (2021)
	Board independence	BIND	Percentage of independent non-executive directors to executive directors	Adegbie et al. (2022)
	Board Gender diversity	BGDIV	Percentage of female directors on the board	Adebayo et al. (2019)
	Board financial expertise	BFEXP	Percentage of directors with professional qualifications to total number directors	Salihu et al. (2020)
	Board meeting	BMEET	Number of board meetings held in a year	Nyor et al. (2021)
Dependent variable (risk management)	Leverage	LVR	Total Debt to Total Assets	Adegbie et al. (2020); Adegbie et al. (2022)
	Earning volatility	EVOL	Standard deviation of ROA over 2020–2024	Nwude et al. (2020)
Control Variable	Firm Age	FAGE	The natural logarithm of the number of years since a firm's incorporation (or the number of years since its establishment).	Githaiga et al. (2022)
	Firm Size	FSIZE	Firm size serves as a proxy for a company's scale, resources, and level of public scrutiny Measurements of firm size = total assets	Hadid et al., (2022)

Source: Author's Formulation, 2026

Econometric Model

The model of the study is stated as thus:

$$RM_{it} = \beta_0 + \beta_1 BSIZE_{it} + \beta_2 BIND_{it} + \beta_3 BGD_{it} + \beta_4 BFEXP_{it} + \beta_5 BMEET_{it} + FSIZE_{it} + FAG_{it} + \varepsilon_{it} \dots \dots \dots (1);$$

The representation of risk management by leverage (LEV) and earning volatility EVOL) can be expressed as:

$$LEV_{it} = \beta_0 + \beta_1 BSIZE_{it} + \beta_2 BIND_{it} + \beta_3 BGD_{it} + \beta_4 BFEXP_{it} + \beta_5 BMEET_{it} + FSIZE_{it} + FAG_{it} + \varepsilon_{it} \dots \dots \dots (2);$$

$$EVOL_{it} = \beta_0 + \beta_1 BSIZE_{it} + \beta_2 BIND_{it} + \beta_3 BGD_{it} + \beta_4 BFEXP_{it} + \beta_5 BMEET_{it} + FSIZE_{it} + FAG_{it} + \varepsilon_{it} \dots \dots \dots (3);$$

where: RM= Risk management; BSIZE= Board size; BIND= Board independence; BGD= Board gender diversity; BFEP= Board financial expertise; BMEET= Board meeting; LEV= Leverage; EVOL= Earnings volatility; FSIZE= Firm size; FAG= Firm ages.

4. Results and Discussion

Table 2

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
LEV	35	0.1319	0.1740	0.0001	0.6570	0.0002	0.0164
EVOL	35	7.2899	12.3046	0.0141	60.8757	0.0000	0.0000
BSIZE	35	9.4000	2.9823	5	16	0.0305	0.8294
BIND	35	0.5996	0.1819	0.25	0.8889	0.1102	0.5584
BGDIV	35	0.2838	0.1815	0	0.6667	0.3283	0.4268
BFEXP	35	0.3794	0.1337	0.125	0.6	0.1486	0.7736
BMEET	35	4.6286	0.8774	4	7	0.0092	0.7675
FSIZE	35	10.6264	1.0798	9.2715	12.7156	0.0974	0.0272
FAGE	35	47.7143	11.4238	28	65	0.7940	0.661

Source: Author's Computation using STATA 14, 2026

Table 2 is about the descriptive statistics which cover 35 firm-year observations and provide insights into the nature of the sampled firms. Leverage has an average value of 0.132, with a standard deviation of 0.174, indicating that, on average, firms rely on debt for about 13% of their capital structure. The minimum value of 0.0001 suggests that some firms operate almost entirely without debt financing, while the maximum value of 0.657 shows that others have a relatively higher debt proportion.

Earnings volatility averages 7.29, with a wide dispersion reflected in the standard deviation of 12.30. The minimum of 0.0141 and maximum of 60.8757 indicate substantial variation in earnings stability, suggesting that while some firms experience very stable earnings, others face extreme fluctuations.

Board size (BSIZE) averages 9 members, with sizes ranging from 5 to 16, implying that while most boards are moderately sized, some are relatively large. Board independence (BIND) averages 0.600, meaning that around 60% of board members are independent directors, though the range from 0.25 to 0.8889 shows that independence levels vary widely among firms. Board gender diversity (BGDIV) has a mean of 0.284, indicating that women

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make up roughly 28% of board members on average; however, some boards have no female representation, while others have as much as two-thirds.

Board financial expertise (BFEXP) shows an average of 0.379, meaning around 38% of board members have financial expertise, with values ranging from 0.125 to 0.6, reflecting varying capacities for financial oversight. Board meetings (BMEET) average about 4.63 annually, with the least active boards meeting 4 times and the most active meeting 7 times a year. Regarding firm-specific characteristics, firm size (fsize), measured in the natural log of total assets, averages 10.63, indicating a predominance of medium-to-large firms in the sample. Firm age (fage) averages 48 years, ranging from 28 to 65 years, suggesting that the sample consists mostly of mature and well-established firms.

Table 2 also presents the Skewness/Kurtosis tests for normality of the study variables. The results reveal that leverage (LEV) has a probability value of 0.0006 for the joint test, which is well below the 5% significance threshold, indicating that it deviates significantly from a normal distribution. Similarly, earnings volatility (EVOL) shows a joint probability of 0.0000, suggesting strong evidence of non-normality, with both skewness and kurtosis components being highly significant. Board size (BSIZE) has a joint probability of 0.0940, which exceeds the 5% level but is close to significance, implying a mild deviation from normality mainly due to skewness.

For board independence (bind), board gender diversity (BGDIV), and board financial expertise (BFEXP), the joint probabilities (0.2087, 0.4280, and 0.3109 respectively) suggest that these variables do not significantly depart from normality. Board meetings (BMEET), however, has a joint probability of 0.0426, indicating a statistically significant deviation from normality at the 5% level, largely due to skewness.

Firm size (FSIZE) has a joint probability of 0.0325, which also points to non-normality, primarily influenced by kurtosis. In contrast, firm age (FAGE) records a probability of 0.1547, suggesting that it is normally distributed. Overall, the results indicate that several key variables — particularly leverage, earnings volatility, board meetings, and firm size — exhibit non-normality.

Table 3

Correlation Matrix

Variables	LEV	EVOL	BSIZE	BIND	BGDIV	BFEXP	BMEET	FSIZE	FAGE	VIF
LEV	1.0000									
EVOL	-0.3080	1.0000								
BSIZE	-0.3510	0.6938	1.0000							6.42
BIND	0.2378	-0.6627	-0.5573	1.0000						5.15
BGDIV	-0.1720	-0.4331	-0.3454	0.5664	1.0000					2.44
BFEXP	0.2844	-0.6840	-0.7242	0.8005	0.2559	1.0000				6.05
BMEET	-0.2645	-0.3522	-0.4249	0.1844	0.2428	0.2849	1.0000			1.95
FSIZE	-0.4552	0.7239	0.8684	-0.5139	-0.1515	-0.7364	-0.5194	1.0000		8.21
FAGE	-0.2106	-0.4762	-0.3401	0.3429	0.3047	0.3612	0.3442	-0.1618	1.0000	1.67

Source: Author's Computation using STATA 14, 2026

Table 3 is about the pairwise correlation matrix which provides insights into the relationships between the variables in the study. Starting with leverage (LEV), it shows a moderate negative correlation with earnings volatility (EVOL) at -0.3080, suggesting that firms with higher leverage tend to experience lower earnings volatility. Leverage also has a moderate negative correlation with board size (BSIZE) at -0.3510, and a stronger negative

relationship with firm size (FSIZE) at -0.4552, implying that larger firms and those with bigger boards may rely less on debt financing. Interestingly, leverage is positively but weakly correlated with board independence (BIND) at 0.2378 and with board financial expertise (BFEXP) at 0.2844.

Earnings volatility (evol) is strongly and positively associated with board size (0.6938) and firm size (0.7239), suggesting that bigger boards and larger firms tend to have more volatile earnings. However, it is strongly negatively correlated with board independence (-0.6627) and board financial expertise (-0.6840), indicating that these governance mechanisms might help reduce volatility.

Board size (bsize) is positively related to firm size (0.8684), reflecting that larger firms tend to have bigger boards. It is negatively correlated with board independence (-0.5573) and board financial expertise (-0.7242), implying that as boards get larger, the proportion of independent and financially literate members might decline. Board independence (bind) is highly and positively correlated with board financial expertise (0.8005) and board gender diversity (bgdiv) at 0.5664, suggesting that diverse and financially knowledgeable boards tend to be more independent. Board gender diversity itself shows generally weak to moderate correlations with other variables, except for its positive association with board independence and modest positive link with firm age (0.3047).

Board meetings (BMEET) has generally low correlations with most variables, the highest being a negative correlation with firm size (-0.5194), suggesting that larger firms may have fewer board meetings annually. For firm-specific attributes, firm size (FSIZE) is positively correlated with earnings volatility and board size but negatively correlated with board independence (-0.5139) and board financial expertise (-0.7364). Firm age (FAGE) shows relatively low correlations across the board, the highest being with board independence (0.3429) and board meetings (0.3442), suggesting older firms may have more independent boards and meet more frequently.

From the results, firm size (FSIZE) has the highest VIF at 8.21, which is approaching the common threshold of 10 that indicates severe multicollinearity. This suggests that firm size shares a substantial amount of variance with other predictors, particularly board size and earnings volatility as earlier seen in the correlation matrix. Board size (BSIZE) and board financial expertise (BFEXP) also show relatively high VIFs of 6.42 and 6.05 respectively, pointing to notable but not extreme multicollinearity concerns. Board independence (BIND) follows with a VIF of 5.15, further indicating moderate collinearity with other governance variables. The remaining variables — board gender diversity (BGDIV) at 2.44, board meetings (BMEET) at 1.95, and firm age (FAGE) at 1.67 — show low VIF values, suggesting minimal multicollinearity issues for these predictors.

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Table 4

Fixed Effect Model

LEV	Coef.	PCSE	Z	P > z
CONSTANT	2.5795	0.4743	5.44	0.000
BSIZE	0.0003	0.0146	0.02	0.985
BIND	0.4192	0.2415	1.74	0.083
BGDIV	-0.2576	0.1306	-1.97	0.049
BFEXP	-0.7230	0.3797	-1.90	0.057
BMEET	-0.1276	0.0318	-4.02	0.000
FSIZE	-0.1646	0.0408	-4.03	0.000
FAGE	-0.0003	0.0014	-0.23	0.817
R – squared	0.6301			
Wald chi2 (7)	73.91			
Prob > chi2	0.0000			
Hausman Test	0.0000			
Pesaran Test	0.7802			

Source: Author’s Computation using STATA 14, 2026

Table 4 shows the regression model explains a substantial proportion of the variation in risk management ($R^2 = 0.6301$), with the Wald chi-square statistic (73.91, $p < 0.001$) indicating that the model is jointly significant. Board size (BSIZE) has an extremely small and statistically insignificant coefficient (0.00027, $p = 0.985$), suggesting that the size of the board has virtually no effect on leverage for the sampled firms. Board independence (BIND) has a positive coefficient (0.4192) that is marginally insignificant at the 5% level but significant at the 10% level ($p = 0.083$). This implies that firms with higher proportions of independent directors tend to have higher leverage, possibly due to their willingness to allow management to access more debt financing, though the relationship is relatively weak in statistical terms.

Board gender diversity (BGDIV) has a negative and statistically significant coefficient (-0.2576, $p = 0.049$), indicating that higher female representation on the board is associated with lower risk leverage. This could suggest that gender-diverse boards adopt more conservative financing strategies, potentially prioritizing reduced debt exposure. Board financial expertise (BFEXP) also shows a negative relationship with leverage (-0.7230), marginally significant at the 10% level ($p = 0.057$). This suggests that boards with more financially skilled members may pursue lower leverage, possibly due to their deeper understanding of debt risks and a preference for balanced capital structures.

Board meetings (BMEET) has a negative and highly significant effect (-0.1276, $p < 0.001$), implying that boards that meet more frequently are linked to lower leverage levels. This may reflect stronger oversight and strategic caution, with frequent meetings enabling timely decisions that limit excessive debt accumulation. Firm size (FSIZE) displays a negative and highly significant relationship with leverage (-0.1646, $p < 0.001$), which is somewhat counterintuitive since larger firms often have better access to debt markets. In this case, the result may indicate that larger firms in the sample rely more on internal financing or equity, possibly due to strong retained earnings or reputational considerations. Firm age (FAGE) has a negligible and statistically insignificant effect (-

0.00031, $p = 0.817$), suggesting that the age of a firm does not play a meaningful role in determining its leverage within the sampled period.

Table 4 also shows that Pesaran's test of cross-sectional independence has a statistic of 0.279 with a p -value of 0.7802. Since the p -value is far greater than the conventional significance levels (0.01, 0.05, or 0.10), the study fail to reject the null hypothesis of cross-sectional independence. This means there is no statistical evidence of cross-sectional dependence among the panels in the data — in other words, the residuals from different cross-sections (firms) are not significantly correlated. The average absolute off-diagonal correlation value of 0.461 suggests a moderate correlation between units, but this is not statistically significant in Pesaran's test, indicating that it is not strong enough to bias the regression results due to cross-sectional dependence.

Table 5

Random Effect Model

EVOL	Coef.	Std. Err.	Tt	P > t
CONSTANT	-94.8247	31.3010	-3.03	0.005
BSIZE	-1.5456	0.9570	-1.62	0.118
BIND	-10.2898	14.0587	-0.73	0.471
BGDIV	-18.6164	9.6921	-1.92	0.065
BFEXP	9.5480	20.7101	0.46	0.648
BMEET	3.5608	1.7917	1.99	0.057
FSIZE	12.1919	2.9893	4.08	0.000
FAGE	-0.4519	0.1275	-3.54	0.001
F (7, 27)	13.19			
R – squared	0.7737			
Adj R – squared	0.7151			
Hausman Test				

Source: Author's Computation using STATA 14, 2026

Table 5 is about the random effect model which explains a substantial proportion of the variation in earnings volatility, with an R^2 of 0.7737 and an adjusted R^2 of 0.7151, indicating that about 77% of the variation in evol is accounted for by the independent variables. The F-statistic (13.19, $p < 0.001$) confirms that the model is jointly significant. Board size (BSIZE) has a negative coefficient (-1.5456) but is statistically insignificant ($p = 0.118$). This suggests that, although larger boards tend to be associated with slightly lower earnings volatility, the relationship is not strong enough to be conclusive.

Board independence (BIND) also has a negative coefficient (-10.2898), indicating that greater independence could be linked to reduced earnings volatility. However, the effect is not statistically significant ($p = 0.471$), suggesting that independence alone may not meaningfully influence volatility within the sample. Board gender diversity (BGDIV) is negatively related to earnings volatility (-18.6164) and is marginally significant at the 10% level ($p = 0.065$). This implies that boards with more female representation tend to have lower volatility in earnings, possibly due to improved oversight, risk aversion, or more balanced decision-making.

Board financial expertise (BFEXP) shows a positive but insignificant effect (9.5480, $p = 0.648$). This suggests that, in this sample, a higher proportion of financially

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skilled members does not necessarily stabilize earnings and might even be linked to more variability, although the evidence is weak. Board meetings (BMEET) have a positive coefficient (3.5608) and are marginally significant at the 10% level ($p = 0.057$). This indicates that more frequent board meetings could be associated with higher earnings volatility, potentially reflecting reactive decision-making during turbulent periods rather than proactive stability.

Firm size (FSIZE) shows a strong positive and highly significant effect (12.1919, $p < 0.001$), suggesting that larger firms in the sample tend to experience greater earnings volatility. This may reflect their broader operational scope, market exposure, or involvement in diverse and sometimes riskier activities. Firm age (FAGE) has a negative and highly significant coefficient (-0.4519, $p = 0.001$), indicating that older firms tend to have more stable earnings. This stability could be due to accumulated experience, established market presence, and more mature operational strategies.

The constant term is negative (-94.8247, $p = 0.005$), implying that when all independent variables are at zero, baseline earnings volatility would be substantially negative, though this value is largely a statistical artifact given the nature of the variables. Also, the Breusch–Pagan Lagrangian Multiplier (LM) test for random effects shows the variance component for the random effect term is estimated to be 0. The test statistic $\chi^2(01) = 0.00$ with a p-value of 1.0000.

Since the p-value is much greater than any standard significance threshold, the study fails to reject the null hypothesis that $\text{Var}(u) = 0$. There is no evidence of significant panel-level effects in the model, meaning that the variability across cross-sections (firms) is not different from zero after accounting for the included variables. This suggests that a pooled OLS model would be appropriate instead of a random effects model for this dependent variable (earnings volatility).

5. Conclusion and Recommendations

The study concludes that the analysis reveals that certain board attributes significantly influence risk management among listed industrial goods firms in Nigeria. Board independence shows a positive link with leverage, suggesting its role in optimizing capital structure, while gender diversity and financial expertise are associated with more conservative debt policies. Frequent board meetings reduce leverage but may coincide with short-term earnings volatility, indicating a trade-off between active oversight and operational stability. Firm size negatively impacts leverage but increases earnings volatility, whereas firm age reduces volatility, reflecting the stabilizing effect of experience. Board size; however, appears to have little direct effect, underscoring the importance of board composition and quality over numerical strength.

Based on these findings, firms should enhance board independence, promote gender diversity, and strengthen financial expertise to improve both financial prudence and stability. Board meetings should be strategically managed to sustain the benefits of reduced leverage without inducing unnecessary volatility. Governance reforms should prioritize the quality and diversity of directors rather than expanding board size. Larger firms should adopt targeted earnings stabilization measures, while younger firms should emulate the risk management practices of older peers to achieve consistent financial performance.

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