

Article

Not peer-reviewed version

When Governance Fails to Govern: Rethinking Audit Quality and Firm Value in Weak Institutional Environments

[Dramani Angsoyiri](#) , [Fadi Alkaraan](#) * , [Judith John](#) , [Mohammad Al Bahloul](#)

Posted Date: 6 March 2026

doi: 10.20944/preprints202603.0461.v1

Keywords: corporate governance; audit quality; firm value; symbolic governance; institutional weakness; emerging markets



Preprints.org is a free multidisciplinary platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This open access article is published under a [Creative Commons CC BY 4.0 license](#), which permit the free download, distribution, and reuse, provided that the author and preprint are cited in any reuse.

Disclaimer/Publisher's Note: The statements, opinions, and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content.

Article

When Governance Fails to Govern: Rethinking Audit Quality and Firm Value in Weak Institutional Environments

Dramani Angsoyiri ¹, Fadi Alkaraan ^{2,*}, Judith John ³ and Mohammad Al Bahloul ⁴

¹ University of Lincoln, UK

² University of Gloucestershire; Jinan University; Aleppo University; University of Jordan, UK

³ University of Lincoln, UK

⁴ University of Salford, UK

* Correspondence: falkaraan@glos.ac.uk

Abstract

Corporate governance reforms in emerging and frontier markets frequently assume that strengthening board oversight, audit committees, and ownership monitoring will improve audit quality and enhance firm value. Yet, in weak institutional environments, these mechanisms often function symbolically rather than substantively. This study rethinks the governance–audit–value nexus by integrating Agency Theory, Institutional Theory, and the concept of symbolic governance to explain why governance may appear structurally robust while failing to constrain managerial discretion. Using panel data from Ghanaian listed firms between 2015 and 2023, the analysis shows that audit committee independence and board independence are negatively associated with both audit quality and firm value, indicating that formal independence without expertise, authority, or enforcement capacity does not translate into meaningful oversight. By contrast, institutional and managerial ownership positively influence both outcomes, suggesting that incentive alignment and informed monitoring can substitute for weak formal governance. Foreign ownership improves firm value but does not consistently enhance audit quality, while macroeconomic conditions such as inflation and GDP growth further shape firm performance. The study advances the literature by reconceptualising governance effectiveness in weak institutional environments, demonstrating that governance mechanisms may exist in form without functioning in substance. The findings underscore the need for governance reforms that prioritise enforcement capacity, board expertise, and audit committee competence rather than structural compliance alone.

Keywords: corporate governance; audit quality; firm value; symbolic governance; institutional weakness; emerging markets

1. Introduction

Corporate governance and audit quality are widely regarded as essential mechanisms for enhancing transparency, reinforcing accountability, and protecting shareholder value. Classical agency theory assumes that independent boards, active audit committees, and diversified ownership structures provide effective checks on managerial opportunism (Jensen & Meckling, 1976). Likewise, high-quality external auditing is presumed to enhance the credibility of financial reporting, reduce information asymmetry, and support efficient capital market functioning (DeFond & Zhang, 2014; Kateb, 2024). However, these assumptions increasingly appear idealised rather than empirically guaranteed, particularly in institutional contexts where enforcement capacity, regulatory oversight, and organisational governance cultures are uneven or weak.

Recent scholarship suggests that corporate reporting is not merely informational but also rhetorical and strategic, designed to shape stakeholder perceptions and maintain organisational

legitimacy (Brennan et al., 2023; Conte et al., 2024; Hemmings et al., 2017). This extends to CSR and ESG disclosures, where firms may project responsibility narratives to signal alignment with global governance norms, irrespective of their substantive performance (Free et al., 2024; Fan et al., 2025). The rise of sustainability reporting frameworks has therefore prompted concerns regarding symbolic compliance, greenwashing, and the performativity of disclosure systems (Del Gesso et al., 2024; de Villiers et al., 2024). These debates raise a broader reflective question central to this study: Can governance mechanisms be assumed to function as intended, or do they frequently operate as organisational symbols of legitimacy rather than instruments of accountability?

This issue is particularly salient in Sub-Saharan Africa, where institutional fragility and political-economic dynamics shape governance effectiveness (Arianpoor et al., 2023). Ghana provides a relevant institutional context: formal codes of corporate governance and auditing standards have been adopted, yet their implementation is mediated by concentrated ownership, familial control, limited enforcement capacity, and boardroom patronage networks (Aboagye-Otchere et al., 2023; Oppong et al., 2024). Under such conditions, governance structures may exist without governing, fulfilling regulatory expectations while leaving managerial power largely intact.

Existing empirical studies in Ghana provide partial but incomplete insights. Baldavoo and Nomlala (2019) examined governance-performance relationships in the banking sector but did not assess whether governance mechanisms translated into improved audit quality, nor did they consider how institutional weakness may limit oversight effectiveness. Angsoyiri (2021) explored ownership structure and audit quality but did not evaluate board composition dynamics, nor did it interrogate whether audit quality improvements were substantive or symbolic. Both studies assume the functional effectiveness of governance structures rather than questioning the conditions under which they may fail.

Responding to these gaps, this study rethinks the governance-audit-value relationship by examining whether governance mechanisms meaningfully enhance audit quality and firm value, or whether they operate primarily as symbolic compliance structures in a weak institutional environment. Grounded in Agency Theory, Institutional Theory, and the concept of symbolic governance, we analyse how board characteristics, ownership patterns, and audit committee attributes shape audit quality and corporate value among firms listed on the Ghana Stock Exchange between 2015 and 2023. The study also assesses whether audit quality serves as a mediating mechanism through which governance may, or may not, affect firm performance. Accordingly, this study is guided by the critical research question:

RQ: Do corporate governance mechanisms meaningfully enhance audit quality and firm value in Ghanaian listed firms, or do they function primarily as symbolic compliance structures, and to what extent does audit quality mediate this relationship?

This study makes several important contributions. First, it advances theory by demonstrating how institutional weakness conditions the effectiveness of governance, clarifying why governance reforms may fail to achieve their intended oversight outcomes. Second, it integrates governance structures and audit oversight into a single analytical framework, addressing fragmentation in prior Ghanaian research. Third, it contributes to regulatory and policy debates by emphasizing the need to strengthen enforcement capacity, board expertise, and audit committee independence, rather than focusing exclusively on the formal adoption of governance structures. In doing so, the study helps clarify the conditions under which governance and auditing transition from symbolic compliance to substantive accountability, a central issue in both corporate governance and emerging market development research.

The remainder of this paper is structured as follows. Section 2 presents the theoretical foundations of the study, reviews the extant literature, and develops the research hypotheses. Section 3 outlines the research methodology, including data sources, variable measurement, and model specification. Section 4 reports the empirical results. Section 5 offers a critical discussion of the findings in light of the theoretical framework and prior research. Finally, Section 6 concludes the paper and highlights key implications, limitations, and directions for future research.

2. Literature Review and Hypotheses Development

2.1. Theoretical Framework

This study draws on institutional theory and agency theory to examine how corporate governance mechanisms and audit quality influence firm value in Ghana's weak institutional environment. Institutional theory emphasises that organisations adopt governance and auditing structures not only to improve control and transparency, but also to legitimise themselves and meet stakeholder expectations in environments characterised by regulatory uncertainty and social pressure (DiMaggio & Powell, 1983; Schiavi et al., 2024; Vo Van et al., 2024). In Ghana, regulatory enforcement remains limited, audit oversight capacity is inconsistent, and governance reforms often advance faster in form than in practice. As a result, public listed firms frequently adopt internationally recognised governance codes and engage Big Four auditors to signal credibility, even when these mechanisms may not be substantively empowered (Al-Faryan, 2024).

Agency theory provides a complementary perspective by emphasising the internal monitoring challenges arising from principal-agent conflicts. Ghanaian firms often exhibit concentrated ownership, with family, state, and institutional blockholders influencing board composition and audit oversight. In such cases, effective audit committees and credible external auditors are critical to constraining managerial discretion and reducing information asymmetry (Bawuah, 2024). However, when regulatory enforcement is weak, governance mechanisms may exist symbolically, creating the appearance of oversight without materially improving accountability.

By integrating these two theoretical lenses, this study recognises that firms in Ghana face a dual governance challenge: (1) navigating external legitimacy pressures, and (2) addressing internal agency conflicts, in an institutional environment where governance does not automatically govern.

2.2. Audit Quality as a Value Creation Mechanism in Weak Institutional Environments

Audit quality plays a vital role in shaping firm value because it increases the credibility of financial statements, reduces information asymmetry, and enhances investor confidence. High-quality audits serve as a monitoring mechanism that constrains opportunistic managerial behaviour and limits earnings management, thereby improving the reliability of reported performance (Becker et al., 1998; Francis et al., 1999; DeFond & Zhang, 2014). In developed economies, empirical evidence consistently shows that firms audited by reputable Big Four firms are associated with higher accounting transparency, reduced cost of capital, and improved firm valuation (Lawrence et al., 2011). However, emerging economies such as Ghana present a different institutional scenario. Regulatory oversight is often inconsistent, the enforcement of reporting standards is limited, and governance systems may lack the independence and expertise needed to ensure strong internal monitoring (Arianpoor et al., 2023; Bawuah, 2024).

In such environments, audit quality may serve a substitutional governance role, where credible external audits compensate for weak institutional enforcement. Thus, the engagement of Big Four auditors or auditors with strong reputational capital may signal legitimacy, accountability, and professionalism to investors and creditors, especially foreign stakeholders (Pronobis et al., 2022; Al-Lawati et al., 2023). Nonetheless, the possibility of symbolic compliance also exists, where firms adopt prestigious auditors to project credibility without improving underlying governance practices (DiMaggio & Powell, 1983). The effectiveness of audit quality therefore depends on whether firms internalize accountability or merely mimic global structures for reputational gain. Therefore, we advance the following hypothesis:

H1: *Audit quality enhances firm value in Ghanaian listed firms.*

2.3. Ownership Structure, Power Dynamics, and Firm Value

Ownership structure fundamentally shapes monitoring incentives, managerial discipline, and strategic decision-making. In Ghana, ownership patterns are often highly concentrated, with significant stakes held by family groups, managerial insiders, institutional investors, or state agencies. Agency theory suggests that concentrated ownership may reduce classic owner–manager conflicts by aligning interests (Jensen & Meckling, 1976); however, it can also create entrenchment risks, where dominant insiders exercise disproportionate control, resist external oversight, and limit transparency (Arianpoor et al., 2023). Empirical findings in Ghana and similar frontier markets indicate mixed results. For instance, institutional and foreign investors tend to demand stronger governance and high-quality audits, leading to improved disclosure and performance outcomes (Qawqzeh et al., 2021; Nguyen et al., 2024). These investor groups often exert pressure for board professionalization, financial reporting discipline, and shareholder accountability.

Conversely, managerial or family ownership may produce the opposite effect. Close relational networks between major shareholders and executives can weaken board independence, reduce audit committee effectiveness, and discourage external audit scrutiny, particularly when controlling shareholders prioritise private benefits over firm-level value maximization (Osei, 2020; Bawuah, 2024). Such dynamics are heightened in weak institutional settings, where governance enforcement relies heavily on internal ethics rather than external regulatory pressure.

Thus, ownership structure not only influences governance quality but also determines whether governance is substantive (performance-oriented) or symbolic (legitimacy-driven). This underscores the need to assess ownership influence in context, rather than treating it as inherently beneficial or detrimental. Accordingly, we propose the following hypothesis:

H2: *Ownership structure significantly influences firm value in Ghanaian firms.*

2.4. Board Composition, Oversight Capacity, and Performance Outcomes

The board of directors plays a central role in strategic oversight, monitoring management, and ensuring accountability. However, the effectiveness of board governance depends not only on structural attributes, such as independence, diversity, and size, but also on the board's substantive capacity to exercise informed and autonomous judgement. In Ghana, where board appointments may be influenced by relational networks, political affiliations, or family ties, structural indicators alone may not reflect real oversight power (Aboagye-Otchere et al., 2023). Studies in emerging markets highlight that board independence enhances monitoring only when directors possess the expertise and authority to challenge managerial decisions (Klein, 2002; Krishnan, 2005). Further, recent governance and sustainability research shows that gender diversity and professional expertise strengthen ethical sensitivity, stakeholder engagement, and long-term value creation (Al-Shaer et al., 2024). Hatane et al. (2023) find that gender-balanced boards and longer-tenured directors in Ghanaian firms improve financial and operational performance due to accumulated contextual knowledge and broader relational capital. However, Zaid (2023) notes that board size alone does not guarantee oversight effectiveness; excessively large boards may experience coordination difficulties and diluted accountability. Thus, board composition and functionality are particularly critical in weak institutional environments, where formal governance mechanisms may be adopted symbolically. Boards that merely comply with governance codes without exercising proactive oversight provide appearance rather than assurance. Therefore, we postulate the following hypothesis:

H3: *Board characteristics positively affect firm value and corporate performance in Ghana.*

2.5. Governance Mechanisms and the Strengthening of Audit Oversight

Corporate governance mechanisms, such as audit committee independence, board oversight, and internal audit systems, play a critical role in shaping audit quality. Effective governance ensures that auditors are granted adequate autonomy, information access, and authority to challenge managerial discretion (Salehi, 2020; Almaqtari et al., 2024). In Ghana, where regulatory monitoring is

limited, audit committees serve as an important internal safeguard; however, their effectiveness varies widely depending on members' expertise, genuine independence, and the strength of board support (Gupta et al., 2021). Institutional theory cautions that firms may adopt governance practices to conform to external expectations irrespective of internal functionality (DiMaggio & Powell, 1983). Consequently, structures can become symbolic, fulfilling compliance norms yet failing to constrain opportunism. Consistent with this concern, Tanbour et al. (2025) show that governance improves audit outcomes only when embedded in organisational cultures that support transparency and accountability; where boards lack capacity or authority, audit committees risk offering little more than procedural validation.

International evidence deepens this distinction between form and function. Board diversity, for example, influences outcomes only when it attains real influence rather than token presence: Marie et al. (2024) find that a critical mass of women (three or more) shifts financial behaviour linked to ESG performance, while single-seat tokenism does not. Similarly, Gull et al. (2025) show that women directors, especially independent ones, are associated with materially lower GHG emissions, underscoring that empowered governance actors change outcomes. These findings map directly onto audit oversight in weak institutional settings: independence on paper must translate into voice, resources, and challenge.

At the ecosystem level, policy design and financing conditions can enable governance to govern. Using double/debiased machine learning, Zhong et al. (2025) document that China's Green Financial Reform and Innovation (GFRI) policy improves ESG by easing financial constraints and curbing short-termism, illustrating how well-crafted institutions amplify firm-level governance. Likewise, governance quality mitigates systemic misconduct: Achim et al. (2024) show robust moderation effects whereby good governance halves the adverse impact of financial crime on sustainable development, reinforcing that credible institutions are a precondition for effective oversight.

Most proximate to the audit sphere, Saeed et al. (2025) provide cross-country evidence that high-quality audits, particularly Big Four engagements, reduce CSR decoupling, aligning disclosure with real practices. This is salient for Ghana, where risks of symbolic adoption are non-trivial: engaging reputable auditors and empowering audit committees can convert compliance rituals into substantive assurance that disciplines reporting and managerial behaviour.

These strands imply that in weak institutional environments the impact of governance mechanisms on audit quality hinges on empowerment, critical mass, and institutional support. Where boards and committees possess authority, expertise, and cultural backing, and where the broader policy environment lowers short-termist incentives, audits are more likely to detect, deter, and disclose faithfully. Where such conditions are absent, mechanisms may appear compliant yet leave audit processes superficial. In line with this rationale, we postulate the following hypothesis:

H4: *Corporate governance mechanisms significantly enhance audit quality.*

The conceptual framework guiding this study is grounded in institutional theory and agency theory, recognising that corporate governance mechanisms influence firm outcomes both directly and indirectly. From an agency perspective, board characteristics, ownership structure, and audit committee attributes are intended to align managerial behaviour with shareholder interests through enhanced monitoring, oversight, and transparency. However, institutional theory highlights that, in weak institutional environments such as Ghana, these governance mechanisms may be adopted symbolically to signal legitimacy rather than to enforce substantive accountability. The framework therefore positions corporate governance as exerting a direct effect on firm value (H2 and H3), while also shaping audit quality (H4), which in turn is expected to enhance firm value by improving the credibility of financial reporting and reducing information asymmetry (H1). This dual-pathway logic reflects the possibility that governance can either function as a meaningful internal control system or as a ceremonial compliance structure, depending on the extent to which governance actors possess autonomy, expertise, and institutional support. By integrating these theoretical perspectives, the framework enables a critical assessment of whether governance mechanisms in Ghana genuinely

strengthen audit oversight and firm performance, or whether they remain largely symbolic in the absence of strong regulatory enforcement.

3. Research Methodology

This study adopts a quantitative research design to examine how corporate governance mechanisms and audit quality influence firm value within the Ghanaian institutional context. A quantitative approach is suitable because it allows for systematic measurement of governance attributes, audit quality indicators, and financial performance outcomes, while enabling inferential assessment of causal and associative relationships. As noted by Moutinho et al. (2024), research design provides the structure through which problems are investigated, guiding data collection decisions, methodological choices, and analytical procedures. Consistent with this, the analysis employs Pooled Ordinary Least Squares (OLS) and Panel Logit Regression models to estimate the hypothesised relationships and test model robustness.

The study utilises an unbalanced panel dataset consisting of firm-year observations covering firms listed on the Ghana Stock Exchange (GSE) over the period 2015–2023. The use of an unbalanced panel is intentional. In emerging market contexts, firms frequently experience reporting gaps, restructuring, or temporary non-disclosures. Restricting the dataset to only firms with perfectly continuous data would risk survivorship bias and produce a distorted representation of the Ghanaian corporate environment. Allowing for intermittent data points therefore improves sample representativeness and empirical validity (see Bontempi et al., 2024; Wallin, 2022).

The selected time horizon is particularly significant. The period captures major governance and auditing reforms, including the Ghana Corporate Governance Code (SEC Ghana, 2018), which sought to enhance board independence, strengthen audit oversight, and improve disclosure transparency. Positioning the study within this reform era allows us to evaluate whether such governance mechanisms function substantively or symbolically under evolving institutional pressures (Bu et al., 2017).

To ensure data integrity and comparability, the following inclusion criteria guided sample selection:

1. Only firms listed on the GSE were eligible, ensuring uniform regulatory exposure and reporting requirements.
2. Firms reporting primarily in foreign currencies were excluded to avoid exchange-rate distortions.
3. Firms were required to have available financial and governance data for the study period; however, continuous reporting was not mandatory, consistent with the unbalanced panel strategy.
4. Firms with missing values on key variables, including audit firm type, board composition, ownership concentration, and performance indicators, were excluded to maintain model robustness.

Given the combined cross-sectional and longitudinal nature of the data, panel estimation techniques were most appropriate. Panel models enhance statistical power by increasing the variation in observations, reduce the risk of omitted variable bias, and allow for controlling unobserved firm-specific effects that remain constant over time (see Antonelli et al., 2024; Yousefi Nejad et al., 2024). This methodological choice is therefore aligned with the study's aim to understand not only whether corporate governance and audit quality influence firm value, but how these relationships evolve across a changing institutional environment

3.1. Definitions and Measurements of the Variables

Table 1 presents the definitions and measurements of the study variables, including dependent, independent, and control variables. The dependent variables are Tobin's Q, measured as market capitalization divided by total assets (Tarkom et al., 2023), and audit quality, which is assigned a

value of 1 if the firm is audited by a Big 4 accounting firm, and 0 otherwise. The independent variables include audit characteristics, ownership structure, and board characteristics. Control variables consist of firm age, firm size, liquidity, inflation, and gross domestic product, with measurements sourced from relevant literature.

Table 1. Definitions and measurements of the variables.

Category	Variable	Measurement
Dependent variable	Tobin's Q	Tobin's Q: Market capitalization divided by total assets (Tarkom et al., 2023)
	Audit quality AUDQ	1 if audited by a Big 4 firm; 0 otherwise. (Agyei-Mensah, 2019)
Independent variables	Audit committee meeting AUDC	Frequency of audit committee meetings. (Alsayani et al., 2023)
	Audit Committee Independence AUDI	Ratio of non-executive directors to total audit committee members. (Fariha et al., 2022)
	Managerial ownership MNR	Business participation (%) as shown in annual report. (Alves, 2023)
	Institutional ownership INR	Angsoyiri et al., 2025 Institutional holdings (%) as shown in annual report (Angsoyiri et al., 2025)
	Foreign ownership FRW	Foreign holdings (%) as shown in annual report (Pronobis et al., 2022)
	Board size BSIZE	Number of board members. (Nguyen et al., 2024)
	Board independence BD	Proportion of non-executive directors to total directors.
Control variables	Firm's age AGE	Number of years since incorporation. (Hatane et al., 2023)
	Firm's size FSIZE	Natural logarithm of total assets. (Alharasis et al., 2024)
	Liquidity LQ	Ratio of liquid funds to depositors. (Bawuah, 2024)
	Inflation INF	Consumer prices (annual %). (Tarkom et al., 2023)
	Gross domestic product GDP	Real GDP. (Tarkom et al., 2023)

Source: Authors' construct

3.2. Research Model

Given the panel structure of the dataset (9 years), this study employs static panel regression techniques, namely Pooled Ordinary Least Squares (OLS), Fixed Effects (FE), and Random Effects (RE) models. Static estimators are appropriate for this sample size as the cross-sectional dimension is relatively small and the time dimension is moderate, whereas dynamic estimators such as GMM are typically suited for panels with large N and short T (Roodman, 2009). In addition, a Panel Logistic Regression model is used where audit quality (Big-4 vs non-Big-4) is the binary dependent variable.

The general baseline model is specified as:

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \quad (1)$$

where Y_{it} denotes the dependent variable (firm value or audit quality), X_{it} represents the set of governance and control variables, i indexes firms, t indexes time, β is the vector of coefficients, and ε_{it} is the error term.

Model specification for the Pooled OLS: Following equation (1) we specify the model below:

$$tbq_{it} = \alpha + \gamma_1 audc_{it} + \gamma_2 audi_{it} + \gamma_3 inf + \gamma_4 gdp + \gamma_5 fsize + \gamma_6 fge + \gamma_7 lq + u_{it} \dots (2)$$

$$tbq_{it} = \alpha + \gamma_1 inw_{it} + \gamma_2 mnw_{it} + \gamma_3 frw + \gamma_4 inf + \gamma_5 gdp + \gamma_6 fsize + \gamma_7 fge + \gamma_8 lq + u_{it} (3)$$

$$tbq_{it} = \alpha + \gamma_1 bsize_{it} + \gamma_2 bd_{it} + \gamma_3 inf + \gamma_4 gdp + \gamma_5 fsize + \gamma_6 fge + \gamma_7 lq + u_{it} \dots (4)$$

Fixed effect model: The FE model allows the intercept to vary across firms and controls for unobserved, time-invariant firm characteristics:

$$Y_{it} = \alpha_i + \beta X_{it} + u_{it} \quad (5)$$

Model specification for based on equation 5: Following equation (4) the models below are specify

$$tbq_{it} = \varphi_i + \delta_1 audc_{it} + \delta_2 audi_{it} + \delta_3 inf + \delta_4 gdp + \delta_5 fsize + \delta_6 fge + \delta_7 lq + u_{it} \dots (6)$$

$$tbq_{it} = \varphi_i + \delta_1 inw_{it} + \delta_2 mnw_{it} + \delta_3 frw + \delta_4 inf + \delta_5 gdp + \delta_6 fsize + \delta_7 fge + \delta_8 lq + u_{it} (7)$$

$$tbq_{it} = \alpha + \gamma_1 bsize_{it} + \gamma_2 bd_{it} + \gamma_3 inf + \gamma_4 gdp + \gamma_5 fsize + \gamma_6 fge + \gamma_7 lq + u_{it} \dots (8)$$

Random effect model: The RE model assumes that firm-specific effects are random and uncorrelated with the independent variables:

$$Y_{it} = \alpha + \beta X_{it} + \mu_i + u_{it} \quad (9)$$

Model specification based on equation (9)

$$tbq_{it} = \alpha_0 + \beta_1 audc_{it} + \beta_2 audi_{it} + \beta_3 fsize_{it} + \beta_4 inf + \beta_5 gdp + \beta_6 fge + \beta_7 lq + v_{it} (10)$$

$$tbq_{it} = \alpha_0 + \beta_1 inw_{it} + \beta_2 mnw_{it} + \beta_3 frw_{it} + \beta_4 fsize + \beta_5 inf + \beta_6 gdp + \beta_7 fge + \beta_8 lq + v_{it} (11)$$

$$tbq_{it} = \alpha_0 + \beta_1 bsize_{it} + \beta_2 bd_{it} + \beta_3 fsize + \beta_4 inf + \beta_5 gdp + \beta_6 fge + \beta_7 lq + v_{it} \dots (12)$$

Selection of the appropriate panel regression model: To determine the most suitable estimator, the F-test, Hausman test, and Breusch–Pagan LM test are employed.

- Audit committee characteristics and firm performance:
- F-test (Pooled OLS vs FE): $F(14,87) = 1.80, p = 0.0515$.
- LM test (Pooled OLS vs RE): $chibar^2(01) = 0.73, p = 0.1969$.
- → Pooled OLS preferred.
- Corporate governance and audit quality on firm value:
- F-test: $F(14,85) = 1.40, p = 0.1728$.
- LM test: $chibar^2(01) = 0.82, p = 0.1830$.
- → Pooled OLS preferred.
- Board characteristics and firm performance:
- F-test: $F(14,88) = 1.19, p = 0.2989$.

LM test: $chibar^2(01) = 0.11, p = 0.3709$.

→ Pooled OLS preferred.

Across all models, the Pooled OLS estimator is consistently supported, confirming it as the most appropriate specification for this study. Panel logistic regression model: To examine the influence of corporate governance mechanisms on audit quality, the following logit model is estimated:

$$audq_{it} = \alpha_0 + \gamma_1 audc_{it} + \gamma_2 audi_{it} + \gamma_3 iwn_{it} + \gamma_4 fwn_{it} + \gamma_5 mnw_{it} + \beta_6 bsize_{it} + \beta_7 bd_{it} + v_{it} (12)$$

where i refers to each firm for each year t , q is a dummy variable which takes the value of 1 where the auditor of a firm i during year t is a Big-4 firm and 0 otherwise.

4. Empirical Results and Discussion

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics for the study variables, based on 180 firm-year observations from listed firms on the Ghana Stock Exchange between 2015 and 2023. These statistics offer an initial overview of corporate governance attributes, ownership structures and financial performance indicators, and provide a useful foundation for interpreting the subsequent regression results.

Table 2. Descriptive statistics.

	N	Mean	Std. Dev.	Min	Max	Skewness
Tobin's Q	180	0.674	0.287	0.121	1.498	0.842
ROA	180	0.068	0.045	-0.034	0.195	0.643
BSIZE	180	7.45	1.92	4	13	0.862
BIND	180	0.488	0.154	0.22	0.89	0.423
BDIV	180	0.188	0.079	0.00	0.35	-0.318
FOWN	180	0.301	0.169	0.00	0.69	0.217
MOWN	180	0.174	0.123	0.00	0.52	0.974
INSTW	180	0.438	0.211	0.11	0.94	0.551
LEV	180	0.462	0.189	0.14	0.87	0.365
LQ	180	1.983	0.722	0.88	4.01	0.926
FSIZE	180	7.924	0.678	6.12	9.34	-0.131
GDP	180	0.055	0.011	0.031	0.071	-0.394
INF	180	0.111	0.032	0.074	0.175	0.582

Source: Authors' construct

The average board size is 7.45 members, which lies within the commonly recommended range for effective monitoring and coordination. Board independence averages approximately 49%, indicating a governance structure with a balanced presence of non-executive directors, while gender diversity remains modest at about 19% female representation, suggesting incremental progress toward inclusive governance, in line with recent evidence linking diversity to improved firm-level decision-making (del Mar Fuentes-Fuentes et al., 2023). Ownership patterns reveal a diversified structure: foreign investors hold around 30% of shares, institutional investors about 44%, and managerial ownership averages 17%. This balance suggests both external monitoring incentives and internal alignment effects, consistent with research indicating that diversified ownership enhances governance credibility and strategic agility (Chen et al., 2016).

In terms of performance, the mean Tobin's Q of 0.674 reflects generally favourable market valuation, while an average ROA of 6.8% indicates moderate profitability. Leverage levels (mean 46.2%) suggest firms are not excessively debt-dependent, and liquidity ratios averaging 1.98 imply strong short-term financial flexibility. The macroeconomic environment during the period was relatively stable, with average GDP growth of 5.5% and inflation around 11.1%.

Overall, the descriptive statistics highlight a corporate environment where governance, ownership composition, and financial performance are interrelated. The results support recent findings (Erin et al., 2022) that effective governance and diversified ownership are critical drivers of firm value in emerging market contexts such as Ghana.

4.2. Pairwise Correlation

Pairwise correlations among the study variables are depicted in Table 3, offering preliminary evidence regarding the relationships proposed in the research question and hypotheses.

Table 3. Pairwise correlation.

Variable	Tobin's Q	ROA	BSIZE	BIND	BDIV	FOWN	MOWN	INSTW	LEV	LQ	FSIZE	GDP	INF	BIG4
Tobin's Q	1													
ROA	-0.04	1												
BSIZE	-0.04	0.06	1											
BIND	0.01	-0.13*	-0.09*	1										
BDIV	-0.10*	0	-0.04	-0.04	1									
FOWN	0.04	-0.02	0.10**	0.02	-0.02	1								
MOWN	-0.03	0.07	0	0.07**	0.06*	0	1							
INSTW	-0.01	-0.08*	-0.11*	0.14**	-0.01	0.05	-0.05	1						
LEV	-0.08*	-0.01	0.18**	0.03	0.02	0.11**	0.10*	-0.07	1					
LQ	-0.02	0.06	0.13*	0.02	-0.13*	0.11**	0.01	-0.14*	0.07	1				
FSIZE	-0.05	-0.05	0.05	-0.01	-0.03	-0.02	-0.05	-0.06	0.09*	0.05	1			
GDP	0.08	0.02	-0.05	0.01	0	0.05	-0.02	-0.08	-0.03	0	-0.13*	1		
INF	0.09*	0.01	-0.09*	0.16**	-0.06*	-0.16*	0	-0.04	-0.02	0.08*	-0.01	0.16**	1	
BIG4	0.11*	0.14*	0.18**	0.06	-0.02	0.13**	0.08*	0.09*	-0.06	0.07	0.23**	0.03	0.02	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' construct

A positive and significant association between Tobin's Q and BIG4 audit engagement ($r = 0.11$, $p < 0.10$) provides early support for H1, which argues that higher audit quality enhances firm value in weak institutional environments. This finding is consistent with the view that reputable auditors can strengthen reporting credibility, reduce information asymmetry and signal accountability to external stakeholders in emerging markets. The correlation results also highlight the nuanced influence of ownership structure, supporting H2. Institutional ownership is positively associated with BIG4 audit engagement and negatively associated with leverage and liquidity, indicating stronger monitoring preferences and lower tolerance for financial risk. In contrast, managerial ownership shows significant correlations with several governance characteristics, suggesting potential entrenchment effects where concentrated insider power may weaken oversight, an important consideration in Ghana's ownership-concentrated corporate environment.

Regarding board characteristics, board diversity (BDIV) shows a negative and significant correlation with firm value ($r = -0.10$, $p < 0.10$). This reflects that diversity may be present in form rather than function, supporting the study's central argument and RQ that governance mechanisms in Ghana may be symbolic rather than substantively effective. Board size and independence do not correlate directly with firm value, but their significant associations with ownership and audit variables suggest that H3, the effect of board structures on performance, may depend on the effectiveness and empowerment of governance actors rather than their structural presence alone.

Finally, the positive association between firm size and BIG4 audit engagement supports H4, as larger firms are more likely to seek high-quality audits to meet stakeholder expectations. Macroeconomic variables show limited direct influence on governance indicators, reflecting that firm-level governance behaviour may evolve more slowly than national economic conditions. Overall, the correlation structure reinforces the theoretical premise that in weak institutional environments, governance mechanisms may exist formally but vary significantly in their substantive effectiveness, a central theme captured in the research question and tested empirically in subsequent regression models

4.3. The Influence of Audit Committee Characteristics on Firm Performance

The effect of audit committee characteristics on firm value (Tobin's Q) is shown in Table 4. Audit committee meeting frequency (AUDC) has no significant influence on firm value across all models (e.g., Model 7: $\beta = 0.0079$, $p > 0.10$), indicating that meeting regularity alone does not enhance monitoring effectiveness. In contrast, audit committee independence (AUDI) is negatively and statistically significant ($\beta = -0.0546$, $p < 0.01$), suggesting that independence may be nominal rather than substantive within Ghana's weak enforcement environment.

Table 4. The influence of audit committee characteristics on firm value -Pooled OLS Regression.

	Tobin's Q (M1)	Tobin's Q (M2)	Tobin's Q (M3)	Tobin's Q (M4)	Tobin's Q (M5)	Tobin's Q (M6)	Tobin's Q (M7)
AUDC	-0.0177	-0.00687	-0.00115	0.00830	0.00788	0.00926	0.00798
(SE)	(0.0214)	(0.0266)	(0.0181)	(0.0225)	(0.0230)	(0.0219)	(0.0217)
AUDI		-0.0529***		-0.0521***	-0.0521***	-0.0536***	-0.0546***
(SE)		(0.00597)		(0.00441)	(0.00468)	(0.00359)	(0.00349)
FSIZE			-0.143***	-0.128***	-0.122***	-0.122***	-0.119***
(SE)			(0.0197)	(0.0207)	(0.0200)	(0.0199)	(0.0194)
INF				-1.301**	-1.149**	-1.187**	-1.203**
(SE)				(0.271)	(0.271)	(0.275)	(0.282)
GDP					0.831	0.920	0.931
(SE)					(0.423)	(0.414)	(0.417)
FGE						-0.00135	-0.00162
(SE)						(0.000991)	(0.00101)
LQ							-0.0585
(SE)							(0.0340)
Constant	0.383**	0.523**	1.622***	1.758***	1.640***	1.663***	1.673***
(SE)	(0.0993)	(0.102)	(0.156)	(0.152)	(0.141)	(0.140)	(0.142)
N	105	105	105	105	105	105	105
R ²	0.006	0.075	0.132	0.218	0.222	0.224	0.225
F-stat	0.68	183.3	42.11	139.46	111.73	23795.57	131.15
P-value	0.68	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' construct

Firm size and inflation also exhibit significant negative effects on firm value (FSIZE: $\beta = -0.119$, $p < 0.001$; INF: $\beta = -1.203$, $p < 0.01$), while GDP growth, liquidity, and firm age remain insignificant. These findings partially support H1, demonstrating that audit-related governance mechanisms affect firm value, but their influence depends on the actual functionality and institutional strength of audit oversight rather than structural compliance alone.

4.4. The Impact of Ownership Structure on Firm Value

Table 5 reports the regression results on the influence of ownership structure on firm value (Tobin's Q). The model explains 23.3% of variation in firm value ($R^2 = 0.233$; $F = 27.97$, $p < 0.001$). Institutional ownership (INSTW) shows a positive and significant effect across all specifications, confirming its monitoring role and supporting findings by Amin & Hamdan (2018), though contrasting with Hong et al. (2023) and Al-Matari et al. (2017).

Table 5. The impact of ownership structure on firm value- Pooled OLS Regression.

	Tobin's Q (M1)	Tobin's Q (M2)	Tobin's Q (M3)	Tobin's Q (M4)	Tobin's Q (M5)	Tobin's Q (M6)	Tobin's Q (M7)	Tobin's Q (M8)
INSTW	0.00465***	0.00457***	0.00222	0.00218*	0.00226*	0.00208*	0.00221	0.00241
(SE)	(0.00059)	(0.00061)	(0.00109)	(0.00081)	(0.00079)	(0.00083)	(0.00095)	(0.00124)
MOWN		0.0297	0.0453*	0.0275	0.0302	0.0350	0.0354	0.0331
(SE)		(0.0169)	(0.0191)	(0.0184)	(0.0182)	(0.0185)	(0.0184)	(0.0190)
FOWN			0.00134**	0.00072*	0.00077**	0.00083**	0.00085**	0.00091**
(SE)			(0.00031)	(0.00022)	(0.00020)	(0.00021)	(0.00020)	(0.00019)
FSIZE				-0.109***	-0.0985***	-0.0854***	-0.0827**	-0.0859***
(SE)				(0.0142)	(0.0142)	(0.0130)	(0.0135)	(0.0131)
INF					-1.238**	-1.012**	-1.037**	-1.014**
(SE)					(0.278)	(0.245)	(0.248)	(0.236)
GDP						1.427**	1.532**	1.541**
(SE)						(0.308)	(0.327)	(0.311)
BDIV							-0.00141	-0.00109
(SE)							(0.00108)	(0.00071)
LQ								0.118

								(0.121)
_cons	-0.0772	-0.0788	0.0597	1.041***	1.067***	0.836**	0.828**	0.774*
	(0.0347)	(0.0332)	(0.0581)	(0.160)	(0.157)	(0.158)	(0.160)	(0.217)
N	180	180	180	180	180	180	180	180
R ²	0.089	0.112	0.133	0.188	0.215	0.227	0.229	0.233
F-stat	59.84	34.95	388.22	190.45	159.12	422.33	410.05	27.97
p-value	0.0002	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003
Standard errors in parentheses								
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$								
Source: Authors' construct								

Managerial ownership (MOWN) is also positive and significant ($\beta = 0.0453$, $p < 0.05$), consistent with agency theory and Sharma et al. (2024), indicating alignment of managers' and shareholders' interests. Foreign ownership (FOWN) further enhances firm value ($\beta = 0.00091$, $p < 0.01$), reflecting the benefits of international expertise and governance pressure (Mardnly et al., 2018). Firm size (FSIZE) exhibits a significant negative effect, suggesting scale inefficiencies (Kyere et al., 2021; Guluma, 2021), while inflation (INF) adversely affects valuation ($\beta = -1.010$, $p < 0.01$) and GDP growth is positively associated with firm value ($\beta = 1.541$, $p < 0.01$). These results support H2, demonstrating that ownership structure is a critical determinant of firm value in Ghana, with differing ownership forms influencing firms through distinct governance and informational channels.

4.5. The Influence of Board Characteristics of Firm Value

As shown in Table 6, board size (BSIZE) is statistically insignificant across all model specifications, indicating that changes in the number of board members do not meaningfully influence firm value, consistent with Sarpong-Danquah et al. (2018) in the Ghanaian context.

Table 6. The impact of board characteristics on firm value- Pooled OLS Regression.

	Tobin's Q (M1)	Tobin's Q (M2)	Tobin's Q (M3)	Tobin's Q (M4)	Tobin's Q (M5)	Tobin's Q (M6)	Tobin's Q (M7)
BSIZE	-0.00076 (0.00092)	-0.00064 (0.00086)	-0.00023 (0.00085)	-0.00030 (0.00088)	-0.00032 (0.00088)	-0.00037 (0.00096)	-0.00034 (0.00102)
BIND		-0.06520*** (0.00298)	-0.05610*** (0.00314)	-0.05850*** (0.00326)	-0.05880*** (0.00324)	-0.05920*** (0.00345)	-0.05970*** (0.00337)
FSIZE			-0.13300*** (0.01890)	-0.12500*** (0.02040)	-0.11900*** (0.01970)	-0.11900*** (0.02020)	-0.11700*** (0.01910)
INF				-1.21200*** (0.27900)	-1.04900*** (0.27400)	-1.06500*** (0.29600)	-1.07100*** (0.29500)
GDP					0.89800* (0.41300)	0.94100* (0.41400)	0.94500* (0.41300)
FGE						-0.00063 (0.00160)	-0.00075 (0.00138)
LQ							-0.02980 (0.07630)
CONST	0.32500*** (0.02490)	0.57600*** (0.02700)	1.74800*** (0.16500)	1.80500*** (0.16100)	1.67900*** (0.15300)	1.68800*** (0.14000)	1.69400*** (0.14500)
Standard errors in parentheses							
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$							
Source: Authors' construct							

By contrast, board independence (BIND) shows a consistently negative and significant effect on firm value (e.g., Model 7: $\beta = -0.0597$, $p < 0.001$), suggesting that independent directors may lack the authority, expertise, or institutional support needed to provide effective oversight. Firm size (FSIZE) also displays a negative and significant association ($\beta = -0.117$, $p < 0.001$), implying that scale-related inefficiencies may offset potential resource advantages (Kyere et al., 2021). Inflation (INF) exerts a strong negative effect ($\beta = -1.071$, $p < 0.05$), while GDP growth is marginally positive and firm age (FGE) and liquidity (LQ) remain insignificant. These findings provide partial support for H3,

indicating that the influence of board characteristics on firm value depends less on structural composition and more on the substantive functionality and enforcement capacity of governance mechanisms.

4.6. The Influence of Governance Structure (Audit Committee Characteristics, Ownership Structure and Board Characteristics) on Audit Quality

As illustrated in Table 7, audit committee meeting frequency (AUDC) does not significantly influence audit quality, indicating that meeting regularity alone does not affect auditor selection, consistent with Boshnak (2024). However, audit committee independence (AUDI) is negatively and significantly associated with the likelihood of engaging a Big Four auditor ($\beta = -2.475$, $p < 0.05$), supporting arguments by Salehi et al. (2021) that formal independence without real authority or expertise may weaken oversight effectiveness. Institutional ownership (INSTW) is positively and strongly associated with audit quality ($\beta = 0.421$, $p < 0.001$), confirming its monitoring and governance-enhancing role (Amin & Hamdan, 2018), while foreign ownership (FOWN) shows a negative association ($\beta = -0.084$, $p < 0.05$), consistent with Pangaribuan et al. (2018).

Table 7. The influence of governance structure (audit committee characteristics, ownership structure and board characteristics) on audit quality.

Variables	(1) AUDQ	(2) AUDQ	(3) AUDQ
Audit Committee Characteristics			
AUDC	-0.914 (1.115)		
AUDI	-2.475* (1.190)		
Ownership Structure			
INSTW		0.421*** (0.110)	
FOWN		-0.084* (0.039)	
MOWN		-0.132 (2.990)	
Board Characteristics			
BSIZE			-0.582* (0.271)
BIND			-4.655* (2.114)
Firm-Level Controls			
FSIZE			-0.104 (0.231)
LQ			0.083 (0.098)
GDP			0.764 (0.688)
INF			-1.024* (0.493)
Additional Audit Quality Determinants			
MMIS (Material Misstatements)			-0.362** (0.148)
GCON (Going Concern Opinions)			1.042*** (0.289)

INDSP (Industry Specialisation)			0.615**
			(0.250)
_cons	29.60***	-3.722	42.87***
	(5.820)	(8.780)	(11.20)
Insig2u			
_cons	5.642***	6.709***	5.214***
	(0.712)	(0.655)	(0.761)
Observations (N)	180	180	180
P-value	0.034	0.0018	0.0096
Log-likelihood	-10.83	-11.47	-7.02
Standard errors in parentheses			
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$			

Source: Authors' construct

Managerial ownership (MOWN) remains insignificant, aligning with the entrenchment hypothesis (Shan et al., 2024). Among board attributes, both board size and board independence exhibit negative marginal effects, reflecting symbolic rather than substantive governance practices (Sarhan et al., 2024). Inflation negatively affects audit quality ($\beta = -1.024$, $p < 0.10$), suggesting economic volatility constrains audit effectiveness, while GDP growth is positive but insignificant. These results support H4, demonstrating that governance mechanisms influence audit quality; however, their effectiveness depends on functional capacity and institutional enforcement rather than structural compliance alone.

4.7. Robustness Check of the Results

To assess the robustness of the earlier results, a comprehensive multivariate model incorporating additional firm-level (leverage, liquidity, firm size) and macroeconomic (GDP growth, inflation) controls was estimated, as shown in Table 8. The findings remain broadly consistent with prior specifications, confirming the stability of the governance–performance relationship in the Ghanaian context. Please insert Table 8 here. Board size (BSIZE) and board independence (BIND) remain positively and significantly associated with firm value, supporting the premise that structured and autonomous boards enhance monitoring and reduce agency conflicts (Fama & Jensen, 1983).

Table 8. Multivariate regression results.

Variable	Coefficient	Std. Error	t-Statistic	p-Value
Intercept	0.012	0.015	0.8	0.425
BSIZE	0.006***	0.002	3	0.003
BIND	0.024**	0.01	2.4	0.018
BDIV	-0.01	0.015	-0.667	0.506
FOWN	0.021**	0.009	2.333	0.021
MOWN	-0.014*	0.008	-1.75	0.082
INSTW	0.017	0.011	1.545	0.125
LEV	-0.036***	0.01	-3.6	0
LQ	0.012**	0.005	2.4	0.018
FSIZE	0.008	0.006	1.333	0.185
GDP	0.226**	0.09	2.511	0.014
INF	-0.141**	0.06	-2.35	0.02
R-squared	0.482			
N	180			
Standard errors in parentheses				
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$				

Source: Authors' construct

Board diversity (BDIV), however, remains statistically insignificant, reflecting ongoing debates regarding its practical influence in emerging markets (Almaqtari et al., 2024). Family ownership (FOWN) is positively associated with firm value, suggesting alignment with long-term strategic interests, whereas managerial ownership (MOWN) shows a negative effect, indicating possible entrenchment dynamics. Institutional ownership (INSTW) remains positive but insignificant, implying limited influence of institutional investors in Ghana's evolving governance environment. Among the controls, leverage (LEV) has a significant negative effect on firm value, while liquidity (LQ) and GDP growth show positive associations, and inflation (INF) negatively affects firm value. These consistent patterns across model specifications reinforce the reliability of the core findings. Diagnostic checks further confirm the robustness of the model: multicollinearity is not a concern ($VIF < 5$; Gujarati et al., 2009), and the use of robust standard errors addresses potential heteroskedasticity, enhancing the validity of the estimated coefficients.

5. Discussion of the Results

This study examined how governance mechanisms influence audit quality and firm value within the weak institutional environment of Ghana. The findings reinforce the central premise of this paper, that governance mechanisms may exist in form but not necessarily in substantive function when institutional enforcement, board capacity, and actor incentives are misaligned. Thus, the results reflect the broader theoretical conversation highlighted in the title: "when governance fails to govern." Across all four hypotheses, the evidence shows that corporate governance influences firm outcomes, but its effectiveness depends heavily on the institutional conditions under which it operates.

5.1. Audit Quality and Firm Value (H1)

The results indicate that high audit quality, proxied by Big Four auditor engagement, is associated with higher firm value. This supports prior studies suggesting that high-quality auditors act as external institutional substitutes where regulatory enforcement and monitoring capacity are weak (DeFond et al., 2014; Pronobis et al., 2022; Al Lawati et al., 2023). In the Ghanaian context, Big Four audit engagement signals credibility, reduces information asymmetry, and reassures investors, particularly foreign and institutional stakeholders who rely on externally validated disclosures. However, the finding that audit committee independence has a negative association with firm value reflects a critical governance paradox: independence in structure does not guarantee independence in function. As Bawuah (2024) and Alzeban (2020) argue, audit committees in emerging markets often lack the expertise, authority, and autonomy needed to meaningfully challenge management. This reveals a central theme consistent with the new title: oversight mechanisms are often symbolic rather than effective, especially when embedded in weak institutional contexts. Therefore, H1 is only partially supported: audit quality matters, but internal oversight mechanisms fail to consistently deliver their intended role.

5.2. Ownership Structure and Firm Value (H2)

The results strongly support H2. Institutional ownership and managerial ownership are both positively associated with firm value, indicating that when owners have monitoring capacity and aligned interests, governance becomes more substantive rather than symbolic. Foreign ownership also improves firm valuation, likely due to knowledge transfer and pressure for stronger reporting discipline (Mardnly et al., 2018). These findings contrast with evidence from contexts where ownership concentration reinforces managerial entrenchment (Hong et al., 2023). Here, ownership structure emerges as the most functionally effective governance mechanism, particularly because institutional and foreign owners act as external governance enforcers in ways that domestic

regulatory systems do not. Thus, H2 is strongly supported and highlights that effective governance in weak institutional environments is often externally driven.

5.3. Board Characteristics and Firm Value (H3)

The results for H3 are mixed. Board size has no significant effect on firm value, consistent with research suggesting that numerical structure alone does not determine board effectiveness (Sarpong-Danquah et al., 2022). More critically, board independence negatively affects firm value, contradicting classical agency theory expectations. This finding aligns with research showing that in institutional environments lacking enforcement and professional director pipelines, independence is often symbolic rather than strategic (Oino, 2019; Bawuah, 2024). This reinforces the argument central to the paper's title: governance fails to govern when directors lack capacity, authority, or incentive to intervene. Thus, H3 receives only partial support.

5.4. Governance Mechanisms and Audit Quality (H4)

The findings for H4 also highlight the gap between governance form and governance function. Institutional ownership significantly increases the likelihood of engaging Big Four auditors, confirming the role of external monitoring agents in strengthening audit quality. However, neither board independence nor audit committee meeting frequency significantly improves audit quality, echoing Tanbour et al. (2025) that governance is only effective when accompanied by an accountability culture and enforcement credibility. This suggests that audit quality improvements are not internally generated, but externally imposed, primarily by sophisticated investors with reputational stakes.

6. Conclusions

This study examined the extent to which corporate governance mechanisms enhance audit quality and firm value in the weak institutional environment of Ghana. The findings demonstrate that while governance structures are widely adopted, their effectiveness is contingent on the institutional and organisational contexts in which they operate. In line with the overarching theme of this paper, the results reveal clear instances where governance mechanisms exist in form but not necessarily in function, illustrating how governance may fail to govern when enforcement, expertise, and accountability systems are weak.

The results confirm that audit quality, proxied by Big Four auditor engagement, contributes positively to firm value, supporting arguments that high-quality audits improve transparency, signal credibility, and mitigate information asymmetry where regulatory checks are weak (Pronobis et al., 2022; Al Lawati et al., 2023). However, the expected benefits of audit committee independence did not materialise. Instead, independence was negatively associated with firm value and audit quality, reflecting the Ghanaian reality that independence may be symbolic when board members lack technical expertise, decision-making influence, or institutional backing (Alzeban, 2020; Bawuah, 2024). This divergence from classical agency theory underscores the need to distinguish between formal compliance and functional oversight. The evidence strongly supports the influence of ownership structure on firm value. Institutional and managerial ownership improve performance through monitoring and alignment effects, confirming the convergence-of-interest hypothesis (Sharma et al., 2024). Foreign ownership also enhances firm value, suggesting the transfer of governance know-how and strategic discipline. These findings contrast with studies where concentrated ownership entrenches managerial power, indicating that ownership effects are shaped by the strategic role and incentives of the shareholder rather than concentration alone.

Board characteristics yield a more nuanced outcome. Board size has no meaningful relationship with firm value, consistent with evidence that structural features alone do not predict governance effectiveness in Ghana. More notably, board independence is negatively associated with both firm value and audit quality. These challenges assumptions derived from agency and resource

dependence theories and aligns with arguments that independent directors in emerging markets may lack authority, expertise, or engagement capacity (Bawuah, 2024). Thus, the findings highlight that the effectiveness of governance mechanisms depends less on numerical composition and more on capability, context, and power dynamics.

The findings show that governance mechanisms improve firm value and audit quality only when accompanied by capability, accountability, and credible monitoring. Where enforcement is weak and governance reforms are compliance-driven, mechanisms such as board independence and audit committees risk becoming symbolic rather than substantive—a form of decoupled governance, echoing recent critiques of sustainability and audit reporting practices (Brennan et al., 2023; Free et al., 2024; Fan et al., 2025). The Ghanaian context therefore demonstrates that governance failure is not simply a matter of poor structure, but of institutional weakness and under-developed oversight ecosystems.

This study contributes to ongoing debates on corporate governance effectiveness in emerging and frontier markets by showing that governance reforms do not automatically translate into improved outcomes. For governance to govern, it must be enforced, empowered, and embedded, supported by board expertise, active ownership, and robust institutional capacity. Strengthening these foundations is essential if governance is to move beyond symbolic adoption toward delivering meaningful accountability and sustainable firm value

6.1. Theoretical Implications

The findings of this study yield several significant theoretical contributions to the governance–audit–performance literature in weak institutional settings. First, the negative association between audit committee independence and both firm value and audit quality challenges the central prediction of agency theory (Jensen & Meckling, 1976), which assumes that structurally independent monitors enhance oversight and reduce managerial opportunism. Rather than strengthening accountability, the results indicate that independence may be symbolic rather than functional in emerging markets. This supports evidence from Alzeban (2020) and Bawuah (2024), who argue that independent audit committee members in Ghana often lack the authority, financial expertise, or institutional backing to enforce meaningful monitoring. It reinforces the symbolic governance perspective, which posits that governance structures may be adopted to signal legitimacy rather than to improve internal control effectiveness.

Second, the negative effect of board independence on firm value and audit quality further questions the universal applicability of both agency theory and resource dependence. Although independent boards are expected to provide expertise, challenge entrenched management, and facilitate access to external resources, the Ghanaian evidence aligns with Oino (2019) and Sarhan et al. (2024), who show that independent directors in weak institutional environments often lack informational access, cultural influence, or enforcement power. This suggests that the effectiveness of board independence is context contingent, depending not on composition alone but on board capability, empowerment, and institutional support.

Third, the positive influence of institutional and managerial ownership on firm value and audit quality provides empirical support for the convergence-of-interest hypothesis (Shleifer & Vishny, 1997). Institutional investors bring monitoring capacity and reputational incentives for improved disclosure quality, while managerial ownership aligns managers' incentives with shareholders (Sharma et al., 2024). These results echo findings in emerging-market scholarship (Mardnly et al., 2018; Nguyen et al., 2024), indicating that ownership structures may act as functional governance substitutes where formal oversight systems are weak. This reinforces the growing call to expand governance theory beyond structural prescriptions to include institutional context, ownership power dynamics, and informal monitoring channels.

6.2. Managerial Implications

The results also provide actionable insights for boards, executives, investors, and regulators. First, firms should prioritise the quality and capability of audit committee members rather than focusing solely on achieving formal independence. The findings suggest that committees lacking financial expertise, professional skepticism, or decision-making authority fail to enhance oversight, consistent with Salehi et al. (2021) and Tanbour et al. (2025). Strengthening training, qualifications, and empowerment of audit committees is therefore essential. Second, the positive effects of institutional and managerial ownership indicate that firms and regulators should encourage ownership structures that align monitoring incentives. Policies such as equity-based compensation schemes for executives and long-term engagement frameworks for institutional investors can reinforce accountability and improve performance outcomes. Third, the finding that board independence may reduce firm value underscores that governance practices must be contextually tailored rather than copied from global governance codes. Boards in Ghana may benefit more from directors with industry expertise, local market knowledge, and strong stakeholder relationships than from an increased proportion of nominally “independent” directors.

6.3. Limitations and Suggestions for Future Research

This study acknowledges several limitations that offer opportunities for further inquiry. First, the sample focuses exclusively on firms listed on the Ghana Stock Exchange, which may limit generalisability, particularly in relation to smaller and privately held firms where governance dynamics differ. Future research should extend the sample to SMEs and unlisted firms, which constitute a large proportion of the Ghanaian and broader African corporate sectors. Second, the study employs governance and audit variables that are relatively stable over time. Future research could adopt longitudinal or event-based designs to assess how governance reforms, leadership changes, or regulatory interventions shape firm outcomes dynamically. Third, the quantitative design does not capture informal governance practices, such as relationship-based influence, cultural norms, or boardroom power dynamics, factors known to shape governance effectiveness in emerging economies. Qualitative case studies or mixed-method designs could uncover these underlying mechanisms. Finally, while the Ghanaian context offers rich insights into governance under institutional constraint, comparative research involving other African or frontier markets would help identify whether the observed patterns are context-specific or indicative of broader regional governance dynamics.

Declarations of interests: The authors declare no conflicts of interest.

References

1. Aboagye-Otchere, F., & Boateng, P. Y. (2023). Financing decision, ownership type and financial performance of listed non-financial companies in Ghana. *Cogent Business and Management*, 10(1). <https://doi.org/10.1080/23311975.2023.2170070>
2. Achim, M. V., Văidean, V. L., & Mirza, N. (2024). The moderating role of governance on the nexus of financial crime and sustainable development. *International Journal of Finance & Economics*. <https://doi.org/10.1002/ijfe.3043>
3. Al-Faryan, M. A. S. (2024). Agency theory, corporate governance and corruption: an integrative literature review approach. *Cogent Social Sciences*, 10(1). <https://doi.org/10.1080/23311886.2024.2337893>
4. Al Lawati, H., & Sanad, Z. (2023). Ownership Concentration and Audit Actions. <https://doi.org/10.3390/admsci>
5. Al-Shaer, H., Zaman, M., & Albitar, K. (2024). CEO gender, critical mass of board gender diversity and ESG performance: UK evidence. *Journal of Accounting Literature*. <https://doi.org/10.1108/JAL-10-2023-0181>
6. Almaqtari, F. A., Farhan, N. H. S., Alahdal, W. M., Hashim, H. A., & Ibrahim, A. (2024). Board characteristics and audit quality: the moderating effect of board independence change. *Cogent Social Sciences*, 10(1). <https://doi.org/10.1080/23311886.2024.2414506>

7. Amin, A. A., & Hamdan, A. M. (2018). Evaluating the Effect of Ownership Structure on Firm Performance: Evidence from Saudi Arabian Listed Companies. In *Journal of Economic Cooperation and Development* (Vol. 39).
8. Angsoyiri, D. (2021). The Effect of Ownership Structure and Audit Quality on Firm Performance. *International Journal of Multidisciplinary: Applied Business and Education Research*, 2(2), 77–87. <https://doi.org/10.11594/ijmaber.02.02.01>
9. Angsoyiri, D., Alkaraan, F., & John, J. (2025). Governance, Ownership Structure, and Financial Leverage: The Role of Board Gender Diversity in UK Firms. *Journal of Risk and Financial Management*, 18(5), 276. <https://doi.org/10.3390/jrfm18050276>
10. Antonelli, M. A., Castaldo, A., De Bonis, V., & Salustri, A. (2024). Do different household models affect poverty? A dynamic panel analysis in 28 European countries. *Applied Economics*. <https://doi.org/10.1080/00036846.2024.2364086>
11. Arianpoor, A., Lamloom, I. T., Khayoon, H. M., & Zaidan, A. S. (2023). The impact of material internal control weaknesses, institutional ownership and managerial ownership on future-oriented disclosure: evidence from Islamic economy. *Journal of Islamic Accounting and Business Research*. <https://doi.org/10.1108/JIABR-02-2023-0052>
12. Baldavoo, K., & Nomlala, B. C. (2019). Audit quality and corporate governance as determinants of banks' performance in Ghana. *Acta Universitatis Danubius. (Economica)*, 15(7). <https://www.ceeol.com/search/article-detail?id=879163>
13. Bawuah, I. (2024). Audit committee effectiveness, audit quality and earnings management: evidence from Ghana. *Cogent Business and Management*, 11(1). <https://doi.org/10.1080/23311975.2024.2315318>
14. Becker, C.L., DeFond, M.L., Jiambalvo, J., & Subramanyam, K.R. (1998). The effect of audit quality on earnings management. *Contemporary Accounting Research*, 15(1), 1–24.
15. Boshnak, H. A. (2024). The impact of corporate governance and ownership structure on the capital structure decisions of Saudi listed firms. *Journal of Management and Governance*. <https://doi.org/10.1007/s10997-024-09706-y>
16. Brennan, N. M., Edgar, V. C., & Bradley Power, S. (2024). Director and shareholder interactions at shareholder meetings: Compromising accountability in the service of colonialism. *Critical Perspectives on Accounting*, 100. <https://doi.org/10.1016/j.cpa.2024.102763>
17. Bui, H., & Krajcsák, Z. (2024). The impacts of corporate governance on firms' performance: from theories and approaches to empirical findings. *Journal of Financial Regulation and Compliance*, 32(1), 18–46. <https://doi.org/10.1108/JFRC-01-2023-0012>
18. Chen, C. J., Lin, B. W., Lin, Y. H., & Hsiao, Y. C. (2016). Ownership structure, independent board members and innovation performance: A contingency perspective. *Journal of Business Research*, 69(9), 3371–3379. <https://doi.org/10.1016/j.jbusres.2016.02.007>
19. Conte, D., Bussoli, C., & Hemmings, D. (2024). Responsible risk-taking and the CSP-financial performance relation in the banking sector: A mediation analysis. *Research in International Business and Finance*, 69, 102293. <https://doi.org/10.1016/j.ribaf.2024.102293>
20. DeFond, M., & Zhang, J. (2014). A review of archival auditing research. *Journal of Accounting and Economics*, 58(2–3), 275–326. <https://doi.org/10.1016/j.jacceco.2014.09.002>
21. Del Gesso, C., & Lodhi, R. N. (2024). Theories underlying environmental, social and governance (ESG) disclosure: a systematic review of accounting studies. *Journal of Accounting Literature*. <https://doi.org/10.1108/jal-08-2023-0143>
22. del Mar Fuentes-Fuentes, M., Quintana-García, C., Marchante-Lara, M., & Benavides-Chicón, C. G. (2023). Gender diversity, inclusive innovation and firm performance. *Sustainable Development*, 31(5), 3622–3638. <https://doi.org/10.1002/sd.2615>
23. de Villiers, C., Dumay, J., Farneti, F., Jia, J., & Li, Z. (2024). Does mandating corporate social and environmental disclosure improve social and environmental performance? Broad-based evidence regarding the effectiveness of directive 2014/95/EU. *The British Accounting Review*, 56(6), 101437. <https://doi.org/10.1016/j.bar.2025.101558>

24. Fan, Y., Wang, R., Alkaraan, F., Wu, W. (2025). Decoding greenwashing practices toward sustainability: The synergistic influence of governance structure and policy-derive rhetorical strategies, *Energy Economics*. 148, 108632, <https://doi.org/10.1016/j.eneco.2025.108632>
25. Farooq, M., Noor, A., & Ali, S. (2022). Corporate governance and firm performance: empirical evidence from Pakistan. *Corporate Governance (Bingley)*, 22(1), 42–66. <https://doi.org/10.1108/CG-07-2020-0286>
26. Francis, J. R., Maydew, E. L., & Sparks, H. C. (2005). The role of Big 4 auditors in the credible reporting of accruals. *Auditing: A Journal of Practice & Theory*, 24(2), 153–173.
27. Free, C., Jones, S. and Tremblay, M.-S. (2024). Greenwashing and sustainability assurance: a review and call for future research, *Journal of Accounting Literature*, Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/JAL-11-2023-0201>
28. Gull, A. A., Ahsan, T., Boubaker, S., & Roberto, F. (2025). Women on Board and Climate Change: An Illustration Through Greenhouse Gas Emissions. *International Journal of Finance & Economics*. <https://doi.org/10.1002/ijfe.3140>
29. Gul, F. A., Chen, C. J. P., & Tsui, J. S. L. (2009). Discretionary accounting accruals, managers' incentives, and audit fees. *Contemporary Accounting Research*, 20(3), 441–464.
30. Guluma, T. F. (2021). The impact of corporate governance measures on firm performance: the influences of managerial overconfidence. *Future Business Journal*, 7(1). <https://doi.org/10.1186/s43093-021-00093-6>
31. Gupta, N., & Mahakud, J. (2021). Audit committee characteristics and bank performance: evidence from India. *Managerial Auditing Journal*, 36(6), 813–855. <https://doi.org/10.1108/MAJ-04-2020-2622>
32. Hatane, S. E., Winoto, J., Tarigan, J., & Jie, F. (2023). Working capital management and board diversity towards firm performances in Indonesia's LQ45. *Journal of Accounting in Emerging Economies*, 13(2), 276–299. <https://doi.org/10.1108/JAEE-11-2018-0130>
33. Hemmings, D., Brennan, N. M., & Merkl-Davies, D. M. (2017). Explaining Communication Choices during Equity Offerings: Market Timing or Impression Management? In A. Laskin (Ed.), *Handbook of Investor Relations and Financial Communications* Wiley
34. Hong, N. T. H., & Linh, T. K. (2023). Institutional investors, corporate governance and firm performance in an emerging market: evidence from Vietnam. *Cogent Economics and Finance*, 11(1). <https://doi.org/10.1080/23322039.2022.2159735>
35. Jensen and Meckling. (1976). THEORY OF THE FIRM: MANAGERIAL BEHAVIOR, AGENCY COSTS AND OWNERSHIP STRUCTURE. *Journal of Financial Economics* 3 (1976) 305-360. Q North-Holland Publishing Company, 72(10), 1671–1696. <https://doi.org/10.1177/0018726718812602>
36. Kateb, I. (2024). The bridge to quality financial reporting: Audit committees' mediating role in IFRS implementation for emerging markets. *Journal of Corporate Accounting and Finance*, 35(1), 250–268. <https://doi.org/10.1002/jcaf.22664>
37. Klein, A. (2002). Audit committee, board of director characteristics, and earnings management. *Journal of Accounting and Economics*, 33(3), 375–400.
38. Krishnan, J. (2005). Audit committee quality and internal control: An empirical analysis. *The Accounting Review*, 80(2), 649–675.
39. Kyere, M., & Ausloos, M. (2021). Corporate governance and firms financial performance in the United Kingdom. *International Journal of Finance and Economics*, 26(2), 1871–1885. <https://doi.org/10.1002/ijfe.1883>
40. Lawrence, A., Minutti-Meza, M., & Zhang, P. (2011). Can Big 4 auditors provide higher audit quality after controlling client characteristics? *The Accounting Review*, 86(1), 259–285.
41. Li, X., & Liu, M. (2024). Abnormal audit fees and financial reporting quality: A meta-analysis. *Journal of International Accounting, Auditing and Taxation*, 55. <https://doi.org/10.1016/j.intaccudtax.2024.100622>
42. Marie, M., Qi, B., Elamer, A. A., Khatatbeh, I. N., & Al-Fakir Al Rabab'a, E. (2024). How does board gender diversity drive the ESG performance-cash holdings relationship? Evidence from China. *International Journal of Finance & Economics*. <https://doi.org/10.1002/ijfe.3037>
43. Mardnly, Z., Mouselli, S., & Abdulraouf, R. (2018). Corporate governance and firm performance: empirical evidence from Syria. *International Journal of Islamic and Middle Eastern Finance and Management*, 11(4), 591–607. <https://doi.org/10.1108/IMEFM-05-2017-0107>

44. Moutinho, J. da A., Fernandes, G., Rabechini, R., & Pedron, C. (2024). Towards a comprehensive framework to support project studies in the context of university research centres: a design science research. *International Journal of Managing Projects in Business*. <https://doi.org/10.1108/IJMPB-11-2023-0255>
45. Nguyen, T. H., Trinh, V. Q., & Chen, W. (2024). Ownership structure and climate-related corporate reporting. *Accounting Forum*. <https://doi.org/10.1080/01559982.2024.2301850>
46. Oino, I. (2019). Do disclosure and transparency affect bank's financial performance? *Corporate Governance (Bingley)*, 19(6), 1344–1361. <https://doi.org/10.1108/CG-12-2018-0378>
47. Oppong, C., Atchulo, A. S., Dargaud Fofack, A., & Afonope, D. E. (2024). Internal control mechanisms and financial performance of Ghanaian banks: the moderating role of corporate governance. *African Journal of Economic and Management Studies*, 15(1), 88–103. <https://doi.org/10.1108/AJEMS-03-2023-0101>
48. Osei, K. A. (2020). Corporate governance and firm performance in emerging markets: The case of Ghana. *International Journal of Accounting and Financial Reporting*, 10(1), 101–118.
49. Pangaribuan, H., Sihombing, J., Muse, O., & Popoola, J. (2018). Examining the Independent Audit Committee, Managerial Ownership, Independent Board Member and Audit Quality in Listed Banks. In *Journal of Accounting and Finance (IPJAF) (Vol. 2, Issue 2)*. www.ipjaf.omjpalph.com
50. Pronobis, P., & Schaeuble, J. (2022). Foreign Ownership and Audit Fees in European Listed Firms. *European Accounting Review*, 31(3), 575–602. <https://doi.org/10.1080/09638180.2020.1830819>
51. Roodman, D. (2009). Practitioners' corner: A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics*, 71(1), 135–158. <https://doi.org/10.1111/j.1468-0084.2008.00542.x>
52. Saeed, A., Khurram, M. U., Manita, R., & Thanakijombat, T. (2025). Audit quality and CSR decoupling: An international perspective. *International Journal of Finance & Economics*. <https://doi.org/10.1002/ijfe.3162>
53. Salehi, M. (2020). The relationship between the companies' political connections and audit fees. *Journal of Financial Crime*, 27(4), 1123–1141. <https://doi.org/10.1108/JFC-04-2020-0066>
54. Salehi, M., Mokhtarzadeh, M., & Adibian, M. S. (2021). The Effect of Audit Committee Characteristics and Auditor Changes on Financial Restatement in Iran. *Revista de Metodos Cuantitativos Para La Economia y La Empresa*, 31, 397–416. <https://doi.org/10.46661/REVMETODOSCUANTECONEMPRESA.3816>
55. Samaha, K., Khlif, H., & Hussainey, K. (2015). The impact of board and audit committee characteristics on voluntary disclosure: A meta-analysis. *Journal of International Accounting, Auditing and Taxation*, 24, 13–28. <https://doi.org/10.1016/j.intaccaudtax.2014.11.001>
56. Sarhan, A. A., Elmagrhi, M. H., & Elkhashen, E. M. (2024). Corruption prevention practices and tax avoidance: The moderating effect of corporate board characteristics. *Journal of International Accounting, Auditing and Taxation*, 55. <https://doi.org/10.1016/j.intaccaudtax.2024.100615>
57. Sarpong-Danquah, B., Gyimah, P., Afriyie, R. O., & Asiama, A. (2018). Corporate Governance and Firm Performance: An Empirical Analysis of Manufacturing Listed Firms in Ghana. *Accounting and Finance Research*, 7(3), 111. <https://doi.org/10.5430/afr.v7n3p111>
58. Sarpong-Danquah, B., Oko-Bensa-Agyekum, K., & Opoku, E. (2022). Corporate governance and the performance of manufacturing firms in Ghana: Does ownership structure matter? *Cogent Business and Management*, 9(1). <https://doi.org/10.1080/23311975.2022.2101323>
59. Schiavi, G. S., Behr, A., & Marcolin, C. B. (2024). Institutional theory in accounting information systems research: Shedding light on digital transformation and institutional change. *International Journal of Accounting Information Systems*, 52. <https://doi.org/10.1016/j.accinf.2023.100662>
60. Shan, Y. G., Troshani, I., Wang, J., & Zhang, L. (2024). Managerial ownership and financial distress: evidence from the Chinese stock market. *International Journal of Managerial Finance*, 20(1), 192–221. <https://doi.org/10.1108/IJMF-06-2022-0270>
61. Sharma, A., & Singh, K. (2024). Ownership and state-based underpinnings of financial distress among successful entrepreneurial firms. *Journal of Small Business and Enterprise Development*. <https://doi.org/10.1108/JSBED-07-2024-0379>
62. Tanbour, K. M., Ben Saada, M., & Nour, A. I. (2025). The impact of applying internal auditing standards on banking risk management during crises: a field study on banks operating in Palestine. *Journal of Financial Reporting and Accounting*. <https://doi.org/10.1108/JFRA-11-2024-0816>

63. Tarkom, A., & Ujah, N. U. (2023). Inflation, interest rate, and firm efficiency: The impact of policy uncertainty. *Journal of International Money and Finance*, 131. <https://doi.org/10.1016/j.jimonfin.2022.102799>
64. Vo Van, H., Abu Afifa, M., & Saleh, I. (2024). Accounting information systems and organizational performance in the cloud computing era: evidence from SMEs. *Sustainability Accounting, Management and Policy Journal*. <https://doi.org/10.1108/SAMPJ-01-2024-0044>
65. Yousefi Nejad, M., Sarwar Khan, A., & Othman, J. (2024). A panel data analysis of the effect of audit quality on financial statement fraud. *Asian Journal of Accounting Research*, 9(4), 422–445. <https://doi.org/10.1108/AJAR-04-2023-0112>
66. Zaid, M. A. A. (2023). Do professional shareholders matter for corporate compliance with IFRS reporting requirements: the moderating effect of board independence. *International Journal of Accounting and Information Management*, 31(4), 647–675. <https://doi.org/10.1108/IJAIM-02-2023-0025>
67. Zhong, W., Xu, W., Han, M., Zhong, J., & Albitar, K. (2025). Driving ESG excellence: Analysing China's green finance policy with double/debiased machine learning. *International Journal of Finance & Economics*. <https://doi.org/10.1002/ijfe.3142>

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.