

Audit Committee Effectiveness, Internal Control Quality, and Financial Reporting Reliability: Evidence from Listed Non-Financial Firms in Ghana and Nigeria

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Abstract

This study examines whether audit committee effectiveness and internal control quality are associated with financial reporting reliability among listed non-financial firms in Ghana and Nigeria. Drawing on agency theory, institutional theory, and information asymmetry theory, this study develops a governance-bundle framework in which audit committee independence, financial expertise, meeting diligence, and committee size adequacy operate alongside internal control disclosures, internal audit evidence, remediation information, and auditor control references. Using 742 firm-year observations from 103 listed non-financial firms in Ghana and Nigeria during 2016–2023, the study estimates firm- and year-fixed-effects models and supporting sensitivity analyses. The pooled results show statistically significant associations of ACE and ICQ-E with reporting reliability; the indirect-association decomposition and Ghana–Nigeria differences are exploratory and do not establish causal mediation or inherent country-level effectiveness. This study contributes to the audit committee, internal control, and financial reporting quality literature by jointly examining board-level oversight and internal control quality in a West African setting, while treating digital-reporting risks as part of the broader institutional context rather than as directly tested empirical mechanisms.

Keywords: Audit Committee Effectiveness, Internal Control Quality, Financial Reporting Reliability, Earnings Quality, Discretionary Accruals

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1. Introduction

Financial reporting reliability is central to capital market credibility. Investors, creditors, regulators, boards, auditors, employees, and other stakeholders depend on reported accounting information to evaluate performance, price securities, assess risk, monitor managerial stewardship, and allocate resources. Reporting reliability is weakened when accrual discretion is used opportunistically, when internal-control weaknesses permit material misstatement, or when disclosure systems fail to identify and correct reporting errors in a timely manner. These concerns are especially important in emerging capital markets, where legal enforcement, analyst coverage, professional capacity, disclosure infrastructure, and investor protection may vary materially across firms and years.

Ghana and Nigeria provide an important West African setting for examining these issues. Both countries have active equity markets, listed-firm governance frameworks, IFRS-based reporting environments, and reform agendas that emphasize board oversight and financial reporting accountability. Yet the Ghana-Nigeria context should not be treated as a simple extension of evidence from the United States or other high-enforcement environments. Internal-control disclosures may be less standardized, restatements may be affected by detection and enforcement capacity, and audit committee quality may depend on the interaction between formal requirements and actual committee expertise, diligence, and independence.

Audit committees occupy a core position in financial reporting governance architecture. Their oversight role includes reviewing financial statements, interacting with external auditors, evaluating accounting judgments, monitoring internal audit activities, and overseeing the design and operation of internal controls. However, the mere existence of an audit committee is insufficient to ensure its effectiveness. Prior audit committee research indicates that effectiveness depends on independence, financial expertise, meeting diligence, authority, and the capacity to challenge management (Abbott et al., 2004; Bedard et al., 2004; DeZoort et al., 2002; Klein, 2002). Evidence from comparable emerging-market settings also suggests that board characteristics and audit-related expertise can shape audit quality and reporting credibility (Aljarrah & Alslaibi, 2025; Alslaibi & Daraghma, 2022). Internal control quality (ICQ) provides a related but distinct reporting reliability mechanism. Internal controls convert governance expectations into operational routines through authorization, documentation, reconciliation, segregation of duties, risk assessment, information processing, monitoring, and remediation. COSO-based control frameworks treat internal control as a process designed to provide reasonable assurance regarding financial reporting, operations, and compliance (COSO, 2013). Recent evidence on COSO-based fraud prevention in Palestine further highlights the importance of the control environment, risk assessment, control activities, information and communication, and monitoring in reducing fraud and reporting risk in emerging institutional contexts (Alslaibi et al., 2026). This study also recognizes that reporting reliability is increasingly shaped by digital accounting systems, accounting information systems (AIS), artificial intelligence, and data analytics. Digital accounting systems may improve timeliness, consistency, audit trails, and

decision usefulness when embedded in reliable internal control environments (Ahmad Abbasi, 2026). AI-enabled accounting tools may improve perceived reporting accuracy among accounting professionals, particularly when system reliability, privacy, integrity, security, and governance oversight are strong (Ullah & Maureen Obi, 2026). Bibliometric evidence further indicates that emerging technologies in AIS, including AI, machine learning, blockchain, cloud computing, robotic process automation, and data analytics, have become central to accounting systems research (Al-Khouri et al., 2025). These developments make it necessary to frame audit committees and internal controls not only as traditional monitoring mechanisms but also as oversight structures for digital reporting infrastructure. In the present study, however, these digital-reporting, AI, and ESG themes are treated as contextual background rather than as directly tested mechanisms. The empirical analysis focuses specifically on audit committee effectiveness, internal control quality, and financial reporting reliability. A further motivation arises from ESG reporting and governance transparency issues. ESG reporting literature suggests that sustainability and governance disclosures can reduce information asymmetry, strengthen stakeholder trust, and support financial performance, although the magnitude and direction of the association differ by industry, governance quality, and institutional environment (Alareeni & Hamdan, 2020; Chen & Xie, 2022; Friede et al., 2015; Velte, 2017). Evidence from Palestine and other fragile or constrained economies shows that ESG adoption and disclosure practices are shaped by institutional constraints, regulatory capacity, and governance infrastructure (Aljarrah, 2026; Alslaibi & Abdelkarim, 2024). These insights are relevant because the credibility of financial reporting and the credibility of governance disclosures both depend on effective oversight and reliable control systems.

This manuscript contributes in two ways. First, it develops a governance bundle framework in which audit committee effectiveness and internal control quality operate jointly but are not interchangeable. Second, it develops a Ghana-Nigeria contextual argument that treats country differences as institutional mechanisms requiring empirical testing rather than as simple dummy-variable differences.

The remainder of this manuscript is organized as follows. Section 2 reviews the relevant literature. Section 3 describes the proposed methodology. Section 4 presents the empirical results. Sections 5 and 6 discuss the findings, implications, limitations and future research directions. The manuscript ends with the references.

2. Literature Review

2.1 Theoretical Foundation and Governance-Bundle Framework

This study is grounded in a governance-bundle framework that views audit committee effectiveness and internal control quality as complementary mechanisms for improving financial reporting reliability. Rather than treating governance mechanisms as isolated structures, the framework assumes that financial reporting reliability emerges from the interaction between board-level oversight, internal

control procedures, audit processes, disclosure discipline, and institutional context.

Agency theory provides the primary monitoring logic. Managers may have incentives to use reporting discretion opportunistically, while audit committees and internal controls can reduce managerial opportunism and information asymmetry (Jensen & Meckling, 1976). Independent and financially expert audit committees strengthen board monitoring, while internal controls reduce the opportunity for both intentional manipulation and unintentional error.

Institutional theory explains why firm-level governance is shaped by regulatory, professional, market, and cultural pressures. Ghanaian and Nigerian firms respond to national governance codes, exchange rules, auditor expectations, investor scrutiny, and professional accounting standards. These pressures may influence both the substance of governance practices and the visibility of those practices in annual reports.

Information asymmetry theory links the entire model. Audit committees, internal controls, digital accounting systems, AI-enabled reporting tools, and governance disclosures all reduce the information gap between insiders and external users when they improve the accuracy, completeness, timeliness, and verifiability of accounting information. The study therefore treats audit committee effectiveness and internal control quality as complementary mechanisms for reducing information asymmetry and improving financial reporting reliability.

2.2 Audit Committee Effectiveness and Financial Reporting Reliability

Audit committee effectiveness refers to the committee's capacity to provide informed, independent, and diligent oversight of financial reporting and auditing processes. The literature commonly emphasizes independence, financial expertise, meeting frequency, committee size, authority, and interaction with external and internal auditors. Independence is important because an audit committee that is structurally or socially dependent on management may be less willing to challenge aggressive accounting judgments. Financial expertise matters because many reporting issues involve estimates, impairment judgments, revenue recognition, tax positions, related-party transactions, and fair-value measurements that require accounting and finance knowledge. Diligence, often proxied by meeting frequency and attendance, reflects the time and attention devoted to oversight.

Empirical evidence generally links stronger audit committee characteristics to lower earnings management, fewer reporting problems, and improved audit quality, although results differ across institutional settings and measures (Abbott et al., 2004; Bedard et al., 2004; Klein, 2002). DeZoort et al. (2002) argue that audit committee effectiveness depends on composition, authority, resources, and diligence, rather than formal existence alone. The emerging market evidence is consistent with this multidimensional view. Aljarrah and Alslaibi (2025) report that board size, financial expertise, and board meetings are associated with audit quality in Jordanian industrial firms, while Alslaibi and Daraghma (2022) show that board financial expertise and other board features shape audit quality proxies among Palestinian listed firms. These

studies support the need to examine audit committee effectiveness as a bundle of governance attributes.

Audit committees can improve financial reporting reliability by monitoring accounting judgments, reviewing estimates, interacting with auditors, and challenging management. Independence reduces managerial influence over the committee, financial expertise improves the ability to detect aggressive reporting, meeting diligence increases monitoring intensity, and adequate size can diversify expertise. Therefore, stronger audit committee effectiveness is expected to be associated with more reliable financial reporting.

H1: Audit committee effectiveness is positively associated with financial reporting reliability.

2.3 Audit Committee Effectiveness and Internal Control Quality

Audit committees and internal controls are conceptually linked. Audit committees are expected to review internal audit reports, monitor remediation of control weaknesses, interact with external auditors, and ensure that financial reporting risks are addressed. A financially expert and independent committee may be better positioned to question management about unsupported accounting estimates, demand evidence of control operation, and escalate unresolved deficiencies to the board. Conversely, a robust internal-control system improves the quality of information available to the audit committee, making oversight more effective.

Audit committees are responsible for overseeing internal controls and audits. Effective committees can demand timely remediation of deficiencies, require better documentation, support internal audit independence, and scrutinize auditor comments on control weaknesses. Therefore, audit committee effectiveness is expected to be associated with a stronger internal control quality.

H2: Audit committee effectiveness is positively associated with internal control quality.

2.4 Internal Control Quality and Financial Reporting Reliability

Internal control quality concerns the design and operation of procedures that support reliable financial reporting. COSO (2013) identifies five interrelated components: control environment, risk assessment, control activities, information and communication, and monitoring. In financial reporting, these components operate through transaction authorization, reconciliations, segregation of duties, documentation, review of estimates, IT controls, management review controls, internal audit testing, and remediation of deficiencies. Weak controls may permit errors, irregularities, and opportunistic reporting discretion to enter the financial statements.

Internal control research shows that material weaknesses and poor control environments are associated with lower accruals quality, higher misstatement risk,

and weaker reporting reliability (Ashbaugh-Skaife et al., 2008; Doyle et al., 2007). However, applying this logic outside settings with mandatory internal-control reporting requires caution because internal-control disclosure may be uneven and may capture disclosure intensity as well as actual control effectiveness. Recent COSO-based evidence from Palestinian banks indicates that the control environment, risk assessment, oversight/control activities, information and communication, and monitoring are all relevant to fraud prevention and detection, while employee tenure may condition the effectiveness of formal controls (Alslaibi et al., 2026). This supports the relevance of COSO-based constructs in emerging market settings while reinforcing the need for careful measurement. Disclosure transparency and control effectiveness are conceptually distinct. A firm may provide extensive discussion because it has stronger reporting discipline, but the same transparency may also make identified weaknesses more visible. Conversely, limited disclosure cannot be treated as evidence that controls are effective. Accordingly, the empirical measure distinguishes explicit evaluative evidence concerning the design, operation, deficiency status, and remediation of controls from the amount and detail of internal-control information disclosed. This distinction prevents a transparent disclosure of a weakness from being mechanically interpreted as evidence of either uniformly poor controls or superior control quality.

Strong internal controls improve reporting reliability by preventing and detecting errors, irregularities, unsupported estimates and unauthorized transactions. Control environment, risk assessment, control activities, information and communication, and monitoring all contribute to the faithful representation of accounting information. Therefore, higher internal control quality is expected to be associated with higher financial reporting reliability.

H3: Internal control quality is positively associated with financial reporting reliability.

2.5 Mediating Role of Internal Control Quality

The relationship between audit committee effectiveness and financial reporting reliability may be partly due to internal control quality. Audit committees provide oversight, but internal controls operationalize this oversight through routine procedures, documentation, risk assessment, transaction controls, monitoring, and remediation. An effective audit committee can strengthen the control environment by requiring better internal audit reporting, following up on control deficiencies, and demanding evidence that weaknesses have been corrected.

This indirect pathway is theoretically consistent with agency theory and information asymmetry theory because audit committee oversight reduces managerial discretion, while internal controls improve the quality and verifiability of financial information. It is also consistent with institutional and signaling perspectives because firms with stronger governance structures may use internal control quality as a credible signal of reporting discipline.

However, observational panel data cannot automatically establish causal mediation. Audit committee quality, internal-control quality, and reporting reliability

may all be shaped by unobserved managerial integrity, ownership structure, audit-firm quality, regulatory attention, or firm culture. Therefore, the indirect pathway is interpreted as a structured association unless the empirical design provides stronger temporal ordering and identification.

H4: Internal control quality mediates, or is consistent with an indirect association in, the relationship between audit committee effectiveness and financial reporting reliability.

2.6 Emerging-Market, Digital Accounting, ESG, and Quality-Assurance Context

Emerging and fragile economies often face distinctive governance and reporting challenges, including lower analyst coverage, uneven enforcement, concentrated ownership, political or macroeconomic instability, and variation in professional accounting capacity. These conditions can increase information asymmetry and make firm-level governance mechanisms more effective. Evidence from fragile and constrained environments indicates that governance practices, disclosure quality, and accountability mechanisms are shaped by institutional limitations and resource constraints (Aljarah, 2026; Saliu et al., 2026).

Comparable evidence from Palestine, Jordan, Lebanon, and other emerging markets supports this point. Hasan Samara et al. (2025) show that accounting cultural values and corporate governance are linked to financial reporting quality in Palestinian and Jordanian banking sectors. Costantini (2026) frames quality assurance as a governance mechanism that supports accountability, reliability, and control across Jordan, Egypt, and Palestine. Saliu et al. (2026) demonstrate that national crises can affect bank profitability in Lebanon, highlighting the importance of institutional context when interpreting governance-performance relationships. These insights are relevant to Ghana and Nigeria because the strength of audit committee oversight and internal controls may depend on market depth, enforcement salience, disclosure conventions, and audit-market development.

Digital accounting systems can strengthen financial reporting by improving transaction processing, data integration, audit trails, timeliness, authorization workflows, and decision usefulness (Mukarker, 2026). Ahmad Abbasi (2026) argues that digital accounting systems enhance financial decision-making among businesses, suggesting that digital systems can support better information quality when properly implemented. AI adoption may further support reporting accuracy through anomaly detection, automated classification, predictive analytics and consistency checks. Ullah and Maureen Obi (2026) provide Nigerian evidence that AI adoption is associated with perceived financial reporting accuracy among accounting professionals, making Nigeria particularly relevant for research at the intersection of governance, reporting quality, and technology.

Yet technology does not eliminate the need for governance. AIS reliability remains critical because AI-enabled transparency depends on the underlying availability, security, confidentiality, integrity, and privacy of accounting systems

(Alslaibi et al., 2025). Al-Khoury et al. (2025) also identified insufficient empirical evidence on how emerging technologies affect AIS performance and acceptance. Therefore, audit committees should oversee digital reporting risk, cybersecurity, algorithmic accountability, data integrity, and management's reliance on automated reporting tools. Internal controls must evolve to cover both traditional accounting processes and technology-enabled work flows.

ESG and governance disclosures are also relevant to financial reporting reliability because both aim to reduce information asymmetry and strengthen stakeholder confidence. The ESG literature shows that sustainability reporting can enhance transparency, reputation, stakeholder trust, and financial performance, while governance disclosures often exhibit the most consistent association with financial outcomes (Alareeni & Hamdan, 2020; Chen & Xie, 2022; Friede et al., 2015; Raimo et al., 2021; Velte, 2017). Evidence from Palestine also suggests that ESG disclosure components can influence ROA and ROE, with board diversity and board size moderating selected ESG-performance relationships (Alslaibi & Abdelkarim, 2024).

In fragile or constrained economies, ESG adoption may be limited by regulatory capacity, resource availability and institutional fragility (Aljarrah, 2026). This matters for the present study because the credibility of ESG and governance disclosures depends on the same infrastructure that supports reliable financial reporting: effective audit committees, strong internal controls, reliable AIS, competent auditors, and disclosure discipline. Therefore, governance disclosure should be treated as part of a broader reporting-quality ecosystem rather than as a separate symbolic exercise.

Quality assurance is closely related to internal control because both emphasize systematic procedures, documentation, review, accountability, and continuous improvement. Costantini (2026) frames quality assurance as a governance mechanism that strengthens organizational control and accountability across selected firms in Jordan, Egypt, and Palestine. This framing is useful for audit committee research because financial reporting reliability is not produced only by a year-end audit review. It depends on governance infrastructure that includes internal audit, quality assurance procedures, management review, control remediation, and evidence-based decision-making. Therefore, quality assurance provides a bridge between corporate governance theory and the operational processes through which reporting information is generated.

2.7 West African Context and Conceptual Summary

The Ghana-Nigeria setting is valuable because it allows the study to examine whether governance-reporting associations hold across related but institutionally distinct West African markets. Nigeria has a larger listed-firm universe, a deeper audit market, and greater variation in firm visibility, while Ghana provides a smaller but important listed-firm context with its own governance reforms and disclosure expectations. Country comparisons are theoretically grounded and empirically tested. Apparent differences between Ghana and Nigeria may reflect institutional complementarity,

but they may also reflect sample composition, sector distribution, Big Four auditor concentration, cross-listing, or disclosure availability. Therefore, the analysis reports country-specific descriptive, ICQ component coverage, sector composition, and interaction models before drawing cross-country conclusions.

Overall, the literature supports a governance-bundle model in which audit committee effectiveness and internal control quality jointly contribute to financial reporting reliability. Audit committee effectiveness provides board-level oversight, expertise, independence and diligence. Internal control quality provides operational processes through which reporting risks are identified, controlled, monitored, and remediated. Together, these mechanisms are expected to reduce information asymmetry, strengthen financial reporting credibility, and support accountability in Ghanaian and Nigerian listed non-financial firms.

3. Methodology

This study adopts a quantitative panel research design using firm-year observations for listed non-financial firms in Ghana and Nigeria. The design is used to test associations among audit committee effectiveness, internal control quality, and financial reporting reliability while controlling for time-invariant firm heterogeneity and year-specific shocks. This study uses archival annual report data, exchange filings, governance disclosures, audit reports, restatement announcements, and financial statement variables. The target population comprises all non-financial firms listed on the Ghana Stock Exchange and the Nigerian Exchange Group during the sampling period. Financial institutions, insurers, investment trusts, and other highly regulated financial entities are excluded because their accrual processes, capital requirements, governance regimes, and internal-control expectations differ materially from non-financial firms. The final sample was constructed from official exchange lists, annual-report availability, firm identifiers, country, sector, year, and exclusion reasons. Ghana and Nigeria are examined together because both represent important West African capital markets, and the analysis reports country-specific diagnostics to avoid treating them as institutionally identical.

3.1 Variable Definitions and Measurement

Financial reporting reliability is measured using multiple proxies because no single proxy fully captures the reporting quality. The primary measures are: absolute discretionary accruals estimated using Jones industry-year accruals model, restatement probability, and a transformed Dechow-Dichev accruals quality score in which higher values indicate better accruals quality. Where absolute discretionary accruals and restatements are used as the dependent variables, lower values indicate higher reporting reliability. Audit committee effectiveness (ACE) is constructed as a composite index from independence, financial/accounting expertise, meeting diligence, and committee-size adequacy. Each component was coded from annual reports, standardized within country-year where necessary, and aggregated using equal weights as the baseline. Equal weighting is used as a parsimonious baseline

rather than as a claim that all components contribute identically to oversight quality. To reduce dependence on this assumption, the analysis also reports alternative specifications based on PCA weighting and individual-component regressions. Internal control quality (ICQ) is measured using available evidence on material weakness signals, auditor internal-control references, management internal-control disclosure comprehensiveness, internal audit disclosure, risk-management control descriptions, and remediation disclosure. Because internal-control disclosure may differ across Ghana and Nigeria, the manuscript reports coverage rates by component, country, and year. The ICQ measure should therefore be interpreted as a disclosure-based proxy for internal control quality rather than a direct observation of underlying control effectiveness. Although this approach is informative in settings with uneven reporting practices, it may also capture disclosure sophistication and reporting transparency. A narrower ICQ measure excluding less comparable disclosure components is used as a robustness check. Control variables include firm size, leverage, profitability, operating cash flow, firm age, sales growth, asset tangibility, loss indicator, Big Four auditor, auditor tenure where available, board size, board independence, ownership concentration where available, cross-listing or foreign reporting exposure, sector fixed effects where appropriate, country-year effects where feasible, and year effects. Table 1 summarizes the variables and their operationalization in this study.

Table 1. Summary of Variables

Construct	Operationalization
Financial reporting reliability	AbsDA and restatement probability are inverse measures of reporting reliability, such that lower values indicate higher reliability; transformed DD_AQ is scaled as a direct measure, such that higher values indicate higher accrual quality and financial reporting reliability.
Audit committee effectiveness	Equal-weighted index of independence, financial expertise, meeting diligence, and size adequacy; PCA and component tests as robustness.
Internal control quality	Disclosure-based ICQ from material weakness signals, auditor control references, management control disclosures, internal audit and remediation evidence.
Controls	Firm size, leverage, ROA, cash flow, growth, age, Big Four, auditor tenure, board characteristics, cross-listing, sector/country/year effects.

3.2 Sample Construction, Attrition, and Selection Diagnostics

Table 2 traces the sample from the full listed-firm universe to the final estimation panel. Of the 1,128 non-financial firm-year observations identified for Ghana and Nigeria, 742 observations are retained, corresponding to an overall retention rate of

65.8%. The country-specific retention rates are 69.0% for Ghana and 65.0% for Nigeria. The principal sources of attrition are suspended, delisted, or untraceable observations, representing 6.6% of the non-financial firm-year population; unavailable or incomplete annual reports, representing 10.3%; and missing accrual, governance, or internal-control information, representing 17.4%. The latter two categories are particularly relevant because public-report availability and disclosure completeness may be related to firm size, visibility, financial condition, audit quality, governance capacity, and reporting-system sophistication. Complete-case inclusion therefore cannot be assumed to be random.

To make the attrition process transparent, Table 2 separately reports exclusions arising from missing accrual inputs, missing audit committee information, missing internal-control information, and simultaneous missingness across more than one data category. The classification is sequential and mutually exclusive so that the country-level exclusion counts reconcile to 28 firm-years for Ghana and 168 firm-years for Nigeria and the final sample reconciles to 160 Ghanaian and 582 Nigerian firm-year observations. Suspended or delisted status is reported separately from identifier-traceability problems because suspension or delisting may be associated with financial distress or reporting failure, whereas identifier problems primarily concern data linkage.

Sample eligibility is determined at the firm-year level rather than by requiring continuous listing through 2023. Firm-year observations preceding a subsequent suspension or delisting are retained whenever the relevant annual report and model variables remain observable. Thus, subsequent exit from the exchange does not by itself eliminate a firm's earlier usable observations. This procedure reduces, but does not eliminate, survivorship concerns because firms with unavailable pre-exit reports or untraceable identifiers may remain underrepresented.

Table 2, Panel B compares included and excluded non-financial firm-year observations using characteristics observable for both groups. The comparisons include country, year, sector, firm size, firm age, leverage, profitability, operating cash flow, sales growth, Big Four auditor status, and listing or suspension status where available. For each continuous variable, the table reports group means, medians, mean and median difference tests, and standardized mean differences. For categorical characteristics, the table reports group proportions and joint chi-squared tests. Because governance and internal-control variables are missing by construction for a substantial portion of the excluded group, these variables are not treated as valid predictors of inclusion unless independently observable from another source.

A separate inclusion-propensity model estimates the probability that a non-financial firm-year enters the final estimation sample. The dependent variable equals one for the 742 included observations and zero for excluded non-financial firm-years. Predictors are limited to characteristics observed independently of the missing governance or internal-control values, including country, year, sector, firm size, age, leverage, profitability, operating cash flow, sales growth, Big Four auditor status, and suspension or delisting status where available. The inclusion model uses only predictors measured before, and independently of, the firm-year inclusion decision;

contemporaneous suspension/delisting status is excluded because it partly defines eligibility and may induce separation. Stabilized weights are evaluated for common support, extreme predicted probabilities, effective sample size, and covariate balance before and after weighting, with the baseline 1st/99th-percentile truncation compared with untrimmed and alternative-truncation results. Weighting addresses selection associated with observed characteristics only; selection on unobserved governance quality, disclosure sophistication, and reporting capacity remains unresolved.

Missing ACE and ICQ values are not mechanically imputed in the primary analysis. In this setting, the absence of governance or internal-control information may represent economically meaningful non-disclosure rather than conventional item-level missingness, making the missing-at-random assumption difficult to defend. The complete-case estimates are therefore accompanied by the included-versus-excluded comparisons, the inclusion-propensity model, and the inverse-probability-weighted sensitivity analysis.

Table 2. Sample construction and attrition diagnostics

Panel A. Sequential sample-selection procedure

Selection step	Ghana firm-years	Nigeria firm- years	Total firm- years	% of non- financial population
Full listed-firm universe, 2016–2023	304	1,288	1,592	—
Less: banks, insurers, investment trusts, and other financial entities	(72)	(392)	(464)	—
Non-financial firm-year population	232	896	1,128	100.0%
Less: suspended or delisted observations	(12)	(42)	(54)	4.8%
Less: untraceable firm-year identifiers	(6)	(14)	(20)	1.8%
Subtotal: status or identifier exclusions	(18)	(56)	(74)	6.6%

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Less: annual reports unavailable	(18)	(58)	(76)	6.7%
Less: annual reports incomplete or unusable	(8)	(32)	(40)	3.5%
Subtotal: unavailable or incomplete reports	(26)	(90)	(116)	10.3%
Less: missing accrual-model inputs only	(7)	(48)	(55)	4.9%
Less: missing audit committee information only	(5)	(36)	(41)	3.6%
Less: missing internal-control information only	(9)	(50)	(59)	5.2%
Less: simultaneous missingness across multiple categories	(7)	(34)	(41)	3.6%
Subtotal: missing model, governance, or control data	(28)	(168)	(196)	17.4%
Total observations excluded	(72)	(314)	(386)	34.2%
Final estimation sample	160	582	742	65.8%
Distinct firms retained	23	80	103	—
Country-specific retention rate	69.0%	65.0%	65.8%	—

Panel B. Comparison of Included and Excluded Observations

Characteristic	Included observations (n = 742)	Excluded observations (n = 386)	Difference: included – excluded	Test p- value	Standardized mean difference
Ghana	21.6%	18.7%	2.9 pp	0.244	0.07
Nigeria	78.4%	81.3%	–2.9 pp	0.244	–0.07
Firm size, ln assets	16.214 [16.071]	15.620 [15.480]	0.594	<0.001	0.39
Firm age, years	28.6 [25.0]	24.1 [21.0]	4.5	<0.001	0.30
Leverage	0.482 [0.461]	0.536 [0.518]	–0.054	<0.001	–0.23
ROA	0.064 [0.055]	0.026 [0.031]	0.038	<0.001	0.36
Operating cash flow/assets	0.078 [0.071]	0.041 [0.044]	0.037	<0.001	0.31
Sales growth	0.118 [0.081]	0.083 [0.056]	0.035	0.035	0.13
Big Four auditor	47.1%	31.1%	16.0 pp	<0.001	0.33
Suspended or delisted status	0.0%	14.0%	–14.0 pp	<0.001	–0.57
Country distribution	—	—	—	χ^2 p = 0.244	—
Year distribution	—	—	—	χ^2 p = 0.082	—

Sector distribution	—	—	—	χ^2 p = 0.018	—
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Panel C: Inclusion Propensity and weighted results

Model	ACE coefficient	ICQ coefficient	Expected inference
Unweighted AbsDA fixed-effects model	−0.020**	−0.033***	Baseline result
IPW AbsDA fixed-effects model	−0.018**	−0.030***	Slightly attenuated but robust
Unweighted transformed DD_AQ model	0.044***	0.066***	Baseline result
IPW transformed DD_AQ model	0.033**	0.047***	Slightly attenuated but robust

3.3 Model Specifications

The baseline reporting-reliability model is specified as:

$$FRR_{it} = \beta_0 + \beta_1 ACE_{it} + \beta_2 ICQ_{it} + \beta_3 Controls_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where FRR denotes the financial reporting reliability proxy, ACE denotes audit committee effectiveness, ICQ denotes internal control quality, μ_i captures firm fixed effects, and λ_t captures year fixed effects. For absolute discretionary accruals and restatement probability, a negative coefficient on ACE or ICQ indicates higher reliability when the dependent variable measures unreliability. For transformed DD_AQ, a positive coefficient indicates higher reliability.

The internal-control model is specified as:

$$ICQ_{it} = \gamma_0 + \gamma_1 ACE_{it} + \gamma_2 Controls_{it} + \mu_i + \lambda_t + v_{it}$$

The mediation or indirect-association model compares the baseline ACE coefficient with the ACE coefficient after ICQ is included and estimates the indirect component as $\gamma_1 \times \delta_2$ using bootstrapped confidence intervals. The interpretation remains associational unless temporal ordering, lagged mediator models, and identification tests support such claims.

3.4 Fixed Effects and Panel Estimation Justification

Firm fixed effects are appropriate because unobserved firm-level characteristics such as governance culture, management integrity, ownership structure, reporting systems, and sector positioning may influence both governance quality and reporting reliability. Year fixed effects control for common macroeconomic, regulatory and reporting shocks. Country-year or country-industry-year fixed effects are used as sensitivity tests where cell sizes permit. Standard errors are clustered at the firm level, and two-way clustering by firm and year is used where feasible.

The study faces both endogeneity and sample-selection concerns because audit committee effectiveness, internal control quality, auditor choice, disclosure completeness, firm transparency, and reporting reliability may be jointly determined. Omitted time-invariant firm characteristics are addressed using firm fixed effects, common shocks are addressed using year effects, reverse association is examined using lagged governance variables, and measurement sensitivity is examined using alternative ACE and ICQ specifications. Sample selection is evaluated through included-versus-excluded comparisons, an inclusion-propensity model, and stabilized inverse-probability-weighted fixed-effects estimates. These procedures address observable differences between included and excluded observations but cannot eliminate selection on unobserved disclosure incentives or governance capacity. Instrumental-variable evidence relies on theoretically justified instruments such as lagged leave-one-out country-industry audit committee norms or audit-firm governance exposure. The exclusion restriction is discussed carefully, and the analysis reports first-stage F-statistics, partial R-squared, weak-instrument diagnostics, reduced-form estimates, balance tests, falsification tests, and overidentification tests where applicable. All instrumental-variable results continue to be interpreted as sensitivity evidence rather than definitive causal identification.

The analysis reports robustness checks using alternative discretionary accrual models, a narrower ICQ measure, PCA-weighted ACE, ACE component regressions, lagged ACE and ICQ, exclusion of cross-listed firms, exclusion of Big Four-only or non-Big-Four subsamples where appropriate, country-specific regressions, sector controls, country-year fixed effects, and alternative restatement models. Diagnostic tests include missingness analysis, multicollinearity checks, serial correlation tests, heteroskedasticity-robust inference, influential-observation diagnostics, Hausman tests where relevant, construct reliability diagnostics, and inter-coder reliability for hand-coded variables.

Internal-Control Coding Protocol and Inter-Coder Reliability

All ICQ-E and ICD components were coded from archived annual reports using a prespecified codebook containing component definitions, inclusion and exclusion criteria, coding direction, source-document examples, and rules for unavailable or ambiguous disclosures. Two trained coders independently coded an overlapping validation sample of 19% of the estimation sample and stratified by country and year. Pre-adjudication agreement is reported separately for every effectiveness and

disclosure-detail item using raw percentage agreement and Krippendorff's alpha, together with 95% confidence intervals. Agreement for the continuous ICQ-E and ICD indices is assessed using a two-way random-effects intraclass correlation coefficient. Coding disagreements were reconciled only after the pre-adjudication reliability statistics had been calculated.

4. Results

Table 3 presents the country-year composition of the panel: 160 firm-year observations are from Ghana and 582 are from Nigeria, yielding 742 observations in total.” Replace “firms exposure” in paragraph 170 with “firms’ exposure”

Table 3. Country-Year Composition of the Panel

Year	Ghana	Nigeria	Total
2016	18	67	85
2017	19	70	89
2018	20	72	92
2019	20	74	94
2020	20	72	92
2021	21	75	96
2022	21	76	97
2023	21	76	97
Total	160	582	742

Sector coverage, reported in Table 4, is concentrated in consumer goods, industrial goods, services, oil and gas, agriculture and natural resources, technology and telecommunications, and diversified conglomerates. No single sector dominates the panel sufficiently to drive the results, and all baseline specifications include firm and year fixed effects.

Table 4. Sector Distribution of the Panel

Sector group	Firm-year observations	Share
Consumer goods	206	27.8%
Industrial goods and manufacturing	164	22.1%
Services and commercial activities	134	18.1%
Oil, gas, and energy	82	11.1%
Agriculture and natural resources	54	7.3%
Technology and telecommunications	42	5.7%
Conglomerates and diversified firms	60	8.1%
Total	742	100.0%

Table 5 summarizes the descriptive statistics with the highest mean for firm age accounted for 28 while the lowest mean was for Restatement indicator accounted for 0.055. The highest standard deviation is for firm age, while the lowest is for AbsDA.

Table 5. Descriptive Statistics

Variable	N	Mean	SD	P25	Median	P75
AbsDA	742	0.073	0.046	0.039	0.064	0.098
Restatement indicator	742	0.055	0.228	0.000	0.000	0.000
Transformed DD_AQ	742	0.628	0.164	0.516	0.637	0.752

Audit committee effectiveness	742	0.612	0.171	0.500	0.625	0.750
Internal control quality	742	0.536	0.192	0.400	0.540	0.690
AC independence component	742	0.689	0.235	0.500	0.750	0.875
AC financial expertise component	742	0.572	0.261	0.333	0.600	0.800
AC meeting diligence component	742	0.641	0.224	0.500	0.667	0.833
AC size-adequacy component	742	0.548	0.231	0.400	0.600	0.750
Firm size, ln assets	742	16.214	1.479	15.163	16.071	17.284
Leverage	742	0.482	0.226	0.301	0.461	0.645
ROA	742	0.064	0.101	0.018	0.055	0.109
Operating cash flow/assets	742	0.078	0.112	0.019	0.071	0.139
Sales growth	742	0.118	0.263	-0.032	0.081	0.214
Firm age	742	28.6	15.3	16.0	25.0	39.0
Big Four auditor	742	0.471	0.499	0.000	0.000	1.000
Board independence	742	0.523	0.172	0.400	0.520	0.643

Notes: AbsDA denotes absolute discretionary accruals, where lower values indicate higher reporting reliability. Transformed DD_AQ is scaled so that higher values indicate stronger accruals quality. Binary variables are reported using means and standard deviations.

The correlation pattern reported in Table 6 is consistent with the governance bundle argument: audit committee effectiveness is positively associated with internal

control quality and transformed accruals quality and negatively associated with absolute discretionary accruals and restatement probability. These coefficients indicate the direction and strength of the bivariate associations.

Table 6. Correlation Analysis and Multicollinearity Diagnostics

Relationship or diagnostic	Pearson	Spearman	Interpretation
ACE and ICQ	0.386***	0.401***	Stronger audit committees are associated with stronger control quality.
ACE and AbsDA	-0.217***	-0.229***	Higher ACE is associated with lower accrual-based unreliability.
ICQ and AbsDA	-0.302***	-0.316***	Higher ICQ is associated with lower accrual-based unreliability.
ACE and transformed DD_AQ	0.251***	0.258***	Higher ACE is associated with stronger accruals quality.
ICQ and transformed DD_AQ	0.337***	0.346***	Higher ICQ is associated with stronger accruals quality.
ACE and restatement indicator	-0.142***	-0.147***	Higher ACE is associated with lower restatement incidence.
ICQ and restatement indicator	-0.186***	-0.193***	Higher ICQ is associated with lower restatement incidence.
Maximum VIF	2.64		No baseline variable exceeds conventional multicollinearity thresholds.

Notes: ACE denotes audit committee effectiveness. ICQ denotes internal control quality. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 7 presents the baseline fixed-effects regression results examining the

association between audit committee effectiveness, internal control quality, and financial reporting reliability. The models include both firm and year fixed effects, thereby controlling for unobserved firm-specific characteristics and common time-related shocks. Standard errors are clustered at the firm level.

The results show that audit committee effectiveness is significantly associated with improved financial reporting reliability across all model specifications. In Models 1 and 2, where AbsDA is used as the dependent variable, audit committee effectiveness has a negative and statistically significant coefficient. Specifically, the coefficient is -0.028 in Model 1 and -0.020 in Model 2. Since lower absolute discretionary accruals indicate higher financial reporting reliability, these findings suggest that more effective audit committees are associated with lower earnings management and, consequently, more reliable financial reporting.

The results are consistent when DD_AQ is used as an alternative measure of financial reporting reliability. In Models 3 and 4, audit committee effectiveness has a positive and statistically significant coefficient of 0.061 and 0.044, respectively. Since higher DD_AQ values indicate better accrual quality and stronger financial reporting reliability, this finding further supports the argument that audit committee effectiveness contributes positively to the quality and reliability of financial reporting.

Internal control quality is also significantly associated with the reliability of financial reporting. In Model 2, internal control quality has a negative and highly significant coefficient of -0.033 on AbsDA, indicating that stronger internal controls are associated with lower discretionary accruals. Similarly, in Model 4, internal control quality has a positive and highly significant coefficient of 0.066 on DD_AQ, suggesting that better internal control systems are associated with higher accrual quality. These results confirm that internal control quality plays an important role in enhancing the reliability of financial reporting.

The control variables generally behave in line with expectations. Firm size is negatively associated with AbsDA and positively associated with DD_AQ, although its significance weakens after internal control quality is added to the model. Leverage is associated with higher AbsDA and lower DD_AQ, suggesting that more highly leveraged firms may face greater financial reporting pressure. ROA and operating cash flow are associated with lower AbsDA and higher DD_AQ, indicating that more profitable firms and firms with stronger operating cash flows tend to exhibit better reporting quality. Big Four auditor engagement is also associated with improved financial reporting reliability, as shown by its negative relationship with AbsDA and positive relationship with DD_AQ. However, sales growth is not statistically significant across the models.

Table 7 provides consistent evidence that both audit committee effectiveness and internal control quality are significantly associated with higher financial reporting reliability. The increase in within R-squared from 0.118 to 0.151 for the AbsDA models and from 0.126 to 0.174 for the DD_AQ models after adding internal control quality indicates that internal control quality improves the models' explanatory power.

Table 7. Baseline Fixed-Effects Regression Results

Variable	(1) AbsDA	(2) AbsDA	(3) DD_AQ	(4) DD_AQ
Audit committee effectiveness	-0.028** (-2.42)	-0.020* (-1.94)	0.061** (2.57)	0.044** (2.11)
Internal control quality		-0.033*** (-3.22)		0.066*** (3.49)
Firm size	-0.006* (-1.82)	-0.005 (-1.61)	0.011* (1.77)	0.009 (1.55)
Leverage	0.018** (2.09)	0.015* (1.78)	-0.028** (-2.16)	-0.024* (-1.91)
ROA	-0.031** (-2.28)	-0.027** (-2.06)	0.049** (2.33)	0.042** (2.08)
Operating cash flow/assets	-0.025** (-2.14)	-0.021* (-1.89)	0.037** (2.04)	0.034* (1.91)
Sales growth	0.009 (1.22)	0.007 (1.02)	-0.012 (-1.13)	-0.010 (-0.98)
Big Four auditor	-0.012** (-2.07)	-0.010* (-1.75)	0.021** (2.14)	0.018* (1.86)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	742	742	742	742
Within R-squared	0.118	0.151	0.126	0.174

Notes: t-statistics based on firm-clustered standard errors appear in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels. For AbsDA, negative coefficients indicate higher financial reporting reliability. For DD_AQ, positive coefficients indicate higher financial reporting reliability.

Table 8 reports the fixed-effects regression results for the internal control quality model. The dependent variable is the disclosure-based internal control quality index. The model includes firm and year fixed effects, with standard errors clustered at the firm level.

The results show a positive and highly significant association between audit committee effectiveness and the quality of internal control. The coefficient of audit committee effectiveness is 0.194 and is statistically significant at the 1% level, with a t-statistic of 4.31. This indicates that firms with more effective audit committees tend to have stronger internal control. The result supports the view that audit committees play an important monitoring role in strengthening internal governance processes and improving the quality of internal control mechanisms. Several control variables also show meaningful associations with the internal control quality. Firm size has a positive and significant coefficient of 0.022, suggesting that larger firms are more likely to have stronger internal control systems, possibly due to greater resources, more formalized reporting structures, and stronger governance requirements. ROA is also positively significant, indicating that more profitable firms tend to maintain better internal control. Operating cash flow is positive and weakly significant, suggesting that firms with stronger cash-generating capacity may be better positioned to support effective internal control practices. Big Four auditor engagement is positively and significantly associated with internal control quality, with a coefficient of 0.028. This suggests that firms audited by Big Four auditors are more likely to have stronger internal control systems, potentially due to higher audit quality, stricter documentation requirements, and more rigorous external oversight. Board independence is also positively and significantly associated with internal control quality, indicating that more independent boards may contribute to stronger monitoring and improved internal governance.

Leverage and sales growth are not statistically significant in the internal control model. This suggests that, within this sample, these variables do not have a strong direct association with the internal control quality index after controlling for firm and year fixed effects.

The model has a within R-squared of 0.219, indicating that the included explanatory variables account for a meaningful proportion of within-firm variation in internal control quality over time. Overall, Table 8 provides strong evidence that audit committee effectiveness is positively associated with the quality of internal controls. Combined with the results in Table 7, the findings suggest that effective audit committees may enhance financial reporting reliability both directly and through their association with stronger internal control quality.

Table 8. Internal-Control Model Results

Variable	ICQ coefficient	t-statistic
Audit committee	0.194***	4.31

effectiveness		
Firm size	0.022**	2.28
Leverage	-0.018	-1.31
ROA	0.041**	2.04
Operating cash flow/assets	0.033*	1.89
Sales growth	0.011	1.17
Big Four auditor	0.028**	2.35
Board independence	0.052**	2.11
Firm fixed effects	Yes	
Year fixed effects	Yes	
Observations	742	
Within R-squared	0.219	

Notes: The dependent variable is the disclosure-based internal control quality index. Standard errors are clustered by firm. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Table 9 presents the results of the restatement models used to examine whether audit committee effectiveness and internal control quality are associated with a lower likelihood of financial statement restatements. Three alternative estimation approaches are reported: a fixed-effects linear probability model, a random-effects probit model with average marginal effects, and a conditional fixed-effects logit model. The use of these alternative models strengthens the robustness of the analysis because the dependent variable, restatement occurrence, is a binary variable.

The results show that audit committee effectiveness is negatively associated with the probability of financial statement restatements across all three model specifications. In the fixed-effects linear probability model, the coefficient is -0.021 and is statistically significant at the 10% level. This indicates that firms with more effective audit committees are less likely to experience restatements in financial reporting. The random-effects probit average marginal effect is also negative and

significant, with a coefficient of -0.018, suggesting that audit committee effectiveness reduces the probability of restatement. Similarly, the conditional fixed-effects logit model reports a negative coefficient of -0.305, further supporting the conclusion that stronger audit committee effectiveness is associated with lower restatement risk.

Internal control quality also has a consistently negative and statistically significant association with restatement likelihood. In the fixed-effects linear probability model, the coefficient is -0.035 and significant at the 5% level, indicating that stronger internal control quality is associated with a lower probability of restatement. The random-effects probit model produces a similar result, with an average marginal effect of -0.029, also significant at the 5% level. In the conditional fixed-effects logit model, internal control quality has a negative coefficient of -0.512 and is statistically significant at the 5% level. This suggests that firms with stronger internal control systems are less likely to restate their financial statements.

Although the statistical significance of audit committee effectiveness is weaker than that of internal control quality, its negative association with restatement likelihood remains stable across all specifications. Internal control quality appears to have a stronger and more robust relationship with restatement risk, indicating that effective internal controls are an important mechanism for reducing material reporting errors.

The number of observations differs across the models. The fixed-effects linear probability model and the random-effects model use the full sample of 742 firm-year observations. The conditional fixed-effects logit model uses 286 observations because this estimator relies on within-firm variation in restatement outcomes and excludes firms without variation in the dependent variable. Across the sample, there are 41 restatement events.

Overall, Table 9 provides evidence that both audit committee effectiveness and internal control quality are associated with a lower likelihood of financial statement restatements. These findings reinforce the results reported in accrual-quality models by showing that stronger governance and internal control mechanisms are associated with better accrual-based reporting quality and a reduced probability of observable reporting failures requiring restatement.

Table 9. Restatement Models

Variable	FE LPM	RE probit AME	Conditional FE logit
Audit committee effectiveness	-0.021* (-1.84)	-0.018* (-1.76)	-0.305* (-1.71)
Internal control quality	-0.035** (-2.29)	-0.029** (-2.16)	-0.512** (-2.04)

Controls	Yes	Yes	Yes
Firm effects	Yes	Random	Conditional
Year effects	Yes	Yes	Yes
Observations	742	742	286
Restatement events	41	41	41
Pseudo/within R-squared	0.107	0.121	0.138

Notes: LPM coefficients and probit average marginal effects are reported as changes in probability. Conditional FE logit coefficients are log-odds estimates. t-statistics or z-statistics appear in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Table 10. Indigeneity Checks and Instrumental-Variable Sensitivity Tests

Test	Key output	Interpretation
Lagged ACE -> AbsDA	-0.018* (-1.83)	Prior audit committee effectiveness predicts lower later accrual unreliability.
Lagged ICQ -> AbsDA	-0.029** (-2.51)	Prior internal control quality predicts lower later accrual unreliability.
2SLS ACE -> AbsDA	-0.026* (-1.89)	IV sign is consistent with baseline but less precise.
2SLS ICQ -> AbsDA	-0.041** (-2.21)	IV sign is consistent with baseline.
First-stage F-statistic for ACE	18.6	Instrument relevance exceeds common weak-instrument threshold.

First-stage F-statistic for ICQ	21.4	Instrument relevance exceeds common weak-instrument threshold.
Overidentification test	p = 0.284	

Table 10 reports additional endogeneity checks and instrumental-variable sensitivity tests. These tests are used to assess whether the baseline association between audit committee effectiveness, internal control quality, and financial reporting reliability remains consistent after addressing concerns related to timing, reverse association, and potential omitted-variable bias.

The lagged-variable results show that prior audit committee effectiveness is negatively associated with later AbsDA, with a coefficient of -0.018 that is statistically significant at the 10% level. This suggests that stronger audit committee effectiveness in an earlier period is associated with lower unreliability of accruals in subsequent periods. Similarly, lagged internal control quality has a negative and statistically significant coefficient of -0.029, indicating that stronger internal control quality in a prior period is associated with lower later discretionary accruals. These findings support the temporal consistency of baseline results.

The instrumental variable sensitivity tests also provide results that are broadly consistent with the baseline fixed-effects models. The 2SLS estimate for audit committee effectiveness remains negative, with a coefficient of -0.026, although the result is less precise and significant at the 10% level. The 2SLS estimate for internal control quality is also negative and statistically significant, with a coefficient of -0.041. These results indicate that the direction of the relationship remains stable after applying the instrumental variable approach.

The first-stage diagnostic statistics suggest that the instruments have acceptable relevance. The first-stage F-statistic is 18.6 for audit committee effectiveness and 21.4 for internal control quality, both exceeding the commonly used weak-instrument threshold of 10. The overidentification test produced a p-value of 0.284, which does not indicate evidence of overidentifying restriction failure. Taken together, the endogeneity checks do not remove the baseline inference that audit committee effectiveness and internal control quality are associated with higher financial reporting reliability. However, because the study is based on observational panel data, these results should be interpreted as sensitivity evidence rather than definitive causal proof.

Table 11 reports the indirect-association decomposition. The purpose of this analysis is to examine whether internal control quality may account for part of the association between audit committee effectiveness and financial reporting reliability. Because the research design is observational, the results are described as indirect associations rather than fully identified causal mediation effects.

The results show that audit committee effectiveness is positively associated with

internal control quality, with an ACE-to-ICQ path coefficient of 0.194, significant at the 1% level. Internal control quality is then significantly associated with both measures of financial reporting reliability. In the AbsDA model, internal control quality has a negative coefficient of -0.033, indicating that stronger internal controls are associated with lower discretionary accruals. In the transformed DD_AQ model, internal control quality has a positive coefficient of 0.066, indicating that stronger internal controls are associated with higher reporting reliability.

The estimated indirect association is -0.0064 in the AbsDA model, with a bootstrapped 95% confidence interval of [-0.0115, -0.0022]. Since the confidence interval does not include zero, this suggests a statistically meaningful indirect association. In the transformed DD_AQ model, the indirect association is 0.0128, with a bootstrapped 95% confidence interval of [0.0041, 0.0226], again indicating a statistically meaningful indirect pathway.

The direct association between audit committee effectiveness and financial reporting reliability remains statistically significant after controlling for internal control quality. The direct ACE association is -0.020 in the AbsDA model and 0.044 in the transformed DD_AQ model. The approximate mediated share was 24.6% in the AbsDA model and 22.5% in the transformed DD_AQ model. This suggests that internal control quality may explain approximately one-quarter of the association between audit committee effectiveness and financial reporting reliability, while the remaining association operates through other governance or monitoring channels.

Tables 10 and 11 strengthen the main findings by showing that the baseline results are robust to lagged specifications, instrumental-variable sensitivity checks, and indirect-association decomposition. The evidence indicates that audit committee effectiveness is associated with stronger internal control quality and that internal control quality, in turn, is associated with higher financial reporting reliability.

Table 11. Indirect-Association Decomposition

Mediation component	AbsDA model	Transformed DD_AQ model
ACE -> ICQ path	0.194***	0.194***
ICQ -> FRR path	-0.033***	0.066***
Indirect association	-0.0064	0.0128
Bootstrapped 95% CI	[-0.0115, -0.0022]	[0.0041, 0.0226]
Direct ACE	-0.020*	0.044**

Mediation component	AbsDA model	Transformed DD_AQ model
association		
Approximate mediated share	24.6%	22.5%

Notes: Mediation estimates are using 5,000 bootstrap replications. Because the panel is observational, the results are described as indirect associations rather than causal mediation

Table 12 reports the Ghana-Nigeria cross-country tests. These tests examine whether the associations between audit committee effectiveness, internal control quality, and financial reporting reliability differ across the two country settings. The purpose of this analysis is to assess whether the baseline results are consistent across countries or whether they are stronger in one institutional environment.

The Ghana subsample results show that audit committee effectiveness has the expected negative sign in the AbsDA model, with a coefficient of -0.013, but the coefficient is not statistically significant. Internal control quality is also negatively associated with AbsDA, with a coefficient of -0.024 that is weakly significant at the 10% level. These findings suggest that the direction of the association in Ghana is consistent with the baseline results, although the statistical precision is weaker.

The Nigeria subsample produces stronger and more precise results. Audit committee effectiveness has a negative and statistically significant coefficient of -0.024, while internal control quality has a negative and highly significant coefficient of -0.038. These findings indicate that the associations between governance mechanisms and financial reporting reliability are stronger in the Nigerian subsample.

The pooled interaction models provide further evidence of these cross-country differences. The interaction term between Nigeria and audit committee effectiveness is negative and statistically significant, suggesting that the association between audit committee effectiveness and lower AbsDA is stronger in Nigeria than in Ghana. Similarly, the interaction term between Nigeria and internal control quality is also negative and statistically significant, indicating that the association between internal control quality and financial reporting reliability is stronger in Nigeria.

Additional sensitivity tests confirm that the main inference is not driven by country-year shocks or sector imbalances. When country-year fixed effects are included, the coefficients for audit committee effectiveness and internal control quality remain negative and statistically significant. This suggests that the findings cannot be explained solely by time-varying country-level conditions. The sector-balanced subsample also produces consistent results, indicating that the baseline inference is not driven only by differences in sector composition across the two countries.

Overall, Table 12 shows that the expected associations are present in both Ghana and Nigeria, but they are stronger and more precisely estimated in Nigeria. The results support the broader conclusion that audit committee effectiveness and internal control quality are associated with higher financial reporting reliability, while also showing that the strength of these associations may vary across country contexts.

Table 12. Ghana-Nigeria Cross-Country Tests

Specification	ACE coefficient	ICQ coefficient	Inference
Ghana subsample, AbsDA	-0.013 (-1.21)	-0.024* (-1.78)	Expected sign; weaker precision.
Nigeria subsample, AbsDA	-0.024** (-2.17)	-0.038*** (-3.05)	Stronger and more precise association.
Pooled model: Nigeria x ACE	-0.011* (-1.75)		ACE association is stronger in Nigeria.
Pooled model: Nigeria x ICQ		-0.014* (-1.84)	ICQ association is stronger in Nigeria.
Country-year FE sensitivity	-0.019* (-1.90)	-0.031** (-2.46)	Baseline signs survive country-year shocks.
Sector-balanced subsample	-0.017* (-1.79)	-0.030** (-2.33)	Inference is not driven only by sector imbalance.

Table 13 presents a series of robustness checks designed to assess whether the baseline findings are sensitive to alternative variable measurements, sample restrictions, model timing, or outlier treatment. Across all specifications, the coefficients for audit committee effectiveness and internal control quality remain negative, indicating a consistent association with lower AbsDA and therefore higher financial reporting reliability.

The results remain consistent when alternative discretionary accrual measures are used in the analysis. Under the Modified Jones AbsDA specification, audit committee effectiveness has a coefficient of -0.018 and internal control quality has a coefficient of -0.030. Under the Kothari performance-matched AbsDA specification, audit committee effectiveness has a coefficient of -0.017 and internal control quality has a coefficient of -0.028. These results indicate that the findings are not dependent on a single accrual-quality measurement approach.

The results also remain stable when alternative index constructions are employed. The narrow internal control quality index produces significant negative coefficients for both audit committee effectiveness and internal control quality, suggesting that the findings are not driven by broader disclosure-based measurement choices. Similarly, the PCA-weighted audit committee effectiveness index produces consistent results, indicating that the construction and weighting of the audit committee effectiveness index do not drive the baseline findings.

The lagged ACE and ICQ specifications also support the main results. Audit committee effectiveness remains negatively associated with AbsDA, with a coefficient of -0.018, while internal control quality remains negatively associated with AbsDA, with a coefficient of -0.029. These findings reinforce the temporal consistency of this baseline association.

The sample restriction tests further confirmed the robustness of the results. When cross-listed firms are excluded, both audit committee effectiveness and internal control quality remain negatively and significantly associated with AbsDA. This suggests that the results are not driven by firms exposure to foreign listing or reporting requirements. When Big Four-only observations are excluded, the coefficients also remain negative and statistically significant, indicating that the findings persist outside firms with concentrated Big Four audit exposure.

Finally, the results remain consistent after applying alternative winsorization at the 2.5% and 97.5% levels. Audit committee effectiveness remains negatively associated with AbsDA, and internal control quality remains negative and significant. This indicates that the baseline results are not explained by extreme observations or outliers.

Overall, Table 13 demonstrates that the main findings are robust across alternative accrual models, alternative index specifications, lagged explanatory variables, sample restrictions, and outlier adjustments. The consistency of the results strengthens the conclusion that audit committee effectiveness and internal control quality are associated with higher financial reporting reliability.

Table 13. Robustness Checks

Robustness specification	ACE result	ICQ result	Conclusion
Modified Jones AbsDA	-0.018*	-0.030**	Consistent with baseline.
Kothari performance-matched AbsDA	-0.017*	-0.028**	Consistent with baseline.

Narrow ICQ index	-0.021**	-0.025**	Disclosure-comparability adjustment does not remove inference.
PCA-weighted ACE index	-0.027**	-0.032***	Index weighting does not drive results.
Lagged ACE and ICQ	-0.018*	-0.029**	Temporal ordering supports baseline association.
Exclude cross-listed firms	-0.019*	-0.031**	Cross-listing exposure does not drive results.
Exclude Big Four-only observations	-0.016*	-0.027**	Inference persists outside Big Four concentration.
Winsorization at 2.5% and 97.5%	-0.020**	-0.034***	Outliers do not explain baseline coefficients.

5. Discussion

The reported patterns are broadly consistent with the governance monitoring argument in agency theory and prior audit committee studies emphasizing independence, expertise, and diligence (Abbott et al., 2004; Bedard et al., 2004; DeZoort et al., 2002; Klein, 2002). The findings support the governance-bundle framework in which audit committee effectiveness and internal control quality operate as complementary rather than competing reporting-reliability mechanisms.

The association between effectiveness-oriented internal-control evidence and reporting reliability is consistent with internal-control research showing that control weaknesses are linked to lower accrual quality and higher misstatement risk (Ashbaugh-Skaife et al., 2008; Doyle et al., 2007). Because the study relies on archival disclosures rather than direct testing of control operation, the evidence is interpreted as showing that explicit control assessments and remediation outcomes, net of disclosure detail, are associated with financial reporting reliability. It does not imply that firms providing more extensive internal-control narratives necessarily possess

more effective controls. The findings also remain consistent with the COSO-based argument that the control environment, risk assessment, control activities, information and communication, and monitoring provide operational safeguards for reliable reporting (COSO, 2013). The Ghana-Nigeria comparison is interpreted cautiously. A stronger Nigeria coefficient may reflect deeper capital markets, greater audit-market visibility, or stronger disclosure salience, but it may also reflect larger firms, greater Big Four auditor concentration, more extensive disclosure, or cross-listing exposure. Accordingly, the cross-country claim is presented as an institutional-complementarity proposition and interpreted in light of composition checks and country-specific diagnostics.

The integration of digital accounting, AIS reliability, and AI-enabled reporting accuracy expands the contribution of this study beyond traditional governance attributes. The manuscript also argues that firms adopting AI and digital accounting systems require governance mechanisms that ensure data integrity, system reliability, privacy, cybersecurity, and algorithmic accountability (Ahmad Abbasi, 2026; Al-Khoury et al., 2025; Alslaibi et al., 2025; Ullah & Maureen Obi, 2026).

The ESG and quality-assurance literature further broadens the interpretation by positioning financial reporting reliability within a wider transparency ecosystem. In this reading, governance disclosures, ESG reporting, internal controls, internal audit, and quality-assurance procedures are mutually reinforcing channels through which firms reduce information asymmetry and strengthen accountability.

6. Conclusion and implications

This manuscript examines the association among audit committee effectiveness, internal control quality, and financial reporting reliability in listed non-financial firms in Ghana and Nigeria.

The central argument is that audit committee effectiveness and internal control quality are complementary governance mechanisms. Effective audit committees can strengthen financial reporting oversight, while strong internal controls provide the operational routines that support reliable accounting information. The manuscript's substantive value lies in the integrated theory, sharpened measurement logic, and empirical evidence reported in the analysis.

The manuscript also links traditional governance mechanisms to digital accounting systems, AI-enabled reporting tools, ESG disclosure, and quality assurance. This broader framing reflects the reality that financial reporting reliability increasingly depends on both human governance and technological infrastructure. Tables 1 through 13 summarize the outputs from the study dataset and estimation procedures.

6.1 Practical Implications

For boards of directors, the framework suggests that audit committee composition

should be treated as a substantive governance issue, not a compliance formality. Boards should appoint independent members with financial and accounting expertise, ensure that audit committees meet frequently enough to address reporting risks, and provide committees with access to internal audit, external auditors, and relevant management information.

For audit committees, the framework emphasizes active monitoring of internal controls, remediation follow-up, auditor communications, digital reporting risks, related-party transactions, estimates, revenue recognition, and impairment judgments. Audit committees should maintain documented agendas, challenge management explanations, and require evidence of control operation rather than relying on general assurances.

For external auditors, the study highlights the value of transparent communication with audit committees about control deficiencies, significant risks, audit adjustments, and management judgments. Auditors should document how audit committee engagement affects audit planning and reporting risk assessment.

For internal auditors, the framework reinforces the need for independent reporting lines, risk-based audit plans, follow-up on control deficiencies, and integration with enterprise risk management. Internal audits should provide audit committees with concise but evidence-based reports on control design, operating effectiveness, and remediation.

For investors and creditors, this study suggests that audit committee characteristics and internal control disclosures can be useful governance signals, but they should be interpreted alongside audit firm quality, disclosure depth, restatement history, ESG reporting credibility, and digital reporting system reliability.

For firms adopting digital accounting systems and AI-enabled reporting tools, audit committees should oversee system implementation, access controls, data governance, cybersecurity, audit trails, model validation, privacy, and exception handling. Digitalization can improve reporting quality only when technology is embedded in a reliable control and governance environment.

6.2 Policy Implications

Regulators in Ghana and Nigeria should strengthen audit committee disclosure requirements by requiring listed firms to report committee independence, financial expertise, attendance, meeting frequency, major activities, interaction with auditors, and oversight of internal control remediation. Securities exchanges should encourage standardized internal-control disclosures to improve comparability across firms and years.

Professional accounting bodies should provide guidance on audit committee competency, financial literacy, digital reporting oversight, AI governance, and internal control documentation. Regulators should also consider requiring clearer disclosure of internal-control weaknesses, remediation status, and management responsibility

for internal control over financial reporting, while recognizing differences in firm size and reporting capacity.

Standard setters and securities regulators should integrate digital accounting and AI-enabled reporting risk into governance codes. AI and AIS reliability should not be viewed as purely technical matters; they are governance concerns requiring board-level oversight. Policy guidance should address data integrity, cybersecurity, auditability, algorithmic transparency, and accountability in automated reporting processes.

The First limitation concerns construct measurement. Audit committee effectiveness may be difficult to capture fully using structural attributes because independence, expertise, and meeting frequency do not necessarily measure the quality of deliberation or the willingness to challenge management. Although the revised internal-control measurement separates explicit effectiveness-oriented signals from disclosure detail, ICQ-E remains based on publicly available archival evidence rather than direct tests of control design and operating effectiveness. Firms may differ in their willingness to disclose adverse assessments, and explicit control evidence is not available for every firm-year. The component-coverage analysis, separate ICD control, component-level regressions, and coder-reliability tests reduce this concern but cannot eliminate residual reporting and detection differences.

Second, endogeneity is a limitation of this study. Firms with higher reporting quality may also be more likely to appoint stronger audit committees, invest in internal controls, hire Big Four auditors, adopt digital systems, and disclose ESG information. Fixed effects and IV strategies can reduce, but not eliminate, these concerns. Accordingly, the manuscript avoids causal language unless supported by empirical design.

A Third limitation concerns country comparability. Ghana and Nigeria differ in market depth, enforcement, disclosure conventions, sector composition, and audit-market structure. Therefore, cross-country findings are interpreted with attention to coverage diagnostics and composition controls.

Further studies should examine internal-control quality in emerging markets using mixed methods, including interviews with audit committee members, internal auditors, external auditors, and regulators. Future work can also explore whether AI-enabled accounting systems, AIS reliability, cybersecurity controls, and digital audit trails strengthen or weaken the relationship between governance structures and financial reporting reliability.

Cross-country studies could compare Ghana and Nigeria with other African and emerging markets, using harmonized coding rules and standardized reporting-quality measures. Longitudinal designs could examine whether governance reforms, code adoption, enforcement actions, or digital reporting mandates change the association between audit committees, internal controls, and financial reporting reliability over time. Future research should also connect financial reporting reliability with ESG disclosure credibility, integrated reporting quality, and sustainability disclosure assurance.

7. Declarations

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Consent to Participate: Not applicable.

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Data Availability: Data Availability: Subject to third-party licensing and copyright restrictions, the corresponding author will provide qualified researchers with the final firm-year analysis file, sample-selection log, variable dictionary, ACE and ICQ coding manuals, coding sheets with annual-report page references, restatement-verification log, data-cleaning documentation, statistical scripts, software/package details, and table-production logs upon reasonable request. Copyrighted annual reports will not be redistributed; a source index and extraction documentation will instead identify the underlying public filings. Requests should specify the intended verification purpose and may be subject to a data-use agreement.

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