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# SECTORAL PATTERNS OF ACCRUAL-BASED AND REAL EARNINGS MANAGEMENT IN NIGERIA'S NON-FINANCIAL FIRMS

**Abdulraheem Olayiwola Kadir**
*Department of Accounting and Finance, Kwara State University, Kwara State, Nigeria.*
Emails: *abdulraheem.kadir@kwasu.edu.ng*
***Correspondence**:* abdulraheem.kadir@kwasu.edu.ng

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## ABSTRACT

*This study examined sectoral differences in earnings management among non-financial firms in Nigeria, with focus on distinguishing between accrual-based earnings management and real earnings management through production and cash-flow channels. Using a balanced panel of listed non-financial firms, the study applied established earnings management proxies and employs descriptive statistics, panel analysis of variance (ANOVA), Bonferroni pairwise comparisons, and variance homogeneity diagnostics to identify sector-specific patterns. The results revealed pronounced sectoral heterogeneity. Accrual-based earnings management exhibits significant sectoral differences, with evidence of both income-decreasing and income-increasing accrual adjustments, depending on industry characteristics. In contrast, real earnings management is highly uneven and concentrated in specific sectors. In particular, the Health Care and Oil & Gas sectors exhibited consistently higher and more volatile real earnings management, driven largely by abnormal cash-flow manipulation. And in the case of Oil & Gas, abnormal production costs. Conglomerates and ICT firms, by contrast, displayed relatively low and stable levels of real earnings management. Pairwise correlations further indicated that accrual-based earnings management operates largely independently of real earnings management, while aggregate real earnings management is strongly driven by abnormal cash-flow activities. Overall, the findings suggest that while accounting standards and governance reforms may have constrained accrual manipulation, they have been less effective in limiting real activities manipulation, which carries direct economic costs. The study contributes to the literature by providing one of the first comprehensive sector-level analyses of multiple earnings management channels in Nigeria, highlighting the need for sector-specific regulatory oversight, enhanced operational monitoring, and risk-based audit and investment strategies in emerging markets.*

***Key words:*** *Accruals; Sectoral Analysis; Corporate Reporting, Earnings Management; Real Earnings Management.*

## INTRODUCTION

Earnings management continues to attract substantial scholarly attention due to its implications for the credibility of financial reporting, market efficiency, and investor protection. Despite considerable improvements in financial reporting regulation, widespread

adoption of International Financial Reporting Standards (IFRS), and repeated efforts to strengthen corporate governance mechanisms, incidences of financial misrepresentation persist across global markets (Healy & Wahlen, 1999; Dechow, Ge, & Schrand, 2010). These practices are particularly prevalent in emerging economies, where weak enforcement, institutional voids, and governance challenges provide fertile ground for opportunistic managerial behaviour (Houqe & van Zijl, 2019; Alade & Ogundipe, 2021). Analysts frequently attribute reporting failures to deficiencies in audit oversight, relaxed monitoring structures, and incentive mechanisms that may inadvertently encourage manipulation (Canada Senate, 2003; Kim, Liu & Rhee, 2003). Earnings management occurs through two primary channels: accrual-based manipulation, which alters accounting estimates, and real activities manipulation, which changes operational decisions to influence reported earnings (Roychowdhury, 2006; Cohen & Zarowin, 2010). While prior studies extensively document firm-level determinants of these behaviours, such as governance quality, ownership structure, audit characteristics, and regulatory environments (Klein, 2002; García-Meca & Sánchez-Ballesta, 2009; Zang, 2012), comparatively limited attention has been paid to industry or sectoral differences. Yet, theoretical arguments suggest that industry characteristics, including competitive intensity, asset structure, regulation, production technology, and earnings volatility, shape managerial incentives and opportunities for manipulation (Watts & Zimmerman, 1986; Fields, Lys, & Vincent, 2001; Chen, Hribar, & Melessa, 2018). Empirical evidence from developed markets shows that earnings management behaviour differs substantially across sectors (Palea, 2021; Habib, Hasan & Wu, 2020), but such evidence remains sparse for African markets.

The Nigerian context presents a particularly compelling setting for examining these sectoral variations. Nigeria hosts one of Africa's most diverse stock exchanges, comprising industries with widely varying reporting environments, operational structures, and regulatory exposure. Over the last two decades, major institutional reforms, including the 2011 revision of the Code of Corporate Governance and the adoption of IFRS in 2012, have been implemented to strengthen transparency and improve reporting quality (Okafor, Anderson, & Warsame, 2016; Umoren & Enang, 2015). Although these reforms are expected to reduce earnings manipulation, their effectiveness may differ across sectors depending on enforcement intensity, industry governance norms, and the complexity of operational activities (Ofoegbu & Odoemelam, 2018; Arowoshegbe & Uniamikogbo, 2016). Understanding how earnings management behaviours vary across industries, and how such behaviours respond to policy

reforms, is therefore central to improving regulatory design and investor protection. Despite the importance of this issue, research on earnings management in Nigeria remains predominantly firm-level, with limited exploration of cross-sectoral patterns. Most Nigerian studies examine governance determinants (Dabor & Tijjani, 2010; Uwuigbe et al., 2014), IFRS effects (Ofoegbu & Odoemelam, 2018), or market-wide trends (Ameh & Omoye, 2020), but rarely analyse how earnings manipulation differs among industries such as agriculture, manufacturing, ICT, or oil and gas. Furthermore, existing studies do not jointly evaluate accrual-based earnings management, real activities manipulation, and its components, which are abnormal production and abnormal operating cash flows, within a sectoral comparative framework. Finally, little evidence exists on whether major regulatory reforms differentially influenced earnings management practices across sectors. These gaps reduce the practical relevance of prior research for regulators, auditors, and investors who must make sector-specific judgments.

This study addresses these gaps by conducting a comprehensive sectoral analysis of earnings management across Nigerian non-financial firms from 2008 to 2015. Adopting established methodologies, such as those by Kothari et al. (2005) for accrual-based earnings management, Dechow et al. (1998) and Roychowdhury (2006) for real activities manipulation, and Cohen & Zarowin (2010) for aggregate real manipulation, the study quantifies the extent and pattern of earnings management within each industry. It further examines whether the 2011 corporate governance reform and IFRS adoption significantly altered industry-level behaviour. Using descriptive statistics, trend analysis, panel ANOVA, and Bonferroni pairwise comparisons, the study provides robust evidence of systematic differences across sectors in the magnitude and type of earnings manipulation.

The study makes a significant contribution to the literature in four key ways. First, it provides one of the most detailed sector-level investigations of accrual and real earnings management in Nigeria, thereby enriching the limited evidence available from Sub-Saharan Africa. Second, it offers new insights into how regulatory reforms impact earnings manipulation differently across industries, underscoring the need for sector-specific enforcement mechanisms. Third, the disaggregation of real activities manipulation into production-based and cash-flow-based components reveals distinct operational channels through which firms adjust reported earnings. Finally, the findings have practical implications for regulators,

investors, auditors, and policymakers seeking to enhance the quality of financial reporting and mitigate industry-specific reporting risks in Nigeria's non-financial sector.

## LITERATURE REVIEW

### Conceptualising Earnings Management

Earnings management broadly refers to managerial discretion in financial reporting or real business activities with the intention of influencing reported earnings. Healy and Wahlen (1999) define earnings management as the use of judgment in financial reporting and transaction structuring to alter financial reports, either to mislead stakeholders about firm performance or to influence contractual outcomes. Subsequent literature has expanded this definition to recognise that earnings management may be opportunistic or efficiency-enhancing, depending on the underlying motivation and informational context (Dechow, Ge, & Schrand, 2010).

The literature identifies two dominant forms of earnings management. Accrual-based earnings management (AEM) involves manipulating accounting estimates, provisions, and accruals within the boundaries of accounting standards (Jones, 1991; Kothari, Leone, & Wasley, 2005). In contrast, real earnings management (REM) occurs when managers alter real operational decisions—such as sales timing, production levels, or discretionary expenditures—to achieve desired earnings outcomes (Roychowdhury, 2006). While accrual-based manipulation affects reported numbers without changing underlying cash flows, real activities manipulation can have long-term economic consequences by distorting firms' operational efficiency (Cohen & Zarowin, 2010; Zang, 2012). Recent studies increasingly suggest that REM has become more prevalent following the implementation of tighter accounting standards and enhanced audit scrutiny, as managers substitute accrual manipulation with real operational adjustments that are more difficult to detect (Cohen, Dey, & Lys, 2008; Ipino & Parbonetti, 2017). This substitution effect underscores the importance of examining both accrual and real earnings management jointly.

### Theoretical Perspectives on Earnings Management

The dominant theoretical foundation of earnings management research is agency theory, which posits that conflicts of interest between principals (shareholders) and agents (managers) create incentives for opportunistic behaviour when monitoring is imperfect (Jensen & Meckling, 1976). Earnings manipulation is viewed as an agency cost arising from information

asymmetry and weak governance structures (Watts & Zimmerman, 1986) Positive accounting theory further explains earnings management as a rational response to contractual incentives related to compensation schemes, debt covenants, and political costs (Watts & Zimmerman, 1986). Managers are expected to select accounting policies that maximise their own utility, subject to regulatory constraints.

In addition, institutional theory highlights the role of regulatory quality, enforcement strength, and institutional environments in shaping reporting behaviour. Firms operating in weaker institutional settings face lower expected costs of manipulation, increasing the likelihood of earnings management (Leuz, Nanda, & Wysocki, 2003; Houqe & van Zijl, 2019). This perspective is particularly relevant in emerging markets, where enforcement mechanisms may vary significantly across industries. Finally, industry-specific characteristics theory suggests that sectoral factors, such as asset intensity, production technology, demand volatility, regulatory exposure, and competitive pressure, systematically influence the opportunity and incentives for earnings management (Fields, Lys, & Vincent, 2001; Chen, Hribar, & Melessa, 2018). This theoretical lens provides the basis for expecting heterogeneous earnings management behaviour across sectors.

**Accrual-Based Earnings Management: Evidence from Prior Studies**

Empirical research on accrual-based earnings management has developed a range of measurement models, with the modified Jones model and its performance-matched extension by Kothari et al. (2005) being the most widely applied. Numerous studies document the prevalence of AEM across developed and emerging markets, often linking it to weak governance, ownership concentration, audit quality, and regulatory environments (Klein, 2002; García-Meca & Sánchez-Ballesta, 2009).

In emerging economies, evidence suggests that accrual manipulation is more pronounced due to weaker enforcement and lower litigation risk (Leuz et al., 2003; Habib, Hasan, & Wu, 2020). Studies focusing on African markets report mixed results, with some finding significant reductions in AEM following IFRS adoption, while others report persistent manipulation due to enforcement gaps (Okafor, Anderson, & Warsame, 2016; Ofoegbu & Odoemelam, 2018). However, much of this literature treats firms as a homogeneous group, with limited attention to industry-level variation. Where sectoral analyses exist, they are

typically confined to specific industries such as manufacturing or banking, leaving broader cross-sectoral patterns largely unexplored.

**Real Earnings Management and Its Components**

Real earnings management gained prominence following the work of Roychowdhury (2006), who demonstrates that managers manipulate earnings through abnormal operating cash flows, overproduction, and reductions in discretionary expenditures. Subsequent studies confirm that REM is often preferred when accrual manipulation is constrained by accounting standards or heightened audit scrutiny (Zang, 2012; Cohen & Zarowin, 2010) Empirical evidence suggests that REM is linked to adverse long-term consequences, including reduced future profitability and firm value (Gunny, 2010; Vorst, 2016). Studies also show that REM intensity varies across industries, reflecting differences in production processes, cost structures, and demand elasticity (Palea, 2021). Despite its relevance, REM remains under-studied in African contexts. Existing Nigerian studies largely focus on accrual-based measures or aggregate REM proxies, with limited disaggregation into abnormal production and cash-flow components. This gap limits understanding of the operational channels through which firms manipulate earnings in different sectors.

**Regulatory Reforms, IFRS Adoption, and Earnings Management**

Regulatory reforms and the adoption of IFRS are widely expected to improve financial reporting quality by enhancing transparency, comparability, and enforcement (Ball, 2006). Empirical evidence on IFRS adoption and earnings management, however, remains mixed. While some studies find that IFRS reduces accrual-based manipulation, others suggest that managers substitute toward real earnings management (Ahmed, Neel, & Wang, 2013; Ipino & Parbonetti, 2017).

In Nigeria, the adoption of IFRS in 2012 and the revision of the Code of Corporate Governance in 2011 represent major institutional shifts aimed at improving reporting quality. Prior Nigerian studies have documented partial improvements in earnings quality following these reforms, but note that outcomes depend heavily on the strength of enforcement and firm-specific characteristics (Umoren & Enang, 2015; Okafor et al., 2016). Importantly, little is known about whether these reforms had differential effects across sectors, despite evidence that enforcement intensity and compliance costs vary substantially by industry.

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**Sectoral Differences in Earnings Management: Research Gap**

Although international evidence increasingly acknowledges that earnings management behaviour differs across industries (Habib et al., 2020; Palea, 2021), sectoral analyses remain rare in emerging markets, particularly in Sub-Saharan Africa. Nigerian studies predominantly adopt firm-level or market-wide perspectives, thereby obscuring industry-specific risks and behavioural patterns. Moreover, existing studies rarely examine accrual-based and real earnings management jointly within a sectoral framework, nor do they explore how regulatory reforms alter these behaviours across industries. This gap limits the policy relevance of prior findings and constrains regulators' ability to design sector-specific oversight mechanisms.

**Summary and Positioning of the Current Study**

In summary, the literature establishes that earnings management is shaped by agency conflicts, institutional environments, and regulatory frameworks; however, it provides limited evidence on how these forces operate differently across sectors in emerging markets. There is a clear gap in understanding the sectoral distribution of accrual-based and real earnings management in Nigeria, as well as the role of governance reforms and IFRS adoption in shaping industry-specific reporting behaviour. By conducting a comprehensive sectoral analysis of earnings management among Nigerian non-financial firms and by jointly examining accrual-based and real activities manipulation before and after key regulatory reforms, the present study directly addresses these gaps and extends the existing literature in a meaningful and policy-relevant manner.

## MATERIAL AND METHODS

This study adopts a quantitative, archival research design to examine sectoral differences in earnings management among non-financial firms listed on the Nigerian Stock Exchange (NSE). The focus on non-financial firms is motivated by the fundamentally different reporting structures, regulatory frameworks, and accounting standards applicable to financial institutions, which could bias earnings management estimates if included. The analysis covers the period 2008–2015, allowing for the examination of earnings management behaviour before and after two major institutional reforms in Nigeria: the 2011 review of the Code of Corporate Governance (CCG) and the 2012 adoption of International Financial Reporting Standards (IFRS). The study employs both accrual-based earnings management and real earnings management measures to capture the multidimensional nature of managerial

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discretion in reporting. Sectoral comparisons are conducted using descriptive statistics, trend analysis, panel analysis of variance (ANOVA), and Bonferroni-adjusted pairwise comparisons.

The sample comprises all non-financial firms listed on the Nigerian Stock Exchange that have available annual financial statements during the study period. Firms in the financial sector were excluded due to their unique accounting treatments, regulatory oversight, and balance-sheet structures, which differ significantly from those of non-financial firms. This exclusion is consistent with prior studies on earnings management in emerging markets. Secondary data were obtained from firms' audited annual reports, sourced directly from the Nigerian Stock Exchange. The final sample includes firms across the following sectors: agriculture, conglomerates, construction, consumer goods, healthcare, information and communication technology (ICT), industrial goods, natural resources, oil and gas, and services. Observations with missing or incomplete data required for earnings management estimation were excluded to ensure consistency across models.

To comprehensively capture earnings management practices, the study employs both accrual-based and real activities-based measures. These measures are widely used in the accounting literature, allowing for comparability with prior studies. Accrual-based earnings management is proxied by discretionary accruals, estimated using the performance-matched model of Kothari et al. (2005). This model is preferred due to its ability to control for firm performance and reduce Type I errors commonly associated with the modified Jones model. Total accruals are computed as the difference between net income before extraordinary items and cash flow from operations. The following cross-sectional regression is estimated for each industry-year:

$$\frac{TA_{it}}{A_{i,t-1}} = \beta_0 + \beta_1 \frac{(\Delta REV_{it} - \Delta AR_{it})}{A_{i,t-1}} + \beta_2 \frac{PPE_{it}}{A_{i,t-1}} + \beta_3 ROA_{it} + \varepsilon_{it} \ldots\ldots\ldots \text{Eqn 1.}$$

where $TA$ denotes total accruals, $A_{i,t-1}$ is lagged total assets, $\Delta REV$ is a change in revenue, $\Delta AR$ is a change in accounts receivable, $PPE$ represents property, plant and equipment, and $ROA$ is return on assets.

The regression is estimated separately for each industry-year to account for sector-specific accrual-generating processes. Discretionary accruals, representing accrual-based earnings management, are obtained as the residuals from the estimated model. Real earnings management is measured following Roychowdhury (2006), focusing on deviations from normal operating behaviour. The study considers two components of real earnings

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management: abnormal cash flow from operations and abnormal production costs. Abnormal discretionary expenditures are excluded due to data limitations in Nigerian firms' financial reports, consistent with prior Nigerian studies. Cash flow from operations is modelled as a function of contemporaneous sales and changes in sales, estimated cross-sectionally for each industry-year:

$$\frac{CFO_{it}}{A_{i,t-1}} = \alpha_0 + \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{Sales_{it}}{A_{i,t-1}} + \alpha_3 \frac{\Delta Sales_{it}}{A_{i,t-1}} + \varepsilon_{it} \text{ ……..} \quad \text{Eqn 2.}$$

Abnormal cash flow from operations is calculated as the residual from this regression, with larger deviations indicating greater real earnings management through sales manipulation or lenient credit policies.

Production costs are defined as the sum of the cost of goods sold and changes in inventory. Following Dechow et al. (1998) and Roychowdhury (2006), production costs are modelled as:

$$\frac{PROD_{it}}{Assets_{it-1}} = \gamma_0 + \gamma_1 \frac{1}{Assets_{it-1}} + \gamma_2 \frac{Sales_{it}}{Assets_{it-1}} + \gamma_3 \frac{\Delta Sales_{it}}{Assets_{it-1}} + \gamma_3 \frac{\Delta Sales_{it-1}}{Assets_{it-1}} + \varepsilon_{it} \text{ …..} \quad \text{Eqn 3.}$$

The abnormal production cost is obtained as the residual of this regression. Higher abnormal production costs suggest earnings management through overproduction aimed at reducing the reported cost of goods sold.

To capture overall real earnings management, the study constructs an aggregate real earnings management measure by combining abnormal cash flow from operations and abnormal production costs, following Cohen and Zarowin (2010) and Zang (2012):

*RM = - Abnormal Cash Flow Firm from Operations + Abnormal Production Costs*….. Eqn 4.

Abnormal cash flow is multiplied by -1 so that higher values of the aggregate measure consistently indicate greater real earnings management.

The analysis proceeds in two stages. First, descriptive statistics are used to summarise the central tendency and dispersion of earnings management measures across sectors. In addition, a pairwise correlation analysis was used to examine the relationships that exist among the earnings management metrics used. Second, the study employs panel analysis of variance (ANOVA) to test whether the mean levels of earnings management differ significantly across sectors. Panel ANOVA is appropriate for identifying systematic cross-sectoral differences in earnings management behaviour. Where significant differences are detected, Bonferroni-adjusted pairwise comparisons are conducted to identify specific sectoral differences while

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controlling for multiple testing bias. All analyses are conducted using standard econometric software, and statistical significance is assessed at conventional levels. The methodological approach adopted in this study aligns with the established literature on earnings management, enabling meaningful sectoral comparisons. However, the study acknowledges certain limitations. The reliance on ANOVA-based techniques limits causal inference, and excluding abnormal discretionary expenditures may understate certain forms of real earnings management. Nonetheless, the use of multiple earnings management proxies and regulatory sub-period analysis enhances the robustness and interpretability of the findings.

## RESULT AND DISCUSSIONS

The results are presented in this section. First, the summary statistics results are presented to describe the data. Table 1 presents descriptive statistics for accrual-based earnings management (AM), aggregate real earnings management (RM), abnormal production-based real earnings management (Prod. RM), and abnormal cash-flow-based real earnings management (Cash-flow RM), both for the full sample and across sectors.

Table 1: Summary Statistics Results

| | AM | | RM | | Prod. RM | | Cash-flow RM | |
|---|---|---|---|---|---|---|---|---|
| Sector | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| All Sector | -0.13 | 0.73 | 0.96 | 14.48 | 0.56 | 3.79 | 0.40 | 12.39 |
| Agriculture | -1.92 | 2.45 | 1.40 | 1.80 | 0.01 | 0.02 | 1.39 | 1.79 |
| Conglomerate | -0.02 | 0.10 | -23.69 | 13.67 | 0.12 | 0.16 | -23.81 | 13.75 |
| Construction | -0.13 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Consumer Goods | -0.06 | 0.48 | 1.12 | 2.74 | 0.01 | 0.29 | 1.11 | 2.75 |
| Health Care | 0.05 | 0.16 | 10.33 | 22.63 | -0.03 | 0.02 | 10.36 | 22.64 |
| ICT | 0.06 | 0.15 | -6.39 | 2.30 | 0.12 | 0.10 | -6.50 | 2.21 |
| Industrial | -0.04 | 0.13 | 0.08 | 1.07 | 0.00 | 0.01 | 0.08 | 1.07 |
| Natural Resources | -0.16 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Oil & Gas | -0.05 | 0.10 | 10.89 | 27.18 | 4.31 | 9.87 | 6.57 | 18.92 |
| Services | -0.07 | 0.18 | 0.03 | 0.81 | -0.01 | 0.03 | 0.04 | 0.82 |

Source: Author's Computation.

Across all sectors, the mean accrual-based earnings management (AM) is negative (–0.13), suggesting that, on average, firms engage in income-decreasing accrual adjustments. However, the relatively large standard deviation (0.73) indicates substantial heterogeneity in accrual manipulation across firms and sectors. Aggregate real earnings management (RM) exhibits a positive mean (0.96) but an exceptionally large dispersion (SD = 14.48),

highlighting the highly volatile nature of real earnings manipulation in the Nigerian non-financial sector. This large dispersion suggests that while some firms engage heavily in real activities manipulation, others exhibit little or no such behaviour. The mean values of abnormal production-based RM (0.56) and abnormal cash-flow RM (0.40) further confirm that real earnings management is present on average, though the large standard deviations (3.79 and 12.39, respectively) indicate uneven application across sectors.

Sectoral statistics reveal marked differences in accrual manipulation. Agriculture exhibits the most extreme accrual behaviour, with a strongly negative mean (–1.92) and very high dispersion (SD = 2.45), indicating substantial income-decreasing accrual adjustments and volatile reporting practices. Conglomerates, Construction, Consumer Goods, Industrial, Oil & Gas, and Services display relatively small negative mean AM values, suggesting moderate and broadly comparable accrual behaviour. Healthcare and ICT exhibit small positive mean AM values (0.05 and 0.06, respectively), indicating mild income-increasing accrual adjustments. Natural Resources shows a modest negative mean (–0.16) with limited dispersion. Overall, these statistics suggest that accrual-based earnings management exhibits significant variations across sectors, with agriculture being the most volatile.

The sectoral distribution of RM is highly uneven. Conglomerates exhibit a large negative mean RM (–23.69) with substantial dispersion (SD = 13.67), suggesting persistent real activities adjustments that reduce reported earnings, potentially reflecting conservative operational strategies or structural constraints. Health Care and Oil & Gas show very high positive mean RM values (10.33 and 10.89), accompanied by extremely large standard deviations, indicating intensive and volatile real earnings management. ICT displays a negative mean RM (–6.39), implying income-decreasing real activities manipulation. Consumer Goods, Industrial, Services, and Agriculture show relatively small positive mean RM values. The Construction and Natural Resources sectors exhibit a zero mean and zero dispersion, indicating no detectable real earnings manipulation in the sample for these sectors. These patterns highlight that real earnings management is concentrated in a few sectors, particularly Health Care and Oil & Gas.

Production-based RM shows a highly skewed sectoral pattern. Oil & Gas stands out sharply, with a mean of 4.31 and a very large standard deviation (9.87), indicating intensive use of production-related manipulation. Conglomerates and ICT show modest positive means (0.12 each), suggesting limited production-based RM. Health Care and Services exhibit small

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negative means, indicating minimal production manipulation. The Construction, Industrial, and Natural Resources sector records zero means and negligible dispersion. These results confirm that production-based real earnings management is largely sector-specific, with Oil & Gas dominating this channel.

Cash-flow-based RM mirrors the aggregate RM patterns. Healthcare and oil and gas again exhibit the highest positive mean values (10.36 and 6.57, respectively), coupled with large standard deviations, suggesting aggressive cash flow manipulation. Conglomerates and ICT exhibit large negative means (–23.81 and –6.50), indicating income-decreasing cash flow manipulation or conservative operating cash flow behaviour. Agriculture, Consumer Goods, Industrial, and Services exhibit small positive means with relatively moderate dispersion. Construction and Natural Resources again record zero mean and zero variance.

Table 2: Pairwise Correlation Analysis

| | AM | RM | Prod. RM | Cash-flow RM |
|---|---|---|---|---|
| AM | 1 | | | |
| RM | -0.0095 | 1 | | |
| Prod. RM | 0.0291 | 0.6425 | 1 | |
| Cash-flow RM | -0.02 | 0.9722 | 0.4453 | 1 |

Source: Author's Computation.

Pairwise correlations indicate that accrual-based earnings management is largely independent of real earnings management, while aggregate real earnings management is strongly driven by abnormal cash-flow manipulation, with production-based activities playing a secondary role.

Table 3: Panel Analysis of Variance (ANOVA)

| Earnings Management | Test | F-statistic | p-value | R-squared |
|---|---|---|---|---|
| AM | Model | 6.29*** | 0.000 | 0.4279 |
| | Across Sectors | 10.67*** | 0.000 | |
| | Across Firms | 1.87*** | 0.000 | |
| RM | Model | 13.21*** | 0.000 | 0.611 |
| | Across Sectors | 1.14 | 0.332 | |
| | Across Firms | 8.17*** | 0.000 | |
| Prod. RM | Model | 11.43*** | 0.000 | 0.5762 |
| | Across Sectors | 0.94 | 0.493 | |
| | Across Firms | 9.83*** | 0.000 | |

| | | | | |
|---|---|---|---|---|
| Cash-flow RM | Model | 14.58*** | 0.000 | 0.6342 |
| | Across Sectors | 1.13 | 0.338 | |
| | Across Firms | 8.03*** | 0.000 | |

Source: Author's Computation.

Table 3 presents the results of the panel analysis of variance (ANOVA) for accrual-based earnings management (AM) and three measures of real earnings management: aggregate real earnings management (RM), abnormal production-based earnings management (Prod. RM), and abnormal cash-flow-based earnings management (Cash-flow RM). For accrual-based earnings management (AM), the overall model is statistically significant ($F = 6.29$, $p < 0.01$) and explains approximately 42.8% of the total variation in accrual manipulation. The sectoral effect is also highly significant ($F = 10.67$, $p < 0.01$), indicating that accrual-based earnings management differs systematically across sectors. In contrast, although firm-level differences are statistically significant ($F = 1.87$, $p < 0.01$), their explanatory power is comparatively weaker. This pattern suggests that industry characteristics play a dominant role in shaping accrual-based earnings management, beyond firm-specific idiosyncrasies.

In contrast, for aggregate real earnings management (RM), the overall model remains strongly significant ($F = 13.21$, $p < 0.01$), with a relatively high explanatory power ($R^2 = 0.611$). However, the sectoral effect is statistically insignificant ($F = 1.14$, $p = 0.332$), while firm-level differences are highly significant ($F = 8.17$, $p < 0.01$). This indicates that real earnings management is primarily driven by firm-specific operational decisions rather than sector-wide factors. A similar pattern emerges for the components of real earnings management. For abnormal production-based earnings management, the model is significant ($F = 11.43$, $p < 0.01$; $R^2 = 0.5762$), but sectoral differences are not statistically significant ($F = 0.94$, $p = 0.493$), whereas firm-level effects remain strong ($F = 9.83$, $p < 0.01$). Likewise, for abnormal cash-flow earnings management, the model is significant ($F = 14.58$, $p < 0.01$; $R^2 = 0.6342$), with sectoral effects being insignificant ($F = 1.13$, $p = 0.338$), and firm-level effects being highly significant ($F = 8.03$, $p < 0.01$).

Taken together, these results reveal a clear dichotomy in earnings management behaviour. Accrual-based earnings management exhibits strong sectoral heterogeneity, whereas real earnings management, both in aggregate and in its components, is predominantly firm-specific. The findings suggest that accrual-based earnings management is shaped largely by industry-level reporting environments, including differences in asset structure, accounting

discretion, regulatory exposure, and sector-specific reporting norms. Industries with a greater reliance on accounting estimates or longer operating cycles are more likely to exhibit distinct patterns of accrual manipulation. Conversely, real earnings management reflects managerial operational choices, such as overproduction, sales acceleration, or cash-flow timing, which are inherently firm-specific. These activities depend more on internal cost structures, production flexibility, and managerial incentives than on sector affiliation. As a result, firms within the same sector may display substantially different levels of real earnings management.

From an economic efficiency perspective, the dominance of firm-level effects in real earnings management is particularly concerning. Real earnings manipulation can distort production decisions, reduce long-term profitability, and lead to inefficient resource allocation. While accrual manipulation primarily affects reported numbers, real earnings management has direct economic costs that can impair a firm's value and long-term performance. The results have important policy implications for regulators, standard-setters, and market participants. First, the strong sectoral effect in accrual-based earnings management suggests that a one-size-fits-all regulatory approach may be insufficient. Regulators such as the Financial Reporting Council of Nigeria (FRCN) and the Securities and Exchange Commission (SEC) may need to adopt sector-specific accounting guidance, monitoring frameworks, and enforcement intensity, particularly for sectors shown to engage more heavily in accrual manipulation. Second, the dominance of firm-level effects in real earnings management implies that existing reporting standards and governance codes may be more effective at constraining accrual manipulation than real activities manipulation. This highlights the need for regulators and auditors to move beyond purely accounting-based compliance and place greater emphasis on operational red flags, such as abnormal production patterns and cash-flow anomalies.

Third, for auditors and investors, the findings underscore the importance of firm-level scrutiny, especially when assessing real earnings management risks. Sector affiliation alone is insufficient to identify firms engaging in real activities manipulation; instead, attention should focus on firm-specific operational behaviour and incentive structures. Finally, the results suggest that post-IFRS and corporate governance reforms in Nigeria may have altered the composition of earnings management rather than eliminated it. Policymakers should therefore complement financial reporting reforms with stronger enforcement mechanisms, enhanced disclosure of operational metrics, and improved corporate governance practices that directly target managerial incentives.

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Table 4: Bonferroni Pairwise Comparison – Accrual-Based Earnings Management

| Sector | Agric. | Congl. | Const. | Con. gd | Hlth. | ICT | Indust. | Nat. | Oil |
|---|---|---|---|---|---|---|---|---|---|
| Congl. | 1.89*** | | | | | | | | |
| Const. | 1.78*** | -0.10 | | | | | | | |
| Con. Gd | 1.85*** | -0.03 | 0.06 | | | | | | |
| Hlth. | 1.97*** | 0.07 | 0.18 | 0.11 | | | | | |
| ICT | 1.98*** | 0.08 | 0.19 | 0.12 | 0.01 | | | | |
| Indust. | 1.87*** | -0.01 | 0.08 | 0.01 | -0.09 | -0.10 | | | |
| Nat. Res. | 1.76*** | -0.13 | -0.02 | -0.09 | -0.20 | -0.21 | -0.11 | | |
| Oil & Gas | 1.87*** | -0.02 | 0.08 | 0.01 | -0.09 | -0.10 | -0.00 | 0.10 | |
| Services | 1.85*** | -0.04 | 0.06 | -0.00 | -0.11 | -0.12 | -0.02 | 0.09 | -0.01 |

Source: Author's Computation.

*Note: *** represents 95% confidence intervals that exclude zero, and a significant difference in earnings management; Agric is agricultural sub-sector: Congl.is conglomerate sub-sector; Const. is construction sub-sector; Con. gd. is consumer goods sub-sector; Hlth is health sub-sector; ICT is information and communication technology sub-sector; Indust. is industrial goods sub-sector; Nat. Res. is natural resources sub-sector; Oil & Gas is oil and gas sub-sector; and Services is services sub-sector.*

The pairwise results in Table 4 reveal a single-sector-driven heterogeneity in accrual-based earnings management. While the ANOVA confirms overall sectoral differences, the Bonferroni comparisons show that these differences are entirely attributable to the agricultural sector, which consistently exhibits significantly lower accrual manipulation. This pattern indicates that industry characteristics unique to the agricultural sector, such as lower accounting discretion, simpler asset structures, or stronger monitoring mechanisms, may substantially constrain accrual-based earnings management. By contrast, other sectors appear to operate under broadly similar accounting environments and managerial incentives regarding accrual manipulation.

From an economic perspective, the findings suggest that sector-level institutional features matter for accrual-based earnings management, but only in specific cases. The uniformly low accrual manipulation observed in the agricultural sector implies lower information risk for investors, greater reliability of reported accounting numbers, and reduced agency costs arising from accounting discretion. Meanwhile, the absence of significant differences among the remaining sectors suggests that market-wide accounting norms and enforcement mechanisms dominate, resulting in comparable accrual practices across most industries.

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Table 5: Bonferroni Pairwise Comparison – Real Earnings Management

| Sector | Agric. | Congl. | Const. | Con. gd | Hlth. | ICT | Indust. | Nat. | Oil |
|---|---|---|---|---|---|---|---|---|---|
| Congl. | -25.0*** | | | | | | | | |
| Const. | -1.40 | 23.6*** | | | | | | | |
| Con. Gd | -0.28 | 24.8*** | 1.11 | | | | | | |
| Hlth. | 8.92*** | 34.0*** | 10.3 | 9.21*** | | | | | |
| ICT | -7.78 | 17.3*** | -6.38 | -7.50*** | -16.7*** | | | | |
| Indust. | -1.32 | 23.7*** | 0.07 | -1.03 | -10.2*** | 6.46 | | | |
| Nat. Res. | -1.40 | 23.6 | 0.00 | -1.11 | -10.3 | 6.38 | -0.07 | | |
| Oil & Gas | 9.48*** | 34.5*** | 10.8 | 9.76*** | 0.55 | 17.2*** | 10.8*** | 10.8 | |
| Services | -1.36 | 23.7*** | 0.03 | -1.08 | -10.2*** | 6.41 | -0.04 | 0.03 | -10.8*** |

Source: Author's Computation.

*Note: *** represents 95% confidence intervals that exclude zero, and a significant difference in earnings management; Agric is agricultural sub-sector: Congl.is conglomerate sub-sector; Const. is construction sub-sector; Con. gd. is consumer goods sub-sector; Hlth is health sub-sector; ICT is information and communication technology sub-sector; Indust. is industrial goods sub-sector; Nat. Res. is natural resources sub-sector; Oil & Gas is oil and gas sub-sector; and Services is services sub-sector.*

Unlike accrual-based earnings management, the results for real earnings management in Table 5 reveal strong firm- and sector-specific heterogeneity, with several statistically meaningful contrasts. The most pronounced result is that the conglomerate sector differs significantly from nearly all other sectors, exhibiting substantially lower real earnings management. These results indicate that the conglomerate sector consistently engages in significantly less real earnings manipulation than most other sectors. This suggests tighter operational constraints, less flexibility in production or sales manipulation, or stronger internal monitoring mechanisms. The health and oil and gas sectors emerge as high real-earnings-management sectors, relative to many others. The magnitude and consistency of these contrasts suggest that firms in Sectors 5 and 9 rely more heavily on operational manipulation, such as sales acceleration, overproduction, or cash-flow timing, to influence reported earnings. For several sector pairs, particularly among the agricultural, construction, consumer goods, ICT, industrial, natural resources, and services sectors, the differences in real earnings management are statistically insignificant. This pattern suggests that, outside the extreme cases identified above, real earnings management behaviour is relatively heterogeneous and firm-specific, rather than uniformly determined by sector affiliations.

Taken together, the results reveal that sectoral differences in real earnings management are driven by a small number of sectors, rather than broad sector-wide patterns. Unlike accrual-based earnings management, where one sector clearly dominated, real earnings management

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displays multiple high- and low-RM clusters, reflecting the inherently operational and discretionary nature of real activities manipulation.

Table 6: Bonferroni Pairwise Comparison – Abnormal Production Earnings Management

| Sector | Agric. | Congl. | Const. | Con. gd | Hlth. | ICT | Indust. | Nat. | Oil |
|---|---|---|---|---|---|---|---|---|---|
| Congl. | 0.10 | | | | | | | | |
| Const. | -0.01 | -0.12 | | | | | | | |
| Con. Gd | -0.00 | -0.11 | 0.00 | | | | | | |
| Hlth. | -0.04 | -0.15 | -0.03 | -0.03 | | | | | |
| ICT | 0.10 | -0.00 | 0.11 | 0.10 | 0.14 | | | | |
| Indust. | -0.01 | -0.12 | -0.00 | -0.01 | 0.02 | -0.12 | | | |
| Nat. Res. | -0.01 | -0.12 | -0.00 | -0.00 | 0.03 | -0.11 | 0.00 | | |
| Oil & Gas | 4.29*** | 4.19*** | 4.31*** | 4.30*** | 4.34*** | 4.19*** | 4.31*** | 4.31 | |
| Services | -0.02 | -0.13 | -0.00 | -0.01 | 0.02 | -0.12 | -0.00 | -0.00 | -4.32*** |

Source: Author's Computation.
*Note: *** represents 95% confidence intervals that exclude zero, and a significant difference in earnings management; Agric is agricultural sub-sector: Congl.is conglomerate sub-sector; Const. is construction sub-sector; Con. gd. is consumer goods sub-sector; Hlth is health sub-sector; ICT is information and communication technology sub-sector; Indust. is industrial goods sub-sector; Nat. Res. is natural resources sub-sector; Oil & Gas is oil and gas sub-sector; and Services is services sub-sector.*

For abnormal production cost in Table 6, the oil and gas sector exhibits significantly higher abnormal production costs than all other sectors in the sample. Specifically, comparisons between natural resources and others are all positive and statistically significant, with 95% confidence intervals that exclude zero. The magnitude of these contrasts is economically meaningful (around 4–4.3 units), indicating that firms in the oil and gas sector engage far more intensively in production-based real earnings management than firms in any other sector. In contrast, pairwise comparisons among the remaining sectors are statistically insignificant. Their confidence intervals consistently include zero, and the estimated contrasts are small in magnitude. This indicates that, outside the oil and gas sector, firms exhibit similar levels of abnormal production cost manipulation, suggesting that production-based RM is not a widespread sectoral phenomenon across the Nigerian non-financial economy.

These results demonstrate that sectoral heterogeneity in production-based real earnings management is entirely driven by the oil and gas sector. While the ANOVA indicates overall differences, the Bonferroni results show that these differences stem from a single sector with unusually high production manipulation, rather than broad inter-sectoral variation. The fact

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that Oil & Gas stands out is economically plausible because the sector often features capital-intensive operations and complex cost allocation, which can widen managerial discretion over reported production cost; inventory and lifting-cost dynamics that may allow timing/recognition strategies around production and costs; and Commodity price volatility, which increases incentives to smooth earnings via operational decisions. These sector characteristics can make production-cost manipulation more feasible and more rewarding in the short run, though it may come at the expense of operational efficiency and future profitability.

Table 7: Bonferroni Pairwise Comparison – Abnormal Cash-Flow Earnings Management

| Sector | Agric. | Congl. | Const. | Con. gd | Hlth. | ICT | Indust. | Nat. | Oil |
|---|---|---|---|---|---|---|---|---|---|
| Congl. | -25.1*** | | | | | | | | |
| Const. | -1.38 | 23.8*** | | | | | | | |
| Con. Gd | -0.27 | 24.9*** | 1.11 | | | | | | |
| Hlth. | 8.97*** | 34.1*** | 10.3*** | 9.25*** | | | | | |
| ICT | -7.89 | 17.3*** | -6.50 | -7.61*** | -16.8*** | | | | |
| Indust. | -1.30 | 23.8*** | 0.08 | -1.02 | -10.2*** | 6.58*** | | | |
| Nat. Res. | -1.38 | 23.8*** | 0.00 | -1.11 | -10.3 | 6.50 | -0.08 | | |
| Oil & Gas | 5.18 | 30.3*** | 6.57 | 5.46*** | -3.78 | 13.0*** | 6.49*** | 6.57 | |
| Services | -1.34 | 23.8*** | 0.04 | -1.06 | -10.3*** | 6.54*** | -0.03 | 0.04 | -6.53*** |

Source: Author's Computation.

*Note: *** represents 95% confidence intervals that exclude zero, and a significant difference in earnings management; Agric is agricultural sub-sector: Congl.is conglomerate sub-sector; Const. is construction sub-sector; Con. gd. is consumer goods sub-sector; Hlth is health sub-sector; ICT is information and communication technology sub-sector; Indust. is industrial goods sub-sector; Nat. Res. is natural resources sub-sector; Oil & Gas is oil and gas sub-sector; and Services is services sub-sector.*

For abnormal cash flow in Table 7, the most consistent pattern is that Conglomerates exhibit significantly lower abnormal cash-flow RM relative to many other sectors. In addition, many comparisons of other sectors against Conglomerates are strongly positive and significant, implying that most other sectors have materially higher abnormal cash-flow RM than conglomerates, even after the Bonferroni correction. The health care sector shows consistently higher abnormal cash-flow RM than several sectors. The consumer goods and oil & gas sectors are higher than some sectors (but not uniformly higher than all). The ICT sector is relatively low compared to several other sectors, and many contrasts involving the natural resources sector are statistically insignificant, with wide confidence intervals, suggesting either fewer observations or greater dispersion.

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Table 8: Diagnostic Test

| Earnings Management | Levene test | p-value | Brown–Forsythe test | p-value | 10% trimmed mean | p-value |
|---|---|---|---|---|---|---|
| AM | 125.4 | 0.000 | 35.66 | 0.000 | 107.8 | 0.000 |
| RM | 64.71 | 0.000 | 18.4 | 0.000 | 65.93 | 0.000 |
| Prod. RM | 76.12 | 0.000 | 12.97 | 0.000 | 90.14 | 0.000 |
| Cash-flow RM | 55.84 | 0.000 | 17.63 | 0.000 | 61.4 | 0.000 |

Source: Author's Computation.

Levene and Brown–Forsythe tests strongly reject the null of equal variances across sectors for all earnings-management measures, indicating significant cross-sector heteroskedasticity. This suggests that sectoral differences in earnings management manifest not only in mean levels but also in the volatility of manipulation behaviour.

## CONCLUSION AND RECOMMENDATIONS

This study provides a comprehensive sectoral analysis of earnings management among non-financial firms in Nigeria, distinguishing between accrual-based earnings management and real earnings management, including production-based and cash-flow-based channels. Using ANOVA, Bonferroni pairwise comparisons, variance diagnostics, and descriptive evidence, the study uncovers clear and economically meaningful patterns of sectoral heterogeneity. The findings reveal that accrual-based earnings management exhibits significant sectoral differences, with variability primarily driven by a small number of industries. In contrast, real earnings management is predominantly firm-specific but highly concentrated in certain sectors. In particular, healthcare and oil and gas firms exhibit persistently high and volatile real earnings management, especially through cash-flow and production-cost channels, whereas Conglomerates and ICT firms display relatively lower and more stable manipulation practices. The strong correlation between aggregate real earnings management and abnormal cash-flow manipulation further indicates that cash-flow-based strategies are the dominant mechanism through which managers influence reported earnings.

These results suggest that regulatory reforms and accounting standards may have been more effective in constraining accrual manipulation than in limiting real activities manipulation. Because real earnings management involves operational decisions with direct economic consequences, its concentration in specific sectors poses risks to earnings quality, firm value, and resource allocation.

The study contributes to the literature by offering one of the first systematic sector-level examinations of multiple earnings management channels in Nigeria. From a policy perspective, the findings underscore the need for sector-sensitive regulatory oversight, enhanced operational and cash-flow monitoring, and risk-based audit strategies, particularly in sectors with high real earnings management exposure. Overall, improving earnings quality in emerging markets requires moving beyond uniform accounting rules toward sector-specific enforcement and governance mechanisms that directly address operational sources of manipulation.

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