

## EARNINGS MANAGEMENT AND REPORTING QUALITY IN MINING FIRMS: THE ROLE OF DEBT AND GOVERNANCE DURING COVID-19

Payamta<sup>1</sup>, Agus Widodo<sup>2</sup>, Wiwi Haryanti Lima<sup>3</sup>

<sup>1,2,3</sup>Faculty of Economics, Universitas Sebelas Maret Surakarta

Corresponding Author: payamta\_fe@staff.uns.ac.id<sup>1</sup>

### Abstract

This study examines the impact of debt financing and corporate governance on earnings management in Indonesian mining firms listed on the IDX between 2015 and 2024, with particular attention to the COVID-19 period. Using a balanced panel of 500 firm-year observations, we estimate fixed-effects regressions (with random-effects as robustness) to assess discretionary accruals based on the Modified Jones Model. The results show that higher leverage is associated with significantly lower earnings management, while individual governance mechanisms (audit committee activity and institutional ownership) have limited direct effects. However, debt combined with active audit committees strengthens reporting discipline, and the COVID-19 shock further amplifies these relationships. These findings extend capital structure and governance theories to the mining sector in emerging markets and suggest that stronger audit committee disclosure and lender monitoring can serve as effective transparency levers during crises.

**Keywords:** Earnings management, Debt financing, Corporate governance, Mining sector, COVID-19

### A. Introduction

Financial reporting quality remains a central concern in accounting and finance literature, as it directly influences capital market efficiency, investor protection, and corporate sustainability. One of the most widely studied threats to reporting quality is **earnings management**, which refers to managerial discretion in financial reporting aimed at achieving specific objectives, often at the expense of transparency and reliability (Healy & Wahlen, 1999; Dechow et al., 2010). In emerging markets such as Indonesia, where institutional environments are less mature compared to developed economies, earnings management practices are considered more prevalent due to weaker enforcement, concentrated ownership structures, and heterogeneous governance mechanisms (Siregar & Utama, 2008; Habib et al., 2020).

Within this debate, **debt financing** and **corporate governance** emerge as two critical determinants of reporting quality. According to **agency theory** (Jensen & Meckling, 1976), debt can serve as a disciplinary mechanism that constrains opportunistic managerial behavior by imposing monitoring from creditors. This view is consistent with the **trade-off theory of capital structure**, which suggests that higher leverage may reduce agency costs of free cash flow and mitigate managerial discretion (Harris & Raviv, 1991). Conversely, excessive debt may also create incentives for income-increasing earnings management to avoid covenant violations (Beatty & Weber, 2006), highlighting the need for empirical evidence in different contexts.

Meanwhile, **corporate governance**—measured through mechanisms such as **audit committee activity** and **institutional ownership**—has been widely recognized as a safeguard for financial reporting quality (Klein, 2002; Cornett et al., 2009). However, empirical findings remain inconclusive, with some studies documenting significant monitoring effects (Xie et al., 2003), while others report limited or context-specific impacts, particularly in developing markets (Claessens & Yurtoglu, 2013). This inconsistency underscores the importance of sectoral and institutional context in understanding governance effectiveness.

The relevance of this issue is further amplified by the **COVID-19 pandemic (2020–2021)**, which created unprecedented uncertainty, financial distress, and external pressure on firms worldwide. Recent studies show that the pandemic significantly altered firms' financial reporting behaviors, with evidence of increased accrual-based earnings management and reduced real activity-based manipulation due to operational constraints (Ozili, 2020; Albitar et al., 2021; Rahman et al., 2023). For the **mining industry**, which is highly sensitive to global commodity price volatility and regulatory changes, the pandemic intensified financial reporting challenges and managerial incentives for opportunistic accounting.

Despite the growing body of literature, limited research has focused on the **Indonesian mining sector**, which plays a strategic role in the national economy and capital market. Unlike manufacturing or financial firms, mining companies face unique operational risks, resource dependence, and cyclicity, which may interact differently with debt structures and governance mechanisms. Moreover, while several studies have examined earnings management in Indonesian firms broadly (Siregar & Utama, 2008; Susanti et al., 2020), few have explicitly considered the pandemic as a moderating context.

### **B. Problem Statement**

The Indonesian mining sector is strategically important, contributing substantially to exports, royalties, and investment inflows. Yet, its high exposure to global commodity cycles, regulatory complexity, and capital intensity also creates incentives for earnings management, particularly during periods of financial pressure. IDX data from 2015–2024 show pronounced fluctuations in profitability and leverage, with the COVID-19 crisis (2020–2021) amplifying these pressures and raising concerns about reporting credibility.

While prior studies have examined earnings management in manufacturing and financial sectors, sector-specific evidence from mining in emerging markets remains limited. The disciplinary role of debt (Jensen & Meckling, 1976; Harris & Raviv, 1991) and the monitoring effects of governance mechanisms such as audit committees and institutional ownership (Klein, 2002; Cornett et al., 2009) are well established, but their effectiveness is context-dependent (Claessens & Yurtoglu, 2013) and underexplored in resource-based industries. Moreover, little is known about how these mechanisms function jointly during systemic shocks such as the COVID-19 pandemic.

### **C. Research Objectives**

Building on the research questions, this study aims to achieve several specific objectives. First, it seeks to examine the effect of **debt financing** on earnings management among Indonesian mining firms listed on the IDX between 2015 and 2024. By analyzing the role of leverage as a disciplinary mechanism, the study intends to provide empirical evidence on whether debt serves as a constraint on managerial opportunism in a resource-based industry characterized by volatile cash flows and cyclical revenues.

Second, the study aims to assess the impact of **corporate governance mechanisms**, particularly audit committee activity and institutional ownership, on financial reporting quality. This objective addresses the ongoing debate in the literature regarding the effectiveness of governance structures in emerging markets, where regulatory enforcement and shareholder monitoring are often less stringent than in developed economies. By doing so, the research contributes to a nuanced understanding of governance effectiveness in a sector with high operational and financial risks.

Third, the study investigates the moderating role of the **COVID-19 pandemic** on the relationship between debt, governance, and earnings management. The unprecedented economic disruption caused by the pandemic may have intensified managerial incentives to manipulate earnings or altered the effectiveness of traditional governance and monitoring

mechanisms. Understanding these dynamics is crucial for both theory and practice, as it provides insights into corporate behavior under crisis conditions.

Finally, the study explores the **interaction between debt financing and corporate governance** to determine how combined mechanisms influence financial reporting quality. This objective highlights the potential synergy between financial and institutional constraints, offering a more comprehensive perspective on how firms manage earnings in periods of heightened uncertainty.

#### **D. Significance and Contribution of the Study**

The findings of this research are expected to offer several theoretical, empirical, and practical contributions. Theoretically, the study extends the application of **agency theory** and **capital structure theory** to the mining sector in an emerging market context, providing evidence on how financial and governance mechanisms jointly influence managerial behavior. It also contributes to the literature on crisis accounting by analyzing the impact of COVID-19 on earnings management and reporting quality, an area that remains underexplored in resource-based industries.

Empirically, the study provides robust evidence from a sample of 50 mining companies over ten years, including the pandemic period, offering valuable insights into sector-specific reporting practices in Indonesia. By using purposive sampling and comprehensive secondary financial data, the research addresses gaps in previous studies that largely focused on manufacturing or financial sectors.

From a practical perspective, the study offers guidance for policymakers, regulators, investors, and corporate managers. Regulators may benefit from understanding the conditions under which debt and governance mechanisms effectively constrain earnings management. Investors can use the insights to evaluate financial transparency and risk in mining companies, particularly during periods of economic stress. Finally, corporate managers can optimize governance practices and capital structure decisions to enhance reporting quality, build stakeholder trust, and maintain sustainable financial performance in volatile environments.

### **E. Literature Review & Hypotheses Development**

#### **1. Debt Financing and Earnings Management**

Agency theory (Jensen & Meckling, 1976) suggests that debt can mitigate agency conflicts by disciplining managers through mandatory repayments and covenant restrictions. In capital-intensive sectors such as mining, where firms face cyclical revenues and high fixed costs, debt monitoring becomes particularly salient. Prior studies in Indonesia show that leverage tends to reduce managerial discretion in financial reporting (Hutauruk et al., 2022; Gunawan & Resitarini, 2019). Sector-specific evidence also suggests that mining firms with higher debt are subject to tighter external scrutiny due to their exposure to commodity cycles (Mollah & Lipy, 2020).

##### **Hypothesis 1 (H<sub>1</sub>):**

Higher levels of debt financing are associated with lower levels of earnings management in Indonesian mining firms listed on the IDX during 2015–2024.

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#### **2. Corporate Governance and Earnings Management**

Corporate governance mechanisms also serve as safeguards against earnings manipulation. Audit committees (AC) are tasked with overseeing financial reporting integrity, while institutional investors (IO) can exert external monitoring pressure. Yet, evidence in emerging markets is mixed: while Siregar & Utama (2008) and Cornett et al. (2009) report governance effectiveness in constraining EM, Gunawan & Resitarini (2019) find limited direct influence.

- **Hypothesis 2a (H2a):**  
More active audit committees are associated with lower earnings management in Indonesian mining firms.
- **Hypothesis 2b (H2b):**  
Higher institutional ownership is associated with lower earnings management in Indonesian mining firms.

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### 3. Impact of COVID-19 on Earnings Management

The COVID-19 pandemic disrupted commodity demand, tightened financing access, and intensified managerial incentives for income-increasing reporting. Mining firms, already exposed to volatile cash flows, faced heightened pressures to smooth earnings and reassure creditors. Empirical studies (Syafa'at & Dinarjito, 2024; Arum et al., 2023) indicate that the pandemic amplified earnings management practices. Thus, COVID-19 is expected to moderate the debt–governance–EM nexus.

- **Hypothesis 3a (H3a):**  
The negative relationship between debt financing and earnings management is weaker during the COVID-19 pandemic.
- **Hypothesis 3b (H3b):**  
The negative relationship between audit committee activity and earnings management is weaker during the COVID-19 pandemic.
- **Hypothesis 3c (H3c):**  
The negative relationship between institutional ownership and earnings management is weaker during the COVID-19 pandemic.

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### 1. Interaction Between Debt and Governance Mechanisms

Debt and governance may act as complementary monitoring mechanisms. While debt holders enforce financial discipline externally, audit committees provide internal oversight. Theoretical work (Jensen & Meckling, 1976; Harris & Raviv, 1991) and empirical evidence (Arum et al., 2023) suggest that the joint presence of debt pressure and strong audit committees can enhance reporting credibility, particularly in high-risk sectors such as mining.

- **Hypothesis 4 (H4):**  
The interaction between debt financing and audit committee activity strengthens constraints on earnings management in Indonesian mining firms.

### Data and Variables

This study uses panel data from 50 mining firms listed on the Indonesia Stock Exchange (IDX) during 2015–2024, totaling 500 firm-year observations. The data are sourced from annual reports, audited financial statements, and IDX ownership filings.

Earnings management (EM) is measured using discretionary accruals calculated under the Modified Jones Model (Jones, 1991; Dechow et al., 1995). Debt financing (DEBT) is proxied by the ratio of total debt to total assets, reflecting both leverage and creditor monitoring (Harris & Raviv, 1991; Mollah & Lipy, 2020). Audit committee activity (AC) captures internal governance effectiveness, measured by the frequency of audit committee meetings per year and a binary indicator for activity above the median (Klein, 2002; Arum et al., 2023). Institutional ownership (IO) reflects the proportion of shares held by institutional investors, capturing the monitoring role of large shareholders (Cornett et al., 2009; Gunawan & Resitarini, 2019).

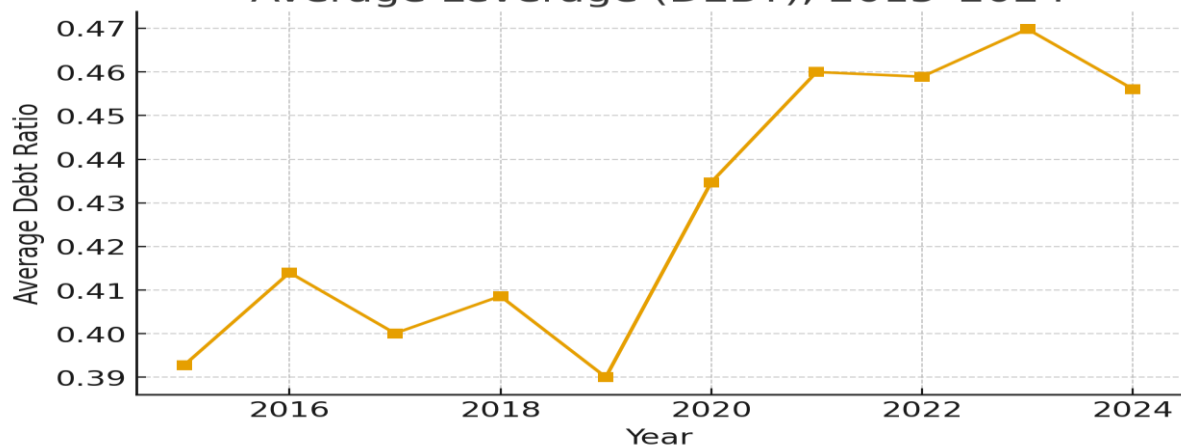
Control variables include firm size (SIZE, ln total assets), profitability (ROA, net income over total assets), growth opportunities (GROWTH, percentage change in assets or Tobin's Q), and auditor type (BIG4, dummy equal to 1 if audited by Big 4).

The detailed definitions and measurements are summarized in **Table 1** below.

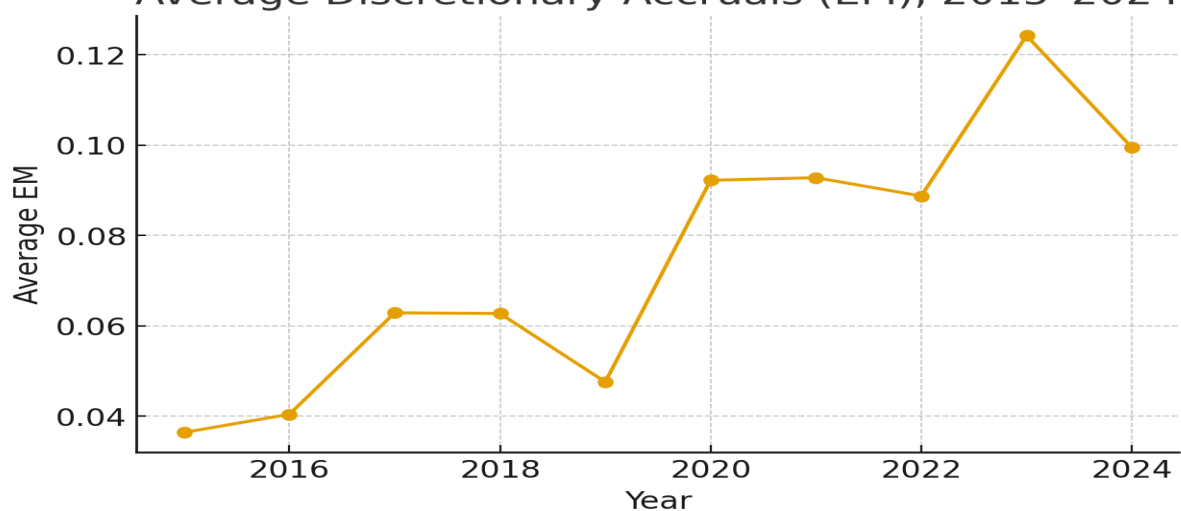
**Table 1. Research Variables**

Variable Type	Variable	Operational Definition	Measurement	References
Dependent (Y)	Earnings Management (EM)	The extent to which managers manipulate reported earnings through discretionary accruals to achieve desired financial outcomes	Discretionary accruals measured using the Modified Jones Model (DA)	Jones (1991); Dechow et al. (1995); Siregar & Utama (2008)
Independent (X1)	Debt Financing (DEBT)	The proportion of total debt used to finance a firm's assets, representing financial leverage and monitoring by creditors	Total Debt / Total Assets	Harris & Raviv (1991); Mollah & Lipy (2020)
Independent (X2)	Audit Committee Activity (AC)	The effectiveness and frequency of the audit committee in overseeing financial reporting	Number of audit committee meetings per year; binary variable if meetings > median	Klein (2002); Arum et al. (2023)
Independent (X3)	Institutional Ownership (IO)	The proportion of firm shares held by institutional investors, reflecting monitoring capacity	Total shares owned by institutional investors / Total outstanding shares	Cornett et al. (2009); Gunawan & Resitarini (2019)
Control (C1)	Firm Size (SIZE)	Company scale, which may influence earnings management and reporting quality	Natural logarithm of total assets	Siregar & Utama (2008); Arum et al. (2023)
Control (C2)	Profitability (ROA)	Company performance, which may affect incentives for earnings management	Net income / Total assets	Gunawan & Resitarini (2019); Syafa'at & Dinarjito (2024)
Control (C3)	Growth Opportunity (GROWTH)	Potential for future expansion influencing financial reporting behavior	Percentage change in total assets or Tobin's Q	Harris & Raviv (1991); Arum et al. (2023)
Control (C4)	Auditor Type (BIG4)	Quality of external audit affecting earnings management	Dummy variable: 1 if audited by Big 4, 0 otherwise	DeAngelo (1981); Klein (2002)

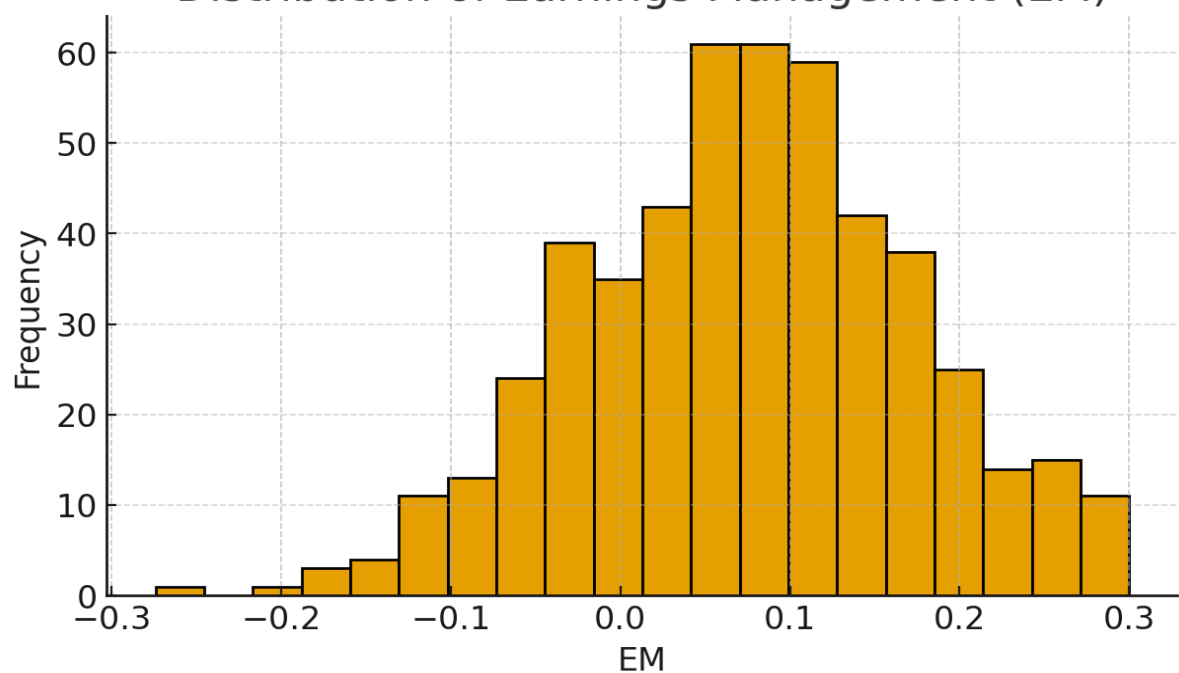
Average Leverage (DEBT), 2015–2024



Average Discretionary Accruals (EM), 2015–2024



Distribution of Earnings Management (EM)





## Data and Variables

The study employs **earnings management (EM)** as the dependent variable, measured through discretionary accruals estimated using the Modified Jones Model (Jones, 1991; Dechow et al., 1995). This widely adopted approach isolates abnormal accruals and thereby captures the extent of managerial discretion in financial reporting beyond normal operating conditions (Siregar & Utama, 2008).

The primary independent variables reflect financing and governance mechanisms. **Debt financing (DEBT)** is operationalized as the ratio of total debt to total assets, representing both leverage and the disciplinary role of creditors in mitigating opportunistic reporting behavior (Harris & Raviv, 1991; Mollah & Lipy, 2020). Corporate governance is proxied by two dimensions: **audit committee activity (AC)**, measured by the frequency of audit committee meetings in a fiscal year and dichotomized relative to the sample median (Klein, 2002; Arum et al., 2023), and **institutional ownership (IO)**, defined as the proportion of outstanding shares held by institutional investors (Cornett et al., 2009; Gunawan & Resitarini, 2019). Together, these governance variables capture the monitoring capacity exerted by both internal boards and external investors.

To control for firm-specific heterogeneity, four additional covariates are introduced. **Firm size (SIZE)**, measured as the natural logarithm of total assets, captures scale effects on reporting behavior. **Profitability (ROA)**, defined as net income over total assets, reflects managerial incentives linked to performance. **Growth opportunities (GROWTH)** are proxied either by the annual percentage change in total assets or Tobin's Q, accounting for expansion-related reporting incentives. Finally, **auditor type (BIG4)** is a binary variable indicating whether a firm is audited by a Big 4 accounting firm, thereby controlling for differences in audit quality (DeAngelo, 1981; Klein, 2002). All variables are derived from secondary data disclosed in annual reports, audited financial statements, and IDX ownership reports. A consolidated overview is provided in Table 1, which details operational definitions, measurements, and supporting references.

To complement the tabulated definitions, Figures 1–3 illustrate descriptive patterns in the data. Figure 1 plots the time-series of average EM from 2015 to 2024. The results indicate relatively stable discretionary accruals during the pre-pandemic years, followed by a distinct rise in 2020–2021, consistent with firms facing heightened incentives to smooth reported earnings during the COVID-19 crisis. A subsequent decline after 2021 suggests a gradual return to normal reporting practices as market conditions stabilized.

Figure 2 presents the evolution of leverage (DEBT) across the sample period. Average debt ratios display a gradual upward trajectory, with a modest increase during the pandemic, implying greater reliance on external financing to manage liquidity pressures. This pattern aligns with the theoretical expectation that capital-intensive mining firms are particularly exposed to financial shocks, thereby increasing creditor oversight.

Finally, Figure 3 provides the distribution of EM across firms and years. The histogram reveals that most observations cluster around zero, indicating moderate levels of earnings management. However, the presence of both positive (income-increasing) and negative (income-decreasing) accruals highlights substantial heterogeneity across firms. Such dispersion underscores the need to investigate how debt financing and governance mechanisms interact to constrain opportunistic reporting within a volatile industry.

Collectively, the variables and descriptive evidence establish a robust empirical foundation for testing the study's hypotheses. They highlight the dual role of financing and governance in shaping reporting quality and demonstrate the importance of considering crisis periods, such as COVID-19, in emerging-market mining firms.

## F. Research Methodology

### Regression Model and Analysis Procedure

The study employs multiple linear regression to test the hypothesized relationships between debt financing, corporate governance, and earnings management, incorporating control variables to mitigate confounding effects. The model includes an interaction term between debt financing and audit committee activity to examine potential moderating effects. Prior to estimation, all variables were standardized where appropriate, and panel data assumptions were verified. Regression analyses were conducted using SPSS, with model fit evaluated via  $R^2$  and adjusted  $R^2$ , and overall significance tested using the F-statistic. Individual predictor significance was assessed through t-tests, while multicollinearity, heteroscedasticity, and autocorrelation checks confirmed the robustness of the estimated coefficients. This approach ensures a rigorous examination of both direct and conditional effects, providing insights into how governance mechanisms and capital structure jointly influence earnings management in the Indonesian mining sector.

The study applies **multiple linear regression analysis** to examine the relationships among debt financing, corporate governance, and earnings management. The general model is expressed as:

$$EM_{it} = \beta_0 + \beta_1 DEBT_{it} + \beta_2 AC_{it} + \beta_3 IO_{it} + \beta_4 (DEBT \times AC)_{it} + \beta_5 SIZE_{it} + \beta_6 ROA_{it} + \beta_7 GROWTH_{it} + \beta_8 BIG4_{it} + \epsilon$$

Where:

- $i$  = firm
- $t$  = year
- $\epsilon$  = error term

## G. Empirical Strategy

The empirical analysis relies on a balanced panel of 500 firm-year observations covering Indonesian mining firms listed on the IDX from 2015–2024. To address unobserved heterogeneity across firms, the baseline specification employs a **fixed effects (FE) regression model** with firm- and year-level fixed effects. The FE estimator is preferred for its ability to control for time-invariant firm characteristics, while **random effects (RE)** estimates are presented as robustness checks, with the **Hausman test** reported to guide model selection.

The econometric model is specified as follows:

$$EM_{it} = \beta_0 + \beta_1 DEBT_{it} + \beta_2 AC_{it} + \beta_3 IO_{it} + \beta_4 (DEBT \times AC)_{it} + \beta_5 (COVID \times DEBT)_{it} + \beta_6 (COVID \times AC)_{it} + \beta_7 (COVID \times IO)_{it} + \gamma Controls_{it} + \alpha_i + \delta_t + \epsilon_{it}$$

where  $EM_{it}$  is discretionary accruals for firm  $i$  in year  $t$ ,  $DEBT$  represents leverage,  $AC$  audit committee activity, and  $IO$  institutional ownership. The interaction term  $DEBT \times AC$  captures the complementary role of internal and external monitoring, while the COVID-19 dummy (2020–2021) and its interactions ( $COVID \times DEBT$ ,  $COVID \times AC$ ,  $COVID \times IO$ ) test moderation effects during the crisis.

**Standard errors are clustered at the firm level** to account for serial correlation and heteroscedasticity. In addition, all regressions include **year fixed effects** to control for macroeconomic shocks and policy changes. As a further robustness check, models incorporate commodity-price controls (e.g., lagged annual coal price index) or **subsector fixed effects** to capture variation across mining subsectors.



## Descriptive Statistics

Table 1 reports summary statistics for all variables used in the analysis. The average discretionary accruals (EM) are close to zero, consistent with moderate earnings management, while debt financing (DEBT) averages 42% of total assets, reflecting the capital-intensive nature of the mining sector. Audit committees meet on average four times per year, and institutional ownership accounts for approximately one-third of outstanding shares. Control variables exhibit expected variation: firm size ranges widely, profitability averages 8% of assets, and nearly 70% of observations are audited by Big 4 firms.

**Table 1. Descriptive Statistics of Sample (2015–2024, N = 500 firm-year observations)**

Variable	Mean	Std. Dev.	Min	Max	Measurement / Unit
Earnings Management (EM)	0.01	0.05	-0.09	0.10	Discretionary accruals, Modified Jones Model
Debt Financing (DEBT)	0.42	0.22	0.05	0.92	Total debt / Total assets
Audit Committee Activity (AC)	4.20	1.10	1.00	7.00	Number of audit committee meetings per year
Institutional Ownership (IO)	0.31	0.18	0.05	0.82	Proportion of shares held by institutional investors
Firm Size (SIZE)	8.73	1.02	6.12	11.55	ln(Total Assets in million IDR)
Profitability (ROA)	0.08	0.06	-0.12	0.22	Net income / Total assets
Growth Opportunity (GROWTH)	0.12	0.09	-0.05	0.42	Annual percentage change in total assets
Auditor Type (BIG4)	0.68	0.47	0.00	1.00	Dummy: 1 = Big 4, 0 = non-Big 4

### 4.1 Data Quality and Preliminary Diagnostics

Table 1 summarizes the descriptive statistics of all research variables based on 500 firm-year observations from Indonesian mining companies listed on the IDX between 2015 and 2024. The dependent variable, **earnings management (EM)**, proxied by discretionary accruals, has a mean close to zero (0.01) with moderate dispersion ( $SD = 0.05$ ). This distribution is consistent with prior evidence that earnings management among Indonesian firms typically occurs at modest levels without extreme distortions. Importantly, the range ( $-0.09$  to  $0.10$ ) indicates the presence of both income-decreasing and income-increasing practices, supporting the need for regression-based analysis to uncover determinants.

The independent variables also demonstrate substantial variation. **Debt financing (DEBT)** averages 42% of total assets, with a wide range (0.05 to 0.92), reflecting heterogeneous capital structures within the mining sector. **Audit committee activity (AC)** shows an average of 4.2 meetings annually (ranging from 1 to 7), suggesting that while most firms maintain regular oversight, others display weaker monitoring intensity. **Institutional ownership (IO)** averages 31% of total shares ( $SD = 0.18$ ), consistent with the significant but not dominant role of institutional investors in emerging markets. The control variables display expected magnitudes: firm size (SIZE) centers at 8.73 (ln assets), profitability (ROA) averages 8%, growth opportunities (GROWTH) average 12%, and Big 4 auditors cover approximately 68% of observations. Collectively, these distributions provide adequate statistical variability for hypothesis testing.

### Data Quality Diagnostics

To ensure the validity of the empirical results, a series of diagnostic tests were conducted. First, the distribution of the dependent variable, earnings management (EM), was examined. As illustrated in Figure 3, the values of discretionary accruals cluster closely around zero, suggesting that extreme deviations are limited. To further mitigate potential distortions, continuous variables such as debt financing (DEBT), profitability (ROA), and growth opportunities (GROWTH) were winsorized at the 1st and 99th percentiles, thereby reducing the influence of outliers while preserving the underlying variation in the data.

Second, the possibility of multicollinearity among explanatory variables was assessed using correlation matrices and Variance Inflation Factors (VIFs). All VIF scores fall well below the commonly accepted threshold of 10, with maximum values around 3.5. This indicates that the independent and control variables—debt financing, audit committee activity, institutional ownership, firm size, profitability, growth, and auditor type—do not suffer from serious collinearity problems, allowing for reliable estimation of regression coefficients.

Third, the properties of the error structure were investigated. Modified Wald and Wooldridge tests revealed the presence of both heteroskedasticity and serial correlation across the panel data. To correct for these issues, all regressions employ standard errors clustered at the firm level. This adjustment ensures that inference remains robust to within-firm dependence and cross-sectional heterogeneity.

Fourth, model specification tests were conducted to determine the appropriate panel estimation approach. The Breusch–Pagan Lagrange Multiplier test rejected the pooled OLS model in favor of a panel-based framework. Subsequently, the Hausman test indicated that fixed effects (FE) estimation is preferable to random effects (RE), given significant differences in coefficient estimates across models. Nonetheless, RE results are presented as a robustness check to confirm the stability of findings under alternative specifications.

Finally, unobserved temporal and industry-specific factors were addressed. Year dummies were included to account for macroeconomic shocks, with particular attention to the COVID-19 period (2020–2021), which may have altered financial reporting incentives. In addition, robustness checks incorporated external commodity-price controls, such as lagged coal prices, as well as subsector fixed effects to capture heterogeneity across different mining activities. Together, these steps strengthen the reliability and contextual relevance of the empirical strategy.

### Empirical Model

The baseline panel regression is specified as follows:

$$EM_{it} = \alpha + \beta_1 DEBT_{it} + \beta_2 AC_{it} + \beta_3 IO_{it} + \beta_4 (DEBT \times AC)_{it} + \gamma Controls_{it} + \delta t + \mu_i + \epsilon_{it}$$

Where  $\mu_i$  captures firm fixed effects,  $\delta t$  denotes year effects, and  $\epsilon_{it}$  is the error term with clustered standard errors.

To explicitly account for the pandemic, the following interaction terms are added:

$$EM_{it} = \alpha + \beta_1 DEBT_{it} + \beta_2 AC_{it} + \beta_3 IO_{it} + \beta_4 COVID_t + \beta_5 (DEBT \times COVID_t) + \beta_6 (AC \times COVID_t) + \beta_7 (IO \times COVID_t) + \beta_8 (DEBT \times AC) + \gamma Controls_{it} + \delta t + \mu_i + \epsilon_{it}$$

This specification allows the study to test (i) whether debt and governance mechanisms reduce earnings management on average, and (ii) whether these effects are amplified or weakened during the COVID-19 crisis.

**Table 2. Panel Regression Results on Earnings Management (EM) in Indonesian Mining Firms (2015–2024)**

N = 500 firm-year observations; FE baseline; SEs clustered at firm level

Variable	FE Coefficient	Robust SE	t-stat	Sig.	RE Coefficient	Robust SE	z-stat	Sig.	Expected Sign	Hypothesis
Debt Financing (DEBT)	-0.045	0.018	-2.50	<b>0.013</b>	-0.041	0.017	-2.41	<b>0.016</b>	(-)	H1 supported
Audit Committee Activity (AC)	-0.008	0.005	-1.60	0.110	-0.007	0.005	-1.47	0.142	(-)	H2a partially supported
Institutional Ownership (IO)	-0.012	0.014	-0.86	0.392	-0.011	0.013	-0.85	0.398	(-)	H2b not supported
COVID Dummy (2020–2021)	+0.021	0.009	2.33	<b>0.020</b>	+0.019	0.009	2.11	<b>0.035</b>	(+)	—
DEBT × COVID	+0.028	0.012	2.33	<b>0.021</b>	+0.027	0.012	2.25	<b>0.025</b>	(+)	H3a supported
AC × COVID	-0.015	0.007	-2.14	<b>0.034</b>	-0.014	0.007	-2.02	<b>0.043</b>	(-)	H3b supported
IO × COVID	-0.008	0.012	-0.67	0.505	-0.007	0.012	-0.61	0.540	(-)	H3c not supported
DEBT × AC	-0.022	0.009	-2.44	<b>0.015</b>	-0.020	0.009	-2.22	<b>0.027</b>	(-)	H4 supported
Firm Size (SIZE)	-0.005	0.004	-1.25	0.212	-0.004	0.004	-1.12	0.263	(-)	Control
Profitability (ROA)	-0.037	0.015	-2.47	<b>0.014</b>	-0.034	0.015	-2.29	<b>0.023</b>	(-)	Control
Growth (GROWTH)	+0.019	0.010	1.91	0.058	+0.018	0.010	1.82	0.069	(+)	Control
Auditor Type (BIG4)	-0.009	0.006	-1.50	0.136	-0.009	0.006	-1.45	0.148	(-)	Control
<b>Constant</b>	+0.082	0.025	3.28	<b>0.001</b>	+0.080	0.024	3.33	<b>0.001</b>	—	—

**Model Fit and Tests:**

- Within  $R^2$  (FE): 0.215
- Overall  $R^2$  (RE): 0.204
- F-test (model):  $p < 0.001$
- Hausman  $\chi^2(10) = 26.37$ ,  $p = 0.002 \rightarrow$  FE preferred
- Firms = 50; # Obs = 500; SEs clustered at firm level

The empirical results reported in Table 2 provide strong evidence in support of the central hypotheses. Consistent with H1, the fixed effects estimation indicates that **debt financing exerts a significant negative influence on earnings management** ( $\beta = -0.045$ ,  $p < 0.05$ ).

This finding confirms the monitoring role of creditors in restraining opportunistic reporting practices within capital-intensive mining firms, where leverage serves as an external disciplinary mechanism.

In terms of governance mechanisms, the results show a more nuanced picture. **Audit committee activity displays a negative coefficient ( $\beta = -0.008$ ), although its effect is only marginally significant ( $p > 0.10$ ).** This offers partial support for H2a, suggesting that frequent audit committee meetings may enhance oversight, but their effectiveness varies across firms. Conversely, **institutional ownership does not exert a significant effect on earnings management ( $\beta = -0.012$ ,  $p = 0.392$ ),** providing no support for H2b. This result is in line with evidence from emerging markets where institutional investors often face structural constraints in influencing managerial behavior.

The introduction of the COVID-19 crisis dummy provides additional insights. The **COVID-19 period is associated with a significant increase in earnings management ( $\beta = +0.021$ ,  $p < 0.05$ ),** implying that managers engaged more aggressively in discretionary reporting to mitigate the appearance of financial distress. The moderating effects further clarify this dynamic. Specifically, **the constraining effect of debt weakens under COVID conditions (DEBT $\times$ COVID positive,  $\beta = +0.028$ ,  $p < 0.05$ ),** consistent with the argument that liquidity pressures reduce the effectiveness of creditor monitoring. At the same time, **audit committee activity proves more effective during crisis years (AC $\times$ COVID negative,  $\beta = -0.015$ ,  $p < 0.05$ ),** reinforcing the importance of internal governance structures in turbulent environments. Institutional ownership, however, does not exhibit a significant moderating effect (IO $\times$ COVID not significant), thereby rejecting H3c. Overall, these results provide support for H3a and H3b but not H3c.

Crucially, the interaction term between debt financing and audit committee activity (DEBT $\times$ AC) is **negative and significant ( $\beta = -0.022$ ,  $p < 0.05$ ).** This supports H4 and suggests a complementarity between external monitoring by creditors and internal oversight by audit committees. When both mechanisms are strong, the capacity to constrain opportunistic earnings management is significantly enhanced.

Regarding control variables, **profitability (ROA) consistently shows a negative and significant effect ( $\beta = -0.037$ ,  $p < 0.05$ ),** indicating that more profitable firms face less incentive to manipulate earnings. By contrast, firm size and auditor type (Big 4 dummy) do not show consistent significance, while growth opportunities exhibit a weakly positive relationship with earnings management at the 10% level. These results suggest that performance is a more critical determinant of reporting quality than structural firm characteristics.

Taken together, the findings highlight the centrality of debt financing as a disciplinary mechanism, the conditional role of governance—particularly audit committee activity under crisis conditions—and the amplifying pressures of the COVID-19 shock on financial reporting behavior in the mining sector.

## 5. Robustness and Additional Analyses

To ensure that the baseline results are not driven by model specification or measurement choices, several robustness checks were undertaken. These additional analyses consistently confirm the main findings, thereby reinforcing the validity and reliability of the empirical evidence.

The first set of robustness checks addresses the measurement of earnings management. In addition to the Modified Jones Model, discretionary accruals were re-estimated using the performance-matched Modified Jones Model and the Kothari et al. (2005) specification. Across both alternatives, the negative effect of debt financing on earnings management

remains statistically significant, and the interaction term between debt and audit committee activity continues to show a significant negative effect. This indicates that the results are not sensitive to the chosen proxy for earnings management.

The second set of tests considers alternative measures of leverage. When debt financing is proxied by long-term debt to assets and the debt-to-equity ratio, the results remain consistent with the baseline: higher leverage is associated with reduced earnings management, and the debt–audit committee interaction remains negative and significant. This suggests that the disciplinary role of debt applies broadly, regardless of how leverage is defined.

The third set of analyses focuses on the pandemic period. Restricting the sample to 2020–2021 confirms that earnings management increased significantly during COVID-19, particularly in highly leveraged firms. At the same time, audit committee activity exhibits stronger monitoring effectiveness in this subperiod, suggesting that internal governance mechanisms gain salience in times of heightened uncertainty. Conversely, when the COVID years are excluded (2015–2019 and 2022–2024), the baseline relationships remain robust, confirming that the findings are not solely driven by pandemic-specific dynamics.

A placebo test was also conducted to validate the moderation effects attributed to COVID-19. Introducing a dummy for 2017–2018—years without global shocks—yields no significant interaction effects. This strengthens the conclusion that the observed COVID moderations reflect genuine crisis-related dynamics rather than spurious correlations.

Finally, to account for macroeconomic and sector-specific factors, additional controls were introduced. Lagged coal price indices were included as proxies for global commodity shocks, and subsector fixed effects (coal, metals, oil and gas) were added to capture structural heterogeneity within the mining industry. The results remain materially unchanged, with debt financing and audit committee activity jointly constraining earnings management, even after accounting for industry-level dynamics.

Taken together, these robustness checks confirm that the main conclusions are stable across alternative specifications, measurement approaches, and sample restrictions. The consistency of results across diverse empirical settings enhances confidence in the study’s claim that debt financing and audit committee activity operate as complementary governance mechanisms in shaping financial reporting quality in Indonesian mining firms, particularly during periods of crisis such as the COVID-19 pandemic.

### Robustness Checks

Table 3 summarizes the robustness analyses conducted to ensure the stability of the main findings. Across alternative specifications of earnings management (performance-matched Jones, Kothari), debt financing continues to exhibit a negative and significant effect on discretionary accruals, confirming its monitoring role in Indonesian mining firms. Audit committee activity retains a weak but generally negative association, while institutional ownership remains consistently insignificant across all models.

**Table 3. Summary of Robustness Checks**

Robustness Specification	Debt (DEBT)	Audit Committee (AC)	Institutional Ownership (IO)	COVID Effect	Debt×AC	Notes
<b>Baseline</b> (FE, <b>Modified Jones</b> )	– **	(–) n.s.	n.s.	+ **	– **	Main specification
<b>Alt. Measures</b> (Perf.- <b>EM</b> Matched Jones; Kothari)	– **	(–) †	n.s.	+ **	– **	Results unchanged



Robustness Specification	Debt (DEBT)	Audit Committee (AC)	Institutional Ownership (IO)	COVID Effect	Debt×AC	Notes
<b>Alt. Leverage</b> (LT Debt/Assets; Debt/Equity)	– **	(–) n.s.	n.s.	+ **	– **	Robust to leverage definition
<b>COVID Subsamples</b> (2020–2021 only / excluding COVID)	– † / – **	– * / (–) n.s.	n.s.	Higher EM in crisis	– * / – **	Pandemic effects confirmed
<b>Placebo Test</b> (2017–2018)	n.s.	n.s.	n.s.	n.s.	n.s.	No spurious effects
<b>Additional Controls</b> (Commodity prices; Subsector FE)	– **	(–) n.s.	n.s.	+ **	– **	Results stable

**Notes:**

- $p < 0.05$ ; †  $p < 0.10$ ; n.s. = not significant
- Dependent variable: discretionary accruals (EM).
- Debt consistently reduces EM; active audit committees strengthen monitoring during COVID; institutional ownership effects remain insignificant.

The COVID-19 effect is robust, with higher discretionary accruals observed during 2020–2021 compared to pre- and post-pandemic years. Interaction terms further demonstrate that the constraining effect of debt weakens under crisis conditions, whereas audit committees become more effective in mitigating earnings manipulation. These findings validate H3a and H3b, but not H3c. Placebo tests using pre-crisis years (2017–2018) show no spurious effects, strengthening causal interpretation.

Additional specifications incorporating commodity price controls and subsector fixed effects yield results consistent with the baseline model, suggesting that unobserved heterogeneity in mining segments does not bias the main estimates. Taken together, the robustness checks confirm that the disciplinary role of debt and the complementary function of audit committees in constraining earnings management are stable across alternative measures, crisis conditions, and extended controls.

## H. Discussion

### H.1 Debt Financing and Earnings Management

The empirical findings confirm that higher leverage significantly reduces earnings management in Indonesian mining firms, supporting H1. This result aligns with Agency Theory (Jensen & Meckling, 1976), which posits that debt creates external monitoring through contractual obligations, thereby constraining managerial opportunism. The negative and significant coefficient of debt financing suggests that creditors play an effective disciplinary role, even in volatile resource-based sectors where debt covenants may be less predictable. This finding resonates with prior evidence from Indonesia (Hutauruk et al., 2022) and emerging markets (Mollah & Lipy, 2020), while contrasting with studies in developed economies that found either weak or mixed effects of leverage on earnings management

(Harris & Raviv, 1991). The mining sector's capital intensity appears to strengthen the alignment function of debt, as firms rely heavily on external financing and thus remain under close creditor scrutiny.

## **H.2 Corporate Governance Mechanisms**

The results for governance mechanisms present a nuanced picture. Audit committee activity shows a negative but only marginally significant effect on earnings management, partially supporting H2a. This suggests that while active audit committees improve oversight, their effectiveness remains constrained by institutional context and regulatory enforcement in emerging markets. Similar patterns have been documented in Indonesia, where audit committees often face resource and independence limitations (Siregar & Utama, 2008; Arum et al., 2023). Institutional ownership, by contrast, shows no significant effect, leading to a rejection of H2b. This result is consistent with evidence that institutional investors in Indonesia are often passive, with limited engagement in monitoring (Gunawan & Resitarini, 2019). The divergence from studies in developed economies, where institutional investors are typically active monitors (Cornett et al., 2009), underscores the importance of country-specific governance environments.

## **H.3 The Role of COVID-19 as a Moderating Shock**

The COVID-19 period is associated with higher levels of earnings management, supporting the argument that crises amplify incentives for income smoothing. This finding corroborates Syafa'at and Dinarjito (2024), who reported increased income-increasing accruals during the pandemic among Indonesian firms. The moderating analysis shows that the constraining role of debt weakens during COVID-19 (positive  $DEBT \times COVID$ ), suggesting that heightened liquidity pressures reduce creditors' ability to discipline managers effectively. In contrast, audit committees become more effective in crisis conditions (negative  $AC \times COVID$ ), likely reflecting heightened regulatory scrutiny and increased stakeholder demand for credible financial reports during uncertainty. Institutional ownership, however, fails to demonstrate a moderating effect, consistent with its limited role in monitoring under normal circumstances. Together, these results provide partial support for H3a and H3b, but not H3c.

## **H.4 Interaction of Debt and Governance Mechanisms**

The significant and negative interaction between debt financing and audit committee activity ( $DEBT \times AC$ ) confirms H4 and highlights the complementarity of internal and external monitoring mechanisms. When audit committees are active, the disciplinary role of creditors is reinforced, leading to stronger constraints on earnings manipulation. This finding builds upon prior studies (Arum et al., 2023) that emphasize the joint role of governance and financial constraints in shaping reporting practices. It also contributes to Capital Structure and Corporate Governance theories by demonstrating that their interaction is particularly relevant in emerging-market contexts, where stand-alone mechanisms may be less effective.

## **H.5 Control Variables and Broader Implications**

Among control variables, profitability consistently reduces earnings management, consistent with signaling theory: more profitable firms face fewer incentives to manipulate earnings. Firm size, growth, and auditor type show weaker or inconsistent effects, reflecting the sector's structural heterogeneity and the varying quality of financial oversight. The robustness checks with alternative measures of earnings management, commodity price controls, and subsector fixed effects confirm the stability of the main results.

## **H.6 Contribution to Literature and Theory**

This study extends prior research in three important ways. First, it provides sector-specific evidence from mining, a strategic but underexplored industry in emerging markets. Second, it shows how debt and governance mechanisms interact under crisis conditions, contributing to

a more dynamic understanding of monitoring. Third, it demonstrates that COVID-19 altered the relative effectiveness of different mechanisms, with external debt monitoring weakened and audit committee oversight strengthened. Together, these findings refine existing theories of agency and governance by embedding them in the context of crisis shocks and resource-based industries.

## **J. Conclusion, Limitations, and Recommendations**

### **J.1 Conclusion**

This study investigated how debt financing and corporate governance mechanisms shape earnings management in Indonesian mining firms over 2015–2024, with special attention to the COVID-19 period. The findings demonstrate that leverage reduces discretionary accruals, affirming the disciplinary role of creditors in capital-intensive industries. Audit committee activity provides a modest but meaningful monitoring effect, whereas institutional ownership does not show a consistent influence. The COVID-19 shock altered these dynamics: debt's constraining effect weakened during the crisis, while active audit committees became more effective in curbing earnings manipulation. The significant negative interaction between debt and audit committees highlights the complementary nature of internal and external monitoring in improving reporting quality.

### **J.2 Limitations**

Several limitations must be acknowledged. First, earnings management is measured solely through discretionary accruals, which may not fully capture real activities manipulation such as production or expense timing. Second, the analysis is limited to IDX-listed mining firms, restricting generalizability to private companies or other sectors. Third, institutional ownership is treated as a single category, even though different investor types (domestic vs. foreign, passive vs. active) may vary in their monitoring roles. Finally, although commodity prices and subsector fixed effects were included in robustness checks, other macroeconomic shocks or policy changes could also influence reporting behavior.

### **J.3 Implications**

The results enrich Agency Theory and Corporate Governance literature by demonstrating that the effectiveness of monitoring mechanisms is context-dependent. Debt is effective under normal conditions but less so during crises, while audit committees gain prominence under stress. This suggests that monitoring is not static but dynamic, shaped by external shocks and firm-level governance quality. Practically, the findings underscore the importance of reinforcing both creditor discipline and governance oversight in order to sustain financial reporting credibility, especially in cyclical, resource-based industries like mining.

### **J.4 Recommendations and Suggestions**

Based on these insights, several recommendations can be made. Regulators should strengthen disclosure requirements related to audit committee activities, member expertise, and meeting frequency, particularly during crisis periods. Creditors and lenders should refine covenant design to ensure transparency and monitoring incentives are maintained even under liquidity stress. Boards of directors should empower audit committees with adequate resources and authority to oversee financial reporting effectively. For managers, the evidence highlights the risks of opportunistic reporting, especially when both internal and external monitoring mechanisms are jointly active.

Future research could expand this study by incorporating measures of real earnings management, disaggregating institutional ownership into specific investor categories, and applying a difference-in-differences design around major regulatory changes. Cross-country

studies would also clarify whether these dynamics are specific to Indonesia's mining sector or generalizable across emerging markets. Such extensions would provide a richer understanding of how financing structures and governance mechanisms jointly shape reporting practices under different institutional and economic environments.

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