

Leverage and Earnings Management: Firm Size Moderation in Indonesian Industrial Firms

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Abstract

Keywords:

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Purpose: This study investigates the firm-level determinants of accrual-based earnings management among Indonesian industrial firms, focusing on leverage, firm size, and their interaction. It hypothesises that leverage positively affects the magnitude of discretionary accruals (H1), firm size negatively affects it (H2), and firm size moderates the relationship between leverage and earnings management (H3). **Methods:** Using purposive sampling, the sample comprises 41 industrial-sector firms listed on the Indonesia Stock Exchange over the 2023–2025 period, yielding 123 firm-year observations. Earnings management is proxied by the absolute value of discretionary accruals from the cross-sectional Modified Jones Model. Two nested ordinary least squares models, namely a baseline model and a moderation model that adds a leverage and size interaction, are estimated with year fixed effects and firm-clustered standard errors, with all continuous variables winsorised at the 1st and 99th percentiles. **Results:** firm size is negatively and marginally associated with discretionary accruals ($p = .073$), offering modest support for the political cost hypothesis, whereas leverage's main effect is positive but statistically weak and not significant ($p = .241$, so H1 is not supported). Sales growth emerges as the most robust positive determinant of accrual magnitude, and the interaction between leverage and firm size is positive and marginally significant, indicating amplification rather than attenuation of the relationship for larger firms, including its interaction raises the model's explanatory power from $R^2 = .149$. **Implications:** Auditors should treat sales growth as a salient operational risk signal when designing substantive procedures, and regulators may use the evidence to support differentiated audit-risk frameworks. Future research should extend the analysis to multi-sector panels and incorporate real activities manipulation proxies.

INTRODUCTION

Accrual-based earnings management has long occupied a central position in financial reporting research because reported earnings constitute the single most influential summary metric that investors, creditors, regulators, and auditors rely upon when forming judgements about a firm's financial health. Within the audit risk framework codified in ISA 315 (IAASB, 2015) and its Indonesian counterpart SA 315 (IAPI, 2021), earnings quality functions as a key input in the assessment of the risk of material misstatement. Two firm-level characteristics consistently emerge as risk signals in this literature. Leverage captures the firm's reliance on debt financing and links managers' incentives to manage reported earnings upward as a means of avoiding the costs associated with debt covenant violations (DeFond & Jiambalvo, 1994; Watts & Zimmerman, 1986). Firm size, in turn, proxies for the breadth of stakeholder scrutiny that constrains opportunistic accounting choices (Watts & Zimmerman, 1986; Zang, 2012).

The Indonesian setting offers a distinctive context for testing these mechanisms. Indonesia's capital market combines emerging-market institutional characteristics, including concentrated ownership, less mature creditor monitoring, and developing audit oversight, with a heterogeneous industrial sector that spans large capital-intensive manufacturers and small listed firms (Habib et al., 2019). The 2023-2025 window captures the post-pandemic recovery, during

which industrial firms faced simultaneous shocks from supply-chain normalisation, rising domestic interest rates, and pressure to restore profitability after a period of working-capital strain. These conditions generate cross-sectional variation in leverage, profitability, and growth that enriches an empirical test of accrual behaviour.

Recent Indonesian evidence on the determinants of earnings management remains mixed. Some studies report a positive leverage effect consistent with the debt covenant hypothesis (Nalarreason et al., 2019; Narsa et al., 2023), whereas others find no significant relationship. A closely related study published recently in this journal, Rivaldo & Utaminingsih (2026), examines ESG performance and earnings management as predictors of audit opinions in the Indonesian mining sector and establishes the relevance of accrual behaviour for audit-quality outcomes among IDX-listed firms. Their work, however, leaves open the question of how leverage and firm size jointly shape accrual choices in adjacent sectors. The present study addresses two gaps in this stream. First, it isolates the industrial sector, which differs substantially from manufacturing or mining in operating leverage and capital intensity, across a recent and theoretically meaningful window. Second, it explicitly models the moderating role of firm size on the leverage-earnings management relationship, a dimension that prior single-equation studies have largely overlooked.

A methodological consideration motivates the present design. An earlier conceptualisation of this study modelled the binary audit opinion, modified versus unqualified, as the dependent variable in a logistic regression. Subsequent inspection of the data revealed that only 2 of 123 firm-year observations carried a modified opinion, representing an event prevalence of 1.63% and an Events-Per-Variable ratio of approximately .29, well below the threshold of 10 recommended by Peduzzi et al. (1996) and re-examined by van Smeden et al. (2019). At such low event prevalence, maximum-likelihood logistic estimates are unstable, standard errors are inflated, and Wald-based inference is unreliable; even Firth's penalised-likelihood correction fails to recover model fit. The study therefore replaces the binary outcome with a continuous, well-distributed dependent variable, the absolute value of discretionary accruals ($|DA|$), and adopts ordinary least squares with appropriate robust inference. The study thereby preserves its substantive research question: what firm-level characteristics drive accrual behaviour that auditors must subsequently assess?

The remainder of the paper proceeds as follows. Section 2 develops the literature review and hypotheses. Section 3 describes the data, variables, and analytical model. Section 4 presents the empirical results. Section 5 discusses the findings, and Section 6 concludes.

METHODS

Sample and Data

The study draws on audited annual financial statements and independent auditor's reports of industrial-sector firms listed on the Indonesia Stock Exchange (IDX) for the period 2023-2025. The unit of analysis is the firm-year observation. The population comprises all firms classified in the industrial sector that maintained continuous listing throughout the study period. Purposive sampling generated the final sample summarised in Table 1, consisting of 41 firms across three years for a total of 123 firm-year observations.

Table 1. Sample Selection

Selection criteria	N
Industrial-sector firms listed on IDX throughout 2023-2025	66
Less: firms without complete audited annual reports for all three years	(18)
Less: firms reporting in currencies other than the rupiah	(3)
Less: firms with negative equity in any year of the period	(4)
Final sample (firms)	41
Total firm-year observations	123

Variable Measurement

Earnings management is measured by the absolute value of discretionary accruals ($|DA|$) estimated through the cross-sectional Modified Jones Model (P. M. Dechow et al., 1995; Jones, 1991) in two steps. First, for each year, total accruals (TACC), computed as net income minus operating cash flow and scaled by lagged total assets, are regressed via OLS on three terms: the inverse of lagged total assets ($1/At-1$), scaled revenue change ($\Delta Rev/At-1$), and scaled property, plant and equipment ($PPE/At-1$). Second, the estimated coefficients are then applied to firm-level data in which ΔRev is replaced by the modified term (ΔRev minus ΔAR) to compute non-discretionary accruals; the residual constitutes the discretionary accrual. The absolute value of this residual proxies for the magnitude of earnings management regardless of direction.

Leverage (LEV) is measured as total liabilities divided by total assets. Firm size (SIZE) is the natural logarithm of total assets. Profitability (ROA) is net income divided by total assets. Operating cash flow (CFO) is cash from operations scaled by lagged total assets. Sales growth (SGROWTH) is the year-over-year percentage change in revenue. Liquidity (CR) is current assets divided by current liabilities. All continuous variables are winsorised at the 1st and 99th percentiles to limit the influence of extreme values and are mean-centred prior to construction of the interaction term $LEV \times SIZE$ to mitigate multicollinearity between the interaction and its constituent variables.

Table 2. Operational Definitions of Research Variables

Variable	Measurement	Scale
Earnings Management. ($ DA $)	Absolute value of discretionary accruals from the cross-sectional Modified Jones Model (Jones, 1991; Dechow et al., 1995). Dependent variable.	Ratio
Leverage (LEV)	Total liabilities divided by total assets. Main predictor.	Ratio
Firm Size (SIZE)	Natural logarithm of total assets, $\ln(At)$. Moderator.	Ratio
$LEV \times SIZE$	Product of mean-centred LEV and mean-centred SIZE. Interaction term.	Ratio
Profitability (ROA)	Net income divided by total assets. Control.	Ratio
Op. Cash Flow (CFO)	Cash flow from operations divided by lagged total assets. Control.	Ratio
Sales Growth (SGROWTH)	(Sales _t minus Sales _{t-1}) divided by Sales _{t-1} . Control.	Ratio
Liquidity (CR)	Current assets divided by current liabilities. Control.	Ratio

Source: author compilation based on Jones(1991), Dechow et al (1995), Watts dan Zimmerman (1986)

Analytical Model

Two nested OLS models are estimated. Model 1 (Baseline) specifies $|DA_{it}|$ as a function of LEV_{it} , $SIZE_{it}$, ROA_{it} , CFO_{it} , $SGROWTH_{it}$, CR_{it} , and year fixed effects. Model 2 (Moderation) extends Model 1 by adding the $LEV \times SIZE$ interaction term.

Model 1: $|DA_{it}| = a + \beta_1 LEV_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} + \beta_4 CFO_{it} + \beta_5 SGROWTH_{it} + \beta_6 CR_{it} + \sum_t Year_t + \varepsilon_{it}$

Model 2: $|DA_{it}| = a + \beta_1 LEV_{it} + \beta_2 SIZE_{it} + \beta_3 (LEV \times SIZE)_{it} + \beta_4 ROA_{it} + \beta_5 CFO_{it} + \beta_6 SGROWTH_{it} + \beta_7 CR_{it} + \sum_t Year_t + \varepsilon_{it}$

Year fixed effects, dummy variables for 2024 and 2025, with 2023 as the reference year — control for anything that affected all firms similarly in a given year, such as a nationwide interest-rate change. Standard errors are clustered by firm, which corrects the statistics for the fact that each firm is observed three times and its three observations are not fully independent of one another (Colin Cameron & Miller, 2015; Petersen, 2009). As a robustness check, heteroscedasticity-robust HC3 standard errors are also estimated. The conventional 5% level ($\alpha = .05$) is used to judge statistical significance, but results that fall just short of it ($.05 < p \leq$

.10) — described here as “marginally significant” — are still reported and interpreted cautiously rather than discarded.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 3 reports descriptive statistics for the 123 firm-year observations (winsorised values). Mean $|DA|$ is .0610 (SD = .0485), indicating that the average industrial firm reports discretionary accruals equal to roughly 6.1% of lagged total assets — a magnitude broadly consistent with prior Indonesian evidence (Narsa et al., 2023). Mean leverage is 0.40, with substantial cross-sectional heterogeneity (SD = .19; range .06–.86). Firm size ranges from 3.4 to 12.1 in natural-log units, reflecting a sample that spans micro-cap to large-cap industrial firms. The negative minimum values of ROA (−.10) and SGROWTH (−0.49) confirm that the sample includes loss-making and contracting firms, a desirable property for hypothesis testing because it generates variance in the relevant predictors.

Table 3. Descriptive Statistics (n = 123)

Variable	Min	Max	Mean	SD
$ DA $	.0023	.2407	.0610	.0485
LEV	.0616	.8562	.3996	.1875
SIZE	3.4223	12.0875	7.2102	1.6931
ROA	−.1004	.2539	.0363	.0647
CFO	−.2537	.4177	.0687	.1164
SGROWTH	−.4901	.6237	.0388	.2123
CR	.5885	11.2046	2.6387	2.2454

Source: Authors' computation (2026).

Correlation Matrix

Table 4 presents the Pearson correlation matrix. $|DA|$ shows a small positive correlation with leverage ($r = .149$) consistent with the debt covenant hypothesis, and a small negative correlation with firm size ($r = −.170$) consistent with the political cost hypothesis. The largest absolute correlation among predictors is between LEV and CR ($r = −0.620$), reflecting the accounting identity that high-leverage firms tend to maintain lower liquidity. All correlations are below the .80 threshold that would suggest problematic multicollinearity (Kennedy, 2008). Variance inflation factors (VIFs) in the regression model remain below 2 for all predictors, confirming the absence of multicollinearity concerns.

Table 4. Pearson Correlation Matrix

	$ DA $	LEV	SIZE	ROA	CFO	SGROWTH	CR
$ DA $	1.000						
LEV	.149	1.000					
SIZE	−.170	−.017	1.000				
ROA	.020	−.272	.262	1.000			
CFO	.034	−.055	.212	.604	1.000		
SGROWTH	.219	.052	−.011	.280	.215	1.000	
CR	.040	−.620	−.143	.184	−.032	.044	1.000

Regression Results

Table 5 reports the results of Models 1 and 2 with firm-clustered standard errors. Model 1 (baseline) is statistically significant at the 5% level ($F = 2.58$, $p = .023$, $R^2 = .130$). Firm size has a negative effect on $|DA|$ with marginal significance ($B = −.0045$, $p = .073$), providing weak support for the political cost hypothesis (H2). Leverage's coefficient is positive ($B = .061$) but not statistically significant ($p = .241$); H1 is therefore not supported in direction-and-significance

terms, although the sign is consistent with the debt covenant hypothesis. Sales growth is positively associated with $|DA|$ at the 10% level ($B = .045$, $p = .087$).

Model 2 introduces the $LEV \times SIZE$ interaction. The model F-statistic improves to 4.01 ($p = .001$), R^2 rises to .149, and the interaction term is positive with marginal significance ($B = .028$, $p = .099$). Sales growth becomes statistically significant at the 5% level ($B = .051$, $p = .040$). The positive sign of the moderation runs counter to a simple political cost prediction (which would have predicted negative moderation, with size attenuating any leverage-driven incentive to manage earnings). Instead, the result is more consistent with the alternative view that larger Indonesian industrial firms possess more sophisticated debt structures and accounting capabilities, which can amplify rather than constrain the leverage–earnings management relationship.

Table 5. OLS Regression Results for Models 1 and 2

Variable	Model 1 B	SE	Model 2 B	SE
Constant	.0623***	(.007)	.0621***	(.007)
Leverage (LEV)	.0610	(.052)	.0535	(.046)
Firm Size (SIZE)	-.0045*	(.003)	-.0040	(.003)
$LEV \times SIZE$	—	—	.0281*	(.017)
ROA	.0340	(.134)	.0216	(.133)
CFO	.0003	(.089)	.0053	(.088)
Sales Growth	.0450*	(.026)	.0507**	(.025)
Current Ratio	.0031	(.002)	.0026	(.002)
Year 2024	-.0102	(.008)	-.0101	(.008)
Year 2025	.0065	(.009)	.0073	(.009)
N	123		123	
R^2	.130		.149	
Adjusted R^2	.069		.082	
F-statistic	2.579		4.011	
Prob > F	.023		.001	

Note: Dependent variable is $|DA|$, the absolute value of discretionary accruals from the Modified Jones Model. Standard errors clustered at firm level in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$. All continuous variables winsorised at the 1st and 99th percentiles and mean-centred. Year dummies included with 2023 as base year.

Source: Authors' computation (2026).

Hypothesis Summary

Table 6 consolidates the empirical results against the three hypotheses formulated in Section 2.

Table 6. Hypothesis Summary

H	Statement	p-value	Decision
H1	Leverage positively affects $ DA $.	.241	Not Supported
H2	Firm size negatively affects $ DA $.	.073	Weakly Supported (marginal at 10%)
H3	Firm size moderates the $LEV \rightarrow DA $ relationship.	.099	Weakly Supported (amplifying)

Source : Author analysis

DISCUSSION

The empirical findings present a nuanced picture of accrual-based earnings management in the Indonesian industrial sector during 2023-2025. The political cost hypothesis receives modest empirical support, as larger firms report lower magnitudes of discretionary accruals, consistent

with greater external scrutiny, broader analyst coverage, and stronger reputational stakes (Becker et al., 1998; Watts & Zimmerman, 1986). The marginal significance of the size effect ($p = .073$) suggests that the political cost mechanism operates in this market, although its economic magnitude is modest; a one-unit increase in $\ln(\text{Total Assets})$ is associated with a 0.45 percentage-point reduction in $|\text{DA}|$.

The modest political cost effect is accompanied by leverage's statistically insignificant main effect, which offers only directional support for the debt covenant hypothesis. Loan agreements in Indonesia tend to be less detailed than those in the US or UK. Indonesian banks generally focus on collateral value and a firm's ability to service debt from current cash flow, rather than on strict accounting-based triggers. The mechanism proposed by DeFond & Jiambalvo (1994), where managers adjust accruals specifically to avoid breaching tight accounting-based covenants, may therefore apply less strongly here. In addition, post-pandemic recovery may have temporarily improved coverage ratios across the industrial sector, reducing covenant pressure and the associated incentive to manage earnings. The relatively short three-year panel also limits statistical power to detect moderate-sized effects.

The marginally positive $\text{LEV} \times \text{SIZE}$ interaction represents the study's most theoretically interesting finding. A simple political cost reading would have predicted negative moderation, with firm size attenuating the leverage-earnings management relationship. The observed positive moderation suggests instead that the leverage-driven incentive to manage earnings is amplified, not muted, in larger entities. This pattern aligns with the view that larger firms possess more sophisticated debt structures involving multiple lenders, public bonds, and complex covenants, as well as stronger access to accounting expertise and greater capability to execute accrual choices that are simultaneously material and disclosure-compliant (Zang, 2012). The finding enriches the burgeoning literature from emerging-market evidence suggesting that size and scrutiny do not necessarily move in lockstep with accrual quality.

Sales growth emerges as the most statistically robust predictor in the model, and its positive coefficient ($B = .051$) in Model 2 is the paper's most reliable empirical finding. High-growth firms in the industrial sector, particularly those expanding receivables and inventories rapidly, face greater accounting estimation uncertainty, more revenue-recognition judgement, and stronger pressure to validate management's growth narrative to capital providers. This positive association is consistent with prior evidence that revenue-growth volatility expands the latitude for accrual choices (P. Dechow et al., 2010). Profitability, operating cash flow, and liquidity exhibit no statistically significant relationship with $|\text{DA}|$ in this sample, and the absence of an ROA effect, which contrasts with some prior Indonesian evidence (Nalarreason et al., 2019), aligns with the perspective that following the pandemic profitability dispersion was largely driven by sector-wide demand factors rather than firm-level accrual choices.

When considered alongside Rivaldo & Utaminingsih (2026), the present findings contribute a coherent narrative across two adjacent IDX sectors. Their mining-sector study demonstrates that earnings management feeds into audit opinion outcomes; the current industrial-sector study identifies the firm-level antecedents, most prominently sales growth and, secondarily, firm size, that shape that accrual behaviour at its source. A sector-wise comparison of accrual effect magnitudes across both sectors constitutes a productive direction for subsequent research.

Bringing the three findings together, this study points to a coherent risk profile rather than one dominant result: fast-growing firms carry the clearest accrual-management risk regardless of size or debt level; large, highly-leveraged firms carry a secondary, more tentative risk, because their more sophisticated debt structures appear to give them more — not less — room to manage accruals; and firm size alone offers only a weak protective effect once growth and leverage are accounted for. For audit planning, this ordering — growth first, the size-leverage interaction second — is more actionable than treating leverage and size as independent, additive risk signals, as much of the earlier single-equation literature implicitly does.

CONCLUSION

Conclusion

This study investigates the determinants of accrual-based earnings management among Indonesian industrial firms across 2023-2025, with particular attention to leverage, firm size, and their interaction. The analysis yields three notable findings. Firm size is negatively associated with the magnitude of discretionary accruals, providing modest support for the political cost hypothesis (Watts & Zimmerman, 1986), while leverage's main effect is positive but statistically weak, offering limited direct support for the debt covenant hypothesis (DeFond & Jiambalvo, 1994). Sales growth is the most statistically robust positive determinant of accrual magnitude, and the LEV x SIZE moderation is positive and marginally significant, suggesting amplification rather than attenuation of the leverage-earnings management relationship for larger firms. Auditors would benefit from treating sales growth as a salient operational signal when designing substantive procedures in industrial-sector engagements, alongside size and leverage; regulators and standard-setters may use these findings to reinforce the case for differentiated audit-risk frameworks that recognise the heterogeneity of Indonesian industrial firms; and researchers are reminded of the inferential cost of using binary audit-opinion outcomes in samples with low modification rates, where continuous accrual measures provide stronger statistical leverage on the same underlying audit-risk constructs.

Limitation and Recommendation

The three-year window restricts the ability to absorb business-cycle variation in leverage and growth, and the industrial sector, while internally heterogeneous, may not generalise to other sectors; real activities manipulation (Roychowdhury, 2006) also remains unmeasured here. A recommendation for future research is to extend the sample to multi-sector panels, incorporate both accrual and real earnings management proxies, and apply panel methods with longer time series to strengthen causal inference.

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