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GCG, Firm Value, and Debt Structure in Indonesian Basic Materials Firms

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Abstract

This study examines how internal governance mechanisms shape corporate debt structure in a capital intensive and crisis exposed industry. It analyses 61 basic materials firms listed on the Indonesia Stock Exchange over 2019–2023 (305 firm year observations), a period covering pre pandemic conditions, the COVID 19 shock, post crisis recovery, and global monetary tightening. Debt structure is proxied by the debt to equity ratio (DER), which exhibits extreme volatility with values ranging from −23,124.66 to 4,950.11, indicating widespread negative equity and severe financial distress in part of the sample. The empirical model is a fixed effects panel regression with cluster robust standard errors. Board size, institutional ownership, and firm age show positive and statistically significant effects on leverage, while the proportion of independent commissioners has a strong negative effect; audit committee size and return on assets (ROA) are not significant. Firm value, measured by price to book value (PBV), has a large negative impact on DER and significantly moderates the effects of board size and independent commissioners on leverage. A PBV threshold at approximately 0.945 separates regimes where independent commissioners reduce leverage (distressed/undervalued firms) and where they facilitate higher leverage (fairly valued or overvalued firms). The findings validate a conditional multi theory framework that combines agency theory, resource dependence theory, and pecking order logic instead of relying on any single theory. They highlight that governance mechanisms are neither uniformly "good" nor "bad" for leverage but context dependent, with firm valuation and crisis conditions critically shaping their effects. The results provide implications for boards, regulators, creditors, and investors in emerging markets when designing governance structures and monitoring extreme leverage in capital intensive sectors.

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INTRODUCTION

Corporate failures and repeated financial crises have placed good corporate governance (GCG) at the centre of debates on optimal capital structure, especially in emerging markets with concentrated ownership and weaker investor protection (Jensen & Meckling, 2019). The Indonesian basic materials sector is capital intensive, highly cyclical, and strongly exposed to commodity prices and macroeconomic shocks, which makes leverage decisions both critical and risky (Ekananda, 2022). During 2019–2023, the sector experienced sharp swings in stock indices, deep

downturns during the COVID 19 pandemic, and subsequent recovery, creating a natural experiment to test governance–leverage dynamics under stress (KOMANG & PUTU, 2025).

Preliminary evidence shows that average DER in several Indonesian sectors, including properties, healthcare, and basic materials, was negative during 2019–2023, implying accumulated losses that fully eroded shareholders' equity and signalling extreme financial distress (Gyesi, 2025). This is theoretically puzzling because firms with strongly negative equity are usually considered insolvent and should either restructure or exit, yet multiple basic materials firms continued to operate with persistent negative DER. At the same time, the sector ranks among the top three in capitalization and volatility on the domestic exchange, highlighting its systemic relevance for the Indonesian capital market (Indonesia, 2023).

Existing empirical studies on GCG and capital structure often mix sectors and countries, under represent basic materials firms, and rarely analyse the phenomenon of very large negative DER in a single emerging market sector (Panda & Leepsa, 2017). Many studies also focus on simple linear relationships and treat firm value only as an outcome variable, ignoring its potential moderating role in governance–leverage links (Myers & Majluf, 1984). This study addresses these gaps by focusing exclusively on Indonesian basic materials firms during an exceptionally volatile period and by developing a conditional multi theory framework that integrates agency theory, resource dependence theory (RDT), and pecking order theory (POT) with firm value (PBV) as a key contextual moderator (Chen & Strange, 2005; Eisenhardt, 1989; Frank & Goyal, 2003).

The paper aims to answer three main questions. First, how do board size, audit committee size, independent commissioners, and institutional ownership affect debt structure in Indonesian basic materials firms? Second, how does firm value both influence leverage directly and moderate the effect of GCG mechanisms on DER? Third, how do firm age and profitability (ROA) shape debt structure as control variables during crisis and recovery periods? By answering these questions, the study contributes to the governance–capital structure literature in emerging markets and provides evidence based recommendations for policymakers and practitioners.

THEORETICAL BACKGROUND AND HYPOTHESES

Agency Theory

Agency theory conceptualizes the firm as a contract between principals (shareholders) and agents (managers) with divergent interests, asymmetric information, and risk preferences (Jensen & Meckling, 2019). Classic formulations emphasize monitoring costs, bonding costs, and residual loss as sources of agency costs, highlighting the role of governance mechanisms in aligning managerial actions with shareholder interests (Eisenhardt, 1989). In the context of leverage, debt can mitigate free cash flow problems but may also exacerbate risk shifting and under investment when financial distress is severe (Purnanandam, 2008).

Mechanisms such as independent commissioners and effective boards are expected to reduce excessive leverage and risk taking when agency problems are pronounced (Klein, 2002). Especially in firms with concentrated ownership and weak institutional environments, independent oversight can counterbalance controlling shareholders and managers who might use debt to pursue private benefits or empire building strategies (Aiken, 1991).

Pecking Order Theory

Pecking order theory (POT) argues that firms follow a hierarchy of financing preferences: internal funds, then debt, and finally equity, primarily due to information asymmetry between insiders and external investors (Myers & Majluf, 1984). In this view, more profitable firms rely more on retained earnings and therefore exhibit lower

leverage, generating a negative relationship between profitability and DER (Frank & Goyal, 2003). However, in crisis periods, profitability becomes highly volatile and may lose its predictive power for financing choices when firms face liquidity shocks and credit constraints (Li et al., 2016).

Resource Dependence Theory

Resource dependence theory (RDT) views firms as open systems dependent on external resources and stakeholders (Pfeffer & Salancik, 2015). Board size, board composition, and institutional ownership are interpreted as mechanisms to secure critical resources, information, legitimacy, and access to capital (Usendok et al., 2022). Larger boards and strong institutional investors can enhance firms' credibility with creditors and broaden their funding options, potentially increasing leverage, particularly in capital intensive industries in emerging markets (Baltagi & Baltagi, 2008).

Firm Value as Contextual Moderator

Firm value, proxied by PBV, captures the market's assessment of future growth prospects and risk (Hermawan et al., 2025). High PBV reflects favourable expectations, strong fundamentals, or speculative over valuation, while low or negative PBV signals distress and undervaluation (Altman et al., 2017). Prior work shows that market to book ratios are typically negatively associated with leverage, as high growth firms prefer flexible, low debt structures (Chen & Strange, 2005). This study extends that logic by treating PBV as a moderator that can strengthen, weaken, or reverse the impact of GCG mechanisms on leverage across different valuation regimes (Tripathi et al., 2024).

Hypotheses

From the integrated framework, the main hypotheses are:

- H1: Board size has a positive effect on DER, reflecting its role as a resource acquisition mechanism in a capital intensive sector.
- H2: Audit committee size has a negative effect on DER due to enhanced monitoring of financial reporting and risk.
- H3: The proportion of independent commissioners has a negative effect on DER by constraining opportunistic or excessive leverage.
- H4: Institutional ownership is associated with DER, with the sign depending on whether monitoring or resource access functions dominate.
- H5: PBV has a significant (expected negative) direct effect on DER.
- H6: PBV moderates the effect of board size on DER (the leverage enhancing role of larger boards is stronger in firms with higher PBV).
- H7: PBV moderates the relationship between independent commissioners and DER, with potential sign reversal across PBV levels.
- H8: ROA has a negative effect on DER, consistent with POT.
- H9: Firm age has a negative effect on DER, reflecting accumulated retained earnings and reputation.

DATA AND METHODOLOGY

Sample and Data

The study uses an unbalanced panel of 61 companies in the basic materials sector listed on the Indonesia Stock Exchange over 2019–2023, yielding 305 firm year observations (Wooldridge, 2002). The sector classification follows the Indonesia Stock Exchange Industrial Classification (IDX IC). Financial data, including balance sheets, income statements, and equity information, are derived from audited annual reports, while share prices and market data are obtained from the exchange database and regulator publications (Indonesia, 2023).

The observation window captures four distinct macroeconomic phases: pre pandemic normal conditions (2019), the COVID 19 shock (2020–2021), post crisis recovery (2022), and global monetary tightening (2023), providing rich variation in both firm level and macro level conditions. Firms that do not report complete governance or financial variables for at least one year within the period are excluded (Cameron & Trivedi, 2005).

Variable definitions

1. Dependent variable:

- DER (YLEVERAGE) = total debt divided by total equity; negative values arise when equity is negative, making DER highly sensitive to accumulated losses.

2. Main governance variables:

- X1 (Board size): number of directors.
- X2 (Audit committee size): number of audit committee members.
- X3 (Independent commissioners): percentage of independent commissioners in the board of commissioners.
- X4 (Institutional ownership): percentage of shares held by institutional investors.

3. Moderator:

- MPBV: firm value measured by price to book value, allowing negative values when equity is negative.

4. Control variables:

- X5 (ROA): return on assets, net income over total assets.
- X6 (AGE_ln): natural logarithm of firm age in years since incorporation.

Interaction terms MPBV×X1 and MPBV×X3 are included to capture moderation effects.

Descriptive statistics

Table 1. Summarises the descriptive statistics.

Variable	Mean	Std. Dev.	Min	Max
YLEVERAGE (DER)	56.55	1,383.64	-23,124.66	4,950.11
X1JUMLAHDIREKSI	4.33	1.93	2	15
X2KOMITEAUDIT	3.01	0.27	1	4
X3DEWANKOMISARISINDEPENDEN (%)	40.36	10.36	16.67	75
X4KEPEMILIKANINSTITUSIONAL (%)	67.54	22.58	1.39	99.71
MPBV	1.21	1.63	-14.72	9.78

X5ROA (%)	2.44	12.06	-104.98	61.35
X6AGE (Ln)	4.63	0.42	2.95	5.68

- DER has a mean of 56.55 and an extremely high standard deviation of 1,383.64, with a minimum of −23,124.66 and a maximum of 4,950.11, indicating extreme volatility and pervasive negative equity for several firms.
- Board size averages 4.33 members (SD 1.93) with values from 2 to 15, consistent with local listing rules and substantial heterogeneity in governance structures.
- Audit committees have a mean size of 3.01 members (SD 0.27), suggesting high compliance with the typical three member requirement and limited cross sectional variation.
- Independent commissioners average 40.36% (SD 10.36) with a range from 16.67% to 75%, indicating that most firms exceed the minimum 30% independence requirement, but some lag behind.
- Institutional ownership has a high mean of 67.54% (SD 22.58), ranging from 1.39% to 99.71%, confirming the dominance of institutional investors in ownership structures.
- PBV averages 1.21 (SD 1.63), with values between −14.72 and 9.78, revealing a highly skewed distribution from deeply distressed to strongly valued firms.
- ROA averages 2.44% (SD 12.06) with a range from −104.98% to 61.35%, reflecting highly volatile performance over the crisis.
- AGE_ln averages 4.63 (SD 0.42), which corresponds roughly to an average age of about 100 years, with the youngest firms around 19 years and the oldest approaching three centuries.

These statistics confirm that the sector and period provide a rich setting for analysing governance under extreme financial conditions.

Econometric Model and Estimation

The baseline specification is a firm fixed effects panel regression of DER on governance variables, PBV, their interactions, and controls:

$$DER_{it} = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 MPBV_{it} + \beta_6 (MPBV_{it} \times X_{1it}) + \beta_7 (MPBV_{it} \times X_{3it}) + \beta_8 X_{5it} + \beta_9 X_{6it} + \varepsilon_{it}$$

Firm specific fixed effects α_i capture unobserved time invariant heterogeneity (such as managerial quality, corporate culture, and long term strategy). The choice of fixed effects is justified by a significant Chow test (F=4.25, p<0.01) rejecting pooled OLS and a highly significant Hausman test ($\chi^2 \approx 314.85$, p<0.01) favouring fixed over random effects.

Diagnostic tests are performed for multicollinearity, heteroskedasticity, and autocorrelation. Correlation matrices indicate that correlations among main regressors are below 0.90, except for expected mechanical correlations between PBV and interaction terms. Variance inflation factors (VIFs) for core governance and control variables remain below 3, while VIFs for PBV and interaction terms are higher due to their construction but considered acceptable in moderated regression contexts. Breusch–Pagan/Cook–Weisberg tests indicate significant heteroskedasticity ($\chi^2 \approx 1830.12$, p<0.01), and a Wooldridge test indicates first order autocorrelation (F≈7.19, p<0.05).

To obtain valid inference, the study uses firm clustered robust standard errors that are consistent in the presence of both heteroskedasticity and serial correlation, as recommended for panel data.

RESULT AND DISCUSSION

Model fit

The fixed effects model with cluster robust standard errors yields the following fit indicators.

- Within R^2 = 0.8112, implying that about 81% of within firm variation in DER is explained by the regressors.
- Between R^2 = 0.1455, suggesting limited explanatory power for differences across firms once fixed effects are controlled.
- Overall R^2 = 0.3192, which is within the typical range for corporate finance panel studies involving highly volatile environments.
- The overall F statistic for joint significance is 3.16 (p=0.0035), confirming that the model is statistically significant.

These indicators show that the model captures the dynamic within firm leverage adjustments reasonably well over the crisis period.

Main governance effects

Table 2. Reports the Estimated Coefficients

Variable	Coefficient	Robust Std. Error	t-statistic	p-value	Significance
Governance Variables:					
X1TOTALDIRECTORS	242.234	106.653	2.27	0.027	Positive Significant
X2AUDITCOMMITTEE	-164.287	160.916	-1.02	0.311	Not Significant
X3BOARDOFINDEPENDENTCOMMISSIONERS	-63.188	16.297	-3.88	0.000	Negative Significant
X4INSTITUTIONALOWNERSHIP	38.72	12.879	3.01	0.004	Positive Significant
Moderating Variables:					
MPBV	-2,259.15	603.311	-3.74	0.000	Negative Significant
Interaction Terms:					
MPBVxX1TOTALDIRECTORS	48.628	20.197	2.41	0.019	Positive Significant
MPBVxX3BOARDOFINDEPENDENTCOMMISSIONERS	66.893	15.511	4.31	0.000	Positive Significant
Control Variables:					
X5ROA	7.988	6.831	1.17	0.247	Not Significant
X6AGE	2,658.65	997.447	2.67	0.010	Positive Significant
Constant	-13,520.92	4,868.63	-2.78	0.007	

- Board size (X1): coefficient 242.234 (p=0.027). Larger boards are associated with significantly higher DER, supporting H1 and aligning with RDT. Each additional director increases DER by about 242 basis points, ceteris paribus.
- Audit committee size (X2): coefficient −164.287 (p=0.311). The effect is negative but statistically insignificant, so H2 is not supported. This suggests that audit committees, at least as measured by size, do not materially influence leverage decisions in this setting.
- Independent commissioners (X3): coefficient −63.188 (p<0.001). A higher proportion of independent commissioners significantly reduces DER, strongly supporting H3 and the monitoring role predicted by agency theory. An increase from 30% to 50% independent commissioners implies an approximate reduction of 1,264 basis points in DER.
- Institutional ownership (X4): coefficient 38.720 (p=0.004). Higher institutional ownership increases DER, indicating that institutional investors function more as resource providers than pure monitors in this context, supporting H4 in favour of the RDT interpretation.

Firm value and moderation effects

- PBV (MPBV): coefficient −2,259.153 (p<0.001). Firm value has a large and negative effect on DER: higher PBV is associated with much lower leverage. This supports H5 and aligns with evidence that high valuation or growth firms rely less on debt. The magnitude is economically substantial; for example, a move from PBV=0.5 (undervalued/distressed) to PBV=2.0 (strongly valued) reduces DER by more than 3,300 basis points.
- Interaction PBV × Board size (MPBV×X1): coefficient 48.628 (p=0.019). This positive and significant interaction supports H6, indicating that the leverage increasing effect of board size is stronger when PBV is higher. At low PBV (e.g. 0.5), the marginal effect of board size on DER is about 266.5, whereas at PBV=3.0 it rises to roughly 388.1, underscoring that larger boards are especially effective in obtaining debt when firms are positively valued by the market.
- Interaction PBV × Independent commissioners (MPBV×X3): coefficient 66.893 (p<0.001). This positive and highly significant interaction confirms H7 and reveals a threshold effect. The marginal effect of independent commissioners on DER is:

$$\frac{\partial DER}{\partial X_3} = -63.188 + 66.893 \times PBV$$

  Setting this equal to zero gives a PBV threshold of approximately 0.945.

- For PBV below 0.945 (distressed/undervalued firms), the effect of independent commissioners on DER is negative; they reduce leverage and act mainly as monitors.
- For PBV above 0.945 (fairly valued/overvalued firms), the effect becomes positive; independent commissioners support higher leverage, reflecting their advisory and resource access roles in stronger firms.

This non monotonic pattern reconciles conflicting findings in prior governance–leverage studies and illustrates that the same governance mechanism can have opposite effects across valuation regimes.

Control Variables

- ROA (X5): coefficient 7.988 (p=0.247), not statistically significant. Thus, H8 is not supported. Profitability does not predict leverage in a stable way during the 2019–2023 period, likely because extreme volatility, crisis conditions, and adjustment lags offset the usual pecking order relationship.

- Firm age (X6): coefficient 2,658.647 (p=0.010). Contrary to H9, firm age has a positive and significant effect on leverage. Older firms tend to have higher DER, possibly due to accumulated debt over time, higher debt capacity, and large reinvestment needs in ageing capital intensive assets.

Discussion

The results support a conditional multi theory view of governance and capital structure in emerging markets. Board size and institutional ownership behave in line with RDT, functioning as channels to access external funds and credibility, especially in a relationship based financial system where banks and institutional investors dominate. Independent commissioners, however, exhibit a dual role, consistent with agency theory under distress and with RDT under strong valuations.

The PBV threshold around 0.945 is particularly informative. In distressed or undervalued firms, independent commissioners primarily safeguard creditors and minority investors by pushing for conservative leverage policies. Once firms cross into a healthier valuation range, the same independent commissioners support leverage when it can be used to exploit growth opportunities or to optimise the capital structure without endangering solvency. This context dependence explains why global studies have reported both negative and positive governance–leverage links.

The lack of a significant ROA–leverage relationship and the positive age–leverage effect suggest that classical pecking order predictions are weakened under extreme volatility and in highly cyclical, capital intensive sectors. In such environments, liquidity shocks, covenant constraints, and access to long term credit may dominate short term profitability in shaping financing decisions.

CONCLUSION

This study shows that GCG mechanisms, firm value, and firm characteristics jointly determine debt structure in Indonesian basic materials firms, especially under crisis conditions. Board size and institutional ownership generally support higher leverage by enhancing access to external resources, while independent commissioners reduce or increase leverage depending on the firm's valuation level. Firm value exerts a strong direct negative effect on leverage and crucially moderates governance effects through a PBV threshold.

Practical implications include:

- Boards and nomination committees should calibrate board size and independence to the firm's valuation and risk profile, recognising that "more independence" is not universally leverage reducing.
- Regulators may focus not only on formal compliance (e.g. minimum audit committee size) but also on effectiveness dimensions such as expertise and activity to enhance real impact on financial policy.
- Creditors and rating agencies can incorporate governance configurations and PBV levels when assessing the sustainability of extreme leverage, particularly in sectors with frequent negative equity episodes.

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