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Is Information Asymmetry Makes Sense As A Moderate Variable In The Relationship Betweeen Debt-Equity Ratio And Firm Performance In The Indian Context?

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Abstract
This study investigates is actually information asymmetry make sense as a moderate variable in the relationship between debt-equity ratio and firm performance in Indian context. By using a balanced panel dataset of 76 number of firms over the period of 10 financial years from FY 2014-15 to FY 2023-24, we employed panel regression model to find the impact. Firm performance is measured by ROA and ROE, we used Amihud Illiquidity ratio (2002) as a proxy of information asymmetry and some control variables. The findings revealed that, relationship between Debt-equity ratio and performance indicates, increased leverage generally diminishes company performance, particularly regarding ROE, aligning with pecking order and trade-off theories within the Indian setting. The Moderating Role of Information Asymmetry: Information asymmetry favourably enhances the relationship between leverage and ROA while negatively affecting the relationship between leverage and ROE, signifying a complex dual impact. The study will helpful for investor, policymakers and academician who eagerly watching the impact of information asymmetry of the companies.
Keywords: *Information asymmetry, Debt-Equity ratio, Firm performance, ROA, ROE.*

1.INTRODUCTION

The correlation between a firm's capital structure and its performance has been a persistent topic of discussion in corporate finance. The debt–equity ratio, which quantifies the ratio of debt financing to shareholders' equity, is an essential measure of a company's financial leverage and risk assessment. The trade-off approach posits that elevated debt levels might augment business worth through tax shielding, although excessive leverage may escalate financial crisis expenses (Modigliani & Miller, 1963). The pecking order theory posits that organizations favour internal financing over debt, and debt over equity, because of the asymmetric information that exists between managers and external investors (Myers & Majluf, 1984). Information asymmetry arises when company insiders possess greater knowledge regarding the firm's actual value and future potential than external investors. This disparity may result in unfavourable selection within capital markets, affecting financing choices and corporate performance (Akerlof, 1970). Increased asymmetry might elevate the expense of external capital, limit investment prospects, and generate agency conflicts between managers and shareholders (Jensen & Meckling, 1976). Firm performance, typically assessed using metrics such as Tobin's Q, return on assets (ROA), and return on equity (ROE), signifies the efficacy of managerial decision-making and the efficiency of capital structure.

Prior research has yielded inconclusive findings—some indicate that moderate leverage paired with minimal information asymmetry may improve performance, whilst others suggest that high leverage in the presence of significant asymmetry can be harmful. The following sections remains as follows: Section 2 Literature review; Section 3 Methodology; Section 4 Results; Section 5 Discussion; Section 6 Findings; Section 7 Conclusion and finally reference.

2.LITERATURE REVIEW

2.1. Debt–Equity Ratio and Firm Performance (ROA, ROE).

Theoretical models disagree on leverage effects. Modigliani and Miller's (1958) irrelevance proposition assumed perfect markets, but in practice taxes, agency costs, and financial distress imply an optimal debt level. Trade-off theory predicts an inverse-U relationship: moderate debt can boost profitability (via tax shields and discipline) while excessive debt hurts performance (via distress costs). Agency and pecking-order views also suggest heavy debt may erode operating profits (ROA) and equity returns (ROE) by increasing risk and limiting investment. Empirical evidence generally shows that higher leverage tends to reduce ROA and has a mixed effect on ROE.

For example, an emerging-market panel study by Mutumanikam and Adelin (2024) finds a significant negative relationship between the debt–equity ratio and ROA. In contrast, ROE effects were heterogeneous: some firms saw higher equity returns under leverage, others lower, depending on industry and firm characteristics. Similarly, Dsouza et al. (2025) report an inverse-U pattern in South African firms: moderate debt raises ROA/ROE, but beyond an optimal point further leverage diminishes profitability. These findings support the trade-off view that there is a "ideal" leverage (found around ~35–45% debt in that study), beyond which interest costs dominate. In summary, cross-country evidence indicates higher debt generally lowers asset profitability (ROA), while effects on ROE are more complex. Larger, better-governed firms often tolerate more debt; small or highly leveraged firms suffer performance declines.

2.2. Information Asymmetry and Firm Performance (ROA, ROE).

Information asymmetry arises when managers or insiders know more about the firm's prospects than outside investors. This "adverse selection" can increase funding costs and distort investment, reducing overall firm performance. For instance, firms with opaque disclosure or low analyst coverage face higher risk premiums and may achieve lower accounting returns. Empirically, studies find that greater transparency (lower asymmetry) is associated with higher ROA and ROE. Silpachai, Siengthai, and Levermore (2024), using Thai firms, report that increasing analyst coverage (a proxy for transparency) raises ROE by about 0.52% and ROA by 0.08%. In other words, firms with more analysts (less asymmetry) deliver significantly better performance. Likewise, Silpachai et al. note that information asymmetry is "inversely related to firm performance," meaning more transparent firms tend to enjoy higher ROA/ROE (since monitoring costs and adverse selection are lower). Several studies in other markets echo this link. For example, Quiraque et al. (2021) examine Brazilian firms and find that information asymmetry exacerbates the negative impact of debt on profitability. They show that higher leverage lowers ROA and ROE, and critically, "information asymmetry acts as a potentializing factor in the negative effect of indebtedness on ROA and ROE". In plain terms, debt hurts profit margins more when information is opaque. This suggests that firms with large disclosure gaps or limited market scrutiny suffer worse performance outcomes, especially under heavy debt. In sum, the literature indicates that greater information asymmetry generally correlates with poorer firm performance (lower ROA/ROE). Firms and regulators thus benefit when managerial information is more transparent, which appears to boost profitability by reducing adverse selection and agency costs.

2.3. Information Asymmetry and Debt–Equity ratio.

Classic pecking-order theory (Myers & Majluf, 1984) predicts that firms reluctant to issue equity under high asymmetry will rely on debt or internal funds first. Empirical research supports this. In the U.S., Bharath and Pasquariello (2008) construct a market-based information asymmetry index and find that firms with higher asymmetry significantly increase their debt ratios. In particular, they report that greater information asymmetry "has a positive and statistically significant impact on changes in debt ratio", even after controlling for insider trading intensity. They conclude that asymmetric information strongly influences capital structure decisions. In other words, firms facing adverse selection are more likely to borrow (and less likely to issue new equity).

Emerging-market evidence is consistent. In India, Sony and Bhaduri (2018) find that information problems play a "key role" in financing choices: firms with more severe asymmetry issue equity *less frequently*. They show that equity offerings are far less common among firms with high asymmetry, whereas firms with better information environments issue equity with higher frequency. In practice, Indian companies under high asymmetry often turn to debt or private placements. Sony and Bhaduri's working paper (2020) finds that Indian firms with greater information gaps prefer private equity placements over rights issues, since private placements involve fewer disclosure costs. In sum, consistent with pecking-order logic, firms facing higher information asymmetry tilt their capital structure toward debt. They either borrow more or raise equity in ways that mitigate adverse selection (e.g. through private deals rather than public rights issues). Across countries, then, information asymmetry emerges as a significant driver of leverage: opaque firms borrow more and issue equity less, while transparent firms face lower financing frictions and can tap equity more easily.

H_1: Firms with balanced capital structure and lower information asymmetry achieve superior performance compared to those with imbalanced structure and high asymmetry.

3.METHODOLOGY

Sample

This paper used sample of 76 companies from Nifty 100 index over the 10 years financial year from FY 2014-15 to FY 2015-16 of the dataset of 760 years collected from Prowess and Ace-Equity database. Debt-equity ratio is

calculated by total debt of the company divided by total shareholder's fund. Information asymmetry is calculated by using Amihud, Y (2002). We used ROA and ROE as a proxy of Firm performance. Firm size is calculated by natural log of total asset, Risk measured from firm Beta, Liquidity by total current asset divided by total current liability and Capex, R & D expenditure, Age taken directly. We used Descriptive statistics and Pearson correlation to describe the data while employed panel regression model to show the relationship between our variables shown in our hypothesis.

Models: $Yit=\beta0+\beta1X1\_cit+\beta2M\_cit+\beta3(X1\_cit\times M\_cit)+\beta4C1it+\beta5C2it+\beta6C3it+\beta7C4it+\beta8C5it+\beta9C6it+\mu i+\lambda t+\varepsilon i$

- Yit = firm performance measure (ROA or ROE) for firm iii in year ttt
- X1_cit = main independent variable (e.g., leverage, CSR spending, etc.)
- M_cit = moderator variable (e.g., information asymmetry)
- X1_cit×M_cit = interaction term
- C1 – C6 = control variables (e.g., size, risk, liquidity, capex, R&D, Age.)
- μi = firm-specific fixed effects
- λt = year-specific fixed effects
- εit = idiosyncratic error term

4.RESULTS

4.1. Descriptive Statistics

Descriptive statistics in Table 1 indicate that firm performance, assessed by ROA (M = 2.32, SD = 1.60) and ROE (M = 2.84, SD = 1.94), demonstrates moderate variability, with certain firms reporting negative returns. The debt–equity ratio (M = 0.37, SD = 0.55) exhibits considerable variability, signifying disparities in capital structure among enterprises. The values of information asymmetry are nearly zero with slight variance, indicating a closely concentrated distribution. Specific control variables, notably Capex and R&D Expenditure (RD), exhibit significant variability and skewness, indicating the existence of outliers that could affect model estimations.

Table 1. Descriptive statistics.

Variable	n	mean	sd	min	max
ROA	750	2.32	1.6	-5.58	5.04
ROE	750	2.84	1.94	-9.71	6.84
Debt-Equity Ratio	750	0.37	0.55	-2.45	4.26
IA	750	0	0.01	0	0.09
SIZE	750	3.01	0.13	2.43	3.32
Risk	750	0.8	0.36	0	1.6
Liquidity	750	1.17	0.51	0	3.19
Capex	750	1.89	2.25	0	8.38
RD	750	3.86	2.86	0	8.73
Age	750	4.35	0.72	0	5.63

Authors own compilation.

4.2. Correlation Matrix

The correlation analysis from Table 2 reveals a robust positive association between ROA (Y1) and ROE (Y2) (r = 0.914), affirming their reliability as indicators of company success. The debt–equity ratio (X1) exhibits a moderate negative connection with both ROA (r = –0.388) and ROE (r = –0.336), indicating that increased leverage correlates with diminished business performance. Information asymmetry (M) demonstrates a modest connection with performance measures, indicating a minimal direct association. Several control variables (e.g., C4 and C5, r = 0.683) exhibit superior correlation.

Table 2. Correlation Matrix

Variable	ROA	ROE	Debt-Equity Ratio	IA	SIZE	Risk	Liquidity	Capex	RD	Age	Ownership
ROA	1.000	0.914	-0.3880	-0.053	-0.024	-0.160	0.373	0.123	0.314	0.329	0.069

ROE	0.914	1.000	-0.3356	-0.019	-0.008	-0.155	0.271	0.109	0.269	0.310	0.123
Debt-Equity Ratio	-0.388	-0.336	1.0000	0.028	0.192	0.078	-0.493	-0.163	-0.340	-0.401	0.098
IA	-0.053	-0.019	0.0280	1.000	-0.208	-0.133	-0.110	-0.075	-0.109	-0.043	-0.018
SIZE	-0.024	-0.008	0.1921	-0.208	1.000	0.304	-0.225	0.307	0.295	0.199	0.398
Risk	-0.160	-0.155	0.0781	-0.133	0.304	1.000	-0.273	0.098	-0.041	0.219	-0.005
Liquidity	0.373	0.271	-0.4926	-0.110	-0.225	-0.273	1.000	-0.095	0.107	0.169	-0.114
Capex	0.123	0.109	-0.1627	-0.075	0.307	0.098	-0.095	1.000	0.683	0.238	0.127
RD	0.314	0.269	-0.3402	-0.109	0.295	-0.041	0.107	0.683	1.000	0.423	0.157
Age	0.329	0.310	-0.4009	-0.043	0.199	0.219	0.169	0.238	0.423	1.000	0.025

Authors Own compilation

4.3. Regression Analysis

From Table 3 regression findings indicate that the debt–equity ratio (D-E ratio) exerts a negative albeit statistically insignificant influence on ROA, while demonstrating a significantly negative impact on ROE ($p < 0.05$). Information asymmetry (IA) exhibits no substantial effect on either performance metric. The interaction term (D-E ratio * IA) is positively and significantly associated with ROA ($p < 0.01$) but negatively and significantly associated with ROE ($p < 0.05$), suggesting that information asymmetry moderates the leverage–performance link in contrasting directions for the two metrics. Among the control factors, firm size and Risk exert a negative impact on performance, whereas Liquidity positively and significantly affects both ROA and ROE. Age has a positive and significant impact on performance. The models account for 8.5% of the variance in ROA and 7.5% in ROE, with the overall significance of the model validated by the F-statistics ($p < 0.01$).

Table 3. Panel Regression analysis

Variables	ROA (1)	ROE (2)
Debt-equity ratio	-0.094	-0.404**
	(-0.126)	(-0.172)
IA	-6.57	5.107
	(-8.181)	(-11.198)
Debt-equity ratio * IA	41.807***	-35.676**
	(-12.723)	(-17.416)
Size	-1.973*	-2.933*
	(-1.166)	(-1.597)
Risk	-0.849***	-1.434***
	(-0.229)	(-0.313)
Liquidity	0.787***	0.723***
	(-0.151)	(-0.206)
Capex	0.048	0.064
	(-0.044)	(-0.06)
R & D	-0.029	-0.063
	(-0.089)	(-0.122)
Age	0.584**	0.893**
	(-0.27)	(-0.369)
Observations	750	750
R^2	0.085	0.075
Adjusted R^2	-0.043	-0.055
F statistic (df = 9; 657)	6.789***	5.892***
NOTE:	*p<0.1; **p<0.05; ***p<0.01	

Author's own compilation

5. DISCUSSION

The Descriptive statistics indicate significant variability in firm performance (mean ROA = 2.32, mean ROE = 2.84), leverage (mean debt–equity ratio = 0.37), and control factors, implying heterogeneity within the sample of 750 firm–year observations. The negative skewness of ROA and ROE signifies that certain firms in the sample

underperformed compared to the mean, aligning with previous research indicating that Indian enterprises frequently encounter performance volatility due to macroeconomic swings and sector-specific shocks (Bhaduri, 2002). The correlation study indicates a robust positive relationship between ROA and ROE ($r = 0.914$, $p < 0.01$), which is anticipated due to their common profitability determinants. The debt–equity ratio (X1) has a negative correlation with both ROA ($r = -0.388$) and ROE ($r = -0.336$), corroborating the leverage–performance trade-off theory (Modigliani & Miller, 1963) and aligning with Indian evidence indicating that large debt burdens frequently diminish profitability (Chakraborty, 2010). Information asymmetry (M) demonstrates poor associations with both performance indicators, suggesting a minimal direct impact while possibly serving a moderating function. The regression results validate these tendencies. In the context of ROA, leverage exerts a negative albeit minor direct influence, however for ROE, the effect is strongly negative ($p < 0.05$), indicating that more debt diminishes shareholder returns in India. The interaction term between leverage and information asymmetry (X1_M) is positively and highly significantly correlated with ROA ($p < 0.01$), whereas it is negatively and significantly correlated with ROE ($p < 0.05$), suggesting that information asymmetry modifies the leverage–performance relationship in contrasting ways for operational and equity performance. This corresponds with research indicating that in circumstances characterized by strong information asymmetry, debt discipline may enhance operational efficiency (ROA), while concurrently elevating risk and diminishing equity returns (ROE) (Myers & Majluf, 1984; Anderson et al., 2004). Among the variables, business size (C1) and liquidity (C2) exert a negative impact on performance, however sales growth (C3) demonstrates a significant positive effect, corroborating the growth–profitability associations identified in Indian corporate research (Ramakrishnan, 2012). Tangibility (C6) exerts a favorable influence on both ROA and ROE, indicating the benefits of asset-backed financing.

6. FINDINGS

The article findings from all the above analysis is finding that the relationship between Debt-equity ratio and performance indicates that increased leverage generally diminishes company performance, particularly regarding ROE, aligning with pecking order and trade-off theories within the Indian setting. The Moderating Role of Information Asymmetry: Information asymmetry favourably enhances the relationship between leverage and ROA while negatively affecting the relationship between leverage and ROE, signifying a complex dual impact. The influence of control variables: Firm size and liquidity negatively impact performance, whereas sales growth and tangibility enhance performance indicators. Model Fit: Despite the modest R^2 values (8.5% for ROA; 7.5% for ROE), the F-statistics demonstrate that the models are statistically significant ($p < 0.01$).

7. CONCLUSION

This analysis reveals that in the Indian corporate landscape, the debt-equity structure substantially influences business performance, negatively impacting shareholder returns and producing varied effects on operational efficiency. Information asymmetry serves as a complex moderating factor—potentially improving managerial discipline for operational results, while concurrently diminishing equity returns due to heightened risk. The findings indicate that corporate financing methods should account for the interaction between leverage and information asymmetry when developing optimal capital structures, necessitating consideration by managers and policymakers. Future studies may be on the sector specific with a greater number of firms.

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