

Impact of Capital Structure on Financial Performance and Firm Value of Automobile Companies in India: Empirical Evidence from Indian Automobile Companies

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Abstract

This study examines the relationship between capital structure, financial performance and firm value among Indian automobile companies. Using 430 company-year observations from the supplied secondary financial dataset, the study represents capital structure through the debt-to-equity ratio (DER), financial performance through return on assets (ROA), return on equity (ROE) and net profit margin (NPM), and firm value through Tobin's Q and market capitalization. Descriptive statistics, Pearson correlation and simple linear regression are employed at the 5% significance level. The evidence shows a statistically significant negative association between DER and ROA ($r = -0.451$, $p < .001$; $R^2 = 0.204$) and between DER and Tobin's Q ($r = -0.267$, $p < .001$; $R^2 = 0.071$). The DER–ROE relationship is negative but statistically insignificant ($r = -0.065$, $p = .181$), while DER is also not significantly related to market capitalization ($r = 0.044$, $p = .364$). A supplementary analysis using debt ratio and NPM reports a significant negative relationship ($r = -0.437$, $p < .001$; $R^2 = 0.191$). Taken together, the results indicate that the association between leverage and corporate outcomes depends on the performance or valuation measure used. The findings are discussed in relation to capital-structure perspectives and evidence reported in the supplied literature.

Keywords: capital structure; debt-to-equity ratio; financial performance; firm value; automobile industry; return on assets; return on equity; Tobin's Q; market capitalization.

1. Introduction

It is a continuing decision in corporate finance as the organization needs to decide the proportion of its business activities and investments that are to be financed using debt and those that would use equity financing. This becomes an issue for the automobile firms as they belong to the capital-intensive industries which face cyclical demand and require heavy investments in production facilities, technology, marketing and research and development. The nature of this tradeoff between financial leverage and internally generated finance is a corporate finance decision.

The classical theory of capital structure postulated that the financial structure may not change the value of the firm under highly restrictive market conditions. The later developments of the theories considered the impact of taxes, bankruptcy cost, asymmetric information, agency problems and financing preference as other reasons as to why financial leverage may be advantageous or disadvantageous depending upon the amount of the same used. Literature provided for this study is reflective of such debate. Some research from India has found negative relationship of many debt ratios with profitability whereas some have found sector specific and non-linear relationships rather than a general one (Chisti, Ali and Sangmi, 2013; Pal, 2022; Thakur, Joshi and Aziz, 2023).

Value is a further dimension in this regard. The choice of the method of finance could impact accounting profitability in the absence of any change in the value-based measures of the firm's profitability. Tobin's Q and market capitalization indicate the market's perspective regarding the growth and valuation of assets/equity in contrast to accounting profitability measures like ROA, ROE and NPM. Current literature contained in the source list indicates that leverage-value relations are not only distinct in terms of their shape (linear or non-linear) and may also differ in terms of markets and industries (Karaca, Mensi and Gemici, 2025; Sharma, 2023).

The Indian automotive industry makes a good case study in this context because there are firms in this sector having differing levels of operating scale, financial structure and profitability. Indian studies on automobiles have revealed that capital structure-performance relation is statistically significant and differs in direction/level of impact depending on the measure used for debt as well as profit (Chisti, Ali and Sangmi, 2013; Pal, 2022). Such a difference calls for an investigation into the matter using several measures for accounting and market-based performance measures.

This study, therefore, assesses the impact of capital structure by use of DER and investigates four main outcomes' relationship; DER and ROA, DER and ROE, DER and Tobin's Q, and lastly DER and market capitalization. Another aspect of assessment is done in respect of debt ratio and NPM for profitability analysis. The study makes use of the provided dataset consisting of 430 observations and adopts an empirical procedure which is clear from descriptive statistics, Pearson correlation and simple regression. This being observational data and the main regressions being made with only one independent variable, the findings are seen as statistical correlations rather than causations of single variables.

1.1 Research Motivation

The research motivation stems from conflicting results in the provided literature. While some literature shows that high leverage is linked with poor profitability, other research shows that leverage can have a positive impact on performance, a statistically insignificant one, or even a non-linear effect based on industry type, nation, accounting system or valuation metrics used. For instance, Pal (2022) observes negative associations between short- and long-term debt and several performance indicators in Indian manufacturing industries but differences in automobile industry-related effects emerge across metrics. Likewise, Thakur, Joshi and Aziz (2023) observe negative associations between certain capital structure metrics and performance among non-financial Indian corporations, where age and size could influence the association. With regard to valuation, Sharma (2023) proposes that moderate leverage can aid valuations while excessive debt would decrease valuations while Karaca, Mensi and Gemici (2025) provide evidence supporting the hypothesis of the inverted U-curve association in an emerging economy context. This demonstrates that it is impossible to conclude on the association using one particular coefficient since different outcome measures are at play. The provided literature also demonstrates that capital structure

associations can be affected by accounting system and economic environment among other factors. (Nikhil et al., 2023; Sharma)

1.2 Research Questions

- Is there any statistically significant relationship between DER and ROA in the sampled automobile firms in India?
- Is there any statistically significant relationship between DER and ROE?
- Is there any statistically significant relationship between DER and Tobin's Q?
- Is there any statistically significant relationship between DER and market capitalization?
- What role does the secondary debt-ratio and net profit margin (NPM) relationship play in the capital structure and financial performance interpretations?

1.3 Research Objectives

- To investigate the influence of capital structure on the financial performance of automobile companies in India.
- To investigate the influence of capital structure on the firm value of automobile companies in India.
- To investigate the relationship between Debt Ratio and Net Profit Margin of automobile companies in India.
- To determine the debt-equity ratio for improved financial performance and firm value of automobile companies in India.

2. Literature Review

2.1 Capital Structure and Profitability

Empirical research studies done in India offer strong support for the relationship between capital structure and profitability but there are inconsistencies about the nature of that relationship. Chisti, Ali and Sangmi (2013) carried out an empirical study of automobile firms in India with secondary data and revealed a statistically significant influence of capital structure on profitability where debt equity ratio and net profit ratio were among the main measures. This study is particularly relevant for the current study due to its automobile orientation.

Pal (2022) studied manufacturing firms in India belonging to steel, cement and automobile industries using correlation and regression techniques. There was a negative relationship found between short-term and long-term debts and various financial performance measures in some of the selected industries. However, at the same time, different coefficients depending on the industry were found for some performance measures.

Thakur, Joshi and Aziz (2023) have studied the long-run data of Indian non-financial firms and moderated firm age and size in their analysis. It is found from the results that certain capital structure variables could have adverse impact on financial performance and that firm-specific factors might modify the relationships. Hence, it underscores the importance of not looking at leverage as a standalone factor in isolation from other corporate attributes.

Rashmi and Chougule (2024) contribute to the Indian research by analyzing certain IT companies in pre and post-Ind-AS eras. By using ROA, ROE and ROCE as performance measures and debt-to-assets ratio and debt to equity ratio as capital structure measures, the study illustrates the importance of studying various accounting outcomes rather than a single indicator of profitability.

2.2 Capital Structure and Firm Value

There are various ways in which capital structure could impact the value of a firm. These include cost of financing, taxes, financial distress and agency approaches. Literature on the subject indicates that empirical findings could be a function of whether the measure used for firm value is the market-based measure such as Tobin's Q or market-based equity measure like market capitalization.

Sharma (2023), for example, analyzes Indian manufacturing companies' financial structures with respect to their debt/equity ratios, long-term liabilities and retained earnings and Tobin's Q and market capitalization. The evidence provided shows that there is a positive effect from a moderate level of leverage on valuation whereas high level of debts decreases the firm value. Karaca, Mensi and Gemici (2025) analyze the same topic for the emerging markets and find out that the relationship is an inverted-U curve. Therefore, a simple coefficient of the linear regression might not describe the economic relationship fully.

Goyal and Sah (2026) present Indian evidence on IT and automobile companies. In particular, Goyal and Sah (2026) underline that it is crucial to consider the structure of the industry since the asset intensiveness of the industry, financing requirements and the ways in which the leverage influences the firm value might differ. This is important in terms of the current study since automobile companies are asset intensive compared to service industries.

Bui, Nguyen and Pham are authors that consider the problem of the capital structure and firm value for the listed companies with the use of various estimation methods. Together with the above mentioned sources, the evidence suggests

2.3 Theoretical Perspectives

Modigliani-Miller theoretical approach can serve as the classical example of finance theory. In an environment with perfectly competitive markets, capital structure is not related to firm value in isolation. Later theories make less strict assumptions. Trade-off theory focuses on balance between tax savings and estimated costs of financial distress, whereas pecking-order theory focuses on informational asymmetry and preferred financing approach. Agency theory explains potential contradictions between managers, shareholders and creditors. Indian and emerging market studies discussed in the supplied source set provide practical examples to apply these theoretical approaches. (Jaisinghani and Kanjilal, 2017; Georgakopoulos et al., 2022; Ahmed et al., 2023)

The supplied literature demonstrates how each theoretical perspective can provide different empirical hypotheses. For example, Ahmed, Nugraha and Hågen (2023) prove that agency cost moderates the relationship between capital structure and performance. According to Mazanec (2023), high levels of debt ratio indicate poor corporate performance in a sample of large Central European transport companies, whereas according to Jaiswal and Elmarzouky (2025), there are negative correlations between leverage and corporate performance according to different performance measures used in UK in the period of the pandemic. However, these findings do not mean that all firms should use the

2.4 Research Gap

Three research gaps are addressed by the current research. First, studies conducted in India tend to focus on either profitability or firm value, whereas the current research brings together both accounting performance and market valuation into one empirical framework. Second, various studies have used different leverage ratios and have examined various dependent variables, thereby precluding easy comparison. In this research, DER has been employed consistently for the analysis of capital structure and

the effects analyzed are many. Third, according to the source literature, there could be a sectoral specificity to the leverage effect. This current research has therefore focused specifically on Indian automobile firms. An additional research methodology gap relates to the interpretation of results. A statistically significant coefficient for one dependent variable does not imply statistical significance across all performance or value variables. Comparison of ROA, ROE, Tobin's Q and market capitalization, and incorporation of the debt ratio/NPM analysis has helped identify the robustness of the leverage effect and its dependency on the measures employed.

3. Data and Methodology

3.1 Research Design

This research employs a quantitative, explanatory research design based on secondary financial data. The empirical unit used in this analysis is the company-year observation. The analytical dataset provided includes 430 observations of Indian automobile firms. The analysis was carried out employing descriptive statistics, Pearson correlation, and simple linear regression. All decisions about hypotheses were done at a 5% level of significance ($\alpha = 0.05$).

Design element	Implementation
Research approach	Quantitative empirical analysis
Data type	Secondary financial/company data
Industry	Indian automobile companies
Complete observations	43 companies and 430 company-year observations
Capital-structure measure	Debt-to-Equity Ratio (DER)
Financial-performance measures	ROA, ROE; supplementary NPM
Firm-value measures	Tobin's Q, Market Capitalization
Primary statistical tools	Descriptive statistics, Pearson correlation, simple linear regression
Significance level	5% ($\alpha = 0.05$)
Interpretation	Statistical association; not definitive causality

3.2 Variables and Measurement

Variable	Role	Interpretation
DER	Independent	Debt-to-equity ratio representing financial leverage/capital structure
ROA	Dependent	Accounting return generated relative to assets
ROE	Dependent	Accounting return relative to shareholders' equity
NPM	Dependent (supplementary)	Net profit generated relative to sales/revenue
Tobin's Q	Dependent	Market-oriented measure of firm value

Market Cap	Dependent	Market capitalization representing equity-market valuation
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3.3 Empirical Models

The principal regression specifications are:

$$ROA_i = \alpha + \beta_1 DER_i + \varepsilon_i$$

$$ROE_i = \alpha + \beta_1 DER_i + \varepsilon_i$$

$$\text{Tobin's } Q_i = \alpha + \beta_1 DER_i + \varepsilon_i$$

$$\text{Market Cap}_i = \alpha + \beta_1 DER_i + \varepsilon_i$$

$$NPM_i = \alpha + \beta_1 \text{Debt Ratio}_i + \varepsilon_i$$

In both models, the coefficient sign shows the direction of the estimated correlation, while the p-value is used to determine the significance level. R^2 denotes the fraction of the variance of the dependent variable explained by the single explanatory variable in the estimated model. Since the number of explanatory variables in each model is one and the data is observational company-years data, we shouldn't interpret the results as an indication that changes in leverage automatically lead to the estimated change in the dependent variable.

4. Descriptive Statistics

The descriptive statistics results give us information about the magnitude and dispersion of the variables before the interpretation of the relationship test results. The mean value of DER is 0.577 and the median value of it is 0.340, meaning that the leverage variable distribution is positively skewed, where some observations have much higher debt than equity. ROA has a mean value of 7.266 and ROE has a mean value of 13.293. Tobin's Q has a mean value of 2.291 and the market capitalization is dispersed, where its mean value is 28,280.722 in the reported units of the dataset. This distribution is important because the leverage variable isn't necessarily homogenous among firms, as proven

Variable	N	Mean	Median	SD	Minimum	Maximum
DER	430	0.577	0.340	0.778	0.000	4.531
ROA	430	7.266	6.523	5.511	-17.769	31.411
ROE	430	13.293	13.823	10.238	-83.983	41.261
Tobin's Q	430	2.291	1.962	1.227	0.584	10.171
Market Cap	430	28,280.722	5,152.507	56,936.284	0.000	396,155.004

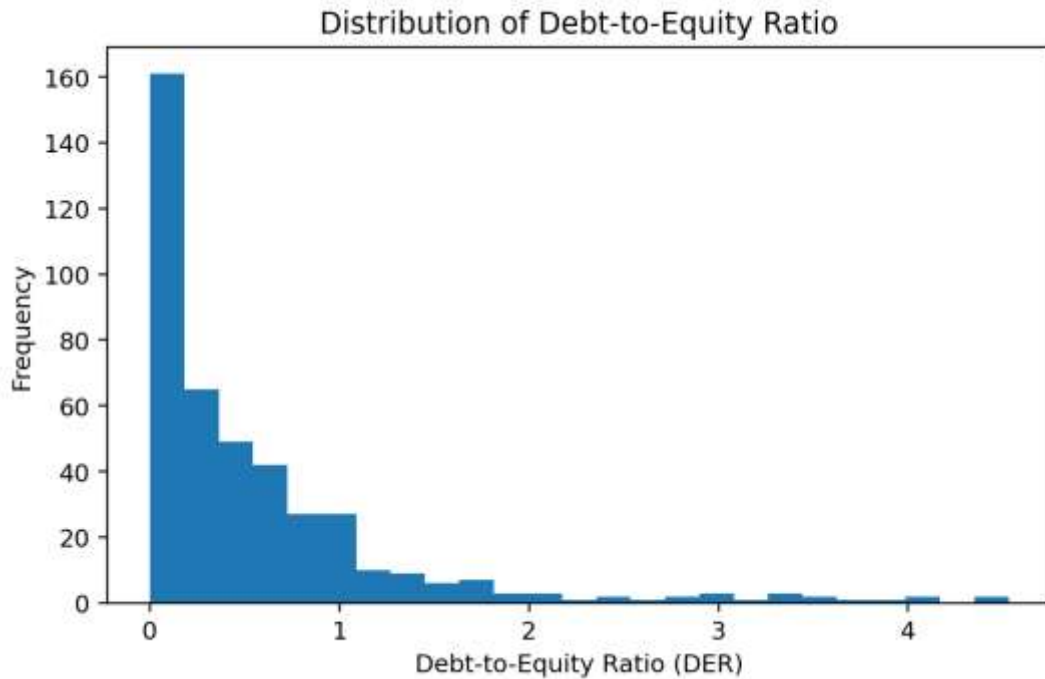


Figure 1. Distribution of the debt-to-equity ratio in the supplied 430-observation dataset.

5. Pearson Correlation Test

Correlation analysis gives the first opportunity to analyze the degree of the relationship between capital structure and the selected indicators. DER has negative correlations with both ROA ($r = -0.451$, $p < .001$) and Tobin's Q ($r = -0.267$, $p < .001$). On the other hand, the relationship between DER and ROE is insignificant and weakly negative ($r = -0.065$, $p = .181$), and between DER and market capitalization is also insignificant ($r = 0.044$, $p = .364$). It means that the level of correlation between leverage and asset-based profitability as well as Tobin's Q is higher than in the case of ROE and market capitalization.

Variable 1	Variable 2	Pearson r	p-value	Interpretation
DER	ROA	-0.451	< .001	Significant negative
DER	ROE	-0.065	0.181	Not significant
DER	Tobin's Q	-0.267	< .001	Significant negative
DER	Market Cap	0.044	0.364	Not significant
ROA	ROE	0.795	< .001	Significant positive
ROA	Tobin's Q	0.631	< .001	Significant positive
ROA	Market Cap	0.214	< .001	Significant positive
ROE	Tobin's Q	0.449	< .001	Significant positive
ROE	Market Cap	0.191	< .001	Significant positive
Tobin's Q	Market Cap	0.358	< .001	Significant positive

6. Empirical Results

6.1 Objective 1: Capital Structure and Financial Performance

The first objective investigates whether capital structure, as measured by the DER, correlates with finan-

cial performance. Both ROA and ROE measures are employed as alternatives to avoid relying on just one accounting variable.

6.1.1 DER and ROA

The DER-ROA regression is statistically significant, $F(1,428) = 109.448$, $p < .001$. The estimated regression coefficient is -3.196 (standard error = 0.306); $t = -10.462$; standardized $\beta = -0.451$. R^2 for the regression is 0.204 , and the adjusted R^2 is 0.202 , which means that the DER variable explains about 20.4% of variance in ROA in this case with one predictor only. The regression equation is $ROA = 9.111 - 3.196(DER)$. The negative value of the regression coefficient indicates that higher values of leverage are correlated with lower values of ROA.

Model	R	R ²	Adjusted R ²	F	p	B	SE	t	β
DER → ROA	-0.451	0.204	0.202	109.448	< .001	-3.196	0.306	-10.462	-0.451

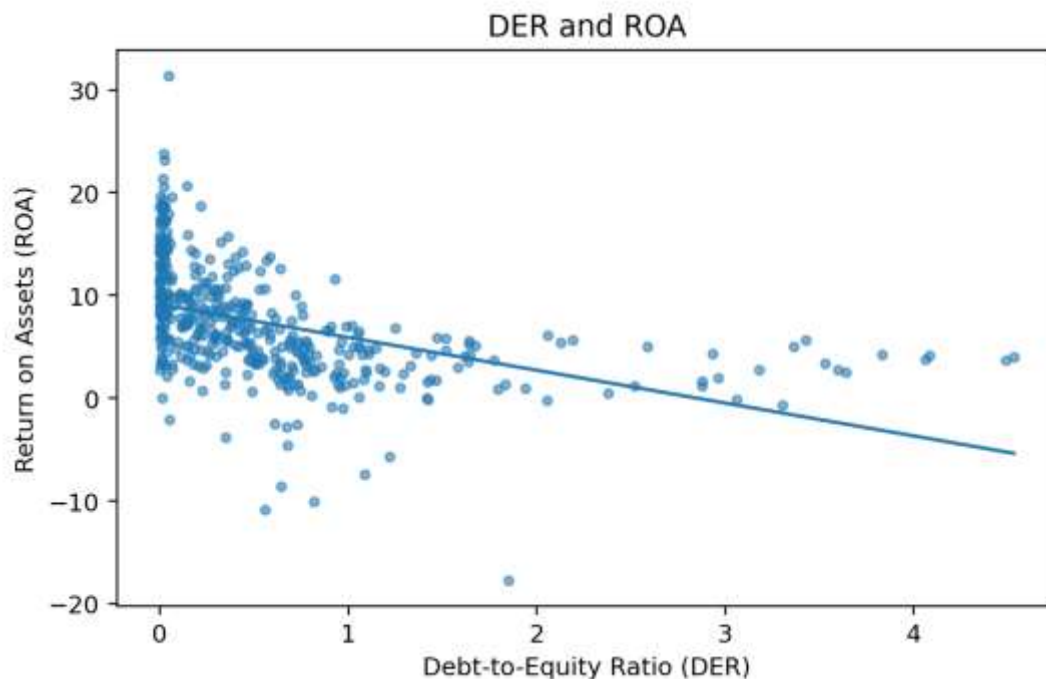


Figure 2. DER and ROA with fitted linear regression line.

6.1.2 DER and ROE

The DER-ROE relation is statistically insignificant, $F(1,428) = 1.792$, $p = .181$. The regression coefficient is -0.849 (standard error = 0.635) with $t = -1.338$ and standardized $\beta = -0.065$. R^2 equals 0.00417 , implying that the single-predictor regression explains less than 0.42% of the variability of ROE. Therefore, even though the coefficient is negative, the sample fails to show statistically significant linear relationship between DER and ROE at the 5% significance level.

Model	R	R ²	Adjusted R ²	F	p	B	SE	t	β
DER → ROE	−0.065	0.00417	0.002	1.792	0.181	−0.849	0.635	−1.338	−0.065

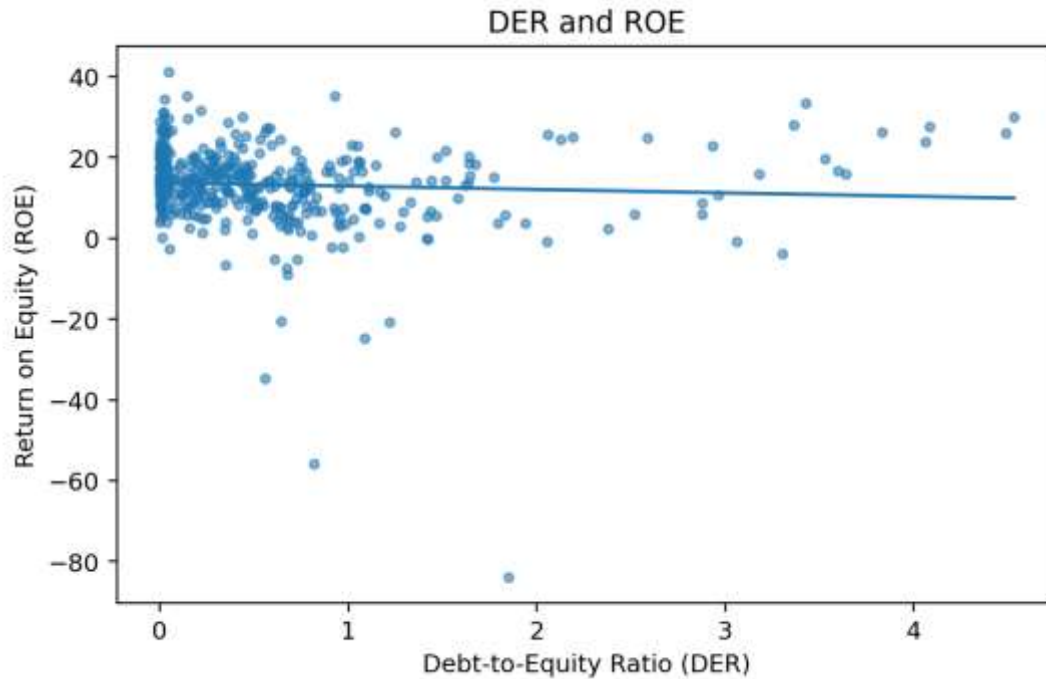


Figure 3. DER and ROE with fitted linear regression line.

6.1.3 Objective 1 Summary

Relationship	β	R ²	F	p-value	Decision
DER → ROA	−0.451	0.204	109.448	< .001	Reject H ₀
DER → ROE	−0.065	0.00417	1.792	0.181	Fail to reject H ₀

The statistical significance and negativity of the DER-ROA relationship are partial evidences for Objective 1. However, the DER-ROE relationship is statistically insignificant. Such result is crucial since it proves that the statement about the capital structure-performance relationship is sensitive to the choice of the accounting performance indicator.

6.2 Objective 2: Capital Structure and Firm Value

The second objective is related to two market-based results such as Tobin's Q and market capitalization. Such separate consideration is required since Tobin's Q and market capitalization are different indicators of value creation.

6.2.1 DER and Tobin's Q

The DER-Tobin's Q regression is statistically significant, $F(1,428) = 32.778$, $p < .001$. The estimated coefficient is -0.421 ($SE = 0.073$), $t = -5.725$, $\beta = -0.267$. R^2 is 0.0711 and adjusted R^2 is 0.069, which means that DER explains 7.11% of the total variance in Tobin's Q. The fitted regression is $\text{Tobin's Q} = 2.534 - 0.421(\text{DER})$. Negative coefficient of the regression indicates inverse correlation between leverage and Tobin's Q.

Model	R	R ²	Adjusted R ²	F	p	B	SE	t	β
DER → Tobin's Q	-0.267	0.071	0.069	32.778	< .001	-0.421	0.073	-5.725	-0.267

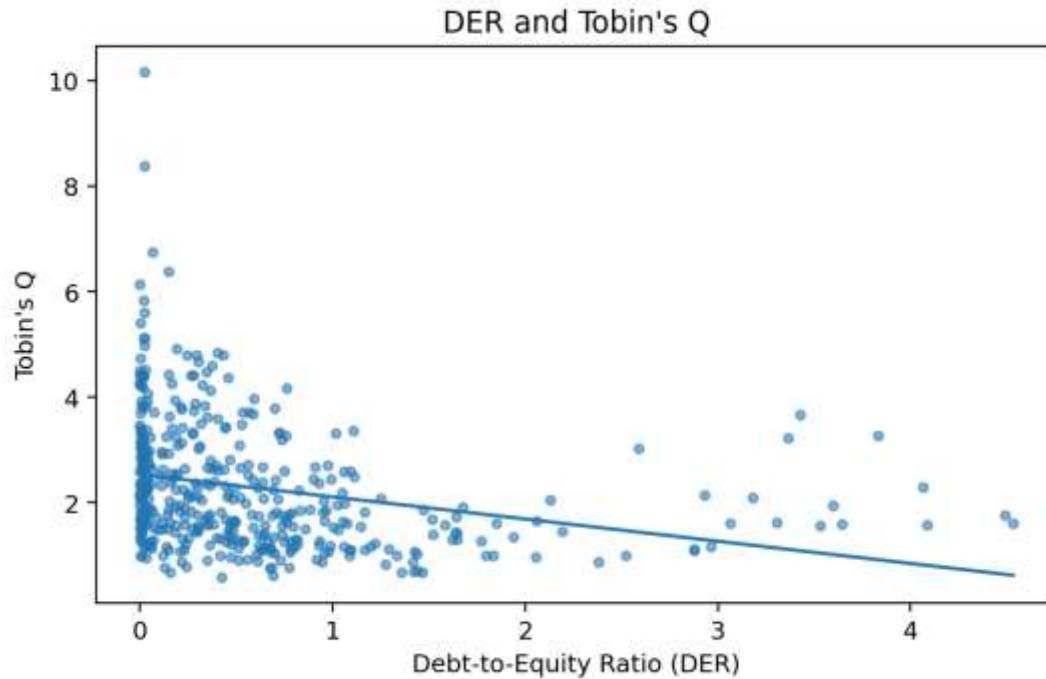


Figure 4. DER and Tobin's Q with fitted linear regression line.

6.2.2 DER and Market Capitalization

The DER-market capitalization regression model is not statistically significant, $F(1,428) = 0.825$, $p = .364$. The coefficient of the model is positive, equal to 3,209.041; however, its standard error is high (3,533.632), resulting in $t = 0.908$ and $p = .364$. The value of R^2 is 0.00192, which means that DER accounts for only about 0.19% of variation in market capitalization. Thus, this model is not statistically significant.

Model	R	R ²	Adjusted R ²	F	p	B	SE	t	β
DER → Market Cap	0.044	0.00192	-0.000	0.825	0.364	3,209.041	3,533.632	0.908	0.044

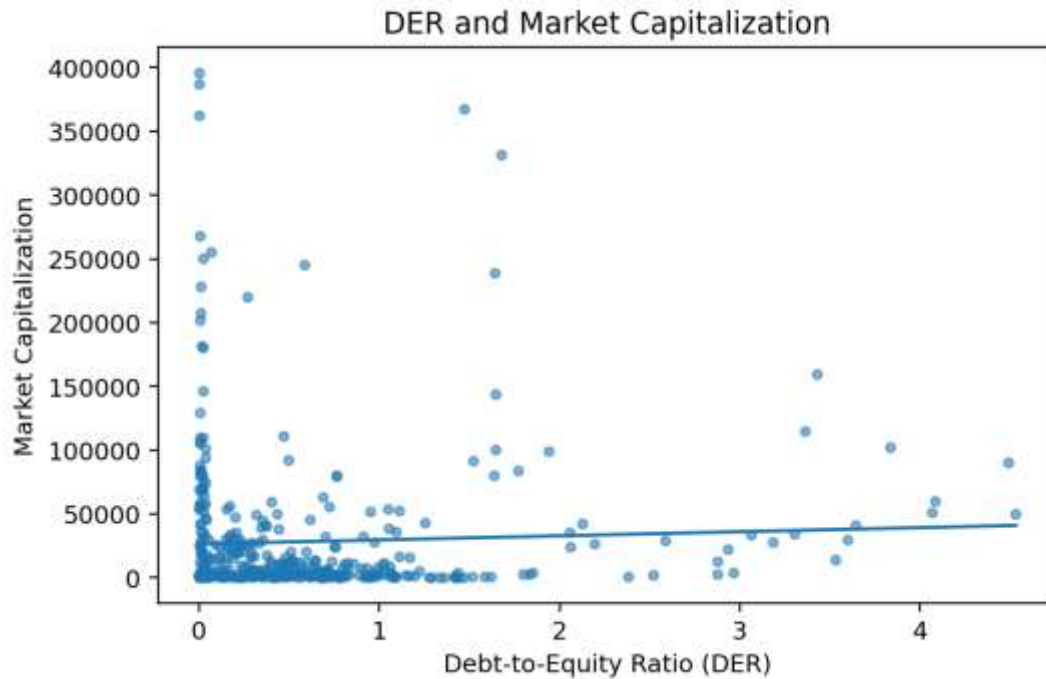


Figure 5. DER and market capitalization with fitted linear regression line.

6.2.3 Objective 2 Summary

Relationship	β	R^2	F	p-value	Decision
DER $\rightarrow$ Tobin's Q	-0.421	0.071	32.778	< .001	Reject H_0
DER $\rightarrow$ Market Cap	0.044	0.00192	0.825	0.364	Fail to reject H_0

Partial empirical justification can be seen for Objective 2 as well since there exists a statistically significant negative relation between DER and Tobin's Q, but there is no statistical significance for the market-capitalization model.

7. Profitability Supplementary Analysis: Debt Ratio and NPM

In addition, we perform a supplementary regression of the relation between Debt Ratio and Net Profit Margin based on 430 observations. The results show Pearson correlation at -0.437 ($p < .001$), R^2 from the regression of 0.191, and an adjusted R^2 of 0.189. Statistically significant is the regression model ($F(1,428) = 101$, $p < .001$). The coefficient for Debt Ratio is equal to -15.13 ($SE = 1.505$), $t = -10.1$, $p < .001$ and standardized $\beta = -0.437$. The estimated regression equation is $NPM = 9.55 - 15.13(\text{Debt Ratio})$.

Statistic	Result	Interpretation
N	430	Complete observations in the supplementary analysis
Pearson r	-0.437	Moderate negative association
R^2	0.191	19.1% of observed NPM variation explained by Debt Ratio
Adjusted R^2	0.189	Adjusted one-predictor fit

F(1,428)	101	Overall regression is statistically significant
B	-15.13	Negative Debt Ratio coefficient
β	-0.437	Moderate negative standardized association
p-value	< .001	Statistically significant at $\alpha = 0.05$

The supplementary result is directionally consistent with the DER–ROA finding: higher observed leverage is associated with weaker accounting profitability in the sample. However, the two models use different leverage and performance definitions, so the coefficients should not be compared as if they were measurements on the same scale.

8. Consolidated Hypothesis Testing

Hypothesis	Relationship	Evidence	p-value	Decision	Conclusion
H ₀₁	DER → ROA	$\beta = -0.451$; $R^2 = 0.204$	< .001	Reject H ₀	Significant negative association
H ₀₂	DER → ROE	$\beta = -0.065$; $R^2 = 0.00417$	0.181	Fail to reject H ₀	Not statistically significant
H ₀₃	DER → Tobin's Q	$\beta = -0.267$; $R^2 = 0.071$	< .001	Reject H ₀	Significant negative association
H ₀₄	DER → Market Cap	$\beta = 0.044$; $R^2 = 0.00192$	0.364	Fail to reject H ₀	Not statistically significant
H ₀₅	Debt Ratio → NPM	$\beta = -0.437$; $R^2 = 0.191$	< .001	Reject H ₀	Significant negative association

The regression findings show a mixed picture and not a universal leverage effect. The two main regression relationships – DER and ROA and DER and Tobin's Q are statistically significant and negative. The DER–ROE and DER–market capitalization relationships are not statistically significant. The secondary Debt Ratio–NPM regression is statistically significant and negative. In summary, the evidence is strongest for the relationships between leverage and the chosen accounting and valuation measures.

9. Regression Diagnostics and Robustness Issues

The regression diagnostics provided in this case include Q-Q plots of the residuals. The diagnostics suggest departures from the perfectly straight reference line, especially at the tails of the distribution. With 430 observations, formal normality tests can also detect departures from normality that may be quite small in magnitude. The appropriate interpretation of the finding is to recognize imperfect residual normality rather than invalidate the regression. The inclusion of graphical diagnostics in addition to formal tests is appropriate because large samples may make normality tests sensitive to small departures.

Another limitation of the analysis provided is that the regression models utilize only one independent variable. The financial performance and business value can be affected by company size, growth, liquidity, capital structure, business risk, age and many other elements. Therefore, since these controls are not taken

into account in this regression models, R^2 values reflect only explanatory power of DER and should not be considered as a complete model of corporate performance or valuation.

Moreover, since the underlying 430 observations have repeated data for the same firms in different years, independence assumption of simple cross-sectional regression may also be flawed. The utilization of formal panel data model including firm and year effects can be a more rigorous test in further research.

10. Discussion

The observed negative relationship between the DER ratio and ROA is in line with the general trend indicated by various studies included in the source set. For instance, Chisti, Ali and Sangmi (2013) identify a significant impact of capital structure on profitability for Indian automobile firms, whereas Pal (2022) indicates negative correlations between different debt ratios and financial performance in the manufacturing industry in India. Thus, the result obtained can be considered in light of previous findings that support the possibility of the simultaneous existence of increased debt usage and poorer accounting profitability without establishing any causality in the current study design. Similar negative relationships have been observed among debt and profit metrics in India and abroad. (Nikhil et al., 2023; Pal, 2022; Jaiswal and Elmarzouky, 2025)

The non-significant relationship between the dependent and independent variables is equally illuminating in this case. The ROE ratio has equity as its denominator, and thus could react differently to changes in leverage than ROA. From the lack of significance in the current sample, we can learn that the negative relationship found with ROA cannot just be generalized to all other profitability indicators. Rashmi and Chougule (2024) demonstrate how multiple accounting measures can be useful in analyzing the effect of capital structure on financial performance.

The significant negative relationship between DER and Tobin's Q also proves that leverage is connected with one of the market-based valuation ratios. It is consistent with the view that the investor will assign lower values to firms because of higher leverage associated with financial risks. Meanwhile, this result does not imply that each additional unit of debt reduces the firm's value. As noted by Sharma (2023) and Karaca, Mensi and Gemici (2025), the link between leverage and value can be nonlinear.

The lack of significance of the relationship between DER and market capitalization is yet another example of measurement dependence. Market capitalization is strongly dependent on firm size and stock price and thus contains a completely different set of economic information than Tobin's Q. Lack of a strong simple relationship between market capitalization and DER does not mean that capital structure is unimportant for firm valuation, but it does mean that DER alone cannot account for a statistically significant linear portion of market capitalization variance in this sample. Goyal and Sah (2026) too highlight that the valuation effect depends on industry structure and financing environment.

The additional Debt Ratio-NPM relationship further supports the profitability interpretation. Correlation of -0.437 and R^2 of 0.191 reflect a moderate negative relationship, quite consistent in sign and size with the previous relationship between DER and ROA. Consistency of the sign and approximate magnitude of the relationship with profitability using two different profit metrics implies that the relationship between leverage and profitability is not limited to one particular measure of the latter despite different leverage measurements precluding equality of coefficients. This finding is consistent with the literature on relationships between various measures of leverage and profitability in study.

In summary, the study provides support for a measure sensitive view of capital structure. The most significant empirical finding is not that leverage impacts all corporate performance measures equally, but

the significant negative correlations between leverage and ROA, NPM and Tobin's Q in the provided dataset, whereas ROE and market capitalization evidence is not sufficient to find the significant linear correlation.

11. Implications

11.1 Implications for Financial Management

The empirical findings provide a message for financial managers of automobile firms that leverage should be measured in conjunction with the level of profitability and valuation instead of solely on access to debt finance. However, the findings do not reveal the existence of an optimal DER since the non-linear analysis was not performed and firm-level factors were not controlled.

11.2 Implications for Investors and Analysts

It is possible for investors and analysts to consider the debt ratio only one of the factors used in the financial analysis of companies. The inconclusive nature of the results suggests that the relationship between the debt ratio and other accounting and market factors may vary according to the specific measure.

11.3 Implications for Future Research

Future research should involve even more sophisticated specifications involving panel data and including non-linear terms among others. Having considered the evidence from the literature provided for the impact of firm size, agency costs and non-linear relationships between leverage and value, it is possible to conduct further research on whether linear coefficients retain their negative sign.

12. Limitations and Directions for Further Research

- The primary regressions only have DER as an explanatory variable, with other determining factors explaining part of the variability. The absence of control variables is especially crucial since the provided literature states firm size, liquidity, asset composition, growth, and agency cost to be conditional variables. (Thakur et al., 2023; Ahmed et al., 2023; Marozva, 2024)
- The analysis is observational and thus supports associations and not a definite causal relationship.
- There might be dependencies within a firm in case there are repeated company-year observations among the 430 observations. This case will make simple regression not to capture fully the intra-cluster dependencies.
- The residual diagnostic shows deviation from perfect normality, especially in the tails.
- There is extreme dispersion in market capitalization making a simple linear model less informative compared to scale controlled or transformed models.
- This research does not examine any non-linearity and thresholds although several provided studies show the leverage-value relationship to be non-linear.
- Future research should use firm size, growth, liquidity, age, tangibility, business risk among other theoretically sound control variables.
- Future research could utilize fixed/random effects models, robust standard errors, quantile regression, and non-linear Competing models.

13. Conclusion

The present study has been carried out to find the relationship between capital structure, performance and firm value among the Indian automobile companies using 430 complete observations. DER has been considered the primary proxy of the capital structure, while ROA, ROE, Tobin's Q and market

capitalization have been chosen as the alternative proxies for performance and valuation. In the course of empirical analysis, a certain distinct pattern depending on the measure has been found. There has been a significant negative relationship between DER and ROA ($r = -0.451$, $p < .001$) and Tobin's Q ($r = -0.267$, $p < .001$). Accordingly, the regressions have explained 20.4% of the variance in ROA and 7.1% of the variance in Tobin's Q. At the same time, the relationships between DER and ROE and market capitalization have not been significant. As for the supplementary Debt Ratio-NPM model, there has been a significant negative relationship with $R^2 = 0.191$ and $p < .001$.

Thus, it can be concluded that the relationship under consideration is determined by the corporate indicator under analysis. The results obtained are in agreement with the majority of studies presented in the provided literature and pointing to the negative leverage-profitability associations, while the mixed valuation evidence is consistent with research emphasizing sectoral and nonlinear effects. The study contributes by placing several accounting and market indicators in a common empirical framework for Indian automobile companies.

Evidence from the Supplied Literature

The 30-study source set reveals that the capital structure body of literature fails to predict the same thing at all times. It is dependent on the country of operation, industry sector, definition of leverage, measures of performance, valuation approach, duration of study period and estimation technique. Such heterogeneity becomes crucial in interpreting the results of the current automobile companies study rather than being a reason to ignore conflicting evidence.

Evidence from India is especially pertinent. Chisti et al. (2013) use listed Indian firms and establish a statistically significant relationship between the capital structure and profitability. Pal (2022) uses Indian manufacturing firms classified into three sectors: steel, cement and automobiles and establishes negative relations between both short- and long-term debts and a number of performance measures. Thakur et al. (2023) complement the Indian literature by considering the impact of firm age and size as moderators in the context of selected capital structure variables and find negative and statistically significant effects. Nikhil et al. (2023) find that leverage negatively impacts the profitability of Indian non-financial firms and that Ind AS adoption changes the leverage-performance link. All of these studies form a good empirical basis for testing the relationship of interest.

The source set also illustrates the nonlinear nature of the relationship between debt and other financial variables. Nonlinear dynamics of capital structure, profitability, and size of Indian manufacturing firms are identified by Jaisinghani and Kanjilal (2017). Karaca et al. (2025) find an inverted U-shaped relationship between capital structure and firm value in an emerging market environment. The studies illustrate that the optimal level of leverage cannot always be found by analyzing the coefficients of one linear regression.

Specifically, the studies on firm value demonstrate mixed results. Bui et al. (2023), considering a large Vietnamese sample and using multiple estimation methods, found that different types of measures of debt have varying impacts on ROA, ROE, and Tobin's Q depending on whether total debt, short-term debt or long-term debt is used. Aggarwal and Padhan (2017) provide the Indian hospitality sector evidence on the topic of capital structure and firm value. Goyal and Sah (2026) show that Indian IT and automobile sectors have specific characteristics of debt that impact firm value differently. Hence, the evidence from the latter is particularly important for understanding the current findings.

Further support for the contextual perspective comes from international research. In their investigation into the telecommunications sector in the US, Habibniya et al. (2022) use panel data and differentiate

between debt-to-assets and equity-to-assets ratios. According to Mazanec (2023), some capital-structure, asset-structure and liquidity factors have been found to be the determinants of the performance of transport SMEs in Central Europe. Leverage has been found to be negatively correlated with some performance criteria in the case of FTSE All-Share companies by Jaiswal and Elmarzouky (2025) but with the varying degree of significance during the pre-pandemic, pandemic and post-pandemic eras.

The body of literature also identifies some mechanisms other than the ratio of leverage itself. Ahmed et al. (2023) consider the effect of agency cost as a moderator and identify that the governance mechanisms can influence the effect of the capital structure on performance. Marozva (2024) uses the panel-ARDL model to investigate the links between leverage, performance and liquidity and reveals that liquidity might have some important role in the long-run relationship between leverage, performance and Tobin's Q. Malik et al. (2026) also demonstrate that the ESG disclosure may impact the capital structure decisions in the case of Indian non-financial organizations.

2.6 Theoretical Framework and Hypothesis Development

The trade-off theory of debt indicates that organizations consider the benefits associated with debt and the expected costs of financial distress. While tax shields can make debt more favorable, too much debt may cause increased financial risks and higher costs of financial distress. In this way, the U-shaped findings of Karaca et al. (2025) and the non-linear evidence from the Indian manufacturing industry by Jaisinghani and Kanjilal (2017) are congruent with the assumption that the effect of debt is subject to change as the level of leverage increases.

Information asymmetry and financing hierarchy are the core assumptions of pecking order theory. According to this theory, more profitable companies can avoid debt financing since internal resources are readily available. Thus, the negative relationships between leverage and profitability found by Pal (2022) and Nikhil et al. (2023) may be explained in terms of pecking order theory. However, the current research does not test this theory.

Finally, the agency theory can explain the relationship between debt and corporate performance. While debt may impose restrictions on managers' behavior and decrease the number of discretionary resources available to them, too much debt can create problems related to conflicts between

Based on the available literature and the measures used for the purposes of this study, the following hypotheses can be formed:

H1: There exists a statistically significant relationship between the debt-equity ratio and return on assets for Indian automobile companies.

H2: There exists a statistically significant relationship between the debt-equity ratio and return on equity for Indian automobile companies.

H3: There exists a statistically significant relationship between the debt-equity ratio and Tobin's Q for Indian automobile companies.

H4: There exists a statistically significant relationship between the debt-equity ratio and market capitalization for Indian automobile companies.

H5: There exists a statistically significant relationship between the debt ratio and net profit margin for Indian automobile companies.

These hypotheses have been formed as relationship hypotheses and not as directional causal hypotheses due to the nature of the data collection and analysis method used in this study.

2.7 Conceptual Framework

The conceptual framework makes the capital structure the main explanatory construct and distinguishes

between firm outcomes in terms of accounting performance and market-based firm value. DER becomes the main capital structure indicator. Accounting profitability includes ROA and ROE, whereas market-value indicators include Tobin's Q and market capitalization. Debt Ratio and NPM become an additional relationship for profitability. Therefore, the conceptual framework investigates whether the signal of leverage is consistent with various measures of outcome instead of taking a single measure as representing all firm performance.

Conceptually, the conceptual framework could be stated as follows: Capital Structure (DER) → Financial Performance (ROA, ROE) and Capital Structure (DER) → Firm Value (Tobin's Q, Market Capitalization), together with the additional Debt Ratio → NPM relationship. At the same time, the framework acknowledges the impact of such factors as the firm's size, liquidity, growth, asset tangibility, age, governance and economic conditions on the above relationships despite their lack of inclusion as control variables in the current simple models. Such a limitation is typical for the broader literature where such factors are considered relevant determinants or moderators (Thakur et al., 2023; Ahmed et al., 2023; Marozva, 2024).

3.4 Data Source and Data Preparation

The analysis will be conducted on the provided Excel data set and the associated statistical outputs. The resulting analytical dataset comprises 430 observations of companies' year for the variables employed in the main models. The data has been selected in such a way that there was information on DER, ROA, ROE, Tobin's Q and Market Cap for the selected observations. The statistical output report provided alongside the assignment proves $N = 430$ for all five main variables.

Secondary financial data is appropriate for conducting the capital structure study because leverage, profitability and market valuation can be determined from the financial statement of corporations. Prior studies within the source list also employ the audited financial statements, listed companies' database or established financial databases including Chisti et al. (2013), Pal (2022), Thakur et al. (2023), Nikhil et al. (2023) and Goyal and Sah (2026).

3.5 Interpretation of Variables

Debt-to-Equity Ratio (DER) is an indicator of the level of debt financing as opposed to equity financing. The higher the DER, the more debt used compared to equity, although the economic interpretation varies according to the business model and asset structure of the organization. ROA is the indicator of return made as per the assets, ROE is an indicator of return made as per the equity shareholders, Tobin's Q is an indicator of market valuation ratio, while market capitalization is the market value of equity.

Multiple dependent variables have been considered intentionally due to the orientation of each variable. ROA is asset oriented, ROE is equity oriented, NPM is margin oriented, Tobin's Q is market oriented, and market capitalization is absolute equity market oriented. Therefore, it is possible to have a relationship of the variable in one case but not in another, without creating any statistical inconsistency. This is evident from the existing literature (Habibniya et al., 2022; Rashmi and Chougule, 2024; Bui et al., 2023).

3.6 Statistical Procedure

The process consists of four steps. In the first step, descriptive statistics are employed to analyze measures of central tendency and dispersion. In the second step, the degree and the direction of the linear association are evaluated using Pearson correlation. In the third step, the relationship between leverage and the dependent variable is estimated using simple linear regression. In the fourth step, residual diagnostics are reviewed to detect obvious deviations from the assumed residual pattern.

In reporting the results of each regression analysis, R , R^2 , adjusted R^2 , F-statistic, coefficient estimate, standard error, t statistic, p-value, and standardized beta are provided when possible. A consistent 5% level of significance is used. If the p-value is less than 0.05, the result is treated as an indication of the presence of linear relationship; p-value equal to or greater than 0.05 is treated as lack of sufficient evidence for rejection of the null hypothesis.

3.7 Interpretation of Statistical Significance

The statistical significance of the result is not equated with economic significance. For instance, the DER–ROA model has a larger R^2 compared to the DER–Tobin's Q model, which indicates that more variation in the sample is explained by a single predictor. However, neither R^2 nor statistical significance establishes causality. Economic interpretation must consider the measurement scale, omitted variables, sample structure and theoretical mechanism.

Comparison of Cross-Measure Results

Four key regressions show the following major characteristics: first, the sign is negative for all except for the statistically insignificant market capitalization coefficient; second, the significance occurs in ROA and Tobin's Q; third, the strength of explanation is quite different: R^2 is 0.204 for ROA, 0.071 for Tobin's Q, 0.00417 for ROE and 0.00192 for market capitalization. Hence, there is no sufficient evidence to treat DER as an equivalent indicator of various financial results.

The most robust univariate link in the main analysis is between DER and ROA, because its standardized coefficient (–0.451) exceeds that of Tobin's Q in absolute value (–0.267). The auxiliary Debt Ratio and NPM coefficient (–0.437) is also large enough. The concentration of strong links in profitability indicators implies that leverage is more related to accounting performance than to pure market capitalization in the sample.

On the other hand, the insignificance of the ROE variable does not mean that leverage has no economic significance for stock returns at large. The ROE measure is influenced by profitability and the denominator of equity, where firms may face leverage impacts in light of the return on assets, interest, taxes, and equity. In this case, the above result pertains to the linear relationship between them.

7.1 Relation between the Main Result and Previous Literature

The negative effect of DER-ROA has much in common with previous Indian literature. Specifically, Chisti et al. (2013) have found a significant influence of capital structure on profitability in listed Indian companies, while Pal (2022) has identified the negative impact of some debt metrics on performance in Indian manufacturing industries. Similar results have been obtained by Nikhil et al. (2023), who have shown that leverage negatively impacts profitability in Indian non-financial companies.

The finding of no DER–ROE relationship is somewhat conservative. As shown by Habibniya et al. (2022), the link between the capital structure and profitability may depend on the choice of measures of leverage and profitability. Rashmi and Chougule (2024) also apply ROA, ROE and ROCE in their research and explain the importance of a multi-measurement approach. Therefore, it is logical for there to be no significant DER-ROE relationship in the current research in view of the available literature.

The negative connection between DER and Tobin's Q should be interpreted along with the mixed evidence about the valuation effects. As revealed by Bui et al. (2023), total debt and the maturity of debt can lead to different valuation results. Karaca et al. (2025) obtain an inverted-U relationship, and Goyal and Sah (2026) find sector-dependent valuation effects for Indian IT and automobile companies. In this regard, the linear relationship obtained in the current research captures the effect within the provided sample of automobiles but does not verify the presence of a turning point.

It is theoretically possible not to observe a significant connection with market capitalization due to its absolute scale nature. Even large firms with relatively low leverage can have higher larger market capitalizations regardless of whether their leverage is high or low. The supplied literature's emphasis on firm size and industry structure supports caution when interpreting an univariate relationship with market capitalization (Jaisinghani and Kanjilal, 2017; Thakur et al., 2023; Goyal and Sah, 2026).

10.1 Theoretical Implications

The observed empirical relationship provides support for theoretical trade-offs and pecking order reasoning, but it does not allow for a conclusive theoretical selection exercise. The negative profitability relationship is consistent with the hypothesis that increased leverage raises financial costs and distress risk, and it is also consistent with pecking order reasoning where higher-profitability firms do not need to raise debts. The study is unable to distinguish between the two explanations since the study does not directly consider taxation, distress, financing, and endogeneity issues.

Valuation results can also be interpreted in a nonlinear fashion since a linear coefficient estimation allows for a negative average relationship between DER and Tobin's Q to co-exist with a positive relationship at lower levels of leverage and a negative relationship at higher levels of leverage. This is particularly interesting in light of the U-shaped relationship found by Karaca et al. (2025) and the nonlinear Indian relationship established by Jaisinghani and Kanjilal (2017).

10.2 Contributions of the Study

The study makes four contributions. First, it offers automobile industry-based empirical results by applying the same DER index to accounting and market outcomes. Second, it separates ROA from ROE, as opposed to treating profitability as one entity. Third, it uses the Tobin Q compared to market capitalization, which proves that the firm value findings vary according to the valuation proxy used. Fourth, it introduces the Debt Ratio-NPM model, offering an additional profitability measurement.

A fifth contribution comes in terms of methodology. In its findings, the study specifies the correlation coefficient, regression coefficient, R^2 , F statistic, t statistic and the p-value of each model while making a distinction between association and causality. This is especially crucial since regressions may seem very convincing when a coefficient is significant but omitted variables bias and observation problems persist.

11.4 Implications for the Financial Strategy of the Automotive Industry

From the perspective of financial strategy of automobiles, the results imply that the assessment of financial policy needs to be considered jointly with efficiency in asset utilization and profitability and not leverage alone because there are significant negative correlations with ROA and NPM implying an inverse relationship between debt intensity and profitability in the data.

However, the data do not suggest an optimal DER cutoff value. Therefore, the managers need to assess leverage in conjunction with interest coverage ratio, liquidity, cash generation ability, asset structure and investment needs.

The results concerning market values also imply that accounting performance and market value need to be considered independently. There being a significant DER-Tobin's Q correlation but an insignificant correlation with market capitalization implies that different conclusions can be drawn by managers and investors from different valuations.

11.5 Proposed Advanced Model for Further Investigation

For further development, one possible advanced model can incorporate the present specification in panel form: $\text{Performance}_{it} = \alpha + \beta_1 \text{DER}_{it} + \beta_2 \text{Size}_{it} + \beta_3 \text{Growth}_{it} + \beta_4 \text{Liquidity}_{it} + \beta_5 \text{Tangibility}_{it} + \beta_6 \text{Age}_{it} + \text{Firm Effects}_i + \text{Year Effects}_t + \varepsilon_{it}$. A similar specification may be used for Tobin's Q.

A squared leverage measure (DER^2) can also be included to see if there exists a nonlinearity. These enhancements are based on the following given literature on size, liquidity, agency cost, and nonlinearity in leverage (Jaisinghani and Kanjilal, 2017; Ahmed et al., 2023; Marozva, 2024; Karaca et al., 2025).

12.1 Practical Recommendations for Research Reporting

Results should be reported using the language of associations and not causations, except if a different strategy for establishing the identification is employed. The reason why is that phrases such as "high DER leads to decrease in ROA" should not be used. Instead, it is better to write something like "there is a statistical association between high DER and low ROA in the sample". The difference is essential because it corresponds to the nature of journal publishing and the design of the study.

In addition to that, it is necessary to specify the sample creation process, the companies under consideration and the time period of the study, using the information from the Excel file. The paper must include information about the data sources used for research. As for now, Emerald requires its authors to use Harvard or APA styles to cite their data and research methods.

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