

Nexus Between Debt-Equity Choice And Market Value Of The Firm: A Panel Data Analysis On Indian Automobile And Its Ancillaries Firms

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Abstract

This study attempts to provide insight into the effect of capital structure decisions on the listed Indian automobile and automobile ancillaries' firms' market value. The analysis uses secondary data collected for 118 automobile and ancillaries firms listed on the Bombay Stock Exchange (BSE) for the year from 2004 to 2020. The Dynamic panel data regression analysis was employed to study the impact of capital structure on firm's value. The outcomes of the research indicate that in an emerging sector like the Indian automobile sector, equity capital as a component of capital structure is relevant to the value of a firm, and Long-term-debt was also found to be the major determinant of a firm's value. The findings of this study help the corporate financial decision-makers are advised to design the optimal capital structure that maximizes the firm value by reducing the overall cost of capital.

Key Words: Capital Structure, Firm Value, Panel Regression, Indian Automobile Sector

JEL Code: G30, C1, C32

1. Introduction:

Several empirical studies have been undertaken to investigate the factors influencing the relationship between capital structure and firm value. The ongoing discourse in corporate finance revolves around the impact of the choice between debt and equity on a firm's market value. This matter remains inconclusive and subject to ongoing debate within the literature. Various capital structure theories, such as the trade-off theory, pecking order theory, and market timing theory, have been extensively scrutinized and empirically assessed. However, the results have been inconclusive and diverse, leading to a lack of consensus on the overall significance of capital structure theories, particularly within the context of the Indian automobile and ancillary sector. This study aims to unravel the complexities by examining how business growth and debt ratios influence the firm value of the Indian automobile sector within the dynamic framework of a developing economy.

This analysis is centered on specific automobile and auxiliary companies listed on the Bombay Stock Exchange (BSE) in India. The primary objective is to establish a cause-and-effect relationship between these companies' value and their debt structure. Given the automotive industry's pivotal role in India's economy, contributing 7.1 percent to the national GDP and creating employment opportunities for 37 million individuals, these companies play a significant part in the nation's pursuit of a USD 5 trillion economy. Ascertaining the appropriate capital source to finance the capital structure is a complex challenge for finance managers, given its profound impact on a company's value and profitability. The evolving role of companies in this sector and their responsibilities to stakeholders and society have become central topics of discussion in this context.

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This study contributes to the existing knowledge base by investigating the determinants of capital structure and firm value in the context of the Indian automobile sector. It seeks to empirically validate established capital structure theories by examining the relationships within a sample of 118 Indian automobile and ancillary companies over a comprehensive 17-year period. This research represents one of the initial endeavours to explore the long-term association between a company's debt financing ratios and its overall value. The findings from this study are expected to offer valuable insights to various stakeholders, including company management, government entities, and investors, shedding light on the intricate dynamics that shape capital structure decisions, firm growth, and overall firm value in the automotive industry. Analysing the impact of capital structure on firm value will provide management with a basis for reevaluating financial performance and identifying specific factors influencing the company's value. Owners can use these insights to make informed decisions about their capital structure choices, while investors can leverage the findings to identify promising investment opportunities. Regulators may find the study instrumental in formulating policies that foster a conducive environment for the automotive sector.

2. Review of Literature:

The capital structure of a company, encompassing its mix of debt and equity, has long been a subject of extensive discussion regarding its correlation with the firm's value. The discourse has transitioned from theoretical considerations to practical realities, particularly following Modigliani and Miller (1958). In an ideal, frictionless market, they argued that the capital structure has no bearing on a firm's value. However, this ideal scenario, which assumed the absence of transaction costs, taxes, asymmetric information, varying borrowing rates, and risk-free financing, does not align with the complexities of the real world. Modigliani and Miller revised in 1963 by recognizing corporate tax advantages as influential factors in shaping a company's financial structure. Specifically, the tax deduction eligibility of interest payments serves as a crucial aspect. The inclusion of debt in a company's capital structure, thanks to the interest "tax shield," results in reduced taxes paid, thereby enhancing the company's overall value. This implies that the composition of a company's capital indeed affects its total worth. According to Modigliani and Miller (1963), companies should leverage a substantial amount of debt to maximize their value. Miller (1977) extended Modigliani and Miller's (1963) assertions by including both corporate taxes and personal taxes in his model. Miller (1977) states that the firm's value is contingent upon the comparative magnitude of each tax rate in relation to the other two. Miller (1977) stated that the business value is determined by the relative amount of each tax rate and that the benefits of using debt may be less significant than what Modigliani and Miller (1963) proposed. Graham (2000) proposed in a recent study that the tax advantage gained from using loan capital was equal to ten percent of the firm's worth. However, this benefit was decreased by around two-thirds due to personal tax penalties before the Tax Reform Act of 1986, and by slightly less than half following the reform. Additional theories proposed to elucidate the capital structure of organisations encompass bankruptcy cost, agency theory, and the pecking order theory. These theories are sequentially examined. In 1977, Myers formulated the static trade-off theory. According to Myers (1977), there is indeed an ideal capital structure. A firm that aims to maximise its value will choose an ideal capital structure by carefully considering the advantages and disadvantages of financing through debt. Thus, the corporation is valued by considering the firm's unlevered worth, the present value of the tax shield, and subtracting the present value of bankruptcy and agency charges. The pecking order theory, as articulated by Myers (1984) and Myers and Majluf (1984), posits that firms have a hierarchical preference for financing their investments and that there is no specific optimal debt ratio. The pecking order theory suggests that firms have a hierarchical preference for financing their investments. According to this theory, companies initially fund their requirements using funds generated from within the company, specifically undistributed earnings, where there

is no information imbalance. If additional funds are needed, they then turn to less risky debt. Lastly, they resort to issuing risky external equity to fulfil any remaining capital needs. The order of preferences is determined by the varying costs of finance associated with different sources of funding.

According to the research that was looked over, significant studies have been conducted on the topic of the relationship between firm value and capital structure (Friend and Lang, 1988; Barton et al., 1989; Bos and Fetherston, 1993; Michaels et al., 1999; Booth et al., 2001; Abor, 2005; Mollik, 2005; Bonaccorsi di Patti, 2006; Kyerboach-Coleman, 2007). Despite this, the findings of the studies have been called into question due to the fact that different studies have predicted that the relationship between firm value and capital structure will either have a positive, a negative, or no statistically significant relationship at all. Nevertheless, those association between capital structure and firm's value have not been extensively examined in countries beyond the industrialised ones. Prasad et al. (2001) conducted a comprehensive analysis of empirical studies pertaining to business capital structure. Their findings indicate that the majority of empirical research in this domain mostly focuses on developed countries, whereas there exists a noticeable dearth of investigations concerning developing countries such as India. In addition, there is a lack of methodological discussion in the research literature about short-period samples. Data from cross-sectional studies as well as various regression models have been utilised in order to investigate this association. These investigations, however, have not taken into consideration the effects of time, which results in low statistical power and estimates of parameters. Consequently, the purpose of this study is to evaluate the association between firm value and capital structure in Indian automobile and automobile auxiliary industries by utilising modern approaches such as panel threshold regression analysis. To summarise, there is no universally applicable theory on the choice between debt and equity. Various perspectives have been presented with regards to the selection of finance. This study utilises dynamic panel data regression to analyse the influence of capital structure on the valuation of Indian automobile and automobile auxiliary companies.

3. Research Methodology:

The panel data is utilised for 118 Indian automobile and automobile and ancillaries firms that are listed on the BSE. The analysis encompasses the time period from 2004 to 2020. The data is obtained from the CMIE database. The database encompasses 148 listed firms within the automotive industry sector. 118 firms were chosen for the investigation based on data availability.

3.1. Variable Description:

Variables of the study were categorised into three groups. i.e.

- Capital Structure Variables
- Control Variables
- Dependent Variable

Dependent Variable

The dependent variable in this study is firm's value. In order to assess the worth of the firm, we utilise Tobin's Q ratio as a proxy instead of accounting-based measurements like the return on assets. This choice is made since Tobin's Q ratio considers risk and is less prone to distorting the results compared to other measures such as the return on assets (Lindenberg and Ross, 1981). Tobin's Q is a financial metric that quantifies the relationship between a firm's market value and the book value of its assets.

Capital Structure Variables:

This study employs four distinct metrics to assess capital structure, namely the debt-equity ratio, the long-term debt ratio, the short-term debt ratio, and the total debt ratio. These

variables are more suitable as indicators of capital structure because these ratios offer a more precise assessment of the risk profile associated with leverage and provide a more accurate depiction of previous financing activities (Rajan & Zingales, 1995).

Debt-to-Equity Ratio

The debt-to-equity ratio quantifies the extent to which a firm funds its activities with borrowed money compared to its own capital. To be more precise, it indicates the capacity of shareholders' equity to fully compensate for all outstanding loans in the event of a firm decline. The debt-to-equity ratio is determined in this study by dividing the total liabilities of a corporation by its shareholder equity.

Long-term Debt Ratio

This ratio quantifies the percentage of long-term debt in relation to the total assets of the company. The capital structure variable is seen as significant as it indicates a company's long-term solvency. The long-term debt ratio is utilised as a threshold variable due to its superior representation of the capital structure among all the leverage ratios. The long-term debt ratio is approximated by dividing long-term leverage by total assets.

Short-Term Debt Ratio:

Short-term debt refers to the financial commitment of a company that must be repaid within a single fiscal year. Short-term debt poses many threats to a company's financial and economic well-being. It is crucial to take into account the ratio of short-term debt to equity as a metric for evaluating the composition of a company's capital structure.

Total Debt Ratio

The total debt ratio is a metric that measures the level of leverage employed by a corporation. It provides the proportion of the company's overall assets that are funded by creditors. Put simply, it is the ratio of a company's total debt to its total assets. The majority of scholars consider this proxy to be an indicator of capital structure.

Control Variables:

In this study, the firm's growth is included as a control variable to account for the possibility that the firm's value could be affected by its growth while analysing the impact of capital structure. In this study, we employ firm size, sales growth rate, and profitability as proxy metrics to assess the growth of a firm.

Firm size

Firm size represents the aggregate value of the firm's assets. Trade-off theory suggests that enterprises with substantial assets typically have lower risks of incurring direct bankruptcy expenses associated with debt financing. The anticipated impact of this phenomenon is a favourable influence on both the size and value of the firm. This is because longer-established firms tend to exhibit greater diversification, more consistent cash flow, and reduced chance of bankruptcy. The study employs the natural logarithm of total assets to quantify the size of the firm.

Growth Rate in Sales

The growth rate is employed as a surrogate for the percentage alteration in sales, a measure commonly utilised by numerous studies (Nha et al., 2016; Malinic et al., 2013; Raza et al., 2021; Kasthury & Anandasayanan, 2019). This study forecasts a positive correlation between growth and value due to the fact that a greater growth rate in sales leads to increased profitability, which is directly tied to the firm's value.

Profitability

Profitability refers to a firm's capacity to effectively convert its business operations into financial gains. This study forecasted a favourable influence of profitability on the firm's value due to the tendency for highly profitable enterprises to possess a greater market value. This study assesses profitability through the metric of return on assets (ROA), which quantifies the efficiency of utilising assets to generate money. This proxy is widely employed by numerous researchers (Doan, 2019; Hossain & Ali, 2012; Li & Islam, 2019; Khasnobis & Bhaduri, 2002; Psillaki & Daskalakis, 2009) as an indicator of capital. The firm's profitability is determined by dividing the profits before interest and tax (EBIT) by the total assets.

Table 1: Summary of variables, and measurement of Variables

Variables		Measurement	Expected Relationship for This Study
Dependent Variable	Market Value of Firm	Tobin's Q	
Capital Structure Variables	Debt- Equity Ratio	Long-Term Debt / Share Holders Equity	+Ve
	Long-Term debt ratio	Long-Term Debt / Total Assets	+Ve
	Short Term Debt Ratio	Short-Term Debt / Total Assets	-Ve
	Total Debt Ratio	Total Debt / Total Assets	+Ve
Control Variables	Profitability	Return on Assets	+VE
	Size	Natural Log of Total Assets	+VE
	Growth Rate	Percentage Change in Sales	+VE

Source: Author's own presentation based on literature

3.2. Empirical Model:

The assessment of the influence of the capital structure of the Indian automobile industry on the firm's value relies on many statistical techniques, including summary statistics, covariance analysis, assumption tests, and panel data regression. The theoretical framework involves a comprehensive examination of different capital structure theories, the elements that determine a firm's value, and the extent and direction of the relationship between variables. This analysis is conducted using a typical econometric model. The GMM model is utilised to analyse the influence of capital structure and a company's growth on its market value. The study's findings extend beyond just statistical analysis. The study compares the observed associations with empirical theories on capital structure and suggests practical implications to achieve its main purpose. The model specification provided aims to analyse the influence of existing capital structure factors and control variables on the value of a corporation. The dynamic panel regression model is used when the data exhibit both cross-sectional and time-series dimensions and there is the problem of autocorrelation and heteroskedasticity. The basic model specification behind dynamic panel regression is to include lagged dependent variables as explanatory variables in the regression model. This helps to capture the dynamic relationship between the variables and accounting for potential endogeneity issues. This study used the Generalised Method of Moment (GMM) to address the potential inconsistency caused by the presence of autocorrelation and heteroskedasticity by using a system of equation and instruments to estimate the

parameters, providing more consistent estimates. The basic specification of the dynamic model is as follows:

$$Y_{it} = \beta_1 Y_{it-1} + \beta_2 Y_{it-2} + \beta_3 CSV_{it} + \beta_4 CV_{it} + \mu_{it} + \epsilon_{it}$$

The above-shown model is the specification of difference Generalised Method of Moments (Difference GMM) Where, Y_{it} represents three leverage measures (Tpbins Q ratio) for firm i and in year t and Y_{it-1} and Y_{it-2} are used as first-order lag and second order lag for firm's value (Tobin's Q ratio). CSV_{it} is the vector for the capital structure variables and CV_{it} is the vector for the control variable. μ_{it} represents time-invariant random heterogeneity and ϵ_{it} is the error term of the model.

4. Analysis and Interpretation:

The evaluation of the association between the value of the firm and the capital structure of the Indian automobile and automobile ancillaries sector is based on several statistical analyses: summary statistics, correlation analysis, unit root test, and panel regression analysis.

4.1. Descriptive Statistics:

Before conducting extensive statistical analysis, it is essential to have knowledge of the summary statistics related to the main variables. Table 2 presents a variety of descriptive statistics, such as the maximum, minimum average, and standard deviation, to accomplish this objective. Furthermore, the Jarque-Bera test is utilised to evaluate the normality of important variables. The Q ratio, as defined by Tobin, varies from -0.145 to 27.56. The average and dispersion of this ratio are computed as 1.273 and 1.471, correspondingly. The capital structure variables exhibit a higher amount of volatility, as indicated by their standard deviation. The average values of the control variables, specifically rate, profitability, and size, are 0.116, 0.076, and 2.490, respectively. A p-value of 0.000 obtained from the Jarque-Bera test indicates that all the variables conform to a normal distribution.

Table 2: Descriptive Statistics of Key Variables

	D-E Ratio	L-T D. Ratio	S. T. D. Ratio	T. D. Ratio	G- Rate	Profitability	Size	Tobin's Q
Mean	0.719	0.134	0.118	0.252	0.116	0.076	2.490	1.273
Median	0.208	0.098	0.089	0.234	0.094	0.0715	2.451	0.835
Maximum	309.00	1.484	6.13	6.291	8.041	0.958	4.798	27.56
Minimum	-94.44	0.000	0.000	0.000	-2.27	-1.852	0.505	-0.145
St.Dev.	10.92	0.166	0.217	0.275	0.376	0.120	0.782	1.471
Skewness	23.64	3.444	15.51	8.357	8.838	-2.462	0.374	7.251
Kurtosis	623.87	22.153	358.6	145.86	167.15	42.840	3.111	99.15
Jarqu Bera	32148	34353	10570	1715	2127	13362	47.591	7627
P-Value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Author's own calculation by using E-Views software

4.2. Correlation Matrix:

Table 3 displays the correlation matrix of the key variables within the model. The matrix includes both the correlation values and the associated probability values. Notably, the association between the dependent variable, Tobin's Q, and the long-term debt ratio is found to be both significant and negative, with a p-value of 0.000. In contrast, the correlation between Tobin's Q and the other capital structure variables is deemed insignificant. This correlation outcome underscores the significance of the long-term debt ratio and justifies its use as a threshold variable. Additionally, the relationship between Tobin's Q and both profitability and size is found to be significant and positive. However, the correlation between Tobin's Q and the growth rate in sales is determined to be statistically insignificant.

Table 3: Correlation Matrix of Key Variables

	D-E Ratio	L-T D. Ratio	S. T. D. Ratio	T. D. Ratio	G-Rate	Profitability	Size	Tobin's Q
D-E Ratio	1.00							
L-T D Ratio	-0.002 (0.903)	1.00						
S-T D Ratio	0.018 (0.45)	0.02 (0.382)	1.00					
T. D. Ratio	0.012 (0.59)	0.598 (0.00)	0.813 (0.00)	1.00				
G-Rate	-0.045 (0.052)	0.077 (0.00)	-0.098 (0.00)	-0.033 (0.15)	1.00			
Profitability	-0.046 (0.045)	-0.257 (0.00)	-0.39 (0.00)	-0.462 (0.00)	0.205 (0.00)	1.00		
Size	-0.015 (0.52)	-0.143 (0.000)	-0.213 (0.00)	-0.254 (0.000)	-0.013 (0.571)	0.179 (0.00)	1.00	
Tobin's Q	-0.028 (0.246)	-0.09 (0.00)	0.035 (0.133)	-0.024 (0.29)	0.030 (0.199)	0.285 (0.00)	0.232 (0.000)	1.00

Source: Author's own calculation by using E-Views software

4.3. Test of Stationarity:

Before applying the panel data model, it is essential to evaluate the stationarity of the variables included in the model. Failure to meet stationarity requirements may result in a spurious regression issue, leading to biased parameter estimates. To address this, three panel data unit root tests—the Levin-Lin-Chu test, enhanced Dickey-Fuller test, and Phillip-Peron test—were employed to assess the presence of a group mean panel unit root. The null hypothesis, indicating non-stationarity, was tested against the alternative hypothesis of stationarity for each variable. The results of the panel unit root tests, presented in Table 6.3, indicate that the null hypothesis of non-stationarity for all variables is rejected at a significance level of 1%. This implies that all variables exhibit stationarity at level I (0).

Table 4: Panel Unit-root test of key variables

Variables	Levin, Lin & Chu		Im, Pesaran and Shin W-stat		ADF	
	t statistic	P Value	W stat	P Value	Chi-Sq Stat	P Value
D-E Ratio	-627.410	0.0000	-92.5182	0.0000	494.368	0.0000
L-T D Ratio	-732.355	0.0000	-100.206	0.0000	387.564	0.0000
S-T D Ratio	-6.30421	0.0000	-4.83031	0.0000	377.248	0.0000
T. D. Ratio	-9.94091	0.0000	-5.11400	0.0000	381.241	0.0000
G-Rate	-12.7106	0.0000	-10.2411	0.0000	499.657	0.0000
Profitability	-11.3451	0.0000	-6.06140	0.0000	382.081	0.0000
Size	-13.4215	0.0000	-2.44066	0.0073	356.284	0.0000
Tobin's Q	-4.16033	0.0000	-5.46414	0.0000	346.777	0.0000

Source: Author's own calculation by using E-Views software

4.4. Panel Regression Model:

Table 5 presents regression slope coefficients, standard errors from conventional ordinary least squares (OLS), t-statistics, and P-values for independent variables. A notable positive influence on the firm's market value is observed for the dependent variable's lag of two periods, suggesting the prior market value significantly impacts the current value. The study finds that certain capital structure characteristics, particularly the long-term debt ratio and short-term debt ratio, positively affect the firm's market value, with the short-term debt ratio having a more substantial impact. Conversely, the debt-equity ratio and total debt ratio are found to have adverse effects on the firm's value, with the total debt ratio impact being considerable. Regression analysis indicates a positive impact of the short-term debt ratio on the market value of Indian automobile and auxiliary companies, while the total debt ratio and debt-to-equity ratio have negative effects. Growth rate and profitability coefficients of 0.071 and 1.901, respectively, with p-values of 0.000, signify a statistically significant positive impact on firm value. The business size coefficient of -1.749 is statistically significant and negatively associated with firm value at a 5% significance level. Overall, company augmentation, encompassing profitability and sales growth rate, significantly and positively influences market value, suggesting that an increase in growth pace corresponds to an increase in firm value. The exogeneity of instruments in the model is confirmed through Sargan J statistics with a p-value of 0.376.

Variable	Coefficient	Standard Error	t Statistic	P Value
TOBIN_S_Q(-1)	0.492651	0.001361	362.0446	0.0000
TOBIN_S_Q(-2)	0.204277	0.001530	133.4993	0.0000
D_E_RATIO	-0.000680	0.000797	-0.852997	0.3938
L_T_D_RATIO	0.257508	0.947658	0.271731	0.7859
S_T_D_RATIO	2.620954	0.980718	2.672485	0.0076
T_D_RATIO	-2.275623	0.970718	-2.344268	0.0192
PROFITABILITY	1.901653	0.043965	43.25427	0.0000
SIZE	-1.749111	0.016386	-106.7472	0.0000
G_RATE	0.071091	0.006396	11.11420	0.0000

Effects Specification	S.E. of regression: 1.443119 Sum squared resid: 3223.855 J-statistic: 113.0154 Instrument rank: 118 Prob(J-statistic): 0.376865
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Table 5: Result of Dynamic Panel Regression Model

Source: Author's own calculation by using E-Views software

5. Findings and Suggestions:

1. In the dynamic model, a two-period lag of dependent variables, i.e. Tobin's Q, were used as independent variables, which significantly impacted the value of the firm.
2. In Capital structure variables short-term debt ratio is significant positive in determining the market value of Indian automobile and automobile ancillary firms. Whereas, total debt ratio is significant negative in determining the market value of Indian automobile and ancillaries firms.
3. Moreover, long-term debt ratio and debt-to equity ratio have found insignificant in determining the value of the firm.
4. The outcomes of the model suggest that the inclusion of the firm's growth as a control variable has been found to have a significant effect on the market value of Indian automobile and automobile auxiliary firms.
5. To be more precise, the findings indicate that growth in sales and profitability exhibit a statistically significant impact on the value of the firm, while the business value does demonstrate a statistically significant negative relationship.

6. Conclusion:

The objective of this study is to make valuable additions to the current body of knowledge in multiple ways. Firstly, this study contributes to the understanding of the elements that influence the value of Indian automobile and automobile auxiliary industries over a significant period of 17 years. It is crucial to comprehend the distinct aspects that impact business value due to the significant period of gestation and funding structure being primary considerations in these sectors. Most of the investigations are conducted in industrialised nations. Furthermore, this study is among the initial empirical examinations to employ dynamic panel regression analysis within the Indian automobile industry. According to the study's findings, we propose many policy initiatives for Indian automobile and auxiliary companies. The actual data support the existence of a non-linear relationship and identify the dynamic impact when the effectiveness of debt changes, using the dynamic panel regression model. Therefore, it is impractical for Indian automobile and vehicle ancillary industries to depend exclusively on debt financing as the main source of funding for their capital structure. Financial decision-makers must meticulously examine the optimal blend of debt and equity when determining the capital structure. An excessive dependence on debt financing can have a detrimental effect on the market value of Indian automobile and related sectors. In addition to capital structure finance, size and profitability are two more aspects that impact a corporation's market value. Hence, it is crucial to consider these distinct attributes related to the organisation when developing the capital structure.

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