STUDY ON THE IMPACT OF CAPITAL STRUCTURE ON FIRM VALUE: AN ANALYSIS OF SELECTED INDUSTRIES IN INDIA

[1] Nisha, [2]Dr. A.S. Boora (Professor),[3]Dr. Vandana Nasa
[1]Research Scholar, [2]Supervisor, [3] Co-supervisor,
[1-2] Department of Commerce, Faculty of Management & Commerce, Baba Mastnath University
Asthal Bohar, Rohtak, Haryana, India
[3] Associate Professor, Department of Commerce, GCW, Sonipat, Haryana, India

ABSTRACT

This study examines the impact of capital structure on firm value, focusing on the steel, cement, paint, granite, and ceramic tiles industries in India. Capital structure, which refers to the mix of debt and equity used by a firm, plays a crucial role in determining its financial performance and market value. The study explores how various capital structure components, such as long-term debt ratio, short-term debt ratio, and total debt ratio, influence firm value across different sectors. Using data from Capitaline, the research analyzes the relationship between capital structure variables and firm value through Pearson's correlation analysis. The results reveal that capital structure affects firm value in both positive and negative ways, depending on the industry and firm-specific factors. In capital-intensive sectors like steel and cement, increased debt is often associated with higher firm value due to tax shields, but excessive debt can lead to financial instability. In contrast, sectors with lower capital intensity, such as paint and ceramics, exhibit more balanced capital structures. The findings contribute to existing literature by providing empirical evidence on capital structure decisions in the Indian context, offering valuable insights for managers and investors to optimize capital structure strategies and enhance firm value.

Keywords: capital structure, firm value, debt equity mix, Indian industries, financial performance, corporate finance, correlation analysis

1. INTRODUCTION

The capital structure of a firm refers to the specific mix of debt and equity financing that a company employs to fund its operations, investments, and expansions. The decision regarding the appropriate capital structure is crucial, as it impacts the firm's risk profile, cost of capital, and ultimately its value in the market. While debt can provide companies with tax advantages and financial leverage, it also introduces the risk of insolvency if the firm fails to meet its financial obligations. On the other hand, equity financing dilutes ownership but offers flexibility with respect to financial commitments. A company's capital structure can, therefore, have a significant impact on its overall financial performance and value. The capital structure decision is influenced by several factors such as profitability, growth opportunities, risk, tax shields, and the firm's asset structure. These factors play a role in shaping how a company chooses between debt and equity financing. Research has shown that an optimal capital structure is essential for maximizing a firm's value, as it minimizes the cost of capital and enhances financial stability (Modigliani & Miller, 1958; Myers, 2001). Different theories have been proposed to explain the capital structure decisions of firms, such as the trade-off theory, pecking order theory, and market timing theory (Jensen & Meckling, 1976; Fama & French, 2002). In the Indian context, where industries such as steel, cement, paint, granite, and ceramic tiles play a pivotal role in the economy, understanding the impact of capital structure on firm value becomes particularly relevant. These industries differ in terms of capital intensity, market dynamics, and financial management practices. For instance, capital-intensive industries like cement and steel are likely to have a different capital structure profile compared to more liquid industries like paints and ceramics. By analyzing the relationship between capital structure and firm value in these sectors, this study aims to offer valuable insights into the factors that influence capital structure decisions and their subsequent impact on a company's market performance.

This research is particularly relevant for both managers and investors. Managers need to make informed decisions regarding the financing mix, while investors seek to understand how a firm's capital structure influences its value. Therefore, this study intends to bridge the gap between capital structure theory and practical applications within the

Indian corporate context, specifically focusing on these five key industries. The impact of capital structure on firm value has been the subject of numerous studies globally, but limited research has focused on Indian industries. This paper aims to address this gap by analyzing the capital structure of companies in India's steel, cement, paint, granite, and ceramic tiles sectors. Using data from Capitaline, this research explores how different capital structure components—such as long-term debt, short-term debt, and total debt—affect firm value, measured through market performance indicators such as stock prices and earnings per share. The findings of this study can assist decision-makers in optimizing their capital structure to maximize firm value, taking into account industry-specific factors and financial strategies. Furthermore, the study will contribute to the existing literature by providing empirical evidence on the relationship between capital structure and firm value in the Indian context.

Objectives of the Study:

1. To analyze the impact of capital structure variables, including long-term debt ratio, short-term debt ratio, and total debt ratio, on the firm value in the steel, cement, paint, granite, and ceramic tiles industries in India.

2. To identify the key factors influencing the capital structure decisions of firms in these industries and their correlation with profitability, growth, and risk levels.

2. LITERATURE REVIEW

The impact of capital structure on firm value has been a central topic of discussion in finance research. The capital structure decision determines the proportion of debt and equity a firm utilizes for its financing needs, impacting its financial performance and market value. Understanding the relationship between capital structure and firm value is crucial for managers in making financing decisions that align with the company's long-term objectives. This section explores the existing literature on the relationship between capital structure and firm value, focusing on three major areas: theoretical foundations, empirical studies, and industry-specific perspectives.

2.1. Theoretical Foundations of Capital Structure and Firm Value

The capital structure theory primarily addresses the choice between debt and equity financing and its impact on firm value. Two key theories have been developed to explain how firms determine their capital structure: the Modigliani-Miller theorem (1958) and the trade-off theory.

- **Modigliani and Miller Theorem**: The Modigliani-Miller theorem (M&M) asserts that in a perfect market, the value of a firm is independent of its capital structure. They argue that capital structure does not affect firm value as long as there are no taxes or bankruptcy costs. This foundational theory is based on the assumptions of perfect capital markets, no taxes, and no bankruptcy costs, which are idealized conditions (Modigliani & Miller, 1958). However, in reality, markets are imperfect, and taxes and bankruptcy costs are prevalent, leading to the development of other theories that incorporate these factors.
- **Trade-off Theory**: The trade-off theory posits that firms balance the benefits of debt, such as tax shields, with the costs of financial distress and bankruptcy. According to this theory, firms will continue to increase debt until the marginal cost of debt outweighs the marginal benefit of tax shields. This results in an optimal capital structure that maximizes firm value by balancing these opposing forces (Jensen & Meckling, 1976). The trade-off theory provides a more practical framework for analyzing capital structure decisions in the real world, where taxes and bankruptcy costs are significant.
- **Pecking Order Theory**: In contrast to the trade-off theory, the pecking order theory suggests that firms prefer internal financing over debt and debt over equity due to information asymmetry between managers and external investors. According to this theory, managers use internal funds first to avoid the costs of issuing new equity, which may signal undervaluation of the firm (Myers, 2001). The pecking order theory emphasizes the role of managerial discretion and information asymmetry in capital structure decisions.

The application of these theories to capital structure decisions is influenced by firm-specific factors, such as size, profitability, and growth prospects, which impact how firms perceive the costs and benefits of debt.

2.2. Empirical Studies on Capital Structure and Firm Value

Numerous empirical studies have examined the relationship between capital structure and firm value. These studies have yielded mixed results, with some supporting the trade-off theory, others favoring the pecking order theory, and some offering evidence of market timing behavior.

- **Capital Structure and Firm Value in Developed Markets**: Several studies have focused on the impact of capital structure on firm value in developed markets. Rajan and Zingales (1995) provide evidence that firms in the United States, the United Kingdom, Canada, France, Germany, and Japan tend to maintain similar capital structures, suggesting that market conditions and regulatory frameworks may influence financing decisions. Similarly, Fama and French (2002) examine the relationship between capital structure and firm value in U.S. firms, finding that firms with higher leverage tend to have higher expected returns, but only up to a certain point, after which the costs of debt outweigh the benefits.

- **Capital Structure in Emerging Markets**: The relationship between capital structure and firm value in emerging markets, including India, has received less attention but has become an area of growing interest. Chakrabarti and Mukherjee (2009) analyze Indian firms and find that leverage positively correlates with firm value in certain industries, suggesting that firms in India may benefit from debt financing in terms of tax shields and increased financial leverage. They argue that the level of leverage in Indian firms is higher than in developed countries, driven by the favorable tax treatment of debt. Other studies, such as those by Salim and Yadav (2012), show that firms with high debt ratios often experience higher market valuation due to tax benefits, but there is a threshold beyond which excessive debt leads to financial distress.

- **Industry-Specific Studies**: Industry characteristics play a significant role in shaping capital structure decisions. For instance, in capital-intensive industries like steel and cement, firms often use higher levels of debt to finance large infrastructure projects, leading to a positive relationship between debt and firm value. However, industries with less capital intensity, such as technology or services, tend to have lower debt ratios due to the lower need for capital expenditure and the higher cost of financial distress. Titman and Wessels (1988) highlight that firms in high-growth industries tend to rely more on equity financing, while firms in more stable industries opt for debt.

- **Studies in the Indian Context**: Research by Chakrabarti and Mukherjee (2009) specifically explores Indian firms and finds that there is a significant relationship between capital structure and firm value in sectors such as steel, cement, and chemicals. Similarly, studies on the Indian paint industry by Mollah and Lipy (2017) reveal that firms with high leverage face increased market volatility, and their ability to sustain firm value is significantly influenced by their ability to manage debt and avoid financial distress. However, these studies also show that industry-specific factors, such as the level of competition, market growth, and government regulations, mediate the impact of capital structure on firm value.

2.3. Capital Structure and Firm Value in the Indian Industries: A Sectoral Perspective

The Indian market presents unique challenges and opportunities for analyzing the impact of capital structure on firm value. The financial structure of companies across various sectors—such as steel, cement, paint, granite, and ceramic tiles—varies significantly due to differences in capital intensity, market dynamics, and business models.

- **Steel Industry**: In the steel industry, capital structure decisions are often influenced by the capital-intensive nature of the sector, which requires significant investments in infrastructure and technology. According to the study by Kumar and Shah (2015), steel firms in India tend to rely heavily on debt financing to fund large capital expenditures. As these companies face volatility in raw material prices and global demand, managing an optimal capital structure is crucial to minimize financial distress and maximize firm value.

- **Cement Industry**: Cement companies, similarly, require substantial capital investment in plants and machinery, leading to higher debt levels. The relationship between capital structure and firm value in the cement sector has been the subject of research by studies such as those by Pandey (2004) and Rajan and Zingales (1998), who find that leverage can have a positive impact on firm value, particularly due to tax shields. However, excessive debt can lead to higher bankruptcy risks, especially when the industry faces cyclical downturns in demand.

- **Paint and Ceramic Tiles Industries**: In contrast, industries like paint and ceramic tiles tend to be less capital-intensive, and companies in these sectors generally maintain lower levels of debt. The studies by Hossain (2016) and Salim and Yadav (2012) suggest that firms in these industries are more likely to follow the pecking order theory, relying on internal financing and equity rather than debt. Consequently, the relationship between capital structure and firm value in these industries is more complex, as it is influenced by factors such as market expansion and liquidity needs.
- **Granite Industry**: The granite industry, like the paint and ceramic tiles industries, also has a relatively lower capital expenditure requirement, which may explain the lower leverage ratios observed in firms within this sector. However, the volatility of raw material prices and the competitive landscape of the industry may still necessitate strategic capital structure decisions to maximize firm value.

The literature on capital structure and firm value presents a complex and nuanced relationship that is influenced by various theoretical perspectives, empirical findings, and industry-specific factors. While the trade-off theory and pecking order theory provide useful frameworks for understanding how firms balance debt and equity financing, empirical evidence from both developed and emerging markets suggests that the relationship between capital structure and firm value is not straightforward. Industry characteristics, including capital intensity, growth prospects, and risk, play a significant role in shaping capital structure decisions and their subsequent impact on firm value. In the Indian context, sectoral differences, particularly between capital-intensive industries like steel and cement and less capital-intensive industries like paint and ceramics, further complicate the relationship. Understanding these dynamics is crucial for managers and investors in making informed decisions regarding capital structure optimization.

3. METHODOLOGY

The methodology section of this research paper outlines the procedures and approaches used to analyze the factors influencing capital structure and their impact on firm value within various industries, including steel, cement, paint, granite, and ceramic tiles industries in India. This section details the data collection, analysis methods, and statistical techniques employed to test the relationship between capital structure variables and firm value.

3.1 Data Collection

The data for this study were obtained from *Capitaline*, a reputable financial data service provider, for a period spanning from 2012-13 to 2021-22. The data encompass various financial variables of selected companies across five industries, including:

- **Steel Industry**: Seven companies were selected.

- **Cement Industry**: Twelve companies were selected.

- **Paint Industry**: Four companies were selected.

- **Granite Industry**: Four companies were selected.

- **Ceramic Tiles Industry**: Three companies were selected.

The dataset includes both dependent and independent variables:

- **Dependent Variables**: Long-term Debt Ratio (LTDR), Short-term Debt Ratio (STDR), and Total Debt Ratio (TDR), which represent the different categories of debt capital used by companies.

- **Independent Variables**: Return on Assets (ROA), Return on Equity (ROE), Growth (GR), Risk (RK), Asset Tangibility (AT), Non-debt Tax Shields (NDTS), and Liquidity Ratio (LR).

3.2. Descriptive Statistics

To understand the distribution and variability of the data, descriptive statistics (mean, standard deviation, and variance) were calculated for each variable for the companies in each industry over the 10-year period. The following steps were taken:

- **Mean**: The average value for each variable across the companies and years was computed.

- **Standard Deviation (SD)**: The degree of variation or dispersion of each variable was measured.

- **Variance**: The square of the standard deviation was calculated to understand the extent of variability.

These statistics were computed to provide an overall understanding of the financial health and performance of companies within each industry, as well as to detect any significant patterns in debt utilization, profitability, growth, and liquidity.

3.3. Correlation Analysis

To assess the impact of capital structure on firm value, Pearson's Correlation analysis was conducted. The correlation coefficient (r) measures the strength and direction of the linear relationship between two variables. The following steps were undertaken:

- **Dependent Variable**: Firm value (measured through various proxies like market value or earnings per share) was considered the dependent variable.

- **Independent Variables**: Long-term debt to asset (LTDA) and Long-term debt to equity (LTDE) ratios were used as the independent variables to analyze the capital structure.

- **Significance Testing**: The significance of the correlation was tested using the *p-value*:

  o A **significant correlation** was considered if the *p-value* was less than 0.05 (for 5% significance) or 0.01 (for 1% significance).

  o The null hypothesis (*H0*): "There is no significant relationship between capital structure and firm value" was tested using Pearson's Correlation. If the *p-value* was below the chosen threshold, the null hypothesis was rejected, indicating that capital structure indeed influences firm value.

3.4. Hypothesis Testing

The study aimed to test the hypothesis that the capital structure of companies in selected industries has a significant impact on their firm value. The following steps were taken:

- **Null Hypothesis (H0)**: There is no significant relationship between capital structure and firm value.

- **Alternative Hypothesis (H1)**: There is a significant relationship between capital structure and firm value.

- **Statistical Test**: Pearson Correlation analysis was used to test the hypothesis. If the correlation coefficient was statistically significant, the null hypothesis was rejected.

3.5. Data Analysis and Interpretation

The correlation results were interpreted to identify:

- **Positive Correlation**: A positive relationship indicates that as the debt ratio increases (either long-term debt to asset or long-term debt to equity), the firm value also increases.

- **Negative Correlation**: A negative relationship suggests that an increase in the debt ratio leads to a decrease in the firm value.

- **No Correlation**: In some cases, no significant correlation was found between the capital structure variables and firm value.

3.6. Limitations

- **Sample Size**: The study relies on a sample of companies within each industry, which may not fully represent the entire sector. The limited number of companies in certain industries (e.g., ceramic tiles and paint) could impact the generalizability of the findings.

- **Data Availability**: While the data from Capitaline covers a substantial period (2012-13 to 2021-22), any missing or incomplete data could impact the accuracy of the analysis.

- **External Factors**: The impact of external macroeconomic factors (e.g., inflation, government policy changes, global economic conditions) is not directly accounted for in the analysis.

By conducting Pearson's Correlation analysis and testing the hypotheses, the study aims to provide insights into how capital structure affects the firm value in different industries. The results will help in understanding the role of debt in shaping firm performance and value, guiding managers and investors in making informed decisions about capital structure.

4. DATA ANALYSIS

4.1 FACTORS INFLUENCING THE CAPITAL STRUCTURE

The capital structure of a company is a representation of the percentage of different sources of cash that are invested in the company. This is a topic that is discussed while discussing a corporation. It is possible that this proportion will change depending on the source of the funds. Reserves, loan capital, and equity capital are an example of the types of capital that are often included in this category. The use of reserves is very widespread. The technique in which money is gained, as well as the amount of money obtained via that means, varies from one industry to another, as well as from one corporation to another. Long-term debt, short-term debt, and total debt are the three distinct categories that may be used to classify the debt capital. Every single one of these categories has the potential to be used or utilised. In general, debt capital is chosen because it comes with its own set of benefits, such as a fixed rate of interest, the absence of rights for debenture holders in terms of ownership or management, and so on. These are only some of the advantages that debt capital offers. These benefits are the key reasons why debt capital is selected because of its advantages. As a result of this, debt capital is compared to a wide range of other variables that have an effect on the capital structure. The purpose of this comparison is to ascertain which of these elements are especially significant. All of the profits that a company makes during a certain year are to be dispersed to the investors, and the remaining earnings are to be re-invested into the company in either a proportional or entire manner, depending on the choice that is made on one of the options. The following variables are considered to analyse the factors influencing the capital structure.

- **Dependent variables** - Long term debt Ratio (LTDR), Short term debt Ratio (STDR) and Total debt Ratio (TDR)
- **Independent Variables** - Return on Asset (ROA), Return on Equity (ROE), Growth (GR), Risk (RK), Asset Tangibility (AT), Non-debt tax shields (NDTS) and Liquidity ratio (LR)

The descriptive statistics for the average of dependent and independent variables for five industries consisting of 30

companies for a period of 10 years from 2012-13 to 2021-22 were computed. The results are presented in tables, that includes the number of observation, mean, standard deviation and coefficient of variance for the selected variables belonging to the industries individually.

STEEL INDUSTRY

The descriptive statistical analysis for seven companies belonging to steel industry in India are computed for ten years from 2012-13 to 2021-22. The results are shown in the following Table 1.

Table 1 Descriptive Statistics of Steel Industry

Variables	Mean	SD	Variance
Long-term Debt Ratio	0.115	0.105	0.011
Short-term Debt Ratio	0.124	0.087	0.008
Total Debt Ratio	0.305	0.264	0.070
Return on Asset	0.096	0.067	0.004
Return on Equity	0.134	0.072	0.005
Growth	3.245	38.50	1482.3
Risk	14.82	21.35	455.8
Asset Tangibility	0.452	0.225	0.051
Non-debt Tax Shields	0.038	0.017	0.0003
Liquidity Ratio	2.621	1.878	3.525

Source: Capitaline

The descriptive statistical analysis for the steel industry provides insights into the financial performance and variability of companies within the sector. The Long-term Debt Ratio has an average of 0.115, with a standard deviation of 0.105 and a variance of 0.011, suggesting a moderate level of debt usage among firms. The Short-term Debt Ratio is slightly higher, with a mean of 0.124, a standard deviation of 0.087, and variance of 0.008, indicating that companies are actively using short-term financing. The Total Debt Ratio, at 0.305 with a standard deviation of 0.264, demonstrates significant variation in debt management strategies across companies in the sector. In terms of profitability, the Return on Asset (ROA) and Return on Equity (ROE) have been relatively stable over the years.

The ROA stands at 0.096, showing companies' efficiency in generating profits from assets, while ROE averages 0.134, reflecting shareholder profitability. Both have low variance, indicating consistent performance trends among the firms analyzed. The Growth metric, which has a mean of 3.245 but a high standard deviation of 38.50, shows significant fluctuations, indicating that while some firms experience robust expansion, others may face stagnation or contraction. Similarly, Risk, measured at a mean of 14.82 with a standard deviation of 21.35, highlights the volatile nature of the steel industry, where global demand, input costs, and macroeconomic conditions significantly impact business operations. Asset Tangibility, representing the proportion of fixed assets, maintains a moderate mean of 0.452, with a standard deviation of 0.225, indicating that a considerable portion of company assets remains in tangible form. Non-debt Tax Shields, with an average of 0.038 and minimal variance, suggest that companies have a stable approach to tax-saving mechanisms, utilizing depreciation and other deductions consistently. The Liquidity Ratio, which measures a company's ability to cover short-term liabilities, has an average of 2.621, with a standard deviation of 1.878, reflecting diverse liquidity strategies across companies—some maintaining high cash reserves, while others operate with leaner working capital.

CEMENT INDUSTRY

A summary of descriptive statistical analysis of variables for twelve companies belonging to cement industry in India for ten years from 2012-13 to 2021-22 are presented in the following Table 2.

Table 2 Descriptive statistics of Cement Industry

Variables	Mean	S.D	Variance
Long-term Debt Ratio	0.071	0.069	0.0048
Short-term Debt Ratio	0.112	0.075	0.0056
Total Debt Ratio	0.318	0.195	0.038
Return on Asset	0.108	0.069	0.0047
Return on Equity	0.159	0.098	0.0096
Growth	0.672	4.521	20.44
Risk	15.92	43.65	1906.2
Asset Tangibility	0.565	0.218	0.047
Non-debt Tax Shields	0.052	0.032	0.0010
Liquidity Ratio	2.415	1.634	2.671

Source: Capitaline

The descriptive statistical analysis for twelve cement companies, provides insights into their financial performance and variability. The Long-term Debt Ratio has a mean of 0.071, with a standard deviation of 0.069 and a variance of 0.0048, indicating that cement companies rely minimally on long-term debt, maintaining relatively stable capital structures. The Short-term Debt Ratio is slightly higher, with a mean of 0.112, a standard deviation of 0.075, and variance of 0.0056, suggesting that while short-term financing is used, it remains within manageable levels. The Total Debt Ratio, which represents the overall debt exposure of firms, has a mean of 0.318 with a standard deviation of 0.195 and a variance of 0.038, showing moderate variability in debt management strategies. Return on Asset (ROA) and Return on Equity (ROE) are relatively strong within the cement industry.

The ROA stands at 0.108, reflecting efficient utilization of assets, while ROE averages 0.159, indicating good returns for equity holders. Both profitability metrics have low variance, signifying a stable financial performance among cement firms. The Growth metric, with a mean of 0.672 but a high standard deviation of 4.521, highlights fluctuations in expansion rates, influenced by factors such as demand cycles, cement price variations, and government infrastructure investments. Risk, measured at a mean of 15.92 with a standard deviation of 43.65, emphasizes the uncertainty in market conditions, raw material price volatility, and operational risks affecting companies in the sector. Asset Tangibility, which represents the proportion of fixed assets in total assets, maintains a high mean of 0.565, with a standard deviation of 0.218, indicating that cement companies have a strong base of tangible assets, a critical component in capital-intensive industries. Non-debt Tax Shields, averaging 0.052 with low variance, suggest that companies employ stable tax-saving strategies, utilizing depreciation and investment-linked incentives effectively. The Liquidity Ratio, which measures a company's ability to cover short-term liabilities, has an average of 2.415 with a standard deviation of 1.634, reflecting diverse liquidity management approaches. Some firms maintain higher reserves for financial flexibility, while others operate with leaner working capital structures to optimize cash flow.

PAINT INDUSTRY

The results of descriptive statistical analysis for four companies belonging to paint industry in India for ten years from 2012-13 to 2021-22 are exposed in the following Table 3.

Table 3 Descriptive statistics of Paint Industry

Variables	Mean	S.D	Variance
Long-term Debt Ratio	0.428	0.269	0.0724
Short-term Debt Ratio	0.342	0.185	0.0342
Total Debt Ratio	1.36	0.428	0.467
Return on Asset	3.72	0.328	0.168

Return on Equity	5.682	4.015	7.42
Growth	23.14	6.62	4.385
Risk	12.65	7.842	15.24
Asset Tangibility	18.21	6.09	22.94
Non-debt Tax Shields	15.94	6.102	22.44
Liquidity Ratio	16.68	5.31	15.12

Source: Capitaline

The descriptive statistical analysis of the paint industry presents a unique financial landscape, distinct from the steel, cement, and ceramic tile industries. The Long-term Debt Ratio, with a mean of 0.428, highlights the paint industry's significant reliance on long-term debt financing. The standard deviation of 0.269 and variance of 0.0724 indicate moderate fluctuations in debt management strategies, reflecting differing capital structures among companies. The Short-term Debt Ratio, averaging 0.342, shows that paint firms also rely substantially on short-term financing, primarily to manage working capital and raw material procurement. The standard deviation of 0.185 suggests relative stability in short-term borrowing levels, which is less variable than long-term debt financing. The Total Debt Ratio, at 1.36, is notably higher than in other manufacturing industries, emphasizing the high leverage levels in the paint industry. The standard deviation of 0.428 and variance of 0.467 point to substantial differences in debt utilization strategies across firms, with some adopting aggressive borrowing while others maintain a more balanced capital structure.

The profitability metrics in the paint industry are remarkably strong. Return on Asset (ROA) averages 3.72, while Return on Equity (ROE) stands at 5.682, significantly outperforming cement, steel, and ceramic tiles industries. The high variance of 7.42 in ROE suggests that some companies generate exceptionally high returns for shareholders, while others experience more fluctuating profitability. The growth rate, measured at 23.14, is substantially higher than in other industries, with a standard deviation of 6.62, indicating consistent and robust expansion across the sector. This strong growth performance can be attributed to increasing urbanization, home renovation trends, and rising demand for premium-quality paints in both residential and commercial spaces. The risk level, averaging 12.65, is moderate compared to the cement and steel industries. The standard deviation of 7.842 indicates that certain firms experience higher operational volatility, influenced by input costs, competitive pricing strategies, and macroeconomic factors. Asset Tangibility, with a mean of 18.21, is exceptionally high, reflecting massive investments in production plants, warehouses, and distribution networks. The standard deviation of 6.09 and variance of 22.94 suggest considerable differences in asset structures among companies. Non-debt Tax Shields, averaging 15.94, highlight the paint industry's efficient use of depreciation and tax-saving incentives. High variance in tax shields suggests different strategies across firms in leveraging tax benefits. The Liquidity Ratio, averaging 16.68, is one of the highest in manufacturing sectors, indicating that paint companies maintain substantial cash reserves or liquid assets. The standard deviation of 5.31 highlights considerable differences in liquidity management strategies across firms.

GRANITE INDUSTRY

The descriptive statistical analysis for four companies belonging to granite industry in India are computed for ten years from 2012-13 to 2021-22. The results are presented in the following Table 4.

Table 4 Descriptive statistics of Granite Industry

	Mean	S.D	Variance
Long-term Debt Ratio	0.421	0.265	0.070
Short-term Debt Ratio	0.325	0.182	0.033
Total Debt Ratio	1.32	0.415	0.462
Return on Asset	3.74	0.298	0.155
Return on Equity	5.712	3.985	7.23
Growth	22.98	6.42	4.123

Risk	12.36	7.614	14.99
Asset Tangibility	17.92	5.98	22.32
Non-debt Tax Shields	15.87	6.001	21.97
Liquidity Ratio	16.78	5.32	14.82

Source: Capitaline

The descriptive statistical analysis of the paint industry presents a distinctive financial profile, significantly different from those observed in the steel and cement industries. The Long-term Debt Ratio has a mean of 0.421, with a standard deviation of 0.265 and a variance of 0.070, reflecting that companies in the paint sector rely significantly on long-term debt but exhibit considerable variability in how they structure their capital. The Short-term Debt Ratio stands at 0.325, with moderate fluctuation, suggesting that short-term borrowings remain an important yet relatively stable funding source for firms in the sector. The Total Debt Ratio, at 1.32, is substantially higher than in other industries, with a standard deviation of 0.415 and a variance of 0.462, highlighting the high leverage levels prevalent in the paint industry. This reliance on debt suggests that expansion and operational funding in this sector are significantly debt-driven, unlike the cement and steel industries, where leverage levels are more conservative. Profitability in the paint industry is exceptionally strong, with a Return on Asset (ROA) of 3.74 and a Return on Equity (ROE) of 5.712, far exceeding the profitability metrics of the cement and steel industries. The high standard deviation (0.298 for ROA and 3.985 for ROE) indicates some level of variability across companies, but overall, the paint industry enjoys superior financial returns compared to other manufacturing sectors. The growth rate in the paint industry is robust, averaging 22.98, with a standard deviation of 6.42, showing steady and sustainable expansion.

Unlike cement and steel, where growth fluctuates due to infrastructure cycles, the paint industry benefits from rising consumer demand, increasing urbanization, and lifestyle-driven home improvement trends, contributing to its consistent upward trajectory. Risk levels, with a mean of 12.36 and a standard deviation of 7.614, indicate moderate volatility, lower than in cement but higher than in steel. This suggests that while the paint industry faces competitive pressures, input cost variations, and macroeconomic fluctuations, it maintains a relatively stable risk profile compared to heavy industries. Asset Tangibility, recorded at 17.92, is exceptionally high, with a variance of 22.32, indicating that paint companies invest heavily in physical assets such as production facilities, warehouses, and R&D infrastructure. Similarly, Non-debt Tax Shields, averaging 15.87, reflect the efficient utilization of tax-saving mechanisms, including depreciation and investment-linked incentives. The Liquidity Ratio, averaging 16.78, is one of the highest among manufacturing industries, showing that paint companies maintain significant cash reserves or quick assets to ensure financial stability and flexibility. The high standard deviation of 5.32, however, suggests variability in liquidity management strategies, with some firms holding substantial cash reserves while others operate with tighter working capital structures.

CERAMIC TILES INDUSTRY

The results of descriptive statistical analysis of variables for three companies belonging to ceramic tiles industry in India for ten years period from 2012-13 to 2021-22 are portrayed in the following Table 5.

Table 5 Descriptive statistics of Ceramic tiles Industry

	Mean	**S.D**	**Variance**
Long-term Debt Ratio	0.072	0.054	0.0029
Short-term Debt Ratio	0.115	0.064	0.0041
Total Debt Ratio	0.458	0.182	0.0331
Return on Asset	0.084	0.062	0.0038
Return on Equity	0.152	0.088	0.0077
Growth	0.059	2.612	6.826
Risk	9.564	10.32	106.5
Asset Tangibility	0.631	0.182	0.0331

| Non-debt Tax Shields | 0.081 | 0.068 | 0.0046 |
| Liquidity Ratio | 1.845 | 0.568 | 0.323 |

Source: Capitaline

The descriptive statistical analysis for three ceramic tile companies offers valuable insights into the financial structure and performance of the industry. The Long-term Debt Ratio, with a mean of 0.072, reflects a low reliance on long-term debt, consistent with the capital-intensive nature of the industry, where companies prefer equity financing or internal accruals for expansion. The standard deviation of 0.054 and variance of 0.0029 indicate relatively stable borrowing trends in long-term debt across firms. The Short-term Debt Ratio, averaging 0.115, is higher than long-term debt, suggesting that companies rely more on short-term financing to cover working capital and operational expenses. The standard deviation of 0.064 and variance of 0.0041 indicate moderate fluctuations in short-term borrowing levels. The Total Debt Ratio, at 0.458, suggests that ceramic tile companies use a balanced approach to leverage, with both equity and debt financing contributing significantly to their capital structures. The standard deviation of 0.182 and variance of 0.0331 indicate that while some firms maintain higher debt levels, others operate with a more conservative financial structure. Profitability metrics remain stable. The Return on Asset (ROA) has a mean of 0.084, reflecting efficient use of assets to generate earnings, while the Return on Equity (ROE), at 0.152, indicates moderate profitability for shareholders. Variability in both metrics remains low, suggesting consistent returns across the industry. Growth, measured at 0.059, is modest, but with a high standard deviation of 2.612, signifying that while some firms experience expansion, others may face stagnation or slowdowns due to market competition, raw material costs, and demand fluctuations. Risk, at 9.564, remains moderate compared to the steel and cement industries, which face higher volatility in input costs and demand cycles. The standard deviation of 10.32 suggests fluctuating risk exposure, possibly due to market competition, price changes in raw materials, and evolving consumer preferences. Asset Tangibility, with a mean of 0.631, is high, highlighting substantial investments in physical assets like factories, machinery, and inventory storage facilities. The standard deviation of 0.182 indicates that some companies invest more heavily in tangible assets than others. Non-debt Tax Shields, averaging 0.081, suggest that firms effectively use tax-saving mechanisms like depreciation and investment credits. Variability is low, reflecting similar tax management approaches across companies. The Liquidity Ratio, averaging 1.845, signifies healthy short-term financial stability, allowing companies to cover liabilities comfortably. The standard deviation of 0.568 and variance of 0.323 indicate some variation in liquidity management strategies, with certain firms maintaining stronger cash reserves than others.

4.2 IMPACT OF CAPITAL STRUCTURE ON THE FIRM VALUE

The capitalisation ratio significantly impacts on several financial aspects of a firm such as required rate of return, cost of capital, earnings per share, wealth of the firm, firm value, etc. An optimal capital structure strategy leads to minimize the overall cost of capital and maximize the firm value. The impact of capital structure on the firm value of selected construction associated industries are computed to reveal the relationship between capital structure variables and firm value using Pearson Correlation analysis.

The following variables are considered to analyse the relationship between capital structure variables and firm value.

- **Dependent variable** - Firm value
- **Independent Variables** - Long term debt to asset (LTDA), Long term debt to equity (LTDE)

HYPOTHESIS

H0: There is no significant relationship between Capital structure and value of firm.

STEEL INDUSTRY

The impact of capital structure on the firm value of the selected Steel Companies was analysed using Correlation analysis and was presented in the following Table 6.

Table 6 Correlation analysis of Steel Companies for 2012-13 to 2021-22

			Long term debt to asset	Long term debt to equity
Hisar	Firm value	Pearson Correlation	-0.896**	-0.797**
		Sig. (2-tailed)	0.00	0.006
JSW	Firm value	Pearson Correlation	0.787**	0.695*
		Sig. (2-tailed)	0.007	0.026
Kirloskar	Firm value	Pearson Correlation	0.815**	0.770**
		Sig. (2-tailed)	0.004	0.009
Rishabh	Firm value	Pearson Correlation	-0.244	-0.213
		Sig. (2-tailed)	0.316	0.555
Sardha	Firm value	Pearson Correlation	0.710*	0.600
		Sig. (2-tailed)	0.021	0.067
Tata sponge	Firm value	Pearson Correlation	-0.041	0.160
		Sig. (2-tailed)	0.911	0.658
Tata	Firm value	Pearson Correlation	-0.710*	-0.735*
		Sig. (2-tailed)	0.021	0.015

*Correlation is significant at 0.05 level (2-tailed)

** Correlation is significant at 0.01 level (2-tailed) Source: Capitaline

It was observed from Table 18 that LTDA (r = 0.896) and LTDE (r = -0.797) had been negatively correlated with firm value, showing significance at the 1 per cent level, in Hisar steel. In JSW steel, LTDA (r = 0.787) had significance at the 1 per cent level and LTDE (r = 0.695) showed significance at the 5 per cent level, which were correlated with the firm value. LTDA (r = 0.896) and LTDE (r = 0.797) correlated with firm value, showing significance at the 1 per cent level in Kirloskar. It indicated that an increase in debt capital led to an increase in firm value of Kirloskar and JSW. In the case of Sardha steels, LTDA showed correlation with firm value (r = 0.710) with significance at the 5 per cent level. In Tata Steel, LTDA (r = 0.710) and LTDE (r = 0.735) were found to be negatively correlated with firm value, showing significance at the 5 per cent level. This implied that an increase in debt capital reduced the firm value of Tata Steel. The correlation analysis results revealed that there existed a higher impact of capital structure on the firm value with Hisar, JSW, Kirloskar, Sarda, and Tata Steel companies, showing significance at either 5 percent or 1 percent. Hence, the null hypothesis was rejected. Among Rishabh and Tata sponge steel companies, there did not exist any impact of capital structure on the firm value during the study period.

CEMENT INDUSTRY

The impact of capital structure on the firm value of the selected Cement Companies was examined using Correlation analysis and was shown in the following Table 7.

Table 7 Correlation analysis of Cement Companies for 2012-13 to 2021-22

			Long term debt to asset	Long term debt to equity
ACC	Firm value	Pearson Correlation	-0.611	-0.647*
		Sig. (2-tailed)	0.061	0.043
Ambuja	Firm value	Pearson Correlation	-0.615	-0.608
		Sig. (2-tailed)	0.059	0.062
Birla	Firm value	Pearson Correlation	-0.690*	-0.579

		Sig. (2-tailed)	0.027	0.080
Deccan	Firm value	Pearson Correlation	-0.212	0.380
		Sig. (2-tailed)	0.557	0.279
JK	Firm value	Pearson Correlation	-0.577	-0.338
		Sig. (2-tailed)	0.081	0.340
J.K Lakshmi	Firm value	Pearson Correlation	0.201	0.302
		Sig. (2-tailed)	0.577	0.397
Kakatiya	Firm value	Pearson Correlation	0.887**	0.862**
		Sig. (2-tailed)	0.001	0.001
KCP	Firm value	Pearson Correlation	0.381	0.657*
		Sig. (2-tailed)	0.277	0.039
Mangalam	Firm value	Pearson Correlation	-0.431	-0.344
		Sig. (2-tailed)	0.213	0.331
OCL India	Firm value	Pearson Correlation	-0.604	-0.592
		Sig. (2-tailed)	0.064	0.071
Ramco	Firm value	Pearson Correlation	-0.638*	-0.772**
		Sig. (2-tailed)	0.047	0.009
Shree	Firm value	Pearson Correlation	-0.417	-0.701*
		Sig. (2-tailed)	0.230	0.024

*Correlation is significant at 0.05 level (2-tailed)** Correlation is significant at 0.01 level (2-tailed) Source: Capitaline

It was revealed from Table 19 that LTDE (r = -0.647) was found to be correlated with firm value, significant at the 5 per cent level in ACC cements. LTDA (r = -0.690) had been correlated with firm value in Birla, significant at the 5 per cent level. LTDA (r = 0.887) and LTDE (r = 0.862) were correlated with firm value in Kakatiya cements, showing significance at the 1 per cent level respectively. It specified that an increase in debt capital led to an increase in the firm value of Kakatiya. In KCP, LTDE (r = -0.647) and in Shree Cements LTDE (r = -0.701) were correlated with firm value, significant at the 5 per cent level respectively. LTDA (r = 0.638), significant at the 5 per cent level, and LTDE (r = 0.772), significant at the 1 per cent level, were found to be negatively correlated with firm value in Ramco. It denoted that an increase in debt reduced the firm value of Ramco cements.

The analysis results indicated that there existed a higher impact of capital structure on the firm value in ACC, Birla, Kakatiya, KCP, Ramco, and Shree cements (showing significance at either 5 per cent or 1 per cent). Hence, the null hypothesis was rejected. In the case of Ambuja, JK, Deccan, JK Lakshmi, OCL, and Mangalam cements, there did not exist any impact of capital structure on the firm value during the period of study.

PAINT INDUSTRY

The impact of capital structure on the firm value of the selected Paint Companies was computed using correlation analysis and was presented in the following Table 8.

Table 8 Correlation analysis of Paint Companies for 2012-13 to 2021-22

			Long term debt to	Long term debt to

			asset	equity
Akzo Nobel	Firm value	Pearson Correlation	0.479	0.467
		Sig. (2-tailed)	0.124	0.174
Asian	Firm value	Pearson Correlation	-0.759*	-0.672*
		Sig. (2-tailed)	0.011	0.033
Berger	Firm value	Pearson Correlation	-0.242	-0.361
		Sig. (2-tailed)	0.501	0.306
Kansai Nerolac	Firm value	Pearson Correlation	-0.950**	-0.877**
		Sig. (2-tailed)	0.00	0.001

*Correlation is significant at 0.05 level (2-tailed)

** Correlation is significant at 0.01 level (2-tailed) Source: Capitaline

It was inferred from Table 20 that, in Asian paints, LTDA (r = 0.759) and LTDE (r = 0.672) were found to be negatively correlated with firm value, showing significance at the 5 level. In Kansai Nerolac paints, LTDA (r = 0.950) and LTDE (r = 0.877) had a negative correlation with the firm value, showing significance at the 1 per cent level. It signified that an increase in debt reduced the firm value of Asian and Kansai Nerolac paints. The Correlation analysis results inferred that among Asian and Kansai Nerolac paints, there existed an impact of capital structure on firm value (showing significance at either 5 per cent or 1 per cent) during the period of study. Hence, the null hypothesis was rejected. Among Akzo Nobel and Berger paint companies, there did not exist any impact of capital structure on the firm value during the study period.

GRANITE INDUSTRY

The impact of capital structure on the firm value of the selected Granite Companies was calculated using correlation analysis and was displayed in the following Table 9.

Table 9 Correlation analysis of Granite Companies for 2012-13 to 2021-22

			Long term debt to asset	Long term debt to equity
Aro	Firm value	Pearson Correlation	0.185	0.193
		Sig. (2-tailed)	0.550	0.593
Divyashakti	Firm value	Pearson Correlation	0.134	0.886**
		Sig. (2-tailed)	0.022	0.001
Inani	Firm value	Pearson Correlation	0.506	0.433
		Sig. (2-tailed)	0.135	0.211
Madhav	Firm value	Pearson Correlation	-0.522	-0.489
		Sig. (2-tailed)	0.022	0.052

*Correlation is significant at 0.05 level (2-tailed)

** Correlation is significant at 0.01 level (2-tailed) Source: Capitaline

It was observed from Table 21 that LTDE (r = 0.886) had been positively correlated with firm value, significant at the 1 per cent level in Divyashakti granites. It stated that an increase in debt capital led to an increase in the firm value of Divyashakti Granites. Hence, the null hypothesis was rejected. Among other granite companies in India, namely Aro, Inani, and Madhav granites, there did not exist any impact of capital structure on firm value during the period of study.

CERAMIC TILES INDUSTRY

The impact of capital structure on the firm value of the selected Ceramic Tiles Companies was calculated using correlation analysis and was presented in the following Table 10.

Table 10 Correlation analysis of Ceramic Tiles Companies for 2012-13 to 2021-22

			Long term debt to asset	Long term debt to equity
Kajaria	Firm value	Pearson Correlation	-0.458	-0.500
		Sig. (2-tailed)	0.183	0.041
Orient bell	Firm value	Pearson Correlation	-0.220	-0.447
		Sig. (2-tailed)	0.042	0.196
Somany	Firm value	Pearson Correlation	-0.478	-0.494
		Sig. (2-tailed)	0.162	0.046

*Correlation is significant at 0.05 level (2-tailed)

** Correlation is significant at 0.01 level (2-tailed) Source: Capitaline

It was revealed from Table 22 that among the ceramic tiles companies in India, namely, Kajaria, Orient Bell, and Somany Ceramics, there did not exist any impact of capital structure on firm value during the period of study. Hence, the null hypothesis was accepted.

5. DISCUSSION

The findings of the study highlight key relationships between capital structure and firm value across various sectors in the Indian context. By focusing on industries such as steel, cement, paint, granite, and ceramic tiles, this research offers nuanced insights into how different forms of debt financing (long-term, short-term, and total debt) impact the financial health and market performance of companies in these sectors. The analysis was carried out using Pearson's correlation, with a focus on examining the influence of debt ratios on firm value, as measured through financial indicators such as stock price performance and earnings per share. These findings are important for both managers and investors seeking to optimize capital structure strategies for improved financial outcomes.

In the steel industry, characterized by high capital intensity, the results suggest that debt plays a significant role in financing growth and operational activities. Companies such as **Hisar Steel**, **JSW**, and **Kirloskar** showed a positive relationship between long-term debt to asset ratio (LTDA) and firm value. This suggests that for companies in the steel sector, debt financing can facilitate capital expansion, leading to higher market valuation. The positive correlation between debt and firm value was statistically significant, with p-values well below 0.05, thus indicating a strong positive relationship. On the other hand, companies like **Tata Steel** and **Tata Sponge** demonstrated a negative correlation with firm value. In these cases, the results revealed that excessive reliance on debt might lead to financial distress, which, in turn, reduces firm value. The key takeaway from the steel industry is the importance of maintaining an optimal level of debt that supports expansion without putting undue strain on the company's financial stability (Modigliani & Miller, 1958; Jensen & Meckling, 1976). In the cement industry, which similarly requires substantial capital for plant and machinery, the findings were mixed but emphasized the criticality of managing debt levels. Companies like **Kakatiya Cement** and **KCP** exhibited a positive relationship between debt levels and firm value, suggesting that debt can enhance firm value when used judiciously for growth. In contrast, firms such as **Ramco Cement** showed negative correlations between debt and firm value, especially when debt levels were excessive. The results underscore that high leverage in the cement sector, especially during cyclical downturns, can exacerbate financial distress and erode firm value (Fama & French, 2002; Titman & Wessels, 1988). This highlights the importance of maintaining a careful balance between debt and equity financing in such capital-heavy industries.

In the paint industry, where capital intensity is lower than in steel and cement, the study found that high debt ratios negatively impacted firm value. For instance, **Kansai Nerolac** and **Asian Paints** demonstrated significant negative

correlations with debt, suggesting that these companies may have faced higher financial costs and risk exposure due to their high debt ratios. The results indicate that in less capital-intensive industries, high reliance on debt can reduce a company's market value, as it increases the firm's financial leverage and risks (Myers, 2001). On the contrary, companies with more conservative debt levels exhibited more favorable market performance, suggesting a preference for equity or internal financing in industries like paint that are less reliant on significant capital expenditure (Salim & Yadav, 2012). In the granite industry, the relationship between capital structure and firm value was relatively weak, with only **Divyashakti Granites** showing a significant positive correlation between debt and firm value. The high debt ratios in Divyashakti resulted in improved financial leverage, driving firm value. However, companies such as **Aro** and **Madhav Granites** displayed no significant correlation, suggesting that in industries with lower capital requirements like granite, debt has a relatively minimal impact on firm performance and market valuation (Chakrabarti & Mukherjee, 2009). The lack of significance in most firms points to the more nuanced approach needed in industries where working capital and operational efficiency play a larger role than extensive debt financing.

The ceramic tiles industry showed the least significant relationship between capital structure and firm value. Companies like **Kajaria** and **Somany Ceramics** exhibited either negative or negligible correlations, indicating that the impact of debt on firm value is limited in this sector. Given the lower capital intensity in this sector, firms typically rely more on internal financing and equity capital. The lack of significant correlation in the ceramic tile industry suggests that other factors, such as brand strength, market share, and operational efficiency, play a more substantial role in driving firm value than capital structure decisions (Rajan & Zingales, 1998). The findings underscore the varying importance of capital structure across different sectors. In industries with higher capital needs like steel and cement, debt financing plays a pivotal role in funding large-scale operations and capital-intensive projects, but this comes with increased risks. Firms in these sectors must carefully manage their debt ratios to avoid financial distress and to sustain growth. Conversely, in less capital-intensive sectors such as paint, granite, and ceramic tiles, reliance on debt can harm firm value, suggesting that equity financing or internal funds are more suitable for these industries. Managers in these sectors should focus on minimizing leverage to optimize firm performance and market value.

The analysis confirms that capital structure significantly influences firm value, but the relationship is highly sector-dependent. While debt is crucial for firms in capital-intensive industries, excessive leverage can lead to financial distress and lower firm value. On the other hand, in industries with lower capital intensity, high debt ratios tend to have an adverse effect on market performance. Therefore, the findings highlight the importance of adopting an industry-specific approach when making capital structure decisions. It is crucial for firms to strike a balance between debt and equity financing to maximize value while maintaining financial stability.

6. CONCLUSION

The study concludes that capital structure significantly impacts the firm value across various industries in India. The analysis, based on data from the steel, cement, paint, granite, and ceramic tiles industries, revealed that the relationship between capital structure and firm value is highly dependent on the industry's characteristics, such as capital intensity and market conditions. In industries like steel and cement, where capital expenditure is high, the optimal use of debt financing can enhance firm value by providing tax shields and improving financial leverage. However, excessive debt can lead to financial distress, reducing firm value, as seen in certain companies within these sectors. Conversely, in sectors like paint and ceramics, companies tend to rely more on equity financing due to lower capital intensity and a preference for minimizing risk. The results from correlation analysis indicate that a positive relationship between capital structure and firm value exists in some companies, while others exhibit a negative or insignificant correlation. These findings emphasize the need for firms to carefully evaluate their capital structure decisions, considering both industry-specific dynamics and broader economic factors. Managers and investors must balance the costs and benefits of debt to ensure long-term financial stability and value creation.

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