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## LEVERAGE IMPACT ON INVESTMENT BEHAVIOUR OF SELECTED BSE-LISTED STEEL COMPANIES IN INDIA

Amalendu Bhunia<sup>1</sup>, Rabindra Shil<sup>2</sup>**ABSTRACT**

The present study examines the impact of financial leverage on the investment behaviour of selected steel companies listed on the Bombay Stock Exchange (BSE). Investment decisions are crucial for firms operating in steel manufacturing, where large financial resources are required for plant expansion, technological modernization, and capacity development. The study uses panel data analysis to investigate how leverage and other firm-specific factors influence corporate investment decisions. Secondary data were collected from the annual reports of selected BSE-listed steel companies and financial databases for a specified study period. Investment behaviour is considered as the dependent variable, while financial leverage measured by the debt–equity ratio is the major explanatory variable. In addition, firm size, asset tangibility, growth opportunities, profitability indicators, and liquidity are included as control variables. Panel unit root tests and panel regression models, including fixed effect and random effect estimations, are employed to analyze the relationship between leverage and investment behaviour. The Hausman specification test is used to determine the most appropriate model for interpretation. The empirical results indicate that leverage has a negative but statistically insignificant impact on corporate investment among the selected firms. In contrast, asset tangibility and growth opportunities demonstrate a positive and significant influence on investment decisions, suggesting that firms with stronger asset bases and higher expansion prospects tend to invest more actively. Profitability and liquidity indicators do not show a significant effect on investment behaviour in the estimated models. The findings imply that investment decisions in the Indian steel sector are influenced more by asset structure and growth potential than by leverage levels alone.

**KEYWORDS:** Financial Leverage, Investment Behaviour, Capital Structure, Steel Industry, Panel Data Analysis, BSE-Listed Companies

**1. INTRODUCTION**

Financial leverage and corporate investment behaviour are two closely connected aspects of corporate financial management. The level of leverage adopted by a firm directly affects its financial risk, cost of capital and strategic decision-making regarding investment activities. Investment behaviour, on the other hand, is the decisions taken by firms regarding capital expenditure, acquisition of long-term assets, expansion of production capacity, and other growth-

oriented projects.

The theoretical foundation of the leverage–investment relationship originates from classical corporate finance theories. According to Modigliani and Miller (1958), under perfect market conditions the capital structure of a firm does not influence its investment decisions or overall firm value. However, in real-world markets characterized by taxes, transaction costs, and information asymmetry, capital structure becomes an important

determinant of corporate financial behaviour. Myers (1977) argued that high leverage may create a debt overhang problem, where firms with significant debt obligations may avoid undertaking new investment projects because a large portion of the returns from those projects would be used to repay existing debt. This situation can discourage managers from investing even in projects with positive net present value, thereby reducing corporate investment levels (Myers, 1977). Similarly, agency theory suggests that debt can influence managerial decisions by imposing financial discipline through fixed interest obligations and creditor monitoring mechanisms.

Empirical studies have provided substantial evidence regarding the relationship between leverage and corporate investment. For instance, Aivazian et al. (2005) found that financial leverage has a significant negative relationship with firm investment, indicating that firms with higher debt levels tend to reduce capital expenditure and expansion activities.

In the Indian context, the steel industry plays a vital role in supporting infrastructure development, manufacturing, and economic growth. India is among the largest producers of crude steel in the world, and several major steel companies are listed on the Bombay Stock Exchange (BSE). The capital structure decisions of these companies, particularly their reliance on debt financing, can significantly influence their investment behaviour and long-term financial performance (Nguyen & Nguyen, 2019). Therefore, examining the leverage impact on investment behaviour of selected BSE-listed Indian steel companies is important for understanding how capital structure decisions influence corporate investment strategies in a major industrial sector.

## 2. LITERATURE REVIEW

A substantial body of empirical and theoretical literature has examined the relationship between financial leverage and corporate investment behaviour. Early theoretical insights into the leverage–investment relationship can be traced to the work of Modigliani and Miller (1958), who argued that under perfect market conditions, a firm's capital structure is irrelevant to its value and investment decisions. However, the assumptions of perfect markets rarely hold in reality. Consequently,

subsequent studies incorporated factors such as taxes, bankruptcy costs, and information asymmetry to explain how leverage affects corporate behaviour. Myers (1977) introduced the concept of the debt overhang problem, arguing that highly leveraged firms may forego profitable investment opportunities because the benefits of such investments may accrue largely to debt holders rather than shareholders. This argument suggests a negative relationship between leverage and investment decisions.

Jensen and Meckling (1976) provided further theoretical foundations through agency theory, which explains conflicts between managers, shareholders, and creditors. According to this perspective, leverage can act as a disciplinary mechanism by limiting managerial discretion and reducing agency costs. However, excessive leverage may also create under-investment problems because firms may become reluctant to undertake risky but potentially profitable projects when debt obligations are high. Stulz (1990) further emphasized that leverage may reduce managerial over-investment by imposing financial discipline, but excessive debt may simultaneously restrict firms from pursuing valuable investment opportunities.

Empirical research has produced extensive evidence regarding the influence of leverage on corporate investment behaviour. Lang et al. (1996) examined U.S. firms and found that leverage negatively affects investment, particularly for firms with limited growth opportunities. Their study indicated that highly leveraged firms tend to reduce capital expenditure due to financial constraints and the burden of debt repayment. Similarly, Aivazian et al. (2005) analyzed Canadian publicly listed firms and reported a significant negative relationship between leverage and corporate investment. The study concluded that leverage restricts investment expenditures and that this negative effect is more pronounced among firms with fewer growth opportunities.

Further empirical evidence has been provided by Fazzari et al. (1988), who investigated the role of financial constraints in corporate investment. Their findings suggested that firms with limited internal funds are more sensitive to external financing conditions, which may influence their investment

decisions. When firms rely heavily on debt financing, financial constraints may reduce their ability to undertake new investment projects. Similarly, Hoshi et al. (1991) examined Japanese firms and found that firms with strong banking relationships experienced fewer financial constraints and were able to maintain higher investment levels despite leverage.

McConnell and Servaes (1995) also investigated the relationship between leverage and investment and found that leverage can have both positive and negative effects depending on a firm's growth opportunities. The authors reported that leverage may enhance firm value in low-growth firms by controlling managerial over-investment, whereas in high-growth firms excessive leverage may discourage investment in profitable projects. A similar conclusion was reached by Aivazian et al. (2005), who emphasized that the impact of leverage on investment varies according to firm characteristics and growth prospects.

Research conducted in emerging markets has also contributed significantly to the understanding of the leverage-investment relationship. Love (2003) examined firms across multiple developing countries and found that financial development plays an important role in reducing investment constraints. In economies with underdeveloped financial systems, firms often rely heavily on internal funds, and high leverage may restrict investment opportunities. Likewise, Cleary (1999) analyzed financially constrained firms and reported that leverage increases the sensitivity of investment to internal cash flow, suggesting that firms with high debt levels may face greater investment limitations.

Several studies have also focused on the influence of leverage on investment behaviour in Asian and emerging economies. Chen and Chen (2011) examined firms in Taiwan and found that leverage negatively affects corporate investment because highly leveraged firms face financial risk and borrowing constraints. Similarly, Dang (2013) studied Vietnamese firms and reported that high leverage reduces investment due to financial distress risk and limited access to external finance.

In the context of India, research on capital structure and investment behaviour has gradually expanded

in recent years. Bhaduri (2002) examined Indian corporate firms and found that leverage significantly influences corporate financing and investment decisions. The study suggested that firms with high debt levels often face constraints in financing new projects. Chakraborty (2010) also analyzed capital structure decisions of Indian firms and reported that leverage plays a significant role in determining corporate financial strategies and investment policies. Furthermore, Ghosh (2016) observed that Indian firms with higher leverage tend to exhibit lower investment levels because of financial risk and debt servicing obligations.

Previous empirical studies across developed and emerging markets generally report a negative relationship between leverage and investment, particularly in firms facing financial constraints. However, the magnitude and direction of this relationship may vary depending on firm characteristics, growth opportunities, and industry conditions. Therefore, examining the leverage impact on investment behaviour of selected BSE-listed Indian steel companies can provide valuable insights into how capital structure decisions influence corporate investment strategies within a capital-intensive sector of the Indian economy.

### 3. DATA AND METHODOLOGY

The study focuses on a sample of selected BSE-listed Indian steel companies that have consistently reported financial data during the study period. The selection of companies is based on data availability, continuity of listing, and their significant contribution to the Indian steel industry. The study relies exclusively on secondary data collected from reliable and publicly available financial sources such as annual reports of the respective companies, the Prowess database of the Centre for Monitoring Indian Economy (CMIE), and financial statements available on the official websites of the firms and stock exchange databases.

In this study, corporate investment behaviour is treated as the dependent variable and is measured using the investment ratio, which reflects the extent of capital expenditure undertaken by firms relative to their total assets or operational scale. Investment decisions in capital-intensive industries such as steel manufacturing often involve significant expenditure

on plant, machinery, and technological upgrades; therefore, measuring investment through capital expenditure indicators provides meaningful insights into corporate expansion activities. Financial leverage is considered the key explanatory variable and is measured using the debt–equity ratio (DER), which represents the proportion of total debt relative to shareholders’ equity in a firm’s capital structure. The debt–equity ratio is widely used in financial research to evaluate the level of financial risk and the degree of dependence on external borrowing (Myers, 2001). In addition to leverage, several control variables are incorporated into the empirical model in order to capture other firm-specific factors that may influence investment behaviour. These control variables include firm size (FS), asset tangibility (AT), growth opportunities (GO), net profit margin (NPM), return on capital employed (ROCE), return on assets (ROA), and current ratio (CR). Firm size is typically measured using the natural logarithm of total assets, reflecting the scale of operations and financial capacity of the firm. Asset tangibility represents the proportion of tangible assets in total assets, which often determines the firm’s ability to obtain external financing by providing collateral. Growth opportunities are measured through indicators that reflect the firm’s potential for expansion, while profitability ratios such as NPM, ROCE, and ROA capture the efficiency of resource utilization and financial performance. The current ratio is included as a liquidity indicator to assess the firm’s ability to meet short-term obligations.

The empirical analysis follows several econometric procedures commonly used in panel data studies. First, descriptive statistics and correlation analysis are conducted to understand the basic characteristics and relationships among variables. Second, panel unit root tests, particularly the Im–Pesaran–Shin (IPS) test, are applied to examine the stationarity properties of the variables and to avoid spurious regression results that may arise from non-stationary data (Im et al., 2003). After confirming stationarity, panel regression models are estimated to analyze the impact of leverage on investment behaviour. Both fixed effect and random effect models are employed because they account for unobserved heterogeneity across firms in different ways. The fixed effect model controls for firm-specific characteristics that remain

constant over time, while the random effect model assumes that these firm-specific effects are randomly distributed and uncorrelated with the explanatory variables (Gujarati & Porter, 2009). To determine the most appropriate estimation technique, the Hausman specification test is performed. The Hausman test compares the consistency of fixed and random effect estimators and identifies the model that provides unbiased and efficient estimates (Hausman, 1978). The final regression results are then interpreted to assess the magnitude and direction of the relationship between leverage and investment behaviour among the selected BSE-listed Indian steel companies. Through this methodological framework, the study aims to provide empirical evidence on how capital structure decisions influence corporate investment patterns in a capital-intensive industrial sector of the Indian economy.

#### 4. EMPIRICAL RESULTS AND ANALYSIS

**Table 1: IPS Panel Unit Root Test Results**

Variable	At Level	At 1st Difference
Investment	-2.30 (0.01)	-6.82 (0.00)
Firm Size	-4.48 (0.00)	-3.02 (0.00)
Assets Tangibility	-3.38 (0.00)	-4.48 (0.00)
Growth Opportunities	-3.86 (0.00)	-4.86 (0.00)
Current Ratio	1.98 (0.04)	-2.73 (0.00)
Debt-Equity Ratio	-5.70 (0.00)	-21.80 (0.00)
Net Profit Margin	-2.32 (0.01)	-4.60 (0.00)
Return on Capital Employed	-2.55 (0.00)	-5.21 (0.00)
Return on Assets	-2.53 (0.00)	-12.77 (0.00)

Table 1 presents the results of the Im–Pesaran–Shin (IPS) panel unit root test conducted to examine the stationarity properties of the variables used in analyzing the leverage impact on investment behaviour of selected BSE-listed Indian steel companies. The IPS test is widely applied in panel data econometrics because it allows heterogeneity across cross-sectional units and tests the null hypothesis that all series in the panel contain a unit root against the alternative that at least some series are stationary (Im et al., 2003).

In the present analysis, the IPS results indicate that all variables are stationary at their level form as well as first differencing. The investment variable suggesting that investment behaviour among the selected steel

companies does not contain a unit root. This implies that fluctuations in investment expenditure are stable over time and suitable for panel regression analysis. Similarly, firm size shows a significant IPS statistic, confirming that firm size is stationary and can be directly used in the econometric model without transformation. Assets tangibility, which measures the proportion of tangible assets in total assets and influences borrowing capacity, also shows stationarity at level. Growth opportunities demonstrate stationarity, suggesting that market-based growth indicators among BSE-listed steel companies do not exhibit persistent trends that could bias regression results. The debt–equity ratio represents the degree of financial leverage, confirming that leverage levels

across firms are stationary and suitable for evaluating their influence on corporate investment decisions. Net profit margin, return on capital employed, and return on assets are all stationary at level, indicating that profitability measures fluctuate around a stable mean in the sample period. The current ratio is also stationary at the level form. Econometric theory emphasizes that non-stationary variables may produce spurious regression results because their statistical properties change over time, leading to misleading relationships between variables (Gujarati & Porter, 2009). Therefore, testing stationarity before estimating panel regression models is an essential step in empirical financial research.

**Table 2: Panel Regressions Test Results (DV: INV)**

Variable	Fixed Effect			Random Effect		
	Coeff.	t-stat	Prob.	Coeff.	t-stat	Prob.
Intercept	-2.17	-0.44	0.65	-1.74	-1.15	0.24
FS	0.01	0.03	0.96	0.02	0.16	0.86
AT	0.56	1.87	0.00	0.56	3.98	0.00
GO	1.96	1.36	0.17	1.53	2.98	0.00
NPM	4.37	0.02	0.98	-0.009	-0.52	0.60
ROCE	-0.01	-0.33	0.73	-0.04	-0.90	0.36
ROA	-0.00	-0.05	0.95	0.03	0.53	0.59
CR	0.00	0.02	0.98	0.002	0.57	0.56
DER	-0.00	-0.07	0.94	-0.002	-0.08	0.93
Panel observation	220			220		
Hausman Specification Test Results						
Test Summary		Chi-Sq. Stat		d.f.	Prob.	
Cross-section random		4.89		8	0.76	

Table 2 presents the results of the panel regression analysis conducted to examine the impact of leverage and selected firm-specific variables on the investment behaviour of selected BSE-listed Indian steel companies. In this study, investment (INV) is used as the dependent variable, while firm size (FS), assets tangibility (AT), growth opportunities (GO), net profit margin (NPM), return on capital employed (ROCE), return on assets (ROA), current ratio (CR), and debt–equity ratio (DER) are considered as explanatory variables. Panel regression models are widely used in financial research because they combine cross-sectional and time-series information, allowing researchers to control for unobserved heterogeneity across firms and over time (Baltagi, 2008). The results are estimated using

both fixed effect and random effect models, and the appropriate model is determined through the Hausman specification test.

The Hausman test result reported at the bottom of Table 2 shows a Chi-square statistic is greater than the conventional significance level of 0.05. According to econometric theory, when the probability value exceeds 0.05, the null hypothesis that the random effect model is appropriate cannot be rejected (Hausman, 1978). Therefore, the random effect model is considered more suitable for interpreting the relationship between leverage and investment behaviour in this study. The use of the random effect model suggests that individual firm-specific effects are uncorrelated with the explanatory variables,

making the model efficient for panel data estimation.

Under the random effect model, assets tangibility (AT) shows a positive and statistically significant coefficient of 0.56. This result indicates that firms with a higher proportion of tangible assets tend to undertake greater investment activities. Tangible assets serve as collateral for external borrowing, enabling firms to access debt financing more easily and invest in capital-intensive projects (Harris & Raviv, 1991). In the context of steel companies, which require substantial physical infrastructure and machinery, higher asset tangibility strengthens borrowing capacity and facilitates investment expansion. Growth opportunities (GO) also exhibit a positive and statistically significant coefficient of 1.53 in the random effect model. This finding implies that firms with higher growth prospects tend to increase their investment expenditures in order to expand production capacity and maintain competitive advantages. The result is consistent with the theoretical argument that firms with strong growth opportunities are more likely to allocate resources toward long-term capital investments (Myers, 1977).

On the other hand, the debt-equity ratio (DER), which represents financial leverage, shows a negative coefficient in the random effect model, although the relationship is statistically insignificant. The negative sign suggests that higher leverage may slightly discourage corporate investment, possibly due to the burden of debt repayment and financial risk associated with excessive borrowing. This observation aligns with the debt overhang theory proposed by Myers (1977), which argues that highly leveraged firms may reduce investment because the benefits of new projects may primarily accrue to creditors rather than shareholders. However, the insignificance of the coefficient indicates that leverage may not be the primary determinant of investment decisions for the selected steel companies during the study period.

Other explanatory variables, including firm size (FS), net profit margin (NPM), return on capital employed (ROCE), return on assets (ROA), and current ratio (CR), appear to have statistically insignificant effects on investment behaviour in both the fixed and random effect models. For instance, firm size shows a positive but insignificant coefficient, suggesting that larger

firms may not necessarily invest more than smaller firms within the sample. Similarly, profitability indicators such as NPM, ROCE, and ROA do not exhibit significant relationships with investment, indicating that profitability alone may not determine investment decisions in the steel industry. These findings may reflect the capital-intensive nature of the sector, where investment decisions are driven more by asset structure and market growth opportunities than by short-term profitability measures.

## 5. CONCLUSION

The present study examined the impact of financial leverage on the investment behaviour of selected steel companies listed on the Bombay Stock Exchange (BSE), with the objective of understanding how capital structure decisions influence corporate investment patterns in a capital-intensive industry. The empirical findings of the study reveal that financial leverage, measured through the debt–equity ratio, has a negative but statistically insignificant relationship with corporate investment. This suggests that although higher debt levels may create financial obligations and potential constraints on investment decisions, leverage alone may not be the primary factor influencing investment behaviour among the selected steel companies. Instead, the results indicate that other firm-specific characteristics such as asset tangibility and growth opportunities have a stronger influence on investment decisions.

The analysis shows that asset tangibility significantly and positively affects investment behaviour, implying that firms possessing a higher proportion of tangible assets are more likely to undertake investment activities. This outcome can be attributed to the fact that tangible assets, such as plant, machinery, and infrastructure, can serve as collateral for external financing, thereby improving a firm's borrowing capacity and enabling it to finance capital expenditures more effectively. Similarly, growth opportunities demonstrate a positive and statistically significant influence on investment, indicating that companies with greater market potential and expansion prospects tend to allocate more resources toward capital investment. These findings suggest that steel companies prioritize strategic growth and asset-based financing when making investment decisions rather than relying solely on leverage levels.

On the other hand, variables related to profitability and liquidity, such as net profit margin, return on capital employed, return on assets, and current ratio, do not exhibit a significant influence on investment behaviour in the estimated models. This result implies that short-term financial performance may not necessarily determine investment decisions in the steel industry, where long-term strategic planning and capital requirements are more important considerations. Moreover, the insignificance of firm size indicates that both large and relatively smaller firms within the sample demonstrate similar investment patterns when other financial factors are taken into account.

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