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Financial leverage and firm valuation: an empirical study of Indian metal industry

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Abstract

The process of determining optimal capital structure in the world of inefficient capital market makes it a complicated affair. In corporate finance, the crucial argument is the impact of financial leverage on firms' strategic decisions. Thus, the debate still prevails as how to minimize the agency costs while maximizing the firm value.Additionally, value of firm is gauged by all stake holders which reflect the value of business. The aim of this research is to appraisethe impact of financial leverage on value of firm. The paper attempts to analyse the debt patterns over time and its impact on firm value reflected in market to book ratio using information on publicly traded firms in India. The study involves ratio analysis and multiple regression method to arrive at the results. Empirical findings on the firms related to metal and metal products in India suggest that there is no mean reverting tendency in debt ratios over time. Instead, debt is increasing to unsustainable levels accompanied by poor governance leading to potential disruption in industry. Besides, leverage has negative impact on firm value contradicting traditional trade off theory.

Keywords: Financial leverage, firm value, agency and capital structure.

Introduction

One of the assumptions of ideal capital market is firm's capital structure is fixed; however, the dynamic factors of real-world poses threat to such assumptions. Planning under uncertainty to raise capital for new projects becomes important challenge. Among various financial decisions for a firm it becomes paramount task to determine the quantity of leverage in capital structure. The firm management endeavours to establish an ideal capital structure ensuring maximization of firm value. A delinquent decision about the leverage can eventually experience financial distress and ultimately lead to bankruptcy. Despite many theory and empirical studies, there is no definite procedure to attain optimal capital structure. The decision regarding financial leverage by manager is assisted by various financial theories which help in comprehending the implications of financial leverage on firm.

Firm value is one prime factor considered by all stake holders which reflects the value of business. Other factors due to imperfect capital markets such as information asymmetry, agency cost, taxes and cost of financial distress complicates the financial decisions of firm. This financial decision has direct bearing on value of the firm. Being capital intensive, metal industry involves high debt in the capital structure and hence it is of paramount importance to analyse the impact of leverage on firm value.

Metal industry is primarily associated with metallurgy and metal work. In spite of rich natural resources in India, metal industry received boost post-independence only during five year plan. Foreign direct investment was allowed in 1993 along with new mineral policy which opened new avenues for the mining and metal industry in India. Rapid magnification of infrastructure and automobile industry across the globe is propelling the growth of metal industry in India. The main metals extracted in India are iron and steel followed by coal, aluminium, bauxite and base metals.

According to IBEF report, mineral production in India has reached to 17.62 billion dollars by achieving 5.72 percent compounded annual growth rate between 2013 to 2018. Figure 1 exhibits the overall mineral production in India during the financial year in billions of US dollar. The total number of operative mines as of 2017 – 2018 is estimated to 1531. India was estimated as the fourth largest producer of iron ore in 2017. Majority of iron ore reserves are of medium to High-grade which are exported. During financial year 2010-2018, the iron and steel exports from India has escalated at massive compounded annual growth return of 12.07 percent.

Despite the strong growth of metal industry, due to robust amplification in manufacturing and infrastructure projects, India is turning into net importer of metals especially steel. This indicates vehement potential of industry on one hand and on the other, huge debt in capital structure is eliciting financial distress of such firms. This is evident from report published by Reserve bank of India which listed out twelve firms accounting to Rs. 2654.80 billion debt piles exhibited in Table-1. Five out of the twelve firms belong to metal industry, specifically steel companies.

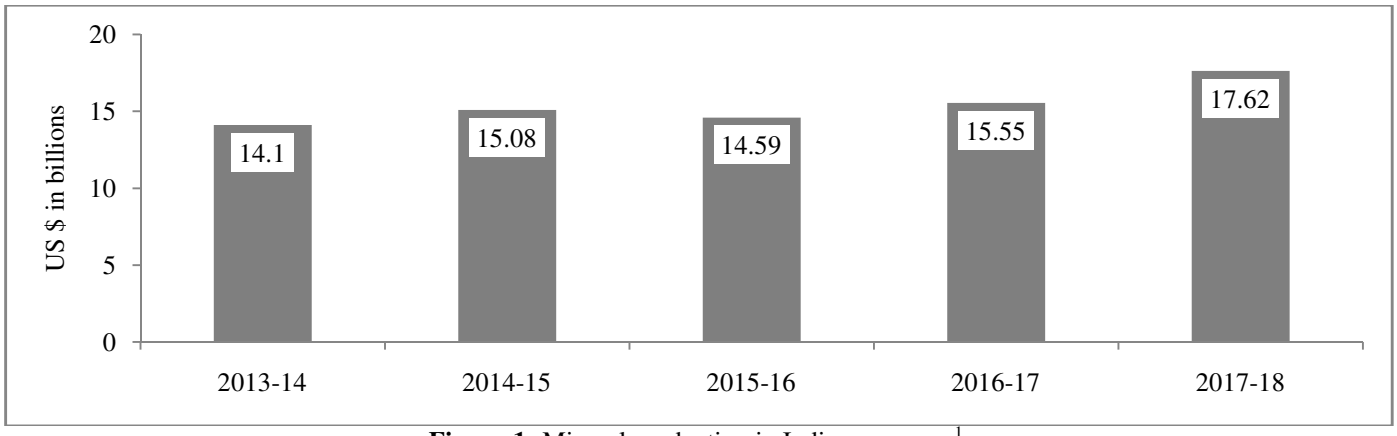

Figure-1: Mineral production in India over years[1].

Table-1: Firms under insolvency and bankruptcy code by Reserve bank of India[2].

Company	Debt (Rs. Billion)
Bhushan Steel	444.80
Lanco Infra	443.70
Essar Steel	490.00
Bhushan Power	372.50
Alok Industries	220.80
Amtek Auto	140.80
Monnet Ispat	121.20
Electrosteel Steels	102.70
Era Infra	100.70
Jaypee Infratech	96.40
ABG Shipyard	69.50
Jyoti Structures	51.70
Total	2654.80

The crucial work of Modigliani and Miller emanated proposition I also referred as the leverage irrelevance theorem which states that firm's management cannot improve the market value of the firm by solely altering the capital structure[3]. Under certain assumptions, Modigliani and Miller exemplified that the firm value was unaffected by amount of leverage in the capital structure. It was followed by proposition II directly derived from proposition I suggesting that leverage has effects on risk and return aspect of firm's equity. Thus, validating that financial leverage does not influence value of firm.

Identifying one of the unrealistic assumptions from their previous paper, Modigliani and Miller introduced effect of corporate taxes which provides the tax shield to the firm. It was argued that there exists a trade-off between the debt and cost of future financial distress[4]. This is the significance of traditional trade off theory which suggests that firm can combine equity with debt to create strategic capital structure. The implication of optimal capital structure is discerned to minimize average cost of capital and enhances the market valuation. However, if the debt in capital structure is beyond this threshold, the market valuation moves to constant and then starts decreasing. In other words, raising capital through debt instruments enhances firm value to certain point after which value to shareholders begin to deteriorate, consequently, approving that financial leverage influences market valuation of firm.

Some studies claim that leverage does not impact firm value at all. Stiglitz argued that in ideal capital market scenario the market value of firm is not affected by amount of debt[5]. However, in the imperfectly competitive market, issuance of new debt by firm irrespective of their capital structure cannot be considered as identical. Barton and Gordon declared that financial decisions is insignificant and has no effect on individual firm valuation. The reason they state is lack of finance theory to explain logic and procedure in deciding capital structure[6].

Harris and Raviv asserted that the firm value is unresponsive to debt. This is because voting power gets accrued with shareholders when leverage increases driving interest of managers. Hence, debtholders inculcate debt covenants constraining options for managers which would negatively impact the firm value[7]. Sanjay Bhayani conducted empirical study of Indian cement industry and established that firm value is not impacted by variations in financial leverage[8].

In some of the research studies deduceinverse relationship of leverage and market valuation. Myers and Majluffrom information asymmetry model elucidate the inverse relationship between leverage and market value[9]. They argued that firm has

to issue default free debt to increase firm value. Fama and French conducted regression analysis between debt and tax by controlling information about profitability of firm due to debt. They denounced that argument of debt providing tax benefits. It was inferred that high debt leads to principal agent conflict between stock holders and bond holders signalling negatively on firm value[10].

Chadha and Sharma analysed the impact of leverage of listed Indian companies on different performance parameters of firm. They argued that financial parameters such as return on asset and Tobin's Q were not impacted by leverage. However, return on equity has significant negative correlation with leverage[11]. Gupta et. al. conducted empirical examination of 231 listed firms classified under nine industries in India. They opined that when debt increases, the market value decreases[12].Admati et. al while inspecting reasons for firms have various levels of debt in the capital structure, originated that high levels of debt is source of inefficiency that later leads to distress and default. Thus, suggested that firm belonging to banking sector should possess low leverage to hike the market value[13].

On the other hand, authors' have elucidated significant influence of leverage on market value. Leland and Toft proclaim that firm will be valued higher with issue of long-term debt[14]. Berger & Di Patti concluded that the high leverage in the capital structure will increase cost of debt contributing to the higher valuation firm[15]. Cheng and Tzeng conducted empirical analysis of listed firms of Taiwan to evaluate the effect of leverage on market valuation. They insist that there exists strong influence of leverage to market value, specifically when the firm have superior profits[16].

Nonetheless, the impact of leverage on market value of firm becomes debatable with irreconcilable results. The above discussed researches have been conducted at various time period at various countries. This paper is an attempt to analyse the debt patterns over time and its impact on firm value for listed companies in India. Based on O'Brien proposal, variation within an industry (metal) is considered[17].

Methodology

The study is descriptive in nature. Both time series and cross-sectional data is gathered for the empirical analysis. The leverage over time is analysed to appraise the pattern along with OLS regression model to examine the relation between leverage with market value.

Data Collection: All firms registered and traded in National stock exchange under metal and metal products industry (as classified by CMIE Prowess) at financial year ending 2014-2015 are considered. There were around 100 firms retrieved from CMIE Prowess database out of which four firms (AML steel Limited, EL forge Limited, Hira Ferro Alloys and Viraj forgings Limited) were acquired during considered period of study and hence they are excluded. The firms which outlasted till end of financial year ending 2017-18 are considered for further analysis. Based on the above stated criteria, final sample consists of 96 firms.

The secondary data collected for the study is annual in nature. The market capitalization and book equity value of firms are collected only for the financial year 2017-18 to conduct cross sectional analysis. The debt and total assets during the financial year 2015-16 to 2017-18 is considered for time series analysis.

Research objectives: In view of the traditional trade off theory, the consequence of tax shield provided to firm due to interest deductibility should be positively related to leverage. Hence, the firm's market value should be directly proportional to leverage of firm in optimal capital structure scenario. To identify the pattern of debt and whether various levels of leverage affects value of firm, specifically in metal and metal product industry, an empirical analysis has been conducted on firms that are publicly traded in NSE in India. i. To analyse the leverage of metals and metal products industry in India. ii. To appraise the impact of leverage on market value of the firm categorised under metals and metal products industry in India.

Hypothesis: The study proposes to test the following null hypothesis: i. $H_{01:}$ There is no significant impact of past debt ratios over present debt ratios of the firm in metal and metal product industry. ii. $H_{02:}$ There is no significant impact of financial leverage on market value of the firm in metal and metal product industry.

The rejection of null hypothesis implies the acceptance of alternate hypothesis.

Link between leverage and market value: The business which is profitable provides relatively high returns for equity holders. The returns can be further enhanced by increasing the borrowings. This borrowing contributes to tax shield to the extent of interest paid resulting in inflated profit after tax. However, failure in interest payments along with remittance of principal amount to lenders will lead to financial distress. With the agency and information asymmetry, the crafting strategic decisions are complicated in imperfect capital markets. Thus, the discussion of relation between capital structure and market value becomes a key issue.

The aim of this research is to identify whether financial leverage affects firm value positively or negatively. An attempt is made to evaluate the leverage and its impact on market value of the firms belonging to metal and metal industry in India.

Results and discussion

The debt ratio is computed by dividing debt (both long term and current) by total assets. The debt ratio at the end of financial year 2015-16 is considered to be past debt ratios and at the end

of financial year 2017-18 is considered to be present debt ratios. If the debt ratios are steady over time and vary with respect to firm (cross-sectional variation), there should be a strong positive relationship between firms' present and past debt ratios. On the other hand, if debt ratios vary randomly across both time and cross-sectional, the relationship will be trivial. Hence regression sequentially indicates whether those debt ratios of the firms are expected to revert to average debt ratios over time or not.

The representation of the regression results of past debt ratios over present debt ratios for the 96 firms under the metals and metal products industry is indicated in Figure-2. The trend line depicts positive relationship between present and past debt ratios. Besides, graph shows that the firms which had less or equal to debt ratio of one during 2015-16, have significantly magnified i.e. The debt ratios of all firms in 2015-16 fell below one, except four firms. Contrarily, during 2017-18, all the firms elucidate that debt is over and above one, except three firms.

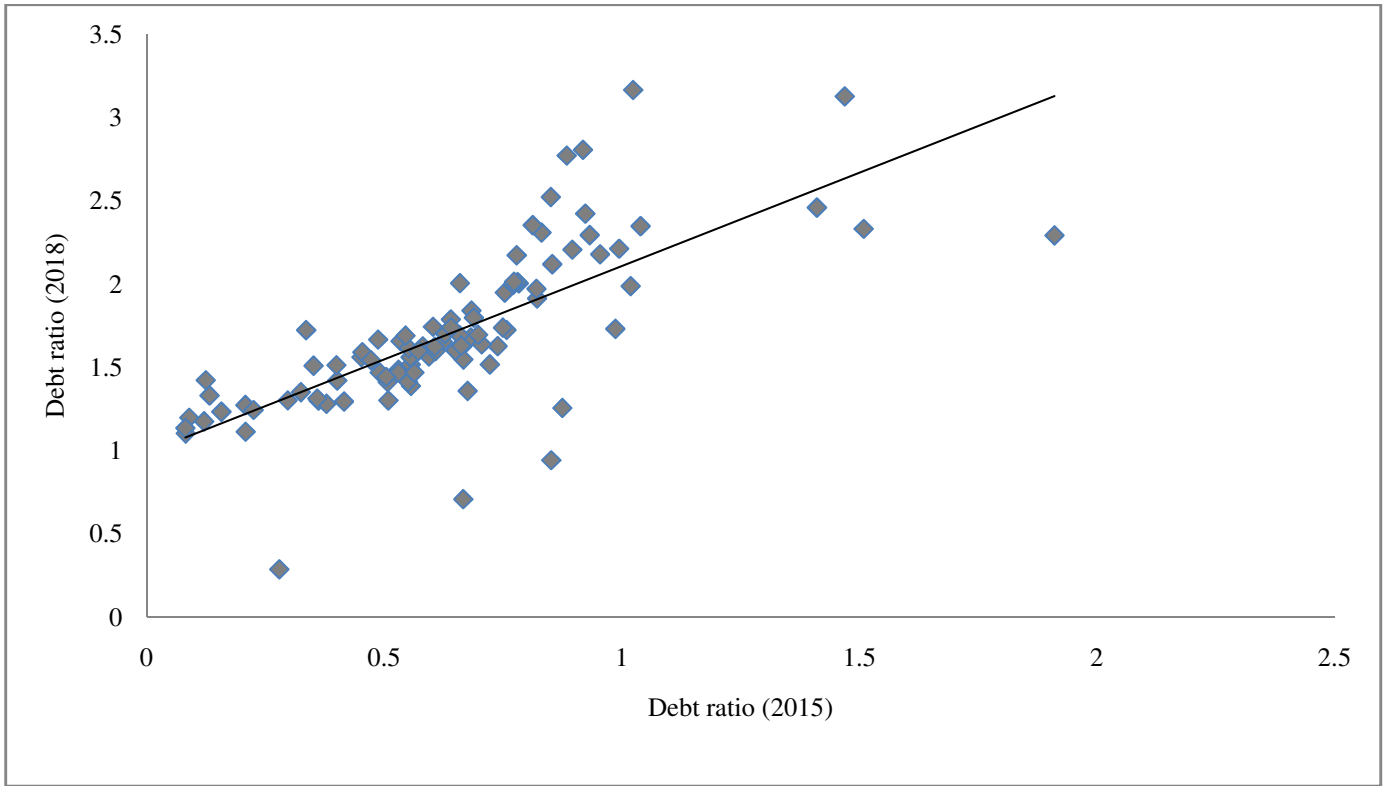

Figure-2: Regression result of past debt ratio over present debt ratio with trend line.

Table-2: Regression result of past debt ratio over present debt ratio.

Pearson's correlation	0.7362
R^2	0.5420
Adjusted R^2	0.5371
Standard Error	0.3194
No. Of Observations	96

	Coefficients	Standard Error	t-Stat	Pvalue
Intercept	0.9846	0.0755	13.0463*	0.0000
D/TA (2015)	1.1210	0.1063	10.5474*	0.0000

***** Significant at 5% significance level.

Regression equation: Debt ratio (2018) = 0.9846 + 1.1210 Debt ratio (2015)

The Table-2 exhibits the regression results where the coefficient of correlation (multiple R) between present debt and past debt ratios is 0.7362. This further confirms strong relation exists between past and present debt ratios. However, positive slope of around 45^0 (beta equal to one) with p value 0.000 indicates debt has continuous upward trend since 2015. Also, the intercept of around one stipulate that many of the firms have debt at least equivalent to equity value by end of financial year 2017-18 and in some cases more than 1.

The t-statistics value is over and above 2, manifests that the null hypotheses can be safely rejected. Adjusted R^2 statistic is 54.20 percent suggesting close relationship of debt ratios. Hence it is concluded that past debt ratios impact present debt ratios of the firm in metal and metal product industry. This is contrary to mean reversion hypothesis which states that firms with low past debt ratios tend to move upwards and firms with high past debt ratios adjust debt ratios by moving downwards. The present trend will have adverse effect on economy due to unsustainable high levels of debt coupled with poor corporate governance practices which comprehensively lead to potential disruption in industry.

In the next part, descriptive statistics of leverage (debt ratio) and firm value (market to book equity value are analysed. Table-3 exhibits the summary of variables of market equity to book equity ratio and debt ratio of 96 firms under metal and metal product industry at the end of financial year ending 2017-18. Even though mean of both variables seems to be equal, there are higher variations noticed in ratio of market to book equity value (range of 19.9619) compared to debt ratios (range of 2.8779). Market to book equity ratio values are positively skewed and leptokurtic in nature. This means that distribution has long tail on right hand side indicating firms over valuation.

The maximum market to book equity ratio is 14.65 for Sundaram-Clayton Ltd. designating most overvalued firm. The minimum market to book equity ratio is -5.30 for Bedmutha Industries Ltd. specifying firm value is either overstated or has poor returns on assets. However, the debt ratio values are almost normally distributed. The maximum debt ratio value is 3.16 for P S L Ltd. signifying more liabilities than assets. The minimum debt ratio value is 0.28 for T T K Prestige Ltd indicating high proportion of firm's asset is funded by equity.

From the previous literatures, it has been identified that firm market valuation should be positively related to leverage due to interest deductibility. According to traditional trade off theory, the leverage is increased until the cumulative tax benefits of debt is completely offset by financial distress. Hence firm having lower leverage accomplishes lower tax benefits resulting in low market to book equity ratio. While the firms that can optimally elevate its leverage will result in higher tax benefits thus receiving high market to book equity ratio.

Table-3: Descriptive statistics of variables 2018.

	MEQ/BEQ	D/TA
Mean	1.6265	1.7025
Standard Error	0.2825	0.0479
Median	1.0571	1.6243
Standard Deviation	2.7680	0.4694
Variance of Sample	7.6617	0.2203
Kurtosis	9.5895	1.5089
Skewness	2.4582	0.5932
Range	19.9619	2.8779
Minimum	-5.3035	0.2846
Maximum	14.6584	3.1625
Sum	156.1480	163.4444
No. Of Observations	96	96

The regression of market to book equity ratios against the corresponding debt ratios at the financial year ending 2017-18 of 96 firms is conducted. The regression results are exhibited in Figure-3. The trend line is depicting inverse relation between market-book equity ratio and leverage.

Furthermore, from the Table-4, coefficient of correlation (Multiple R) between debt ratios and market to book equity ratios is 0.2559. Also, the adjusted R^2 is 5.56 percent advocating obscure relationship. The negative slope coefficient (-1.5092) with p value 0.0118 explains that statistically significant inverse relationship between debt ratios and market to book equity ratios at 95% confidence level. The t-statistics value is over and above 2, which manifest that the null hypotheses can be safely rejected.

Hence it is concluded that debt ratios have negative impact on market to book value of firm in metal and metal product industry which is contrary to traditional trade-off theory. This can be attributed to the fact that market to book value of firm is not only directed by tax benefits achieved through debt but also investor's assessment of future profitable investment opportunities.

Accordingly, it can be ascertained that firm with future profitable investment opportunities which needs to be financed through equity will lower the debt levels besides increasing market to book equity value.

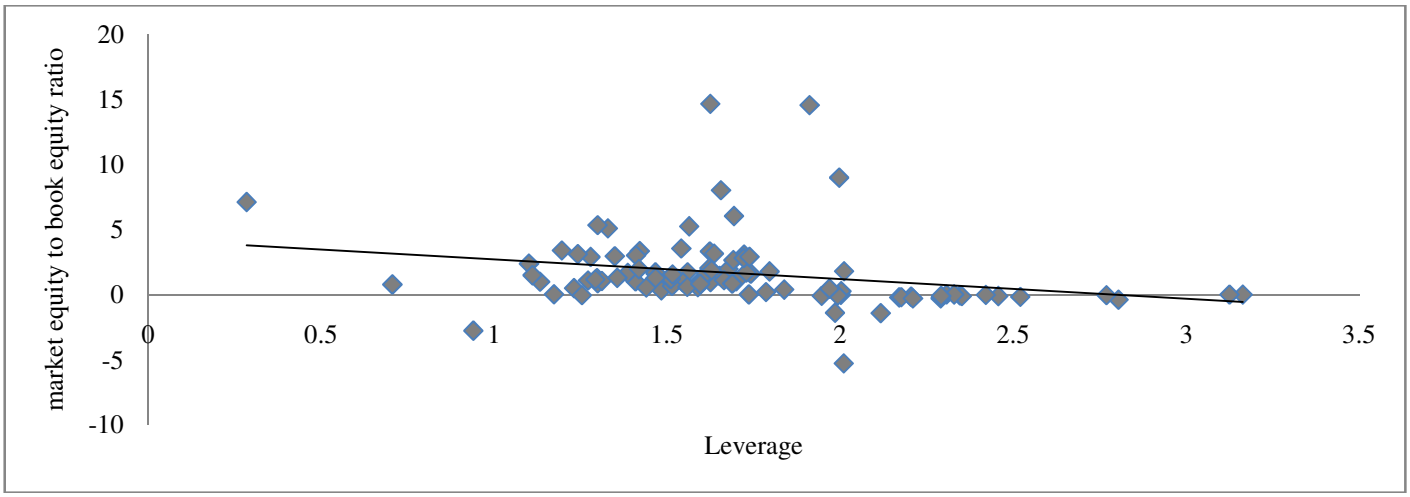

Figure-3: Regression result of market to book equity ratio over leverage with trend line.

Table-4: Regression result of market to book equity ratio over leverage.

Pearson's correlation	0.2559
R^2	0.0655
Adjusted R^2	0.0556
Standard Error	2.6900
No. Of Observations	96

	Coefficients	Standard Error	t Statistic	P value
Intercept	4.1961	1.0380	4.0426*	0.0001
D/TA	-1.5092	0.5879	-2.5670*	0.0118

* Significant at 5% significance level.

Regression equation 1: Market/book =4.1961- 1.5092 Debt ratio.

From the above regression 1 results, the negative slope coefficient value indicates that firm value decreases by more than one and a half times the increase in debt ratios. This specifies that most of firms in metal and metal product industry are facing an unsustainable high debt level which is evident from the dirty dozen list. This makes the metal industry unattractive for the investors who consider it to be high risk firms. In such situations, firms have to forgo new project investments and Upgradation of existing production facilities while having enormous potential.

Conclusion

The study is aimed to appraise the pattern of firms' financial leverage and its impact on market valuation belonging to metals and metal products industry in India. The industry has largely driven by rapid expansion of infrastructure and automobile contributing to growth of India. The 96 firms which existed during 2014- 2015 and outlasted till end of financial year ending 2017-18 are considered for analysis. The patterns of financial leverage over time (time series) and its effects on market value (cross sectional) is identified by employing ordinary least square (OLS) regression technique.

The result reveal that leverage of firms do not revert to average debt ratios over time in metals and metal products industry instead obsessed with accumulated high unsustainable debt. This is in counter with Leland and Toft assumption that firm replaces the retired debt over time with same characteristics[14]. The metal and metal product industry is highly levered and even one instance of negative net profit will lead the firm to debt trap which has been witnessed in all cases of steel firms in dirty dozen list furnished by Reserve Bank of India. The reason for

negative profit was mainly induced by dip in steel price and global recession affecting the export; hence, the lenders instead of flipping old debt by new debt should have identified ways to increase domestic demand of the product accompanied by good corporate governance. In such scenario, the best strategy is to optimize the existing production facilities rather venturing into new projects. The debt trap of the firms had grievous adverse systemic impact on Indian economy since most of the lenders belong to nationalised bank category.

Contradicting to traditional trade off theory, the leverage has negative effect on firm value. This is explained by the fact that despite the tax benefits of debt, cost of future financial distress will offset such benefits. Also, investor's valuation of firm profitable investment in future results in high market to book equity value. Since the future investments are intangible assets, it can be funded only through equity, thus reducing debt in capital structure. Such dual effect clearly explains the inverse relationship of leverage on Market valuation.

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