Capital structure puzzle: the interrelationship between leverage, taxes and other micro economic factors

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Abstract:

The capital structure puzzle still remains unsolved. Every year there are many incidences of firms, reporting very high and risky levels of debt ratios. Since debt has tax advantages over other sources of capital, this paper employs simulated marginal tax rate (MTR) and its variants to study the tax effects on leverage ratios of profitable Indian companies. The paper analyses three different measures of leverage; debt to asset (DAR) ratio, incremental debt to total assets ratio (DINC) and debt to capital employed (DAR1) ratio. For each measure of leverage ratio, different specifications based on four variants of MTR have been considered. The results confirm significant tax effects on debt ratios of profitable Indian companies. It was found that DINC is highly autoregressive and independent variables considered in this paper explain around 55% of the variation in DAR1. The study suggests a new measure of retained earnings (ERTA).

Key words: Marginal tax Rate, debt, leverage, capital structure, tax, incremental debt, debt to equity ratio, capital employed, corporate finance, financial distress

JEL Codes: G32, G38

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1. Introduction:

In the area of corporate finance, capital structure decision is one of the core functions of a financial manager. It is one of the most important decisions which is irreversible, has long term impact and thus, has its bearing on the survival of the company. Modigliani and Miller's (Modigliani & Miller, 1958) prominent work gave much popularity to the issue of corporate capital structure. Since then commendable research work has been done in this field by countries all over the world, the seminal papers in this regard are that of (DeAngelo & Masulis, 1980), (Shum, 1996), (Mackie-Mason, 1990), (Shevlin, 1990), (Graham, 1996a) to name a few.

Capital Structure choice mainly comprises of debt or equity. The basic difference between the two arises out of the nature of cash flow claims that each type of financing demands. Other differences flow from the tax and legal laws of different countries. Each source has its set of advantages and disadvantages. Tax deductibility of interest might sometimes reduce the cost of debt to a great extent. This feature makes it attractive in comparison to equity and other sources of finance. But the accompanying threat of bankruptcy reduces its magnetism; it furthers a conflict of interest between shareholders and managers. Apart from these, managers' discretion and company policies in decision making may sometimes play a major role in the choice of particular source of finance. Owing to this fact, capital structure still remains a puzzle.

Till the beginning of 1990's, researches could not empirically support the hypotheses that there exists a relationship between taxes and leverage. During 1990's some work began to show; following which, now many researchers in other countries have identified significant impact of taxes on debt. The common feature of most of these studies is that they have used marginal tax rate (MTR) proxy to understand the debt movements. The simulated MTR based on Graham - Shevlin methodology is in fact considered to be one of the best proxies for marginal tax rate till now (De Mooij, 2011), (Graham, 1996b).

In India, some work has emerged recently on this topic. The studies focus on identifying the determinants of the corporate financial structure. In these studies tax is only one of the

determinants of capital structure and has been included by way of not so efficient proxies[1]. The results reported are mixed.

To capture the tax effects, we have used simulated marginal tax rates based on Graham - Shevlin methodology (Graham, 1996a). The rates have been calculated using MATLAB code (allowing for 10,000 simulations), developed in (Sinha & Bansal, 2012). The authors have developed the MATLAB codes for two algorithms to calculate marginal tax rate. The algorithms based on Graham – Shevlin methodology have been modified to incorporate the Indian tax code and rules such as minimum alternate tax (MAT) and loss carry forward. Both the algorithms are similar to each other with the difference only, in the part of series being simulated. In Algorithm1 the whole taxable income series is simulated and then the tax rules are applied to calculate marginal tax rate. In Algorithm 2 only the future stream of taxable income series is simulated. Thus we have used four variants of marginal tax rate based on difference in algorithms and underlying series on which tax rates have been calculated.

Another common issue in studies pertaining to leverage is identifying the appropriate measure of leverage. Researchers have proposed that debt to equity ratio is not an efficient measure of leverage, as it may contain the cumulative effects of decisions taken in the past. Instead they have proposed to study incremental financing decisions. Jeffrey K. Mackie-Mason (Mackie-Mason, 1990) is one of the early proponents of this idea and employs a zero-one event (choice of debt over equity) to study leverage changes. (Graham, 1996a) discusses in detail how debt equity ratio leads to the problem of endogeneity and uses change in debt deflated by lagged market value of firm as a measure of leverage. (Alworth & Arachi, 2001) uses change in debt to lagged value of total assets ratio for the study. (Welch, 2011) argues that debt to asset ratio is an inappropriate measure to capture changes in leverage because total assets are inclusive of non financial liabilities. As a result non financial liabilities are treated same as equity especially when the ratio is to be used for capital structure studies. Instead, the author proposes the use of debt to capital employed ratio in such studies. Hence based on the existing literature and to enable comparison in Indian context, this paper employs three measures of leverage by considering debt or incremental debt in the numerator and total assets (net of revaluation reserve and miscellaneous expenditure not written off) or capital employed in the denominator.

[1] In (Graham, 1996b)the author has tested various proxies for marginal tax rate and found simulated marginal tax rate to be the best proxy for true marginal tax rate.

We suggest a new measure of retained earnings, excess return on total assets (ERTA), which has not been used earlier in any study as per our knowledge. Unlike profitability, retained earnings are a direct measure of additional internal funds available in an organization. According to the pecking order theory managers prefer debt, only after retained earnings are exhausted; as a consequence this measure is expected to influence the issuance of debt directly.

The present study attempts to fill the gap in Indian studies by modelling the debt- tax relationship of 234 profitable Indian companies over the period of 22 years, using various tax variables and other control variables. The results indicate significant tax impact on leverage decisions of the firm.

Rest of the paper proceed as follows. Section 2 reviews the literature and section 3 states the significance of the study. Section 4 discusses the model, variables and hypothesis. Section 5 presents the results and observations. Section 6 presents the findings and recommendations followed by limitations and scope of future research in section 7 and conclusion in section 8.

2. Review of literature:

Since the development made by (Modigliani & Miller, 1958), many researchers have tried to prove the debt tax relationship by using numerous methodologies but, consistent results could not be achieved before the end of 1980's. (Myers, 1984) mentions the need for the study that may be able to prove the relationship between taxes and debt policy of the firm. The main reasons identified behind the inability to prove the relationship were lack of variation in time series data of tax rates and non availability of appropriate tax proxy. The following review shows how the debt tax relationship has been tested and hence, research on capital structure has evolved over a period of time.

(DeAngelo & Masulis, 1980) is one of the commendable contributions to the field of knowledge. The authors develop an optimal leverage model of capital structure and claim that presence of non debt tax shields or debt substitutes leads to a unique optimal leverage decision by each firm.

(Auerbach, 1985) and (Barclay, Smith, & Watts, 1995) takes the lead from Modigliani and Miller irrelevance propositions. (Auerbach, 1985) focuses on the information asymmetries and its impact on the issue – investment decisions. (Barclay, Smith, & Watts, 1995) suggests that the form of investment opportunities have an impact on the leverage ratios and finds out that tangibility is positively related with leverage. The author thus attempts to explain the reason behind corporate financing choices by firms through the problem solving methodology.

(Shum, 1996) studies the provincial and time variations in corporate tax rate in Canada and uses the tax rates to study an impact on debt policy of Canadian firms. The author finds debt asset ratio to be highly autoregressive.

(Graham, 1996a) addresses various shortcomings highlighted by (Myers & Majluf, 1984), (Mackie-Mason, 1990), (Shevlin, 1990) and (Scholes & Wolfson, 1992). The author explicitly calculates company specific marginal tax rate for the first time, by including investment tax credits and minimum alternate tax features to methodology developed by (Shevlin, 1990). Since its development, the methodology has been used by many authors to study debt tax relationships in different countries. Till now it is now considered to be the most appropriate proxy for true Marginal tax rate (MTR) (Graham, 1996b). The study has been conducted on 10,000 compustat firms and the results show that 15% of the debt policy changes could be explained by the tax effects.

(Alworth & Arachi, 2001) examines the role of taxes on the use of debt by analysing incremental financial decisions, the author analyzes panel data on 1054 Italian firms to conclude that irrespective of the vast differences in the structure of the financial systems, taxes are important for corporate financial decisions, the author identified significant cross sectional tax effects on debt policy.

(Bhaduri, 2002) seeks to analyze various measures of debt depending upon the maturity structure to identify the factors influencing the choice of capital structure. The results confirm that the presence of restructuring costs in attaining the optimal capital structure is an important consideration. The author tests the dynamic model and has employed factor analytic technique to conduct the analysis. The results suggest that the factors of growth, cash flow, size, product and industry characteristics influence the optimal capital structure choice. The study identifies that the speed of adjustment is higher towards the short term borrowing.

(Bernasconi, Marenzi, & Pagani, 2005) also, finds a significant relationship between tax changes and debt. The author by undertaking a comparative analysis of 3 different categories of non debt tax shield introduced in Italy during 1995 and 1999. The study employs the methodology suggested by (Mackie-Mason, 1990) .

(Gill & Mathur, 2011) investigates the factors influencing the financial leverage of the Canadian manufacturing and service firms . The study employs correlational and non experimental research design to conduct the analyses. Results imply that collateralized assets, profitability, effective tax rate, size and growth opportunities are significant in determining the corporate debt level.

(Kunieda, Takahata, & Yada, 2012) tests the model of debt and taxes using Graham - Shevlin methodology on Japanese firms, they also finds a significant relationship between the two.

3. Significance of the study:

The main focus of capital structure decision is to decide the optimal mix of debt and equity. Therefore, the expected outcome of this decision is the determination of the capital structure that maximises the value of the company by minimizing the weighted average cost of capital.

It is well known that the tax system creates a bias towards debt when compared to equity by allowing interest to be tax deductible. This tax advantage of debt reduces the cost of borrowing on debt. Hence, debt proves to be a cheaper source of finance. The debt bias may result in serious implications for corporate and the economy. Companies may indulge in excessive debt issuance without considering the risk factors associated with it, which may lead to wasting of resources along with the risk of bankruptcy. (Majumdar & Sen, 2011) observes that companies in India have high debt to equity ratio, whereas in the west the ratio moves around a number which is little more than half of nominal value of equity.

Recent financial crises, international trade and other important developments in the field of capital structure point towards the danger to economy (De Mooij, 2011). This issue is now a concern for authorities worldwide.

Therefore, keeping in mind India's current state of corporate debt it becomes worthwhile to find out that, whether high debt ratios in India can be explained by debt biasness?

As important as the question, are the measures and methods used to counter it. Since decades, continuous efforts are being put, to identify the correct measure of leverage to study the debt – tax relationship. Researchers record contradictory results and thus, no consensus has been achieved on this issue till now. It is very important to conduct research under correct set of realistic assumptions, and employ correct and reliable measures of dependent and independent variables, to draw meaningful conclusions from results. As far as possible, all the relevant factors should be carefully identified to achieve the most precise results.

Hence, through our study we strive to address these issues and make an effort to answer the question, mentioned above, in the most meaningful way.

4. The Model:

On the basis of existing theories and the research work undertaken the relationship between tax and debt can be expressed as follows.

Debt = f (tax, risk, credit worthiness, free cash availability, retained earnings, growth, size, target /optimum debt ratio)

Each factor has been discussed in detail below:

4.1. The Dependent variable

Debt or leverage:

Studies have used various measures of leverage. The most common are debt as a proportion of equity, as a proportion of book value of debt and market value of equity, or as a proportion of total assets. There are various variants of the numerator also, these are first difference in the book value of debt, book value of short term loan, long term loan, loan taken from bank etc:

The debt to equity ratio has been criticized in the literature for carrying over the effects of past decisions and thus researchers have proposed the use of incremental financing to

undertake the analysis (Mackie-Mason, 1990), (Graham, 1996a). Depending upon the data availability, the specific objective and the recent developments the following three measures of debt have been used in our study.

1) Change in debt to asset ratio (DAR): this measure incorporates not only change in debt but also change in total assets, here we assume that a firm maintains a target debt to asset ratio to keep risk under control.

2) Incremental debt (first difference in debt) to lagged value of total asset ratio (DINC): this ratio has also been employed by (Alworth & Arachi, 2001). This is more suitable under the assumption that corporate does not have any target ratio, but we feel this ratio may also carry the effects of past decisions as we use the lagged value of total assets.

3) Change in debt to capital employed ratio (DAR1): This is calculated as the first difference in the ratio of debt to capital employed, proposed by (Welch, 2011)

The following graphs show the behaviour of corporate debt in India:

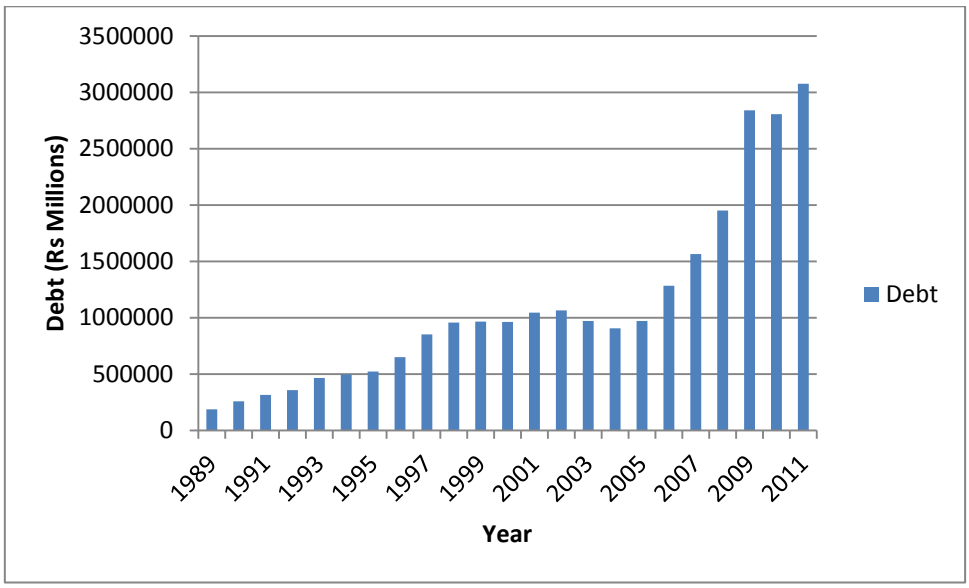

Fig 1: Graph showing total debt employed by the companies used in the study for analysis.

A simple look at graph 1 will give us an impression that the debt levels are rising over a period of time except during some periods (it has been discussed in the data section). So we may assume that in India debt levels are quiet high and might be concerned about the riskiness involved. But it would be wrong to come to a conclusion on the basis of the study of

debt figures in isolation. Thus we have plotted 3 other graphs to understand how debt has behaved as a part of different measures of total capital.

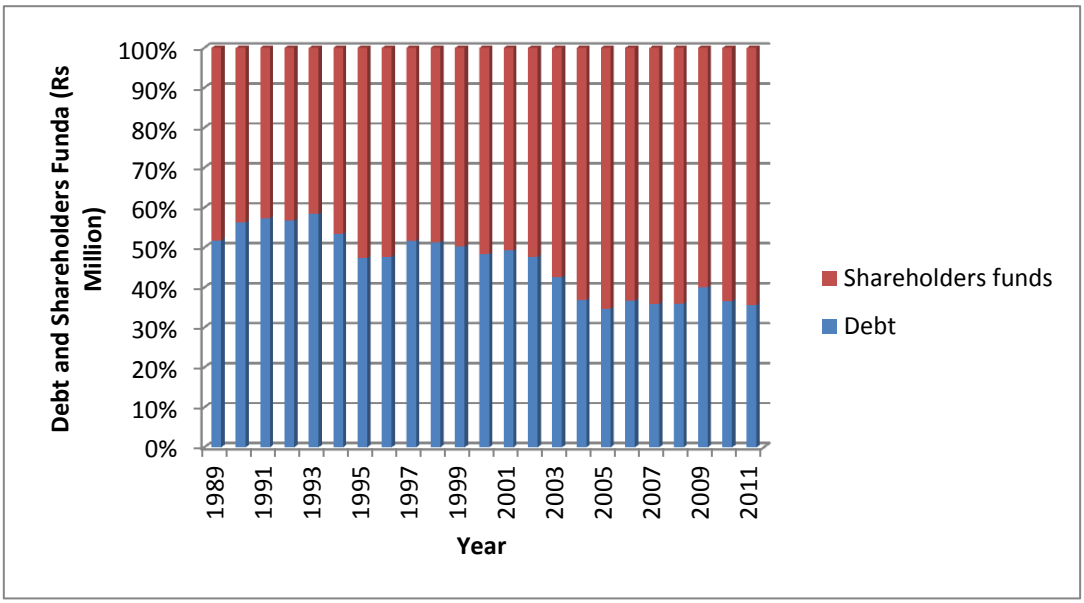

Fig 2: Graph showing the proportion of debt and shareholder's funds in capital employed for all the companies taken together

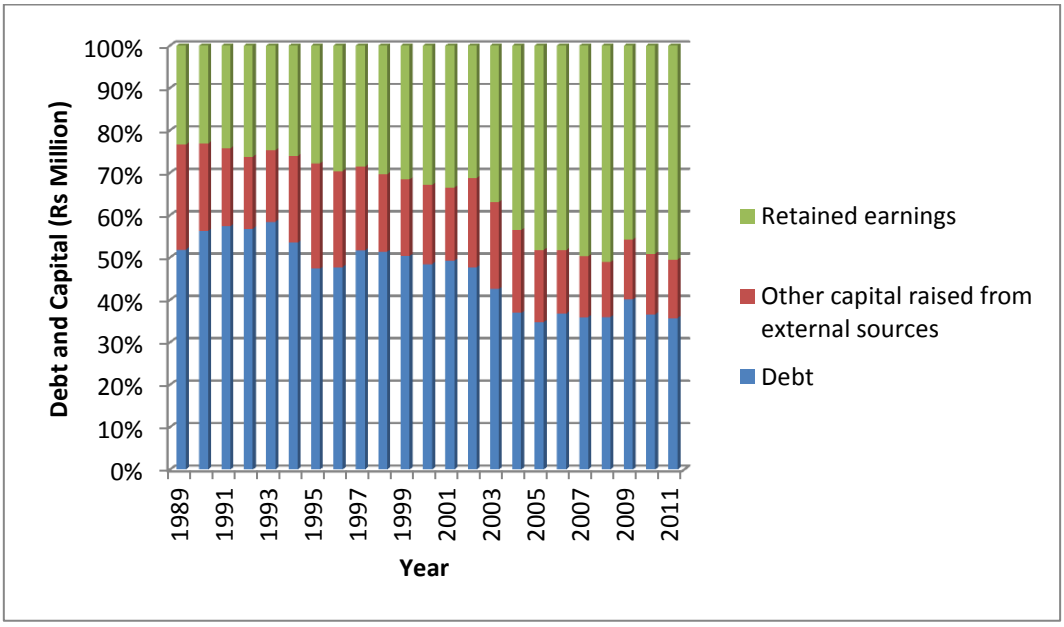

Fig 3: Graph showing the proportion of debt, capital raised from external sources[2] (refer footnote 2) and retained earnings in the total capital employed.

[2] Here total capital raised from external sources is taken as the sum total of equity, preferred stock and debt.

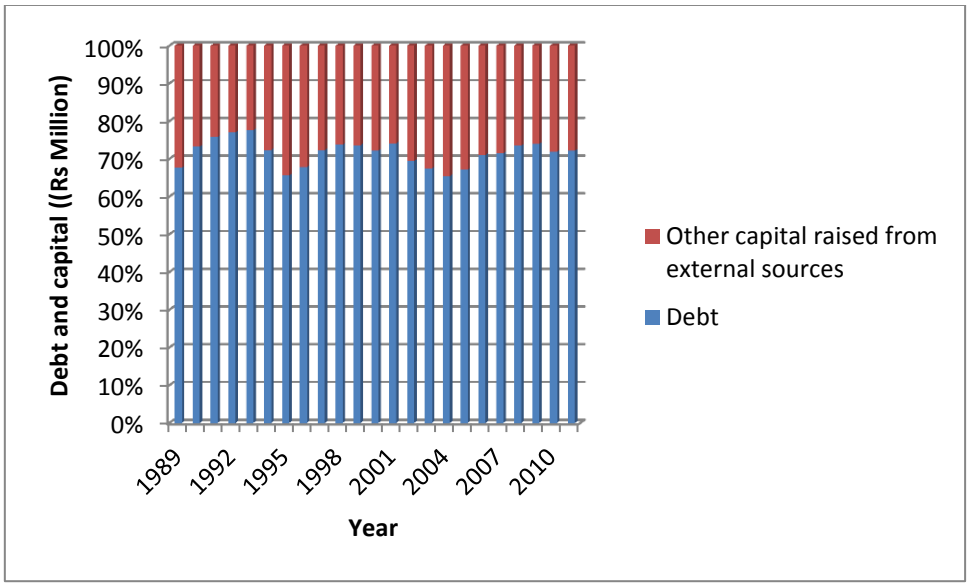

Fig 4: Graph showing the proportion of debt and other sources in the total capital raised from external sources.

Total Capital can be divided in two parts, one that is created through external sources such as debt, equity and preferred capital and the other that is created through internal source in the form of retained earnings. Thus on the basis of data availability and definitions given in CMIE Prowess, we have attempted to study debt as a proportion of total capital (fig 2 & 3) and as a proportion of total capital raised from external sources only (fig 4) .

Figure 2 shows a declining proportion of debt when compared with shareholders funds over a period of time. From 50% it has reduced to around 35% in 20 years time, Some light on above observations can be thrown by dividing shareholders funds into retained earnings and other capital raised from outside sources. This is shown in figure 3. Here we find that the proportion of retained earnings has increased from 25% to 50 %, this shows the preference of managers for retained earnings (when available) and appears to be one of the the reasons behind declining debt proportion in total capital employed; this is in accordance with pecking order theory. It is hard to say that the next preference of managers is debt. This information flows from figure 4, where we observe that the proportion of debt in the total capital raised from outside sources is maintained around 70% over a period of time. This analysis brings out two important indicators affecting leverage ratios, one is retained earnings and the other one is average debt ratios. These are expected to affect the leverage ratios significantly.

4.2. Explanatory variables:

4.2.1 Tax variables:

i) Marginal tax rate (MTR):

(Graham, 1996b) analyses various proxies for true MTR, these are taxable income dummy, net operating loss dummy, trichotomous variable, statutory tax rate etc:. The author aims to find and analyse other easy to calculate alternatives for simulated MTR due to the complexity involved in its calculation. Author concludes that simulated rate is the best proxy for the MTR followed by statutory tax rate, taxable income dummy, and the trichotomous variable. The problem with the tax variable is that it is highly endogenous in nature; (Graham, Lemmon, & Schallheim, 1998) proposes to use forward looking before financing MTR to solve this issue.

In this paper MTR is calculated using the MATLAB code developed in (Sinha & Bansal, 2012). The MATLAB code is developed for algorithms based on the Graham – Shevlin methodology. (Shevlin, 1990) forecasts future incomes based on managers' expectations. The author proxy manager's expectation by suggesting that pre tax income follows random walk with drift and thus, generates simulated future pre tax income to integrate loss carry back and carry forward feature. (Graham, 1996a) elaborates on the algorithm to integrate alternate minimum tax and investment tax credits to arrive at MTR. (Sinha & Bansal, 2012) modifies the above algorithm to incorporate Indian tax rules regarding loss carry forward and minimum alternate tax and develops MATLAB code undertaking 10,000 simulations to arrive at the final figure of MTR. The authors suggest an alternate algorithm. Both the algorithms are similar to each other with the difference only in the part of series being simulated. In Algorithm1 the whole taxable income series is simulated and then the tax rules are applied to calculate marginal tax rate. In Algorithm 2 only the future stream of taxable income series is simulated.

Thus we have used four variants of MTR in our study. These variations are based on two differences. One difference is based on the type of underlying series used to calculate MTR and other one on the type of algorithm (Sinha & Bansal, 2012). Thus four measures of MTR are MTRA1, MTRA2, MTREA1 and MTREA2. The first two are based on profit before taxes and the other two are based on earnings before interest and taxes. 1 & 2 signifies the

type of algorithm used to calculate MTR. We have used one year lagged values of MTR for the purpose of our analyses. Each MTR is used in a separate model.

Firms facing high MTR are expected to have higher levels of debt. This hypothesis is based on the trade off theory of capital structure.

ii) Non debt tax shield (CNDTS):

Presence of deductions such as depreciation and amortization have an effect of reducing the tax burden on the firm and thus, are expected to influence debt issuance (DeAngelo & Masulis, 1980) .The variable has been calculated by dividing the first difference in depreciation by lagged value of total assets. As explained above, the presence of non debt tax shield have an effect of reducing the marginal tax rate, thus firms having high levels of NDTS are expected to have lower levels of debt.

iii) Other tax variables:

To expect each manager to make decisions based on MTR is a very unrealistic assumption Graham (1996a). Thus based upon the availability of data, few other tax variables have been included in the model to check and separate their autonomous effect, if any. These are tax difference, taxable income dummy and effective tax rate. These variables have been used earlier in different studies.

Tax difference is calculated by deducting MTR from statutory tax rate. Therefore, if managers consider statutory tax rate to take the decision, higher debt figures would be observed for companies having larger tax differences. We have considered four measures of tax difference, TDIFA1, TDIFA2, TDIFEA1, TDIFEA2 each based on a separate MTR. Each tax difference variable is used in a separate model along with the relevant MTR. We have used the lagged values of this variable.

Taxable income (TI) is a dummy that takes a value 1 if there are profits before tax and takes a value 0 if there are losses. Many studies have used effective tax rate (EFFT) as a proxy for statutory tax rate. The common measure used for EFFT is taxes paid by profit before taxes. We have used the lagged values of both of these variables. Both TI and EFFT are expected to have positive coefficients.

4.2.2. Other control variables:

To understand the influence of tax on debt, it is important to test and separate the effect of other variables which have an apparent influence on debt figures of companies. Thus following control variables have been considered in the study:

i). Financial Distress (BRISK): The trade off theory suggests that there are both advantages and disadvantages attached to the issuance of debt. Beyond a certain level, debt becomes risky as default in the payment of principal or interest may put the company in financial distress and increase the probability of bankruptcy. Long back Altman (1968) calculated a discriminant function predictor of bankruptcies, ZPROB. (Graham, 1996a) and (Alworth & Arachi, 2001) have used its variant, BRISK in their study to measure the costs of financial distress. Brisk is calculated as total assets divided by the sum of 3.3 times EBIT, sales, 1.4 times shareholder's funds and 1.2 times working capital. We have also used the same measure in our study. Companies experiencing continuous losses or financial distress are expected to issue less or no debt due to their inability to pay interest and decreasing creditworthiness.

ii). Excess return on total assets (ERTA): This is a measure of retained earnings. Pecking order theory suggests that the managers follow an order when they need new capital. It suggets that their first preference is retained earnings, followed by debt and then equity. Retained earnings are understood to be an easy and cheap source of finance because they are free from issuance costs. Thus, its impact on new debt issue is obvious and known. In most of the studies its effect is captured within profitability factor. But higher profits do not imply higher retained earnings. Moreover, there are different schools of thought on profitability factor, and accordingly profitable firms may be found to have higher or lower levels of debt. Thus it is very important to test the effect of retained earnings separately. Its importance is also highlighted in case of India through Figure 3 section 4.1 above. The measure of retained earnings that we have used in our study has not been used earlier in any research as per our knowledge. It is calculated by first deducting dividend from profit after taxes and then dividing the remainder by total assets. The relationship of retained earnings (unlike profitability) with debt is obvious; firms having higher levels of retained earnings are expected to have lower levels of debt

iii). Deviation from average debt to asset ratio (DADAR): Study of capital structure changes in a firm over multiple periods leads to dynamic trade off theory. According to it a firm tries to maintain some target debt to asset ratio, but maintaining such a ratio is costly for a firm due to the presence of restructuring costs, tested by (Bhaduri, 2002) for India also. (Kane, Marcus, & McDonald, 1984) and (Brennan & Schwartz, 1984) for the first time proposed that firms have a range or debt corridor within which its debt ratios would fluctuate. This is also

visible in figure 4 above; wherein the ratio is moving around 70%. Thus deviations from this ratio are expected to affect capital structure decisions. Here we have considered the deviation from average debt to asset ratio (DADAR) and deviation from average debt to capital employed ratio (DADAR 1) to capture this effect (also refer Figure 3 section4.1). DADAR is used in the model which contains DAR and DINC as the dependent variable and DADAR 1 is used in the model containing DAR 1. Firms having debt ratios higher than the average ratios are expected to issue less debt.

iv). SIZE (CSIZ): Capital requirements vary depending upon the size of operations. Size definitely impacts the amount of funds required by the business but it may not necessarily affect debt ratios. Thus this variable may or may not affect the particular capital ratio. The two most commonly used measures of size are log of sales and log of assets. We have measured its effect through log of assets. If it is found significant; this variable is expected to have a positive coefficient.

v). Growth opportunities (GRW) : Growing firms or firms having higher growth opportunities would require greater amount of funds but this may or may not trigger debt issuance. The new projects may be financed through any source depending upon the riskiness of the project. It may not be a wise decision to finance a very risky investment through a source entailing fixed payment. So to assess its impact in India we have included this factor in our study. This factor is measured as percentage change in sales each year. Growing firms may or may not have higher debt ratios.

vi). Collaterability (COL): This factor reflects capability of the business to support additional debt with fixed assets which can be kept as collateral security. This factor stems from the agency theory of debt, it implies that companies which have higher assets have low agency cost of debt. In addition these companies are able to generate higher credit worthiness and thus, are expected to have higher debt. In this study it is measured as change in fixed assets divide by lagged value of total assets. It is expected to have a positive coefficient.

vii). Free Cash Flow (FCF): Presence of free cash flows suggest abundance availability of internal capital, hence according to the pecking order theory we expect companies, generating high levels of free cash flow regularly, to have lower levels of debt. It is measured as Total of cash and non committed bank balance, whole divided by total assets.

Based on the dependent and the independent variables discussed we have constructed 12 models to test various objectives. Under each dependent variable, there are four specifications

A, B, C and D. Models are differentiated on the basis of variants of MTR and respective tax differences (TDIF). Here we are presenting four models A, B, C, D with the dependent variable DAR or DINC or DAR1. Most of the right hand side equation (independent variables) would remain same only DADAR would be replaced by DADAR1 in model with DAR1 as dependent variable respectively.

$$DAR_{it} / DINC_{it} / DAR1_{it}\,(A) = C + B_1CNDTS_{it} + B_2MTRA1_{it} + B_3TDIFA1_{it} + B_4TI_{it} + B_5EFFT_{it} + B_6ERTA_{it} + B_7DADAR_{it}/DADAR1_{it} + B_8CSIZ_{it} + B_9GRW_{it} + B_{10}COL_{it} + B_{11}FCF_{it} + B_{12}BRISK_{it} + E_{it} \quad (1)$$

$$DAR_{it} / DINC_{it} / DAR1_{it}\,(B) = C + B_1CNDTS_{it} + B_2MTRA2_{it} + B_3TDIFA2_{it} + B_4TI_{it} + B_5EFFT_{it} + B_6ERTA_{it} + B_7DADAR_{it}/DADAR1_{it} + B_8CSIZ_{it} + B_9GRW_{it} + B_{10}COL_{it} + B_{11}FCF_{it} + B_{12}BRISK_{it} + E_{it} \quad (2)$$

$$DAR_{it} / DINC_{it} / DAR1_{it}\,(C) = C + B_1CNDTS_{it} + B_2MTREA1_{it} + B_3TDIFEA1_{it} + B_4TI_{it} + B_5EFFT_{it} + B_6ERTA_{it} + B_7DADAR_{it}/DADAR1_{it} + B_8CSIZ_{it} + B_9GRW_{it} + B_{10}COL_{it} + B_{11}FCF_{it} + B_{12}BRISK_{it} + E_{it} \quad (3)$$

$$DAR_{it} / DINC_{it} / DAR1_{it}\,(D) = C + B_1CNDTS_{it} + B_2MTREA2_{it} + B_3TDIFEA2_{it} + B_4TI_{it} + B_5EFFT_{it} + B_6ERTA_{it} + B_7DADAR_{it}/DADAR1_{it} + B_8CSIZ_{it} + B_9GRW_{it} + B_{10}COL_{it} + B_{11}FCF_{it} + B_{12}BRISK_{it} + E_{it} \quad (4)$$

Where:

i = 1 to 234 (cross sections (firms))

t = 1990 to 2011 (22 time periods)

$$DAR = \Delta\left(\frac{Debt}{Total\ assets}\right)$$

$$DINC = \left(\frac{\Delta\ Debt}{Lagged\ value\ of\ total\ assets}\right)$$

$$DAR1 = \Delta\left(\frac{Debt}{Capital\ Employed}\right)$$

$$C = Constant$$

$$CNDTS = \left(\frac{\Delta\ Depreciation}{Lagged\ value\ of\ total\ assets}\right)$$

$$MTRA1 = Marginal\ tax\ rate\ based\ on\ profit\ before\ taxes\ and\ Algorithm1$$

$$MTRA2 = Marginal\ tax\ rate\ based\ on\ profit\ before\ taxes\ and\ Algorithm2$$

$$MTREA1 = Before\ financiang\ marginal\ tax\ rate\ based\ on\ earnings\ before\ interest\ and\ taxes\ and\ \ Algorithm1$$

$$MTREA2 = Before\ financiang\ marginal\ tax\ rate\ based\ on\ earnings\ before\ interest\ and\ taxes\ and\ \ Algorithm$$

$$TDIFA1 = Statutary\ tax\ rate - MTRA1$$

$$TDIFA2 = Statutary\ tax\ rate - MTRA2$$

$$TDIFEA1 = Statutary\ tax\ rate - MTREA1$$

$$TDIFEA2 = Statutary\ tax\ rate - MTREA2$$

$$TI = Dummy, takes\ a\ value\ 1\ if\ profit\ before\ tax\ are\ positive$$

$$EFFT = \frac{(Taxes\ Paid}{Profit\ before\ tax)}$$

$$ERTA = lagged\ value\ of\ \frac{(Profit\ after\ tax - dividend\ paid}{Total\ assets)}$$

$$DADAR = Lagged\ deviation\ from\ average\ debt\ to\ asset\ ratio$$

$$DADAR1 = Lagged\ deviation\ from\ average\ debt\ to\ capital\ employed\ ratio$$

$$CSIZ = \Delta(Log\ of\ total\ assets)$$

$$GRW = \frac{(Current\ year\ sales - last\ year\ sales}{Last\ year\ sales)}$$

$$COL = \frac{(\Delta\ Fixed\ assets}{Lagged\ value\ of\ total\ assets)}$$

$$FCF = Lagged\ value\ of\ \frac{(Cash + Non\ committed\ bank\ balance}{Total\ assets)}$$

$$BRISK = \frac{Total\ assets}{\{3.3\ Earnings\ before\ interest\ and\ taxes\ + Sales + 1.4\ Shareholder's\ funds\ + 1.2(Working\ capital)\}}$$

$E = error\ term$

5. The Data and Research methodology:

Data for the sample has been collected form CMIE Prowess. CMIE contains financial data on around 20,000 domestic Indian companies. The data is available from 1989 onwards on quarterly-annual basis. We have extracted the relevant data from annual financial statements of companies.

In our study, we have considered all those non financial manufacturing companies for which uninterrupted data for the period 1989-2011(23 years) is available. Initially 434 companies were shortlisted for the analysis. The selection was based upon 3 criteria.

1) Profit before tax series of the company should be normally distributed;

2) Data for all the indicators should be available from 1989-2011.

3) The companies should be profitable on an average over the period of 1989-2011.

After deducting the companies with missing values we were left with 234 companies. As per the third condition, we have undertaken analysis for only those companies for which the 23 year average of profit before taxes figure was positive. Throughout the existing literature, we found profitability to be one of the important determinants of leverage. Generally, profitability factor bears a negative coefficient indicating that higher are the profits, lower are the leverage ratios. Although the results confirm to the trade off theory, but as per our understanding the relation between tax and debt may differ in profitable and loss making companies. Like we make a distinction between financial and non financial companies due to different tax treatments, similarly it is important to separate profitability effect to test the debt tax relation in different companies.

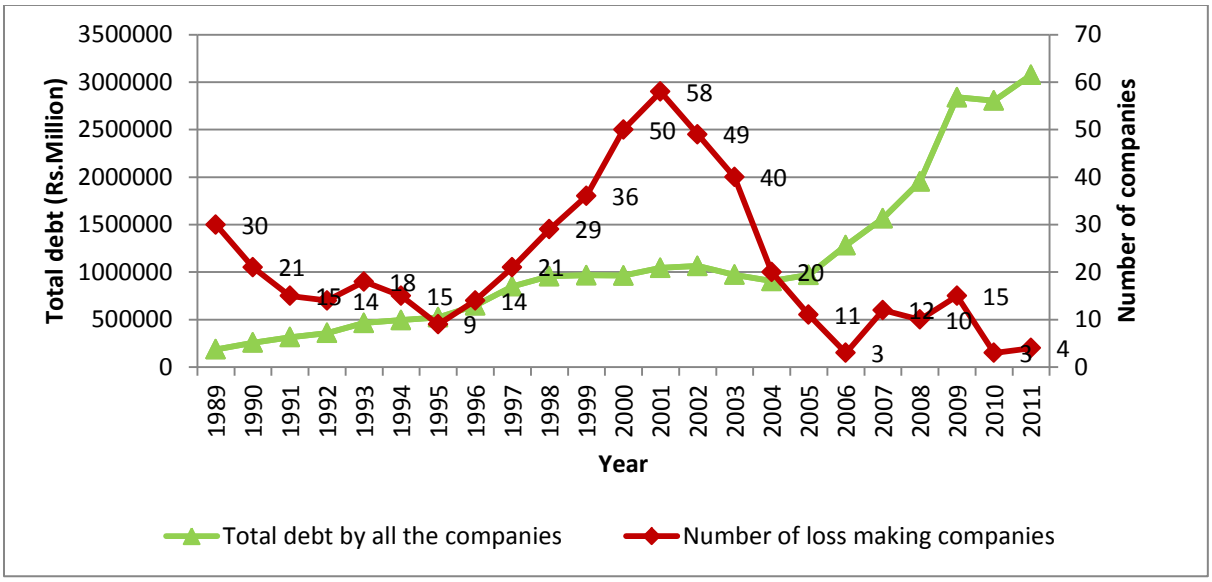

Figure 5: Chart showing total debt and number of loss making companies from 1989 to 2011.

We propose that while studying the relationship between tax and debt we should undertake separate analysis for profitable and loss making companies. Figure 5 throws some light on this. The graph depicts the movement of total debt of all the 234 companies with the number of companies reporting loss (loss before tax) each year. Let us divide the total time in three periods, one from 1989 to1995, second from 1995 to 2001 and the third from 2004 to 2011. During the first period when number of loss making companies was consistently decreasing, debt was increasing at a consistent rate. During the second period, number of companies reporting loss first increased and then decreased sharply, during this phase debt was increasing but at a very slow pace. After 2002 it started decreasing, again at a very low rate. During the years 1999-2005, the rate of change in debt ranged from .33% to 8% and thus debt sometimes seems to remain constant in the second period. In the third period companies reporting loss remained below 20 and there was a steep rise in the total debt employed by the company.

The basis for testing debt tax relationship is that debt has a tax advantage. We propose that a company which is in losses from sometime would try to decrease the debt so as to minimize fixed charges of capital (this might be one of the justifications for behaviour of debt in the second phase). There is a possibility that this company has a positive marginal tax rate due to the presence of minimum alternate tax or future expected profits. Since for such a company cost of financial distress and not MTR may be the crucial factor in capital structure decisions,

therefore there may be a lot of difference between the debt tax relations of two types of corporate. In this paper we have exclusively studied profitable companies.

We have undertaken regression analyses using pooled cross sectional of differenced time series data for all the variables. All the series are stationary. The impact of tax and other independent variables on leverage policy is studied using linear regression analysis. Results of regressions are obtained in EVIEWS using least squares method. Standard errors are heteroskadastic - consistent and the problem of autocorrelation has been checked and resolved.

6. Results and Observations:

Table 2 (i) and (ii) presents the results of regression analysis.

6.1. Comparison of models:

Amongst the 12 regressions, the independent variables are explaining maximum amount (around 55%) of variation in DAR1 compared to around 44% in DINC and only around 17% in DAR. Also the coefficients of significant variables are the highest in models with DAR1 dependent variable. The result flows from the observation of adjusted R square value.

Under each dependent variable there are 4 specifications that vary on the basis of different MTR proxy and corresponding tax difference (TDIF). When compared from Adjusted R^2 or AIC criterion all 4 specifications, under each dependent variable, seem equivalent.

Variables EFFT and COL are not found significant in any of the specifications with DAR as the dependent variable. TI has a positive coefficient and is found to be significant only in the model containing MTRA2, this is the only model where tax difference is not found significant. Thus, in this model TI may be capturing the effect of statutary tax rate.

TI and COL are not found to be significant in any of the models containing DINC as the dependent variable. Durbin Watson statistic indicated towards the problem of auto correlation, which was solved by using an AR term of first order. Minor differences do exist amongst the four models only in terms of coefficients of the significant variables.

Variables TI, EFFT, CSIZ, GRW, COL, FCF AND BRISK are not found significant in any of the specification under DAR1 as the dependent variable. The results show that the change in ratio mainly depends upon tax variables, retained earnings and average debt to capital employed ratio. An important observation in these models is that all the significant variables have larger impact (as measured by coefficients) on the dependent variable (DAR1) in comparison to other models.

Dependent Variable (->)	DAR_{it}				$DINC_{it}$				$Dar1_{it}$			
VARIABLES	A	B	C	D	A	B	C	D	A	B	C	D
C	-0.025432	-0.012356	-0.025501	-0.027932	0.009386	0.006969	0.005630	0.001445	-0.173042	-0.137878	-0.177310	-0.114910
TAX VARIABLES												
$CNDTS_{it}$	0.768813*	0.752169*	0.767598*	0.766336*	0.772261*	0.762656*	0.770392*	0.767650*	2.384713*	2.370441*	2.380872*	2.449695*
$MTRA1_{it}$	0.139331*	NA	NA	NA	0.078401	NA	NA	NA	1.162642*	NA	NA	NA
$MTRA2_{it}$	NA	0.144686*	NA	NA	NA	0.155152*	NA	NA	NA	1.046065*	NA	NA
$MTREA1_{it}$	NA	NA	0.144597*	NA	NA	NA	0.122002**	NA	NA	NA	1.138525*	NA
MTREA2it	NA	NA	NA	0.143899*	NA	NA	NA	0.152576*	NA	NA	NA	1.033836*
$TDIFA1_{it}$	0.150796*	NA	NA	NA	0.240896*	NA	NA	NA	0.806490*	NA	NA	NA
$TDIFA2_{it}$	NA	0.046442	NA	NA	NA	0.099684	NA	NA	NA	0.778736	NA	NA
$TDIFEA1_{it}$	NA	NA	0.141574*	NA	NA	NA	0.189470*	NA	NA	NA	0.865463*	NA
$TDIFEA2_{it}$	NA	NA	NA	0.205713*	NA	NA	NA	0.159970	NA	NA	NA	-0.429132
TI_{it}	-0.003019	-0.017095**	-0.003073	-0.000898	0.006016	-0.002198	0.005944	0.005337	-0.025415	-0.063611	-0.028120	-0.076061
$EFFT_{it}$	-0.003076	-0.00508	-0.0034	-0.003087	-0.018635*	-0.022820*	-0.021130*	-0.021754*	-0.018081	-0.014353	-0.012571	-0.016277

Table 2 (i): Regression results of 12 models with 3 dependent variables (each with 4 different specifications), part (i) showing regression estimates for tax factors causing leverage changes.

* Shows significance at 1% ** Shows significance at 5%

Dependent Variable (->)	DAR_{it}				$DINC_{it}$				$Dar1_{it}$			
Variables	A	B	C	D	A	B	C	D	A	B	C	D
Control variables												
ERTAit	-0.23827*	-0.248118*	-0.239793*	-0.229608*	-0.286469*	-0.308181*	-0.298253*	-0.300180*	-2.268496*	-2.258602*	-2.244335*	-2.475338*
DADARit	-0.278071*	-0.27647*	-0.27846*	-0.278629*	-0.295566*	-0.298419*	-0.300664*	-0.302511*	NA	NA	NA	NA
$DADAR1_{it}$	NA	NA	NA	NA	NA	NA	NA	NA	-1.107821*	-1.107379*	-1.107655*	-1.108827*
$CSIZ_{it}$	0.07332*	0.072389*	0.073026*	0.072864*	0.500802*	0.497292*	0.499106*	0.497298*	-0.005376	-0.001297	-0.006226	0.006481
GRW_{it}	-0.031361*	-0.030783*	-0.031486*	-0.031463*	-0.024754**	-0.025402**	-0.025342**	-0.025616**	-0.051500	-0.046005	-0.050035	-0.047950
Col_{it}	-0.019303	-0.019048	-0.018996	-0.019025	-0.003274	-0.000742	-0.001364	-0.000903	0.120861	0.112803	0.115833	0.113164
FCF_{it}	-0.681675**	-0.636443**	-0.686639**	-0.694831**	-1.575147*	-1.535729*	-1.586412*	-1.585874*	-2.691509	-2.455569	-2.643538	-2.381681
BRISK	0.00266*	0.002713*	0.002676*	0.002693*	0.002381*	0.002558*	0.002513*	0.002529*	-0.016794	-0.017181	-0.017190	-0.017744
AR(1)	NA	NA	NA	NA	0.146512*	0.147106*	0.150536*	0.151681*	NA	NA	NA	NA
Other Statistics												
R^2	0.173128	0.174813	0.17309	0.173394	0.446125	0.443790	0.444055	0.443585	0.555198	0.555092	0.555141	0.555727
Adjusted R^2	0.171195	0.172885	0.171158	0.171462	0.444655	0.442314	0.442580	0.442109	0.554159	0.554052	0.554101	0.554689
F-statistic	89.5958*	90.65297*	89.57223*	89.76244*	303.5969*	300.7396*	301.0628*	300.4902*	534.1225*	533.8922*	533.9980*	535.2678*
Durbin-Watson stat	2.016534	2.027935	2.016324	2.013534	1.989175	1.988080	1.989135	1.988932	2.066116	2.066912	2.066428	2.069707
AIC	-2.174386	-2.176427	-2.174341	-2.174708	-1.706127	-1.701919	-1.702396	-1.701551	2.727495	2.727734	2.727624	2.726305

Table 2 (ii): Regression results of 12 models with 3 dependent variables (each with 4 different specifications), part (ii) showing regression estimates for control factors causing leverage changes.

* Shows significance at 1% ** Shows significance at 5%

6.2. Discussion of variables:

Some of the variables which are significant in all the specifications are CNDTS, MTR (except MTRA1 in one model), TDIFA1, TDIFA2, ERTA and DADAR. TI (except in one model) and COL are the only variables which are not significant in any of the models. Wherever significant, CNDTS, TI (except in one model) and EFFT are those exceptions which do not bear the hypothesized signs. We have divided the discussion on variables in two parts; first part will describe the results on tax variables and the other part on control variables.

6.2.1 Tax effects:

The results show significant tax effects on all the measures of leverage. Tax effects are consistently and mainly captured through MTR. MTR is highly significant except MTRA1 which is not found to be significant in model containing DINC as the dependent variable. TDIFA2 is not significant in any of the models and TDIFEA2 is found significant only in model containing DAR as the dependent variable. The difference in results is due to the different algorithms used to calculate MTR. The results based on algorithm 2 shows that companies consider MTR and not statutory tax rate to take debt decisions. CNDTS is found significant in all models but it does not bear the hypothesized sign. Further, wherever significant, EFFT bears the opposite sign; this is where the important difference between MTR and other tax proxies arise. MTR has always depicted the true relation in all the studies conducted till date.

Thus the hypothesized relation between tax variables and leverage is mainly and correctly depicted only through MTR and TDIF or TI.

6.2.2 Effect of other control variables:

ERTA and DADAR are significant in all the models and bear the hypothesized signs. CSIZ, BRISK, GRW and FCF are also significant factors influencing DAR and DINC ratios; statistical results show that there is not enough evidence that these factors influence DAR1. DINC ratios are highly auto regressive.

7. Findings and Recommendations:

Although our results suggest significant tax effects on all the measures of leverage but some differences exist under different leverage ratios. When compared by adjusted R square criterion, variables employed in the study explain maximum variation in DAR 1 (group of models). Our results, thus, support the proposition made by (Welch, 2011).When we study the behaviour of corporate towards tax advantage of debt, we are mainly concerned with company's actions regarding issue of new capital. Thus, company that is facing high MTR has greater chances of issuing debt when a need of fresh capital arises. As company needs external capital, it would issue either debt or equity or would employ any other source. Accordingly, this action of a company would very well be reflected in change in debt to capital employed ratio (DAR 1) as against incremental debt to total assets ratio (DINC) (or to any other denominator depicting the value of the firm) or DAR. This measure is better than debt to equity ratio too, as it captures company's actions with respect to only debt or equity, wherein company may employ any other source also. According to us, DAR 1 would capture all the actions of the company, whether they are related to issue of new or redemption of existing capital and thus would prove to be the best measure to study capital structure changes. In this study as well, all the significant variables are able to explain the maximum (around 55%) variation in DAR 1. Hence our results support the proposition made by (Welch, 2011).

Under each dependent variable, there are four specifications based on different proxies used for MTR. AIC criterion and adjusted R square shows that there is a minor difference between the models, but unlike the results achieved in (Alworth & Arachi, 2001), we see that coefficients of MTR under each specification is different.

Contrary to the hypotheses, results report positive coefficient on CNDTS and negative coefficients on EFFT. Results of CNDTS very well support Mackie Mason's claim. According to him high levels of non debt tax shield will not affect the profitable firms negatively, it will burden only those firms which are near tax exhaustion (Mackie-Mason, 1990). EFFT may not be carrying the correct signs as it may be capturing the effects of profitability, which is expected to bear negative coefficient.

ERTA is significant at 1% level of significance and bears the expected sign suggesting that managers in India follow pecking order theory. As per our knowledge, this is a new measure of retained earnings used, to study leverage changes, and has contributed in improving our understanding of capital structure decisions in corporate. DADAR and DADAR1 are also found significant at 1% level of significance justifying the trade off theory the results support our dynamic trade off theory. Both these results support our observations in figure 3.

8. Limitations and scope for future research:

Our study is no exception when it comes to limitations. Access to tax related data is an issue in most of the countries. In India, taxable income of corporate, calculated as per Income Tax Act 1961 is not accessible. Hence we have employed book profits for all our tax related indicators. We expect the results may improve and a better and more precise value of MTR may be available if such information is available.

In the presence of appropriate data, total debt may be divided into debt from banks, financial institutions, short term, long term to gain a deeper insight into the determinants of capital structure decisions, and more precisely debt tax relationships. In India, such division is not available for such a long period of time.

9. Conclusion:

Apart from solving the capital structure mystery, it is very important to understand whether managers consider tax related features of a particular source of finance or not. All other factors which affect capital structure are internal to an organisation, only tax is one of the factors which may be exogenously determined and used to control company's actions to some extent. (De Mooij, 2011) mentions that although existence of debt in the capital structure is not a cause of the financial crises but since excessive leverage makes firms more vulnerable to economic shocks, debt biasness might have contributed to the deepness of the crises. Thus, all over the world tax authorities are now considering a proposal to alter their tax policies so as to reduce the tax biasness in favour of debt.

In this paper we have run the regression analysis for 12 models based on three measures of leverage as dependent variable and four variants of MTR under each dependent variable. We

have employed MTR (tax proxy) based on Graham – Shevlin methodology. We found significant tax effects on all measures of leverage. Debt to capital employed ratio (DAR1), a measure of leverage, proposed by (Welch, 2011) is identified to be more suitable; commonly used independent variables are able to explain around 55% variation in this measure (adjusted R square value is quiet high when compared with similar studies). As against change in debt to asset (DAR) or change in debt to capital employed (DAR 1) ratios, measure employing incremental debt (DINC) is found to be auto regressive. This is in contradiction with the observations of (Mackie-Mason, 1990). ERTA, a new proposed measure of retained earnings is also found to be highly significant in our study and supports the implications of pecking order theory. The There exists a huge potential of research in this area, despite the fact that a lot of work has already been done, and is going on in various countries to solve the CAPITAL STRUCTURE PUZZLE.

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