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BUSINESS GROUPS AND CAPITAL STRUCTURE:

EVIDENCE ON INDIAN FIRMS

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Business Groups and Capital Structure: Evidence on Indian Firms [?]

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Abstract

This paper synthesizes two competing strands of the corporate finance literature: the first strand relates to the firm's capital structure decisions, with emphasis on the pecking order theory and the trade off theory; the second strand relates to business groups, particularly in the context of emerging markets. The synthesis is then used to specify a generic model to underpin the capital structure decisions of group-affiliated and non-group firms. The model is estimated and tested on a sample of 1472 Indian firms, of which 912 are independent firms and 560 are group-affiliated. In general, the results confirm that group-affiliated firms are significantly different from their independent counterparts, in terms of their capital structure decisions: for example, the results show that the mean as well as median leverage of group-affiliated firms is higher than the counterpart measures for non-affiliated firms. In terms of the main determinants of capital structure decisions, we uncover a number of interesting findings. It is found that group affiliation has a strong effect on capital structure decisions such that group profitability has a strong negative effect on the leverage decisions of group-affiliated firms. This may be because profitable groups create internal capital markets to avoid having to resort to expensive external finance. We also find that size, as well as growth, does not matter for the capital structure of group-affiliated firms, whereas these factors are critical for the capital structure decisions of independent firms. In addition, only liquidity has a positive (albeit small) impact on the capital structure decisions of group-affiliated firms while intangibility and profitability, group debt and group size have a negative effect. However, we do not find any significant differences between group and non-group firms in terms of the impact of age and stock illiquidity on capital structure decisions.

Keywords : dividend policy; business groups; Indian firms

1. Introduction

Singular among the common distinct features of the business environment in most emerging markets in general, and India in particular, is that companies tend to naturally structure themselves into business-groups. While many of the groups started as a family business where the family has maintained controlling interest even after the business has gone public the evolution of family businesses into distinct business groups may be explained by the ability of groups to fill the gap created in the absence of functional institutions. In this context, the evolution of the business group structure in emerging markets serves to mitigate information problems and other market imperfections that characterise these markets. In general, various explanations for the business group phenomenon in emerging markets have been suggested by various studies, some of which are reviewed in Section 2. The literature suggests that, given the particularly wide gap between external and internal finance in emerging markets due to information asymmetry and other market imperfections, the group structure can narrow the gap between the cost of using external and internal finance. This may be the case when, for example, costly external finance is the result of an underdeveloped financial sector, which is unable to fulfil its traditional monitoring role. In this case, the group's headquarters may be well positioned to monitor member firms and to generate information thus substituting for inadequate financial intermediaries. The group may also be able to create internal markets, to save underwriting fees, or to secure the availability of external finance through its access to bureaucrats. Thus, it appears that group-affiliated firms are relatively less dependent on formal capital markets. In this context, the capital structure of these firms is likely to display different sensitivities to firm factors compared with independent firms. Furthermore, group-wide factors are also likely to play a role in determining the capital structure of group-affiliated firms.

This paper investigates the effect of group affiliation on the firm's capital structure within an emerging market context in general, and with reference to India in particular. In general, existing models of the determinants of capital structure commonly use explanatory variables whose predicted influence on the leverage decision is drawn from literature on information asymmetries, agency theory and the trade off theory. For example, the

pecking order hypothesis is inspired by the prevalence of information asymmetry in these markets to predict that firms tend to prefer internal over external finance; hence, profitable firms tend to resort to debt financing less often compared with unprofitable firms. However, profitability may enhance the use of debt financing because it is a valuable signal to lenders, which leads to cheaper access to debt as per the static trade off theory. Thus information problems and market imperfection are also central to the competing explanations of the capital structure of companies in emerging markets.

The contribution of this study is threefold. First, to our knowledge, this is the first empirical work to examine capital structure decisions in the context of business groups; specifically, the paper synthesizes the theory on business groups with the orthodox corporate finance theories of capital structure. Existing studies of business groups in industrial as well as emerging markets have mainly focused on the effects of group affiliation on firms' performance and value. By focusing on the capital structure of group-affiliated firms, this study offers a different perspective on the implications of the business group phenomenon. Second, the study adds empirical evidence to the capital structure literature, and in particular to the literature on the pecking order theory and the trade off theory, in the context of an emerging market, given that most empirical studies of these issues are from developed markets. Third, the study contributes to the business group literature in emerging markets by looking at business groups in India.

The structure of the paper is as follows. Section 2 reviews some of the relevant literature on both capital structure and business groups. Based on the literature review, the impact of group-affiliation on the capital structure decision is discussed in Section 3, and the models to be estimated and tested are presented. Section 4 describes the sample and how it was constructed, while empirical procedures and results are presented in Section 5. Section 6 concludes.

2. Selective review of the literature

2.1 Studies on capital structure

Models of the determinants of capital structure commonly use explanatory variables whose predicted influence on the leverage decision is drawn from literature on information

asymmetries, agency theory and the trade off theory. Based on information asymmetries, the pecking order hypothesis predicts preference for internal over external finance. This implies, for instance, that profitable firms will resort to debt financing less often compared with unprofitable firms. In contrast, the static trade off theory predicts profitability to enhance the use of debt financing because profitable firms have access to cheaper debt. The trade off theory also predicts that the present value of the costs of financial distress decreases with liquidity, while the value of the tax shield of debt decreases with the availability of alternative non-debt tax shields. Thus while liquidity is predicted to induce firms to use more debt, the availability of alternative non-debt tax shields, such as depreciation, are expected to have the opposite effect.

Vilasuso and Minkler (2001) interpret the trade off theory, on the balancing of the costs and benefits of debt, in terms of the literature on asset structure and agency theory. The literature on asset structure commonly claims that equity financing is preferred when assets are intangible or highly specialised[1]. Vilasuso and Minkler (2001) argue that a project that requires highly specific assets will initially be financed by equity. However, as the debt to equity ratio decreases, in line with agency theory, the cost of debt falls while the cost of equity rises. These agency cost effects become increasingly more important, until debt finance becomes the preferred form of financing[2].

A crucial point in Vilasuso and Minkler (2001) is that when assets are highly specialised, it takes longer for agency cost considerations to dominate. Thus while minimisation of total agency costs ensures that in the long term firms will move towards their optimal financing mix, for those with highly specific assets this optimal mix contains more equity. The findings from the empirical procedure are consistent with the study's propositions. In particular, the sign on the estimated coefficient on the degree of asset specificity indicates that equity levels increase with asset specificity. Further, there is also

[1] A view on the relationship between asset structure and the capital structure of the firm begins with the premise that in the case of liquidation, intangible or highly specific assets are not expected to have high salvage value. Therefore an increase in the fraction of such assets reduces the expected payoff to claim holders in the event of bankruptcy. Further, the probability of bankruptcy increases with the amount of debt in the capital structure, so when assets are intangible or highly specific equity financing is preferred to debt.

[2] Agency theory can be split into theory on the agency cost of equity and theory on the agency cost of debt. The agency cost of equity theory generally suggests that as owners/managers dilute their ownership by issuing outside equity, they will seek more perquisites because the associated costs are shared with the new owners. New equity owners are aware of this tendency, and consequently reduce the price they are willing to pay for the new shares. Thus external equity financing increases the agency cost of equity. An alternative is to use debt financing, but this also has agency cost implications as suggested by the agency cost of debt theory. Accordingly, when the firm issues new debt, bondholders are aware that they are exposed to excessive risk taking by equity owners and therefore demand higher returns. Thus both debt and equity financing are associated with agency costs, and the optimal capital structure is that which minimises the sum of total agency costs.

evidence to support the idea that balancing agency costs leads the capital structure of the firm to converge to its optimal level[3].

Vilasuso and Minkler (2001) link the capital structure decision to agency theory and to assets structure where the latter is measured in terms of assets' specificity. Similarly Gul (1999) aims to explain capital structure in terms of agency theory and asset structure as represented by growth opportunities. The idea is that the higher the fraction of firm's value which is represented by growth opportunities rather than by assets in place, the lower should debt represent in its capital mix. This inverse relationship between growth and debt is driven by two agency costs of debt, namely under-investment and asset substitution[4]. Indeed evidence is found to show that the capital structure decision is influenced by growth opportunities and that due to agency costs, firms with lower levels of growth tend to be more highly geared[5].

Another important issue that is addressed by Gul (1999) is the link between group-affiliation and capital structure. In particular, it is shown that keiretsu-affiliated firms are likely to have more debt in their capital structure. The reason given for this is that conflicts between debt and equity holders in these firms are less severe because the main bank around which the group centres is also likely to be the main shareholder. Although this explanation may be applicable to the Japanese case it may not necessarily apply to business groups in other countries where the group is not formed around a main bank[6]. An alternative link between business groups and the capital structure decision in the case of countries such as India may be cultural factors. Indeed, the relevance of culture to the capital structure decision is the subject of Gleason, Mathur, and Mathur (2000).

[3] Details of the empirical procedures in Vilasuso and Minkler (2001) are given in Appendix A, Note (1).

[4] The under-investment problem refers to the problem that arises when managers, acting in the interest of owners, are reluctant to issue new debt to finance even good projects. This may be the case when managers are aware that profits from assets-in-place are insufficient to pay debt-holders, which means that the profits from the new investment may not necessarily accrue to shareholders. When growth opportunities take up higher fraction of the firm's value, this implies less assets-in-place generating profits to meet debt obligations. Hence, the higher the firm's growth opportunities, the less motivated are managers to finance new projects by debt. The second problem is asset substitution, which refers to tendency by managers to undertake projects riskier than expected. Debt-holders are aware of this tendency to expropriate their wealth and demand premium to cover this risk. A the scope for asset substitution increases with the amount of investment opportunities, firms with more growth opportunities are likely to ace higher cost of debt and thus tend to have less debt. The two agency-costs of debt, the under-investment and asset substitution imply a negative association between growth opportunities and debt, but Gul (1999) also notes that the signalling hypothesis predicts a positive association between growth and debt. Specifically, because outside investors are likely to have less information about the prospects of growth opportunities relative to information about assets-in-place, managers use debt when growth opportunities are high to signal quality.

[5] For further details on the study by Gul (1999) refer to Appendix 6, Note (2).

[6] For instance, one of the features that distinguish the Indian business houses from the Japanese keiretsu is the absence in the case of the former of a main bank.

Gleason, Mathur, and Mathur (2000) draw from the organisational behaviour theory proposed by Hofstede (1984) and propose that the capital structure decision may be influenced by culture. Hofstede (1984) suggests that business organisation is influenced by cultural characteristics such as power distance, masculinity, individualism and uncertainty avoidance. Gleason, Mathur, and Mathur (2000) find that some of these characteristics influence the amount of debt in a firm's capital structure.[7]

But cultural factors have also been suggested as a plausible alternative to economic oriented explanations to the prevalence of business groups in developing countries. Thus, the link between capital structure and business group affiliation may be explained in term of agency theory as in Gul (1999), or alternatively by cultural factors. The next Sub Section presents a discussion on cultural and other possible explanations for business groups in emerging markets. This is followed by a discussion on the synthesis between groups and capital structure, which provides the theoretical proposition to be tested.

2.2 Studies on business groups

The business group structure is common in emerging markets, and this is often explained by the ability of groups to fill the gap created in the absence or poor functioning of institutions. Khanna and Palepu (1999), suggest three ways by which business groups add value. First it is suggested that the groups substitute for venture capital firms. Second, it is said that groups can create their own internal markets for managers where business schools are rare. Third it is proposed that groups develop reputation which facilitates, among other things, access to foreign markets and technology.

Studying the association between group-affiliation and firm's profitability in fourteen emerging markets, Khanna and Rivkin (2001) find that in most markets group-affiliated firms tend to be more profitable compared with non-affiliated firms. Further, it is concluded that due to member firms sharing the cost and benefits of being affiliated with a particular group, the profit rates within groups are more similar than profit rates between

[7] Based on survey results collected from IBM subsidiaries in 40 countries, Hofstede (1984) identifies four dimensions of culture: power distance, masculinity, individualism and uncertainty avoidance. Power distance is defined as relating to the degree of inequality in society, where a culture with small power distance is more concerned with equality and less with authoritative manner. Masculinity is explained as the extent to which a culture can be characterised by traits such as competitiveness and assertiveness, while individualism describes the degree to which the society is individualistic or collectivist. Finally uncertainty avoidance describes attitude towards uncertainty. Gleason, Mathur, and Mathur (2000) test whether debt levels are determined by cultural differences including power distance, masculinity and uncertainty avoidance. Their results are given in Note (3) of Appendix A.

groups. The authors, however, find it difficult to explain these results in terms of either groups as responses to capital market imperfections or groups as rent-seeking devices[8].

Chang and Hong (2000) try to understand precisely how business groups add value. In particular they assess how the sharing and transferring of resources within Korean business groups impact the performance of member firms. They find that both firm-level and group-level resources are important determinants of firm performance. But further evidence is also presented showing that groups use internal transactions for the purpose of cross subsidisation. In particular the study illustrates that debt guarantees, equity investments and internal trade, tend to be used to support poorly performing affiliates at the expense of profitable members. The study concludes that although Korean business groups create value by sharing financial and intangible resources such as technology, advertising and reputation, there is also a drawback to group-affiliation. The drawback relates to the creation of internal markets that facilitate support across member firms for the purpose of achieving group-wide goals but often at a cost to some individual members[9].

Other drawbacks of being affiliated with business groups have also been suggested. Dewenter, Novaes and Pettway (2001) for instance, stress the potential for conflicts of interest that business groups create. Conflicts of interest include internal conflicts among member firms as well as conflicts between member firms and outside investors. The study focuses on the latter and in particular on conflicts between firms and investors, when the group decides to float one of its members[10]. It is proposed that the extent to which

[8] If groups alleviate market imperfections and substitute for missing institutions, than there should be a positive association between the positive effects of business groups and the level of imperfections in the capital market. Similarly, if groups fulfil the role of rent seeking devices than they should enable member firms to obtain favours from the political system and a strong association should be observed between group effects and the level of corruption and distortions in the economy. However, in the final part of their paper, Khanna and Rivkin (2001) investigate the correlation between the importance of group-affiliation and proxies for market conditions but fail to find support for either the market failure or rent seeking predictions. Empirical procedures and results for the study are given in Appendix A, Note (4).

[9] With reference to the benefits of resource sharing Chang and Hong (2000) note that the value of intangible resources such as R&D, advertising, and good reputation does not depreciate with increased use. This implies that intra-group sharing of such assets should enhance the profitability of all participants. For example, due to the typical complex structure of debt guarantees within groups, the bankruptcy of one member firm increases the bankruptcy risk of other member firms. Hence the higher the reputation and liquidity position of other firms in the group, the more easily the firm can access finance and therefore the higher its profitability. With reference to the costs associated with cross-subsidisation within groups, Khanna and Palepu (1999) note that this practice is often claimed to obscure the economic viability of individual firms. Details of the Chang and Hong (2000) study are given in Appendix A, Note (5).

[10] Dewenter, Novaes and Pettway (2001) note that one potential conflict of interest in initial public offers (IPOs) is related to market timing. This refers to the tendency by managers to take advantage of temporary mis-pricing in the market in order to get a particularly high price for the IPO shares. Indeed, the study focuses on IPOs because of the established link between the level of initial returns in IPOs and the degree of uncertainty about the value of the issuing firm. In particular the higher the uncertainty about the issuing firm, the greater the potential loss to uninformed participants, thus the higher their expected return.

opportunistic behaviour by managers of group-affiliated firms, is more or less severe than in the case of independent firms, is a trade off between group visibility and complexity[11].

Using data on Japanese firms, Dewenter, Novaes and Pettway (2001) conclude that affiliation with one of the largest keiretsu industrial grouping increases asymmetric problems, uncertainty, and the opportunity for agency behaviour by management. In particular due to greater complexity, group membership increases the cost of capital, and the magnitude of the impact depends on the level of information asymmetries that are built into the market structure[12].

Thus group-affiliation creates agency costs which become more severe in market structures that increase information problems. This may explain the reported results in Khanna and Rivkin (2001), which they note run contrary to the capital market failure theory on groups[13]. In any case, the realisation that the economic value of group affiliation is not clear gives rise to alternative explanations for the reason for their existence. For instance, Khanna and Rivkin (2001) suggest that perhaps cultural and sociological factors can better explain the business group phenomenon. This view corresponds to the social structure theory on business groups, which is tested in Guillen (2000) [14].

Guillen (2000) notes that consistent with social structure theory, high distance power cultures whose social order is based on inheritance rules lend themselves particularly well to the business group structure. This may explain the prevalence of the family controlled groups in less developed countries, which Hofstede (1984) notes are

[11] Dewenter, Novaes and Pettway (2001) explain the trade off between group visibility and group complexity as follows. There is a widely held belief that managers are constrained from acting opportunistically because sooner or later this behaviour is detected and firms are penalised. However, opportunistic behaviour can only be controlled if the market detects it, thus the question boils down to how group-affiliation influences the ability of the market to detect opportunistic behaviour. On the one hand there is the argument that because information about large groups and their member firms is widely available, this increases the ability of the market to detect and control agency behaviour. Thus visibility reduces agency costs of firms affiliated with large business groups. On the other hand the typically complex structure of groups makes it difficult for the market to infer opportunistic behaviour even when visibility is high. Thus complexity of large business groups makes agency costs in affiliated firms more severe.

[12] Note the difference between the views in Gul (1999) and in Dewenter, Novaes and Pettway (2001). Both these studies look at the Japanese keiretsu but find opposing evidence on the impact of group affiliation to agency costs. In particular, Gul (1999) claims and finds keiretsu membership to reduce potential conflicts between equity and debt holders. In contrast, Dewenter, Novaes and Pettway (2001) claim that group affiliation has the potential for increasing or decreasing conflicts between managers and investors. They find evidence to support the notion that despite the high visibility of keiretsu members, their complex structure gives rise to agency problems that are difficult to control. It is further noted that the impact of group affiliation is larger when shares are sold with fixed prices compared with when they are set by an auction. This is consistent with the idea that market structure is important for market efficiency and that because the auction system reveals more information to investors, it reduces uncertainty. Details of the empirical procedures and results in Dewenter, Novaes and Pettway (2001) are presented in Appendix A, Note (6).

[13] See footnote (8).

[14] As noted in footnote (8) and in Note (4) of Appendix A, Khanna and Rivkin (2001) conclude their study by looking at the relationship between group affiliation and country conditions. However, the correlation between the importance of groups and the conditions in the markets studied do not support the notion that group effects are related to market inefficiencies in a way that is consistent with various economic explanations. The authors suggest that this may be due to variation across countries in the way business groups are defined, or is indicative of the weakness of economic factors in explaining the group phenomenon.

typically authoritarian.[15] Furthermore, the patrimonial social structure in these markets implies that maintaining family control is seen as vital. Indeed the issue of maintaining control provides a possible synthesis between capital structure and business groups, an issue that is discussed in the next section.[16]

3. The model

The empirical model is a cross-sectional regression of leverage on variables that are predicted to be important in explaining the capital structure decision. In the first stage the explanatory variables include only characteristics at the firm level. The idea is to assess whether a single model is good at explaining the capital structure decision of both group-affiliated and non-affiliated firms. Alternatively debt ratios of group-affiliated and non-affiliated firms may differ because capital structure determinants of these two categories of firms are not the same. If this is the case, it is expected that the null hypothesis of stable coefficients in a pooled model should be rejected.

In the second stage of the multivariate analysis, explanatory variables at the group-level as well as interaction terms between firm-level variables and group affiliation dummies are added to the model. The idea is to assess whether the capital structure decision of group-affiliated firms may be explained in terms of the various business group theories. Starting with the model that includes firm-level characteristics only, these two models are outlined below.

3.1 The multivariate model at the firm level

The firm level explanatory variables are drawn from the capital structure literature and are based in particular on Rajan and Zingales (1995) and Booth Aivazian, Demirguc-Kunt and Maksimovic (2001). The general model is of the following form.

$$LEVERAGE_i = ? + ?_1\ (NON\text{-}DEBT\ TAX\ SHIELD)_i + ?_2\ LIQUIDITY_i + ?_3\ INTANGIBILITY_i + ?_4\ (FIRM\ SIZE)_i + ?_5\ AGE_i + ?_6\ (STOCK\ ILLIQUIDITY)_i + ?_7\ GROWTH_i + ?_8\ PROFITABILITY_i + ?_{(j = 1\ to\ 11)} ?_j\ (INDUSTRY_j)_i + ?_I \qquad (1)$$

[15] In particular, Hofstede (1984, page 216) chooses to describe the implicit model for the Indian organisation as the family.
[16] It may, however, be appropriate to mention that the results in Guillen (2000) do not support the social structure view. Specifically, the hypothesis that the higher the power distance in a society, the greater the importance of business groups is rejected by the empirical investigation.

where LEVERAGE is the debt ratio measured as total debt to quasi market value of total assets (LEV2) as defined in Table 1, where other ways for measuring debt are also specified[17]. Definition and prediction for each of the RHS variables are explained below and summarised in Panel A of Table 2.

[Insert Tables 1 and 2 about here]

The first variable on the RHS of Equation (1), namely NON-DEBT TAX SHIELD, is included as a proxy for the trade off theory, and in particular as an inverse proxy for the benefits of debt. It is measured as the log of depreciation and is expected to enter the model with a negative coefficient, because depreciation is a substitute for interest payments in shielding profits from tax liabilities. However, the impact of depreciation as a tax shield may differ for group-affiliated firms. The reason is that these firms may be able to utilise alternative non-debt tax shields that are not available to non-affiliated firms. For instance, profitable group members may engage in intra-group trading designed to reduce their taxable profits.

The next three explanatory variables, namely LIQUIDITY, INTANGIBILITY, and SIZE are also included as proxies for the trade off theory. These variables are expected to measure the costs associated with debt, and in particular to proxy financial distress costs. LIQUIDITY is defined as the ratio of current assets to current liabilities. It is expected to enter the model with a positive coefficient because the ability to meet obligations increases the firm's debt capacity. INTANGIBILITY is defined as the ratio of R&D plus advertising expenditure to sales, and is expected to enter with a negative coefficient. SIZE is the size of the firm, which is measured as the log of sales. Firm size is expected to have a positive impact on debt because the risk of bankruptcy is lower for large firms due to diversification.[18]

However, due to intra-group dependency, the capital structure decision of group-affiliated firms may display different level of sensitivity to firm liquidity, asset structure or size, relative to non-affiliated firms. Particularly, intra-group dependency may be due to transfer pricing or debt guarantee structure within the group, both of which imply that

[17] Experiments with variously defined leverage measures that are described in Table 1 were conducted, as will be noted in the empirical sections.

[18] However, association between firm size and diversification may be less applicable in the Indian context because Indian firms are typically focused (Khanna and Palepu, 2000). Thus size may play a less important role in reducing financial distress costs.

failure of one group member may cause a chain reaction within the group. Thus the general state of the group is expected to impact the financial distress costs faced by the firm. An affiliated firm whose other group-members are in good (poor) financial position may be less (more) sensitive to factors such as its own liquidity or asset structure.

The next three explanatory variables, namely, AGE, STOCK ILLIQUIDITY, and GROWTH, are included as proxies for agency theory. Group visibility and complexity may impact agency conflicts within groups. Hence AGE, STOCK ILLIQUIDITY, and GROWTH may be substantially less or more important in determining the capital structure decisions of group-affiliated firms. AGE is the log of the age of the firm since incorporation, representing firm reputation. It is expected to enter the model with a positive coefficient because reputation is an asset that managers may not be willing to destroy by behaving as predicted by agency theory. However, equity holders are also exposed to agency behaviour by managers, which imply a negative association between age and debt ratio. In light of this ambiguity, STOCK ILLIQUIDITY and GROWTH are also included to measure more directly the agency cost of equity and the agency cost of debt respectively.

STOCK ILLIQUIDITY is included to represent agency cost of equity and is defined as one minus the ratio of the number of days the firm's equity traded on the BSE to the total number of trading days. STOCK ILLIQUIDITY is expected to enter the model with a positive estimated coefficient. This is because highly traded stock is taken to indicate confidence on the part of investors that the firm is relatively free of agency costs of equity and hence can support more equity. GROWTH is included to represent agency cost of debt and is defined as the price to book ratio. Growth gives managers greater opportunities to engage in risk shifting and thus GROWTH is expected to enter with a negative coefficient. Furthermore, consistent with agency theory of debt, highly levered firms tend to pass up profitable investments thus growing firms prefer equity to debt.

The next firm level explanatory variable is the return on assets, PROFITABILITY, which is included as a proxy for pecking order theory. It is defined as the ratio of profit before tax to the total book value of assets, and is expected to enter the model with a negative coefficient. This is because profitable firms can rely on internal funds, which are higher up the preference order. If, however, groups can create internal markets than the

debt ratios of group-affiliated firms should display less sensitivity to pecking order considerations[19]. In contrast it could be argued that groups are particularly sensitive to external exposure because their agendas are not always that of maximising shareholder wealth. In that case internal finance should be relatively more important to group-affiliated compared with non-affiliated firms

Finally, INDUSTRY is a set of 11 industry dummies, which measure the change in the constant due to affiliation with industry *j*. More specifically the dummy variable measures the difference of industry j from the non-financial services.

3.2 The multivariate model incorporating group level variables and interaction terms

The interaction terms between group affiliation and firm level characteristics are included to measure the change attributed to group-affiliation. The group level explanatory variables are chosen to represent the various business group theories and are based in particular on Chang and Hong (2000). The model is specified as follows:

$$LEVERAGE_i = ?_1 + ?_2\, GP_i + ?_3\, HD_i + ?_1\, (NON\text{-}DEBT\ TAX\ SHIELD)_i + ?_2\, LIQUIDITY_i + ?_3\, INTANGIBILITY_i + ?_4\, (FIRM\ SIZE)_i + ?_5\, AGE_i + ?_6\, (STOCK\ ILLIQUIDITY)_i + ?_7\, GROWTH_i + ?_8\, PROFITABILITY_i + ?_1\, (NON\text{-}DEBT\ TAX\ SHIELD_i)\, GP_i + ?_2\, (LIQUIDITY_i)\, GP_i + ?_3\, (INTANGIBILITY_i)\, GP_i + ?_4\, (FIRM\ SIZE_i)\, GP_i + ?_5\, (AGE_i)\, GP_i + ?_6\, (STOCK\ ILLIQUIDITY_i)\, GP_i + ?_7\, (GROWTH_i)\, GP_i + ?_8\, (PROFITABILITY_i)\, GP_i + ?_1\, (NON\text{-}DEBT\ TAX\ SHIELD_i)\, HD_i + ?_2\, (LIQUIDITY_i)\, HD_i + ?_3\, (INTANGIBILITY_i)\, HD_i + ?_4\, (FIRM\ SIZE_i)\, HD_i + ?_5\, (AGE_i)\, HD_i + ?_6\, (STOCK\ ILLIQUIDITY_i)\, HD_i + ?_7\, (GROWTH_i)\, HD_i + ?_8\, (PROFITABILITY_i)\, HD_i + ?_1\, (GROUP\ PROFITABILITY)_i + ?_2\, (GROUP\ LIQUIDITY)_i + ?_3\, (GROUP\ DEBT)_i + ?_4\, (GROUP\ DIVERSITY)_i + ?_5\, (GROUP\ SIZE)_I + ?_{(j\,=\,1\ to\ 11)}?_j\, (INDUSTRY_j)_i + ?_i \qquad (2)$$

where LEVERAGE, the RHS variables with ? coefficients and INDUSTRY are as defined for Equation (1) and summarised in Panel A of Table 2. Definition and prediction for the rest of the RHS variables are explained below and summarised in Panel B of Table 2.

[19] Group affiliation may reduce pecking order related dependency of a firm on its profitability by creating internal capital markets. This can take the form of paying dividends or passing profits within the group by other means such as transfer pricing or advancing or advancing loans at favourable terms.

GP and HD are group-affiliation dummies that are included to measure the change in the constant when the firm is affiliated with a business group. GP is set to one if the firm is a member of a business group and zero otherwise. HD is set to one if the firm is affiliated with a group that is diversified over more than 11 product lines and zero otherwise. Thus HD measures the extra change in the constant in additional to the change reflected in GP, if the firm is affiliated with a highly diversified group. GP and HD are predicted to enter the model with positive estimated coefficients due to control considerations, which favour external debt over external equity. Further, according to the market failure and political economy theories of business groups, group affiliation increases access to external funds through the sharing of group-wide reputation and policy distortions.

The two set of interaction terms with the coefficients donated by ? and ? are included to measure the change in the slopes of the firm level characteristics (as represented by ?) when the firm is group-affiliated. The ? coefficients measure the change in the slopes of the firm level characteristics *(?)* when the firm is group-affiliated. The ? coefficients measure the extra change in ?, in addition to the change measured by ?, when the firm is affiliated with a highly diversified group. If group affiliation changes the sensitivity of the leverage decision to firm factors, than ? and ? should be significantly different from zero.

The set of variables, which are preceded by ? as coefficients are the group-level explanatory variables. These variables measure various characteristics of the group with which a firm is affiliated and are set to zero for non-affiliated firms. They are included to test how group-wide reputation influences the ability of the firm to access external debt. Consistent with Chang and Hong (2000) the idea is that a firm can access external debt more easily and at lower rates if it is associated with a group with good reputation. This is due to complex structure of debt guarantees within groups, which means that the bankruptcy of one member firm may result in a series of bankruptcies across the group.

GROUP PROFITABILITY, GROUP LIQUIDITY, and GROUP DEBT are selected and measured in line with the approach in Chang and Hong (2000). Particularly these variables are based on the weighted averages for the relevant values of other firms in the group for which the required data is available. GROUP PROFITABILITY is measured

as the weighted average of the returns on assets of other firms in the group where the weighting series is total assets. GROUP LIQUIDITY is measured as the weighted average of the current ratios of other firms in the group, where the weighting series is current liabilities. GROUP DEBT is measured as the weighted average of the long-term debt to equity ratios of other firms in the group where the weighting series is the equity base.

GROUP PROFITABILITY and GROUP LIQUIDITY are expected to be positively related to firm debt, because profitable and liquid groups should enhance the reputation and debt capacity of member firms. In contrast, GROUP DEBT is predicted to have a negative impact on firm debt because the higher the debt levels of other firms in the group the lower the debt capacity of the firm. It could also, however be argued that firms that are affiliated with profitable groups need to rely less on external finance due to internal transfers. Hence theoretically GROUP PROFITABILITY like GROUP DEBT may enter the model with a negative coefficient.

GROUP DIVERSITY is measured as the log of the number of industries represented in the group with which the firm is affiliated. Diversification is assumed to reduce the present value of the costs of financial distress. Therefore, if group affiliation is important and member firms share reputation than GROUP DIVERSITY should enter the model with a positive estimated coefficient. In contrast it could be argued that diversified groups typically have complex structure, which makes management behaviour more difficult to monitor. This suggests more opportunities for risk shifting, which should have a negative impact on access to debt. Thus the association between GROUP DIVERSITY and firm debt could be either positive or negative.

Finally, GROUP SIZE is measured as the log of total sales of all firms in the group. Consistent with Dewenter et al (2001), a large group implies high visibility, which ensures that information about the group activities is widely available thus reducing the opportunities for managers to engage in shift risking or other agency behaviour. If group-affiliation is important and visibility reduces the agency costs of debt than GROUP SIZE should enter the model with significant and positive estimated coefficient. However, if the impact of visibility on reducing the agency costs of equity is stronger than its impact on reducing the agency costs of debt, than GROUP SIZE should enter the model with a negative coefficient.

4. Data and measurement

4.1 Data

The data are retrieved from PROWESS database provided by the Centre for Monitoring the Indian Economy (CMIE) and updated to 22 March 2001. The initial data set includes the universe of all quoted and unquoted Indian Private Sector firms available on PROWESS, totalling 6,548 firms, and comprising 4,506 independent firms and 2,042 group affiliated firms; the data are used to construct the group size and diversification measures as will be discussed below.[20]

The period studied is the year ending March 2000 which may be criticised as unrepresentative and arbitrary. However, group affiliation, which is at the centre of this study, is available on PROWESS only as a data variable at a given point in time. The use of one year is thus rationalised by the wish to avoid making the assumption that group affiliation is stable over time.[21] The selection process involved dropping some firms as follows.

Firms, which were dropped, include unlisted firms, financial firms, firms without the basic data, and firms with a year ending date other than March 2000. This procedure resulted in a sample of 1,811 firms, which is the basis for the comparison analysis of the next sub section. The sample includes 1,146 independent firms and 665 group-affiliated firms of which 314 firms are affiliated with groups classified as diversified. Of the 314 firms that are affiliated with diversified groups a further 131 firms are affiliated with highly diversified groups.[22] In the process of constructing the variables further observations were dropped leading to samples of 1,472 and 1,384 for the models specified in (1) and (2), respectively. Table 3 presents the descriptive statistics for the sample.

[Table 3 about here]

As is evident from Panel A of Table 3 some of the firm level explanatory variables are correlated in a way that may cause multicollinearity problems. The principle culprits include NON-DEBT TAX SHIELD, FIRM SIZE and AGE. For instance the correlation

[20] Thus the initial data set excludes firms from the Public Sector, the Foreign Sector, or any combination thereof.
[21] The choice of March as the year ending date is due to the fact that majority of Indian companies have a year ending date of March, which corresponds to the Indian tax year ending. It is also worth noting that, although the assumption that group affiliation is stable over time may be reasonable in the case of India, Khanna and Palepu (2000) too use a single year.
[22] Appendix B presents further details on the sample selection procedure and the categorisation of groups into diversification levels.

between NON-DEBT TAX SHIELD and STOCK ILLIQUIDITY is –0.58 and between NON-DEBT TAX SHIELD and FIRM SIZE it is 0.84. SIZE has a correlation coefficient of –0.55 with STOCK ILLIQUIDITY while its correlation with AGE is 0.38. Similarly, AGE has a correlation coefficient of 0.33 with NON-DEBT TAX SHIELD.

To overcome possible multicollinearity problems the three variables suspected of causing difficulties are replaced by their residuals from auxiliary regressions. Specifically NON-DEBT TAX SHIELD is regressed on a constant and the rest of the firm level explanatory variables. The series of residuals obtained, RESIDUAL TAX SHIELD, provides an alternative measure to the NON-DEBT TAX SHIELD. Similar procedures were undertaken to obtain alternative measures for FIRM SIZE (namely, RESIDUAL SIZE) and AGE (namely RESIDUAL AGE). Panel B of Table 3 presents the descriptive statistics for these residual based variables, as well as the descriptive statistics for the five group level explanatory variables that are included in Equation (2).

4.2 Measurement and comparison of group affiliated and independent firms

One of the main implications that arise from the conclusions in a number of studies reviewed above is that the capital structure of group-affiliated firms could be different to that of non-affiliated firms. For example, Gul (1999) and Dewenter, Novaes and Pettway (2001) note that group-affiliation can impact agency conflicts, which is an important determinant of the capital structure decision. Similarly, Khanna and Palepu (1999) argue that control considerations within groups have often led to the capital structure of group-affiliated firms to be incompatible with their asset structures.[23] Thus as an initial testing method and before carrying out the multivariate analysis, a simple comparison of debt ratios across group affiliation categories is conducted.

The bivariate analysis compares nine measures of borrowing ratios across group-affiliated and non-affiliated firms as well as across firms that are affiliated with groups at various levels of diversification. These include four alternative measures of leverage, long-term and short-term debt measures, as well as measures of bank borrowings, loans from

[23] Khanna and Palepu (1999) note that family controlled business groups in many developing countries have traditionally focused on growth rather than profitability, a practice that has often been driven and encouraged by government intervention policies aimed at creating jobs. However, because debt allows family control to be maintained, group-affiliated firms have preferred to finance growth by external debt rather than by external equity.

government and foreign borrowings. In addition a comparison of intra-group loans are compared across firms affiliated with groups at various levels of diversification. Definition and prediction for each of these debt ratios are summarised in Table 1.

The first four debt-ratios to be compared across group-affiliated and non-affiliated firms are alternative stock measures, based on market value of equity, as suggested in Rajan and Zingales (1995). These include the ratios of total liabilities to total assets (LEV1), total debt to total assets (LEV2), total debt to net assets (LEV3), and total debt to capital (LEV4). The prediction is that group-affiliated firms are more highly levered compared with non-affiliated firms. This prediction is based on control considerations as argued in Khanna and Palepu (1999) and on the group visibility argument put forward in Dewenter, Novaes and Pettway (2001). Alternatively, in the spirit of Dewenter, Novaes and Pettway (2001), it could be argued that due to group complexity, detecting opportunistic behaviour by group-affiliated firms is difficult. Thus group complexity reduces the ability of lenders to monitor the firm and as a result debt levels in group-affiliated firms should be lower compared with non-affiliated firms.

The fifth and sixth debt measures to be compared across group-affiliated and non-affiliated firms are the constitute parts of the forth leverage measure, namely total debt to capital (LEV4). Specifically, the ratio of total debt to capital is split into long-term debt (L_DEBT) and short-term debt (S_DEBT) measures. The prediction is that group-affiliated firms tend to use more long-term debt compared with non-affiliated firms, but that the latter tend to use relatively more short-term debt. Group-affiliated firms can save on issuing costs by using long-term debt and reducing the issuance frequency. In contrast for non-affiliated firms the issuance costs saved by using long-term debt tend not to offset the additional insolvency risk premiums that is due to visibility and information problems. Thus finding that long-term (short-term) debt is statistically higher (lower) for group-affiliated firms compared with non-affiliated firms indicates that group affiliation adds to the creditworthiness of the firm and gives it better access to finance.

The seventh debt measure is bank borrowing to capital (B_DEBT), where bank borrowings is the total of loans sourced from banks. Similar to the argument that non-group affiliated firms should rely more on short-term debt, it is also predicted that these firms use relatively more bank loans. Furthermore, group-affiliated firms have greater

access to capital markets due to greater visibility, reduced information problems and the sharing of group-wide reputation.

The eighth debt measure to be compared across group-affiliated firms and non-affiliated firms is the ratio of loans from government to total borrowings (GOV). Loans from government include loans received from central government, state government, and state government owned development institutions[24]. Ghemawat and Khanna (1998) suggest that groups may be able to create favourable distortions in the allocation of capital from the state financial system. Consistent with this argument, the prediction is that loans from government will constitute a greater fraction of total debt of group-affiliated firms compared with non-affiliated firms.

The ninth debt measure is the ratio of foreign borrowings to total debt (FOREIGN), where foreign borrowing is the amount raised directly from foreign institutions. The prediction is that group visibility gives affiliated firms relatively better access to foreign borrowings. Hence the amount of foreign loans in the total amount of borrowings of group-affiliated firms should be higher compared with non-affiliated firms.

Another debt measure that is unique to group-affiliated firms is the ratio of loans from group companies to total loans from corporate bodies (INTERNAL). The prediction is that intra-group loans should constitute a major part of total loans sourced from companies for the following reasons. Consistent with the market failure theory, business groups typically pool funds from member firms, and reallocate these funds in order of priority. This internal capital market is a substitute for inefficient external capital markets, and it allows for the re-negotiation of debt in cases of financial distress. Further, Chang and Hong (2000) find evidence of cross subsidisation within groups, which may include firms selling capital to other member firms at below market prices.

5. Estimation and testing results

5.1 Results of the comparative analysis

The results from the comparison analysis are given in Table 4, which is split into 10 panels for each of the debt ratios as defined in Table 1. The information given in Table 4 includes

[24] A loan such as sales tax deferred credit is treated as loans form government.

the number of observations, variance, mean and median for the full sample of all non-financial, BSE listed firms with year ending March 2000. The sample is also split into non-affiliated and group-affiliated firms, and the group-affiliated sample is further sub divided into diversified and highly diversified groups. Firms in the sub sample of diversified groups include firms that are affiliated with groups with more than four product lines. The firms in the sub sample of highly diversified groups include firms that are affiliated with groups with more than eleven product lines.[25] To facilitate the discussion of how group-affiliation impact the capital structure decision, a number of tests for the difference between the various group-affiliated samples and the non-affiliated sample are presented in Table 4.[26] It is to this discussion that attention is now turned.

[Insert Table 4 about here]

The four total debt measures (LEV1-LEV4) are shown in Table 4 to be significantly higher for group-affiliated firms compared with non-affiliated firms. Specifically, the means are significantly higher at the 1 percent significant levels, for the sample of group-affiliated firms compared with the sample of non-affiliated firms. However, although the mean debt ratios are always higher compared with the sample of non-affiliated firms, this difference appears to reduce with the level of group diversification. In fact, for the sample of firms affiliated with highly diversified groups, the difference in the mean debt ratios from that for the non-affiliated firms is no longer statistically significant. Similar results are also evident for the median debt ratios.

The long-term debt ratios (L_DEBT) follow a pattern similar to that of the total debt measures (LEV1-LEV4). Both the mean and the median are statistically higher for the sample of group-affiliated firms compared with the sample of non-affiliated firms, but the difference is reduced with the level of group-diversification. However, unlike the results for the total debt measures, for the long-term debt the difference remains significant at the 1 percent significant level, even for the sample of firms affiliated with highly diversified groups.

Similar to the results discussed so far, the results for the short-term debt (S_DEBT) and bank debt (B_DEBT) also point to a systematic difference between the capital mix of

[25] Explain rationale for division
[26] Explain tests

group-affiliated and non-affiliated firms. However, in contrast to the results for the total debt and long-term debt measures, the mean and median short-term debt and bank loan ratios are lower for group-affiliated firms compared with non-affiliated firms. These differences become stronger with the level of group diversification. For the short-term debt ratio the difference is not statistically significant for the all groups category but it is significant for the highly diversified category. For the bank debt ratio, the difference between group-affiliated and non-affiliated firms is always highly significant.[27]

The ratios for the government loans (GOV) and foreign borrowings (FOREIGN), like the general results discussed above are consistent with the predictions outlined above and summarised in Table 1. In particular the mean government and foreign debt ratios are higher for group-affiliated firms compared with non-affiliated firms. The difference becomes stronger with the level of group diversification, and is always statistically significant at the 10 percent level or higher. For the internal debt ratio (INTERNAL), the mean for the full sample is around 13 percent of total corporate loans. The mean increases with the level of group diversification but the difference between the sample of firms affiliated with non-diversified groups and firms affiliated with diversified or highly diversified groups is not significant.[28]

5.2 Results from the multivariate analysis

As noted in Section 3, the empirical procedure includes two stages, both using Ordinary Least Squares (OLS). The approach is the general to specific where the general models are as specified in Equation (1) and Equation (2) for the firm level and group level stages respectively. The dependent variable in all the regressions reported in the body of the text is the ratio of total debt to the quasi market value of total assets (LEV2). However, the

[27] The Mann-Whitney test is a test based on ranking of the observations in order of size. However, it should be noted that in the case of short-term debt, bank loans, government loans, foreign borrowings and intra-group loans, the number of ties is very high. In particular, the number of observations of zero ratios is high and this may have implications for the validity of this test for these debt measures.

[28] The medians for government, foreign and intra-group debt ratios are consistently zero regardless of group-affiliation status. In spite of this the median tests are consistent with the results for the parametric tests of the mean. The reason for this is that the median test compares the fraction of observations at or below the median in each category. A significant test statistics indicates that these fractions are different across the categories. For instance, in the case of government loans, the fractions of observations at or below the overall median (observations at or below the median / total observations) are as follow. 79% for the sample of non-affiliated firms, 61% for the sample of group-affiliated firms, 58% for the sample of firms affiliated with diversified groups, and 51% for firms affiliated with highly diversified groups. Similarly for the foreign borrowing ratio the fraction of observations at or below the overall median are 98%, 91%, 89% and 88% for non-groups, all groups, diversified groups and highly diversified groups respectively. For the intra-group loan measure, the fraction of observations at or below zero are 89% for the non-diversified sample, 82% for the diversified groups sample and 73% for the highly diversified groups sample. These results suggest a positive association between group-affiliation and group level diversification and between the use of government, foreign and internal loans.

regressions were also run on the other three leverage measures (LEV1, LEV3, and LEV4) and on the ratio of long term debt to capital (L_DEBT) as defined in Table 1. These additional regressions gave results similar to the LEV2 regressions, but the diagnostic tests appear to consistently favour the LEV2 models.[29]

Another approach that is common to the two empirical stages is to run alternative models where some of the firm level explanatory variables are replaced with residuals obtained from auxiliary regressions. This procedure is designed to mitigate the impact of multicollinearity among the explanatory variables as discussed in Section 4 and presented in Table 3. Specifically, the three variables NON-DEBT TAX SHIELD, FIRM SIZE, and AGE, are replaced by the residuals obtained by regressing each of these variables in turn on a constant and the remaining seven firm level explanatory variables. The results obtained are similar to those from the original regressions and are reported along side the original regressions. These results are discussed below.

5.2.1 Results from the multivariate analysis at the firm-level

The general model is defined in Equation (1) and the explanatory variables include only characteristics of the firm. The hypothesis to be tested is that group-affiliated firms behave fundamentally different from non-affiliated firms in taking capital structure decisions. The specified model of Equation (1) was run for the pooled sample and then separately for the sub samples of non-affiliated and group-affiliated firms, and a Chow test for stability was then carried out. The results are presented in Table 5 for both the original variables (Panel A) and when some of these are replaced by their residuals (Panel B).

[Insert Table 5 about here]

In studying Table 5, it is important to note that the testing down procedure was carried out with the aim of optimising the model fitted to the pooled sample of all firms. Indeed, the Wald tests reported at the bottom of both Panel A and Panel B of Table 5 do not reject the null hypothesis that jointly the coefficients dropped from the general models are unimportant. This approach was designed to avoid biasing the results towards one or another categories of firms. Nonetheless, bias towards a good fit for the sub sample of

[29] The additional regressions are presented in Appendix C.

non-affiliated firms may be present because over 60% of the firms in the pooled sample are non-affiliated firms. However, the idea of the first stage of the empirical procedure is to assess the stability of the coefficients across group-affiliated and non-affiliated firms. If a structural break is found to be present, than the next stage is to design a model that takes these differences into account.

The results of Table 5 indicate that there is a structural break in fitting the capital structure model to the pooled sample of group-affiliated and non-affiliated firms. In particular the Chow tests of both Panel A and Panel B reject the null hypothesis of stability. These results persist when other leverage measures replace LEV2, the total debt to total capital measure, as reported in Appendix C. Rejection of stability is consistent with the hypothesis put forward in Section 3. Explicitly, the sensitivity of the leverage decision to firm factors seems different for group-affiliated firms compared to non-affiliated firms. It thus appears more appropriate to discuss the results for the separate models, rather than for the model fitted to the full sample, as is done below.

The fit of the specified model of Equation (1) to the non-affiliated sample appears good. Both Regression (3) of Panel A and Regression (7) of Panel B of Table 5 easily pass the LM heteroskedasticity test at the 10% significant level. Indeed, the probability values for the null of homoskedasticity are 0.24 and 0.33 for Regression (3) and Regression (7), respectively. Further, the Jarque-Bera tests for normality of the disturbances can not be rejected at the 5% significant level, and the RESET2 tests for no omitted power terms also pass with very high probabilities.

Evidence of good fit of the specified model of Equation (1) to the sample of group-affiliated firms as presented in Regression (4) and Regression (8) of Panel A and B of Table 5 is weaker. In particular, although the Jarque-Bera tests for normality give similar results to those of non-affiliated sample, the LM heteroskedasticity tests give lower probability values for the null of homoskedasticity [0.09 and 0.11 for Regressions (4) and (8), respectively]. In addition to that the RESET2 test for no omitted power terms is rejected for the sample of group-affiliated firms as is shown in Regression (4) and Regression (8) of Table 5.

Table 5 also indicates that the estimated coefficients for both the non-affiliated and group-affiliated samples generally enter the model with the predicted signs. Furthermore,

as expected there appear to be differences in the magnitudes of the coefficients of the two categories.

NON-DEBT TAX SHIELD as measured by the log of depreciation is important for the capital structure decision of both non-affiliated and group affiliated firms. However, in contrast to the prediction of Table 2, it enters the models with positively signed coefficients, which may be due to depreciation reflecting tangibility of assets. In both Panel A and Panel B of Table 5, however, the magnitude of the coefficients for the sample of group-affiliated firms is about half that of non-affiliated firms. This indicates lesser sensitivity in the case of group-affiliated firms.

The magnitudes of the estimated coefficients on the LIQUIDITY variables are relatively small for both non-affiliated and group-affiliated firms. In the case of the group-affiliated sample this variable enters with the expected positive coefficient which is, however, insignificant. In the case of the non-affiliated firms LIQUIDITY enters with negatively signed estimated coefficients, which is contradictory to expectations. These differences between group-affiliated and non-affiliated firms serve to emphasis the different between these two categories of firms. Thus LIQUIDITY tend to have a small positive effect on the leverage decision of group-affiliated firms but near enough no effect in the case of non-affiliated firms.

Asset structure appears important for both non-affiliated and group-affiliated firms. In particular the INTANGIBILITY is always highly significant and enters the specified models of both group and non-group firms with negatively signed estimated coefficients as predicted. Group-affiliated firms appear more sensitive to asset structure. In Panel A of Table 5, the estimated coefficients on INTANGIBILITY are –0.9 and –1.5 for the non-affiliated and group-affiliated samples respectively. Similar results are also presented in Panel B of the same table.

Larger firms can support more debt as evidence from the positive and significant estimated coefficients on RESIDUAL FIRM SIZE as shown in Panel B of Table 5. FIRM SIZE drops out of the specified model of Panel A of Table 5, but this may be due to multicollinearity problems that are controlled for in Panel B. Similar to the results for NON-DEBT TAX SHIELD and INTANGIBILITY there appears to be a substantial difference between non-affiliated and group-affiliated firms. In particular in Panel B of

Table 5, the magnitude of the estimated coefficient on RESIDUAL FIRM SIZE is 0.12 for non-affiliated firms but only 0.04 for group-affiliated. This suggests that while firm size is important for the leverage decision of non-affiliated firms it has much weaker impact, in the case of group-affiliated firms. This is consistent with the market failure theory of business groups, where affiliated firms share group-wide reputation for stability and thus need to rely less on factors at the firm level.

No definite prediction regarding the sign of the coefficient on AGE is specified in Table 1. However, AGE enters Panel A of Table 5 with negative coefficients, which is in line with agency cost of equity considerations and the notion that due to reputation, mature firms tend to have more equity in their capital mix. Further, the coefficients on AGE, in Panel A, for both non-affiliated and group-affiliated firms are of similar magnitudes. Thus the results do not point to a difference in the impact of AGE on the capital structure decision of group and non-group firms. This variable however drops out of the models of Panel B of Table 5 where the problem of multicollinearity is addressed.

STOCK ILLIQUIDITY, is expected to enter the model with positive estimated coefficients because highly traded equity is taken as a sign of confidence on the part of investors that the firm is free from agency costs of equity. This variable does not appear to play an important role in the capital structure decisions of group-affiliated firms. Indeed, it enters both Regression (4) and Regression (8) of Table 5 with very high probability values of being insignificantly different from zero. There is also not much that can be said about how this variable influences the capital structure decisions of non-affiliated firms. Particularly, although in Regression (3) of Table 5 it enters with the predicted positive sign, this sign is reversed in Regression (7).

GROWTH appears to confirm to expectations. It enters the regressions for the non-affiliated firms with negative and significant estimated coefficients but is insignificant for group-affiliated firms. One caveat, however, with regards the importance of this variable, is the relatively small magnitudes of its coefficients.

Finally pecking order considerations as reflected by PROFITABILITY are shown to be important to both group and non-group firms with a stronger impact in the case of the former. This is consistent with the suggestion that internal sources are particularly

important to group-affiliated firms, perhaps due to these firms guarding their secrecy more jealousy compared with non-affiliated firms.

There are important conclusions to be drawn from the empirical results from both the comparison analysis and the multivariate analysis described in this sub section. Particularly it may be concluded that debt levels and what determined them are systematically different in the case of group-affiliated firms compared with non-affiliated firms. The next sub section reports the results from the empirical approach that attempts to account for these differences.

5.2.2 Results for the multivariate analysis incorporating group-level variables and interaction terms

In the second stage explanatory variables at the group level are added to the model as specified in equation (2). Group-affiliation dummy variables and interaction terms are also added in order to allow the constant and the slopes of the firm level characteristics to differ when the firm is group-affiliated. Moreover, the conclusions from the comparison analysis are that there tend to be some differences in the debt ratios within the group-affiliated category. Particularly it has been shown that the debt ratios tend to change as the group with which a firm is affiliated becomes more diversified. These findings justify the inclusion in equation (2) of the dummy variable, HD, for firms affiliated with highly diversified groups. They further justify the inclusion of interaction terms that measure the extra change in the firm level characteristics' slopes when the firm is affiliated with a highly diversified group.

The general results from the multivariate analysis at the group level indicate that group-affiliated firms display different sensitivities to the determinants of capital structure. Further, it is shown that there is merit to the idea that the capital structure decision of group-affiliated firms may be explained in terms of the various business group theories. In particular it appears that control considerations, sharing of group-wide resources and group complexity influence the leverage decisions of group-affiliated firms. The results from the group level analysis are reported in Table 6 and are discussed in more detail below. As before, Panel A of the table gives the general and specific regressions that are based on Equation (2). Similarly, Panel B is a variant of Equation (2) where some of the

explanatory variables suspected of causing multicollinearity are replaced by the residuals from auxiliary regressions.

[Insert Table 6 about here]

The group dummy, GP, and the highly diversified group dummy, HD, enter the model of both Panel A and Panel B of Table 6 with significant and positive estimated coefficients. This implies that group-affiliated firms tend to use more debt, and is consistent with the comparison analysis results. The positive coefficient on GP is also in line with the social structure theory of business groups, which implies that due to control considerations group firms prefer debt to equity. The additional positive effect for firms affiliated with highly diversified groups, is consistent with Khanna and Palepu (2000) and with the prediction of Table 2 but not with the results of the comparison analysis.

In general, excluding AGE and STOCK ILLIQUIDITY the slopes on the other six firm level explanatory variables are shown in Table 6 to change when the firm is group-affiliated. The interpretation of AGE, and STOCK ILLIQUIDITY, however, is ambiguous because both these variables display inconsistency when Panel A and Panel B of Table 6 are compared. The results for the eight firm level explanatory variables are basically the same as the results obtained for Equation (1) as reported in Table 5. The discussion here, therefore, focuses only on new information that emerges from running the extended model of Equation (2).

INTANGIBILITY as reflected in the ratio of R&D and advertising expenditure to sales has a negative effect in the case of non-affiliated firms. This effect is stronger for group-affiliated firms and much stronger when the firm is affiliated with a highly diversified group. To the extent that R&D and advertising represent distress costs, this extra sensitivity implies that firms affiliated with highly diversified groups face higher risk of failure. This may be due to cross-subsidisation within groups, or to some other inefficiencies that are related to the business group structure. Alternatively, to the extent that R&D and advertising represent growth opportunities, the extra sensitivity may suggest that firms affiliated with highly diversified groups face greater agency costs of debt. This may be due to the typical complex structure of highly diversified groups, which makes agency behaviour difficult to detect. Thus the debt levels of firms affiliated with highly

diversified groups are particularly sensitive to factors that increase the opportunities for wealth expropriation from debt holders such as risk shifting.

PROFITABILITY has a negative impact on the leverage decision of non-affiliated firms. This negative impact seems to increase with group-affiliation and is particularly strong for firms affiliated with highly diversified groups. As previously suggested, this is consistent with pecking order considerations and with the notion that internal sources are particularly important to group-affiliated firms, perhaps due to secrecy factors.

Of the group-wide factors the three variables that are shown in Table 6 to be important include GROUP PROFITABILITY, GROUP DEBT and GROUP SIZE. GROUP PROFITABILITY enters the regressions of panels A and B with negative coefficients, which is inconsistent with the idea that firms share group-wide reputation that gives them better access to debt. The negative sign on GROUP PROFITABILITY, however, may be explained in terms of group internal capital market. Thus the group channel profits to where it is needed to avoid member firms having to resort to external finance. Hence firms affiliated with profitable firms tend to have lower debt ratios. This is consistent with pecking order considerations, and with the market failure theory of groups.

GROUP DEBT enters the models of Table 6 with negative but small coefficients. The negative association with the group-wide leverage and the ability of the affiliated firm to obtained debt finance is consistent with expectations and with the notion of group intra-dependency. Intra-group trading, sharing of resources and loan guarantee links mean that a default by one firm may cause a chain reaction within the group. Therefore the financial risk to which other firms in the group are exposed to, impact the leverage decision of an affiliated firm. It could further be argued that in order to create group-wide reputation, the group imposes debt levels on member firms that are designed to move the group towards its group-wide optimal capital structure.

Finally, GROUP SIZE has a small but important and negative impact on the debt ratios of the affiliated firm. In the spirit of Dewenter et al (2001) it assumed that group size, due to high visibility reduces agency behaviour. The negative sign on the GROUP SIZE coefficient implies that the impact of visibility on reducing the agency costs of equity is stronger than its impact on reducing the agency costs of debt.

6. Summary and concluding remarks

In this paper, we initially provide a brief review of two strands of the corporate finance literature. The first strand relates to the firm's capital structure decisions, with emphasis on the pecking order theory and the trade off theory. The second strand of the literature relates to business groups and theories regarding their role, particularly in the context of emerging markets. A synthesis of the competing strands of the literature is then used to generate some plausible models that explain the capital structure decisions of independent as well as group-affiliated firms. The models are estimated and tested on a sample of 1811 Indian firms, of which 1146 are independent firms and 665 are group-affiliated. Table 7 summarises the main conclusions from the empirical procedures.

[Table 7 about here]

In general, the findings of the study confirm that group-affiliated firms are significantly different from their independent counterparts, in the context of their capital structure decisions. For example, the results show that the mean as well as median leverage of group-affiliated firms is higher than the counterpart measures for non-affiliated firms. This result is consistent with the findings relating to long-term debt, government debt and foreign debt, which all shower higher mean and median measures for group-affiliated firms compared to independent firms. However, lower mean and median measures are found for short-term debt and bank debt for non-affiliated firms rather than independent firms, suggesting that the short run capital structure behaviour of these firms is rather peculiar.

In terms of the main determinants of capital structure, we uncover a number of interesting findings. First, in terms of the non-debt tax shield, it is found that group affiliation has a reduced effect on capital structure decisions such that the tax benefits of debt do not play an important role for group firms; this may be because these firms have alternative shields such as internal transfer of profits. Second, we find that size as well as growth do not matter for the capital structure of group-affiliated firms, whereas it is a critical factor for the capital structure decisions of independent firms. Thirdly, we find that there are no differences between group and non-group firms in terms of the impact of age and stock illiquidity on capital structure decisions. Fourth, only liquidity has a positive

(albeit small) impact on the capital structure decisions of group-affiliated firms while intangibility and profitability, group debt and group size have a negative effect.

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Table 1: Measures of Debt

Variable name	Variable definition	Correlation with group affiliation
LEV1	Total liabilities / Quasi market value of total assets	(+)
LEV2	Total debt / Quasi market value of total assets	(+)
LEV3	Total debt / Quasi market value of net assets	(+)
LEV4	Total debt / Quasi market value of capital	(+)
L_DEBT	Long-term debt / Quasi market value of capital	(+)
S_DEBT	Short-term debt / Quasi market value of capital	(-)
B_DEBT	Bank loans / Quasi market value of capital	(-)
GOV	Loans from government / Total borrowings	(+)
FOREIGN	Direct foreign borrowings / Total borrowings	(+)
INTERNAL	Loans from group companies / Loans from corporate bodies	Not applicable

Note:
Total liabilities = preference capital + total borrowings + current liabilities & provisions;
Total debt = preference capital + total borrowings;
Short term debt = short term bank borrowings + commercial paper + current portion of long term debt;
Long term debt = preference capital + total borrowings – short term debt;
Quasi market value of total assets = book value of total assets – equity capital – reserves + market capitalisation;
Quasi market value of net assets = total assets – current liabilities;
Quasi market value of capital =preference capital + total borrowings + market capitalisation

Table 2: Definition and Predicted Sign of the Explanatory Variables

PANEL A – Explanatory variables at the firm level	**Sign**
Trade-off theory: benefits of debt	
NON-DEBT TAX SHIELD = Log (depreciation)	(-)
Trade-off theory: financial distress costs	
LIQUIDITY = Current assets / Current liabilities =	(+)
INTANGIBILITY = (R&D plus advertising) / Sales	(-)
FIRM SIZE = Log (sales)	(+)
Agency theory	
AGE = Log (firm age since incorporation)	(+/-)
STOCK ILLIQUIDITY = 1- (No. of days stock traded on BSE / Total no. of trading days)	(+)
GROWTH = Market to Book ratio	(-)
Pecking order	
PROFITABILITY = Profit before tax / Book value of total assets	(-)
Industry dummies	
Ij = A set of 11 industry dummies. Ij is set to 1 if the firm is affiliated with industry j.	(?)

PANEL B – Explanatory variables at the group level	**Sign**
GROUP PROFITABILITY = $?_{j?i}$ (profitability)$_j$ W_j. [where W_j = Total assets$_j$ / $?_{j?i}$ (Total assets)$_j$]	(+)
GROUP LIQUIDITY = $?_{j?i}$ (liquidity)$_j$ W_j. [where W_j = Current liabilities$_j$ / $?_{j?i}$ (Current liabilities)$_j$]	(+)
GROUP DEBT = $?_{j?i}$ (Debt / Equity)$_j$ W_j. [where W_j = Equity$_j$ / $?_{j?i}$ (Equity)$_j$]	(-)
GROUP DIVERSITY = Logarithm of number of industries represented in the group.	(-/+)
GROUP SIZE = Logarithm of total sales of all firms in the group.	(-/+)
Group dummies	
GP = Equal to 1 if the firm is group-affiliated and 0 otherwise	(+)
HD = Equal to 1 if the firm is affiliated with a highly diversified group with over 11 product lines	(+)

Notes: The subscript *j* relates to all the firms in the group excluding the firm of interest, firm *i*. The debt to equity ratio is measured as the ratio of long term debt plus preference capital to the market value of equity at the year-end.

Table 3: Descriptive statistics and correlation matrix

1,472 Non-financial BSE listed firms in the Indian Private Sector with year end March 2000

PANEL A – Explanatory variables at the firm level

	Mean	Std Dev	LEV2	NON-DEBT TAX SHIELD	LIQUIDITY
LEV2 (Debt/Assets)	0.419	0.235	1		
NON-DEBT TAX SHIELD	0.404	1.766	0.270	1	
LIQUIDITY (CA/CL)	5.762	16.726	-0.143	-0.128	1
INTANGIBILITY	0.008	0.022	-0.179	0.038	0.015
FIRM SIZE	3.807	1.745	0.145	0.840	-0.102
AGE	2.983	0.633	-0.008	0.329	-0.104
STOCK ILLIQUIDITY	0.407	0.357	0.049	-0.575	-0.001
GROWTH (P/B)	1.508	8.332	-0.186	0.096	0.033
PROFITABILITY	0.032	0.093	-0.396	0.017	0.124
	INTANGIBILITY	**FIRM SIZE**	**AGE**	**STOCK ILLIQUIDITY**	**GROWTH**
INTANGIBILITY	1				
FIRM SIZE	0.075	1			
AGE	0.099	0.377	1		
STOCK ILLIQUIDITY	-0.129	-0.547	-0.131	1	
GROWTH (P/B)	0.062	0.099	-0.001	-0.085	1
PROFITABILITY	0.110	0.151	0.023	-0.210	0.181

Note: The leverage measure, LEV2, is defined in Table 1 while the rest of the variables are defined in Table 2.

PANEL B – Firm level variables obtained from auxiliary regressions and group-level variables

	Number of Observations: 1472			Number of Observations: 559 (group-affiliated firms)				
	Residual of:			**Group measure of:**				
	TAX SHIELD	**FIRM SIZE**	**AGE**	**PROFITABILITY**	**LIQUIDITY**	**DEBT**	**DIVERSITY**	**SIZE**
Mean	-0.006	-0.010	0.002	0.001	3.008	0.869	1.714	7.141
Std Dev	0.891	0.893	0.579	0.095	1.835	2.506	0.923	1.957

Note: The three variables listed on the right hand side of the table are the residuals obtained from the auxiliary regressions. These are the regressions of NON-DEBT TAX SHIELD, FIRM SIZE and AGE, on a constant and the rest of the variables as defined in Panel A of Table 2. The group level variables are defined in Panel B of Table 2.

Table 4: Comparative analysis of debt ratios across group and non-group affiliated firms
Non-financial BSE listed firms in the Indian Private Sector with y/e March 2000

1. LEV1 = TOTAL LIABILITIES / TOTAL ASSETS

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.067**	**0.072**	**0.054**		**0.053**		**0.063**	
F Statistic (equality of variances)			1.329	*0.000*	1.352	*0.001*	1.133	*0.184*
Mean	**0.698**	**0.671**	**0.746**		**0.730**		**0.676**	
NORMAL Statistic (unequal variances)			6.238	*0.000*	3.863	*0.000*	0.215	*0.830*
T Statistic (equal variances)			6.008	*0.000*	3.546	*0.000*	0.205	*0.838*
Median	**0.784**	**0.760**	**0.826**		**0.812**		**0.776**	
CHI SQR (1)			27.394	*0.000*	10.135	*0.001*	0.373	*0.542*
Mann-Whitney test			-6.114	*0.000*	-3.257	*0.001*	0.135	*0.893*

2. LEV2 = TOTAL DEBT / TOTAL ASSETS

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.056**	**0.058**	**0.051**		**0.048**		**0.047**	
F Statistic (equality of variances)			1.140	*0.030*	1.208	*0.021*	1.230	*0.067*
Mean	**0.434**	**0.414**	**0.466**		**0.449**		**0.416**	
NORMAL Statistic (unequal variances)			4.625	*0.000*	2.404	*0.016*	0.066	*0.948*
T Statistic (equal variances)			4.545	*0.000*	2.279	*0.023*	0.060	*0.952*
Median	**0.458**	**0.425**	**0.488**		**0.478**		**0.458**	
CHI SQR (1)			18.139	*0.000*	4.875	*0.027*	1.174	*0.279*
Mann-Whitney test			-4.353	*0.000*	-2.162	*0.031*	-0.010	*0.992*

3. LEV3 = TOTAL DEBT / NET ASSETS

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.088**	**0.091**	**0.079**		**0.077**		**0.081**	
F Statistic (equality of variances)			1.159	*0.017*	1.181	*0.036*	1.128	*0.193*
Mean	**0.584**	**0.555**	**0.635**		**0.613**		**0.559**	
NORMAL Statistic (unequal variances)			5.674	*0.000*	3.241	*0.001*	0.172	*0.863*
T Statistic (equal variances)			5.564	*0.000*	3.091	*0.002*	0.164	*0.870*
Median	**0.661**	**0.627**	**0.705**		**0.693**		**0.638**	
CHI SQR (1)			17.318	*0.000*	5.200	*0.023*	0.069	*0.792*
Mann-Whitney test			-5.537	*0.000*	-2.883	*0.004*	0.057	*0.955*

4. LEV4 = TOTAL DEBT / CAPITAL

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.089**	**0.093**	**0.078**		**0.077**		**0.082**	
F Statistic (equality of variances)			1.183	*0.008*	1.201	*0.024*	1.134	*0.182*
Mean	**0.602**	**0.570**	**0.658**		**0.637**		**0.581**	
NORMAL Statistic (unequal variances)			6.207	*0.000*	3.676	*0.000*	0.401	*0.689*
T Statistic (equal variances)			6.070	*0.000*	3.490	*0.001*	0.381	*0.703*
Median	**0.693**	**0.651**	**0.747**		**0.730**		**0.666**	
CHI SQR (1)			26.383	*0.000*	10.600	*0.001*	0.009	*0.926*
Mann-Whitney test			-6.131	*0.000*	-3.314	*0.001*	-0.108	*0.914*

5. L_DEBT = (LONG TERM DEBT+PREF CAP) / CAPITAL

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.065**	**0.062**	**0.064**		**0.063**		**0.063**	
F Statistic (equality of variances)			0.972	*0.662*	0.983	*0.581*	0.980	*0.576*
Mean	**0.347**	**0.309**	**0.412**		**0.400**		**0.364**	
NORMAL Statistic (unequal variances)			8.396	*0.000*	5.692	*0.000*	2.376	*0.017*
T Statistic (equal variances)			8.428	*0.000*	5.719	*0.000*	2.396	*0.017*
Median	**0.338**	**0.272**	**0.428**		**0.409**		**0.374**	
CHI SQR (1)			57.363	*0.000*	28.596	*0.000*	5.769	*0.016*
Mann-Whitney test			-8.416	*0.000*	-5.793	*0.000*	-2.581	*0.010*

6. S_DEBT = SHORT TERM DEBT / CAPITAL

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.045**	**0.048**	**0.040**		**0.040**		**0.038**	
F Statistic (equality of variances)			1.204	*0.004*	1.179	*0.038*	1.265	*0.044*
Mean	**0.256**	**0.261**	**0.246**		**0.237**		**0.217**	
NORMAL Statistic (unequal variances)			-1.514	*0.130*	-1.863	*0.062*	-2.445	*0.014*
T Statistic (equal variances)			-1.478	*0.140*	-1.778	*0.076*	-2.228	*0.026*
Median	**0.225**	**0.233**	**0.216**		**0.200**		**0.186**	
CHI SQR (1)			2.230	*0.135*	5.813	*0.016*	8.120	*0.004*
Mann-Whitney test			0.770	*0.441*	1.422	*0.155*	1.972	*0.049*

7. B_DEBT = B ANK LOANS / CAPITAL

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**1811**	**1146**	**665**		**314**		**131**	
Variance	**0.048**	**0.053**	**0.038**		**0.033**		**0.032**	
F Statistic (equality of variances)			1.374	*0.000*	1.577	*0.000*	1.636	*0.000*
Mean	**0.281**	**0.294**	**0.260**		**0.236**		**0.220**	
NORMAL Statistic (unequal variances)			-3.289	*0.001*	-4.685	*0.000*	-4.278	*0.000*
T Statistic (equal variances)			-3.154	*0.002*	-4.121	*0.000*	-3.522	*0.000*
Median	**0.252**	**0.267**	**0.233**		**0.210**		**0.198**	
CHI SQR (1)			7.093	*0.008*	9.858	*0.002*	8.478	*0.004*
Mann-Whitney test			2.244	*0.025*	3.424	*0.001*	3.151	*0.002*

8. GOV = G>NMENT LOANS / TOTAL BORROWINGS

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**2060**	**1362**	**698**		**321**		**130**	
Variance	**0.015**	**0.013**	**0.018**		**0.024**		**0.029**	
F Statistic (equality of variances)			1.352	*0.000*	1.813	*0.000*	2.217	*0.000*
Mean	**0.038**	**0.034**	**0.045**		**0.054**		**0.065**	
NORMAL Statistic (unequal variances)			1.879	*0.060*	2.251	*0.024*	2.026	*0.043*
T Statistic (equal variances)			1.973	*0.049*	2.697	*0.007*	2.800	*0.005*
Median	**0.000**	**0.000**	**0.000**		**0.000**		**0.000**	
CHI SQR (1)			70.912	*0.000*	58.825	*0.000*	50.819	*0.000*
Mann-Whitney t est			-5.812	*0.000*	-5.230	*0.000*	-4.803	*0.000*

9. FOREIGN = FOREIGN LOANS / TOTAL BORROWINGS

	All firms	Non-affiliated	Group-affiliated		Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**2060**	**1362**	**698**		**321**		**130**	
Variance	**0.005**	**0.002**	**0.010**		**0.015**		**0.018**	
F Statistic (equality of variances)			5.791	*0.000*	8.619	*0.000*	9.950	*0.000*
Mean	**0.010**	**0.004**	**0.021**		**0.031**		**0.032**	
NORMAL Statistic (unequal variances)			4.190	*0.000*	3.756	*0.000*	2.388	*0.017*
T Statistic (equal variances)			5.281	*0.000*	6.424	*0.000*	5.427	*0.000*
Median	**0.000**	**0.000**	**0.000**		**0.000**		**0.000**	
CHI SQR (1)			55.102	*0.000*	64.172	*0.000*	44.557	*0.000*
Mann-Whitney test			-2.541	*0.011*	-2.555	*0.011*	-1.845	*0.065*

10. INTERNAL = GROUP LOANS / TOTAL CORPORATE LOANS

	All groups	Non-diversified	Diversified groups (> 4 product lines)		Highly diversified (>11 product lines)	
No. observations	**255**	**130**	**125**		**41**	
Variance	**0.108**	**0.097**	**0.120**		**0.159**	
F Statistic (equality of variances)			1.235	*0.118*	1.645	*0.020*
Mean	**0.127**	**0.108**	**0.148**		**0.201**	
NORMAL Statistic (unequal variances)			0.968	*0.333*	1.367	*0.172*
T Statistic (equal variances)			0.970	*0.333*	1.555	*0.122*
Median	**0.000**	**0.000**	**0.000**		**0.000**	
CHI SQR (1)			2.991	*0.084*	6.441	*0.011*
Mann-Whitney test			-0.970	*0.332*	-1.473	*0.141*

NOTE: Test statistics give the difference from the non-affiliated category in all but the last measure. In the case of INTERNAL the test statistics give the difference from the non-diversified group category. The figures in italic are the probabilities attached to the test statistics.

Table 5: Ordinary Least Squares regressions of LEV2 (Debt /Assets) on firm-level characteristics.

1,472 non-financial BSE listed firms in the Indian Private Sector with y/e March 2000.

PANEL A -ORIGINAL EXPLANATORY VARIABLES

	ALL FIRMS (general)			**ALL FIRMS (specific model)**			**NON-AFFILIATED FIRMS**			**GROUP-AFFILIATED FIRMS**		
Regression	1			2			3			4		
Mean of dep. var.	0.419			0.419			0.402			0.448		
Std. dev. of dep.	0.235			0.235			0.238			0.226		
Sum of squared residuals	52.758			52.944			34.178			16.682		
Variance of residuals	0.036			0.036			0.038			0.030		
Std. error of regression	0.191			0.190			0.195			0.175		
R-squared	0.348			0.346			0.338			0.417		
Adj R-squared	0.340			0.341			0.329			0.404		
LM het. Test	6.831 [0.009]			5.017 [0.025]			1.392 [0.238]			2.914 [0.088]		
Jarque-Bera test	0.876 [0.645]			0.482 [0.786]			6.686 [0.035]			6.687 [0.035]		
Ramsey's RESET2	0.284 [0.594]			0.762 [0.383]			0.030 [0.863]			13.170 [0.000]		
F (zero slopes)	40.874 [0.000]			64.371 [0.000]			38.231 [0.000]			32.593 [0.000]		
Schwarz B.I.C.	-288.279			-311.209			-159.153			-148.077		
Log likelihood	361.223			358.622			203.454			189.208		
Variable	**Coeff**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**
C	0.468	12.793	0.000	0.454	15.714	0.000	0.444	11.628	0.000	0.500	11.894	0.000
NON-DEBT TAX	0.055	8.481	0.000	0.051	12.507	0.000	0.068	11.372	0.000	0.030	5.211	0.000
LIQUIDITY	-0.001	-2.063	0.039	-0.001	-2.035	0.042	-0.001	-2.017	0.044	0.002	0.813	0.417
INTANGIBILITY	-1.128	-4.323	0.000	-1.153	-4.414	0.000	-0.855	-2.722	0.007	-1.509	-2.947	0.003
FIRM SIZE	-0.007	-1.116	0.264									
AGE	-0.031	-3.423	0.001	-0.033	-3.749	0.000	-0.034	-2.700	0.007	-0.031	-2.621	0.009
STOCK ILLIQUIDITY	0.086	4.410	0.000	0.091	4.638	0.000	0.123	5.116	0.000	0.045	1.291	0.197
GROWTH	-0.003	-1.879	0.060	-0.004	-1.914	0.056	-0.007	-4.335	0.000	-0.002	-0.777	0.437
PROFITABILITY	-0.739	-6.807	0.000	-0.759	-7.204	0.000	-0.553	-4.363	0.000	-1.133	-5.304	0.000
I1 (food & beverages)	0.093	3.918	0.000	0.084	4.194	0.000	0.102	4.060	0.000	0.030	0.944	0.346
I2 (Textiles)	0.149	6.849	0.000	0.142	8.317	0.000	0.121	5.375	0.000	0.162	6.403	0.000
I3 (Chemicals)	0.071	3.861	0.000	0.065	5.032	0.000	0.067	3.953	0.000	0.051	2.652	0.008
I4 (Mineral products)	0.027	1.040	0.298									
I5 (Metals)	0.062	2.748	0.006	0.052	2.919	0.004	0.050	2.059	0.040	0.037	1.402	0.162
I6 (Machinery)	-0.004	-0.210	0.834									
I7 (transport equipment)	0.019	0.714	0.476									
I8 (Misc. manufacturing)	0.074	2.756	0.006	0.069	2.941	0.003	0.061	2.015	0.044	0.079	2.327	0.020
I9 (Diver. Manufacturing)	0.034	0.708	0.479									
I10 (Mining)	0.039	0.555	0.579									
I11 (Electricity)	-0.051	-0.685	0.494									

WALD TEST - TESTING SEVERAL COEFFICIENTS JOINTLY [Equation (1) versus Equation (2)]:

F(7 1453) Test Statistic: 0.735 Upper tail area: 0.642

CHOW TEST FOR STABILITY [Equation (2) Versus Equations (3) and (4) separately]:

F(12 1448) Test Statistic: 4.945 Upper tail area: 0.000

PANEL B - RESIDUALS FROM AUXILIARY REGRESSIONS REPLACE THE EXPLANATORY VARIABLES: NON-DEBT TAX SHIELD, FIRM SIZE AND AGE.

	ALL FIRMS (general model)			**ALL FIRMS (specific model)**			**NON-AFFILIATED FIRMS**			**GROUP-AFFILIATED FIRMS**		
Regression	5			6			7			8		
Mean of dep. Var.	0.419			0.419			0.402			0.448		
Std. Dev. Of dep. Var.	0.235			0.235			0.238			0.226		
Sum of squared residuals	52.758			52.896			34.220			16.586		
Variance of residuals	0.036			0.036			0.038			0.030		
Std. Error of regression	0.191			0.190			0.195			0.174		
R-squared	0.348			0.347			0.337			0.420		
Adjusted R-squared	0.340			0.341			0.328			0.408		
LM het. Test	6.831 [0.009]			6.272 [0.012]			0.938 [0.333]			2.574 [0.109]		
Jarque-Bera test	0.876 [0.645]			1.012 [0.603]			7.188 [0.027]			7.729 [0.021]		
Ramsey's RESET2	0.284 [0.594]			0.410 [0.522]			0.000 [0.992]			11.275 [0.001]		
F (zero slopes)	40.874 [0.000]			64.540 [0.000]			38.095 [0.000]			33.046 [0.000]		
Schwarz B.I.C.	-288.279			-311.878			-158.603			-149.693		
Log likelihood	361.223			359.291			202.904			190.825		
Variable	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**
C	0.436	23.714	0.000	0.443	39.066	0.000	0.457	25.915	0.000	0.455	26.734	0.000
RESIDUAL TAX SHLD	0.114	11.481	0.000	0.116	12.512	0.000	0.154	11.356	0.000	0.071	5.264	0.000
LIQUIDITY	-0.001	-3.540	0.000	-0.001	-3.598	0.000	-0.001	-4.188	0.000	0.002	0.594	0.553
INTANGIBILITY	-1.322	-5.087	0.000	-1.337	-5.157	0.000	-1.095	-3.444	0.001	-1.567	-3.132	0.002
RESIDUAL FIRM SIZE	0.078	7.726	0.000	0.080	8.681	0.000	0.117	9.126	0.000	0.035	2.141	0.033
RESIDUAL AGE	0.001	0.119	0.905									
STOCK ILLIQUIDITY	-0.051	-3.317	0.001	-0.052	-3.361	0.001	-0.068	-3.237	0.001	-0.043	-1.509	0.132
GROWTH	-0.003	-1.472	0.141	-0.003	-1.497	0.135	-0.006	-3.663	0.000	-0.002	-0.613	0.540
PROFITABILITY	-0.855	-8.222	0.000	-0.860	-8.307	0.000	-0.687	-5.445	0.000	-1.197	-5.817	0.000
I1 (food & beverages)	0.093	3.918	0.000	0.086	4.369	0.000	0.101	4.071	0.000	0.039	1.224	0.221
I2 (Textiles)	0.149	6.849	0.000	0.142	8.391	0.000	0.121	5.406	0.000	0.165	6.492	0.000
I3 (Chemicals)	0.071	3.861	0.000	0.065	5.083	0.000	0.065	3.878	0.000	0.052	2.777	0.006
I4 (Mineral products)	0.027	1.040	0.298									
I5 (Metals)	0.062	2.748	0.006	0.055	3.089	0.002	0.051	2.128	0.034	0.040	1.538	0.125
I6 (Machinery)	-0.004	-0.210	0.834									
I7 (transport equipment)	0.019	0.714	0.476									
I8 (Misc. manufacturing)	0.074	2.756	0.006	0.068	2.902	0.004	0.060	1.985	0.047	0.074	2.106	0.036
I9 (Diver. Manufacturing)	0.034	0.708	0.479									
I10 (Mining)	0.039	0.555	0.579									
I11 (Electricity)	-0.051	-0.685	0.494									

WALD TEST - TESTING SEVERAL COEFFICIENTS JOINTLY [Equation (5) versus Equation (6)]:

F(7 1453) Test Statistic: 0.546 Upper tail area: 0.800

CHOW TEST FOR STABILITY [Equation (6) versus Equations (7) and (8) separately]:

F(12 1448) Test Statistic: 4.966 Upper tail area: 0.000

NOTE: Standard Errors are heteroskedastic-consistent (HCTYPE=2). The dependent variable is defined in Table 1. The explanatory variables are defined in Table 2, excluding the following three: RESIDUAL TAX SHIELD, RESIDUAL FIRM SIZE, and RESIDUAL AGE. These are obtained from regressing respectively NON DEBT TAX SHIELD, FIRM SIZE and AGE on a constant and the rest of the non-dummy explanatory variables. The residuals from these regressions then replace the original variables.

Table 6: Ordinary Least Squares regressions of LEV2 (Debt /Assets) on firm and group characteristics. 1,384 non-financial BSE listed firms in the Indian Private Sector with y/e March 2000.

PANEL A - ORIGINAL EXPLANATORY VARIABLES

	GENERAL MODEL			SPECIFIC MODEL		
Mean of dep. var.	0.419			0.419		
Std. dev. of dep. var.	0.235			0.235		
Sum of squared residuals	46.872			47.335		
Variance of residuals	0.035			0.035		
Std. error of regression	0.187			0.187		
R-squared	0.387			0.381		
Adjusted R-squared	0.368			0.370		
LM het. test	1.937 [0.164]			2.047 [0.152]		
Jarque -Bera test	2.018 [0.365]			3.016 [0.221]		
Ramsey's RESET2	3.746 [0.053]			3.466 [0.063]		
F (zero slopes)	20.139 [0.000]			34.812 [0.000]		
Schwarz B.I.C.	-223.328			-281.610		
Log likelihood	378.832			372.019		
Variable	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**
C	0.445	9.971	0.000	0.448	15.003	0.000
GP	0.203	2.006	0.045	0.177	3.192	0.001
HD	0.129	0.966	0.334	0.056	1.892	0.059
NON-DEBT TAX SHIELD	0.065	8.028	0.000	0.068	11.900	0.000
LIQUIDITY (CA/CL)	-0.001	-1.996	0.046	-0.001	-2.027	0.043
INTANGIBILITY	-0.839	-2.715	0.007	-0.893	-3.486	0.001
FIRM SIZE	0.003	0.434	0.664			
AGE	-0.036	-2.830	0.005	-0.033	-3.574	0.000
STOCK ILLIQUIDITY	0.119	5.088	0.000	0.122	5.167	0.000
GROWTH (P/B)	-0.006	-4.255	0.000	-0.008	-4.650	0.000
PROFITABILITY	-0.557	-4.188	0.000	-0.535	-4.288	0.000
(NON-DEBT TAX SHIELD) x GP	-0.020	-1.208	0.227	-0.033	-4.058	0.000
LIQUIDITY x GP	0.006	2.012	0.044	0.005	1.824	0.068
INTANGIBILITY x GP	0.008	0.013	0.990	-0.095	-2.241	0.025
(FIRM SIZE) x GP	-0.012	-0.679	0.497			
AGE x GP	0.003	0.159	0.874			
(STOCK ILLIQUIDITY) x GP	-0.101	-2.094	0.036			
GROWTH x GP	-0.007	-0.585	0.558			
PROFITABILITY x GP	-0.340	-1.156	0.248	-0.397	-1.461	0.144
(NON-DEBT TAX SHIELD) x HD	0.007	0.252	0.801			
LIQUIDITY x HD	-0.002	-0.352	0.725			
INTANGIBILITY x HD	-2.131	-2.212	0.027	-2.072	-2.902	0.004
(FIRM SIZE) x HD	-0.025	-0.778	0.437			
AGE x HD	0.013	0.395	0.693			
(STOCK ILLIQUIDITY) x HD	-0.022	-0.281	0.779			
GROWTH x HD	0.013	1.002	0.317	0.006	1.331	0.183
PROFITABILITY x HD	-0.552	-1.677	0.094	-0.509	-1.663	0.096
GROUP PROFITABILITY	-0.230	-1.885	0.060	-0.199	-1.945	0.052
GROUP LIQUIDITY	0.005	0.511	0.610			
GROUP DEBT	-0.007	-2.115	0.035	-0.007	-2.255	0.024
GROUP DIVERSITY	0.012	0.699	0.484			
GROUP SIZE	-0.022	-2.226	0.026	-0.018	-2.420	0.016
I1 (food & beverages)	0.081	3.311	0.001	0.081	3.924	0.000
I2 (Textiles)	0.127	5.677	0.000	0.129	7.411	0.000
I3 (Chemicals)	0.055	2.904	0.004	0.057	4.317	0.000
I4 (Mineral products)	0.006	0.221	0.825			
I5 (Metals)	0.037	1.603	0.109	0.038	2.028	0.043
I6 (Machinery)	-0.015	-0.763	0.446			
I7 (transport equipment)	0.019	0.665	0.506			
I8 (Misc. manufacturing)	0.064	2.306	0.021	0.067	2.727	0.006
I9 (Diver. Manufacturing)	0.021	0.379	0.705			
I10 (Mining)	0.051	0.581	0.561			
I11 (Electricity)	0.007	0.104	0.917			

WALD TEST-For several coefficients jointly: F(18 1342) Test Statistic: 0.738 Upper tail area: 0.774

PANEL B - RESIDUALS REPLACE SOME OF THE EXPLANATORY VARIABLES.

	GENERAL MODEL			SPECIFIC MODEL		
Mean of dep. var.	0.419			0.419		
Std. dev. of dep. var.	0.235			0.235		
Sum of squared residuals	46.872			47.540		
Variance of residuals	0.035			0.035		
Std. error of regression	0.187			0.187		
R-squared	0.387			0.378		
Adjusted R-squared	0.368			0.368		
LM het. test	1.937 [0.164]			2.984 [0.084]		
Jarque-Bera test	2.018 [0.365]			1.995 [0.369]		
Ramsey's RESET2	3.746 [0.053]			0.599 [0.439]		
F (zero slopes)	20.139 [0.000]			35.940 [0.000]		
Schwarz B.I.C.	-223.328			-282.234		
Log likelihood	378.832			369.027		
Variable	**Coeff.**	**t-stat.**	**Prob**	**Coeff.**	**t-stat.**	**Prob**
C	0.456	21.022	0.000	0.463	31.359	0.000
GP	0.130	1.927	0.054	0.128	2.458	0.014
HD	0.062	1.213	0.225	0.067	2.231	0.026
RESIDUAL TAX SHIELD	0.163	9.425	0.000	0.153	11.799	0.000
LIQUIDITY (CA/CL)	-0.001	-4.050	0.000	-0.001	-4.017	0.000
INTANGIBILITY	-1.032	-3.250	0.001	-1.098	-4.251	0.000
RESIDUAL FIRM SIZE	0.138	5.577	0.000	0.117	9.504	0.000
RESIDUAL AGE	0.020	1.056	0.291			
STOCK ILLIQUIDITY	-0.064	-2.936	0.003	-0.074	-4.336	0.000
GROWTH (P/B)	-0.005	-3.567	0.000	-0.006	-3.889	0.000
PROFITABILITY	-0.669	-5.254	0.000	-0.755	-7.185	0.000
(RESIDUAL TAX SHIELD) x GP	-0.084	-2.886	0.004	-0.071	-3.769	0.000
LIQUIDITY x GP	0.006	2.123	0.034	0.004	1.565	0.118
INTANGIBILITY x GP	-0.026	-0.041	0.967			
(RESIDUAL FIRM SIZE) x GP	-0.096	-2.247	0.025	-0.075	-3.601	0.000
(RESIDUAL AGE) x GP	-0.033	-1.060	0.289			
(STOCK ILLIQUIDITY) x GP	-0.025	-0.572	0.567			
GROWTH x GP	-0.008	-0.629	0.530			
PROFITABILITY x GP	-0.332	-1.201	0.230			
(RESIDUAL TAX SHIELD) x HD	-0.028	-0.726	0.468			
LIQUIDITY x HD	-0.002	-0.333	0.739			
INTANGIBILITY x HD	-2.127	-2.293	0.022	-2.053	-2.845	0.005
(RESIDUAL FIRM SIZE) x HD	-0.049	-0.834	0.404			
(RESIDUAL AGE) x HD	-0.004	-0.097	0.923			
(STOCK ILLIQUIDITY) x HD	0.017	0.258	0.797			
GROWTH x HD	0.013	0.988	0.323	0.006	1.247	0.213
PROFITABILITY x HD	-0.588	-1.800	0.072	-0.763	-3.323	0.001
GROUP PROFITABILITY	-0.230	-1.885	0.060	-0.240	-2.346	0.019
GROUP LIQUIDITY	0.005	0.511	0.610			
GROUP DEBT	-0.007	-2.115	0.035	-0.007	-2.234	0.026
GROUP DIVERSITY	0.012	0.699	0.484			
GROUP SIZE	-0.022	-2.226	0.026	-0.020	-2.657	0.008
I1 (food & beverages)	0.081	3.311	0.001	0.082	4.053	0.000
I2 (Textiles)	0.127	5.677	0.000	0.131	7.526	0.000
I3 (Chemicals)	0.055	2.904	0.004	0.056	4.269	0.000
I4 (Mineral products)	0.006	0.221	0.825			
I5 (Metals)	0.037	1.603	0.109	0.042	2.259	0.024
I6 (Machinery)	-0.015	-0.763	0.446			
I7 (transport equipment)	0.019	0.665	0.506			
I8 (Misc. manufacturing)	0.064	2.306	0.021	0.067	2.741	0.006
I9 (Diver. Manufacturing)	0.021	0.379	0.705			
I10 (Mining)	0.051	0.581	0.561			
I11 (Electricity)	0.007	0.104	0.917			

WALD TEST-For several coefficients jointly: F(19 1342) Test Statistic: 1.008 Upper tail area: 0.448

NOTE: Standard Errors are heteroskedastic-consistent (HCTYPE=2). The dependent variable is defined in Table 1. The explanatory variables are defined in Table 2, apart from RESIDUAL TAX SHIELD, RESIDUAL FIRM SIZE and RESDIUAL AGE that are defined in Table 5.

Table 7: Summary of Empirical Findings

PANEL A – Comparison analysis	
Debt measures and predicted correlation with group affiliation	**Summary results**
Leverage (+) Due to control & access to debt via group visibility	✍ Mean/median higher for group-affiliated firms compared with non-affiliated firms. ✍ The difference is reduced with the level of group diversification. ✍ The difference between the mean/median of firms affiliated with highly diversified groups is not significantly higher from the category of non-affiliated firms.
Long term debt (+) **Short term debt (-)** Saving on issuing costs by using long-term debt and reducing the issuance frequency creates for long-term debt. For non-affiliated firms the issuance costs saved do not offset the additional insolvency risk	Long term debt ✍ Mean/median higher for group-affiliated firms compared with non-affiliated firms. ✍ The difference is reduced with the level of group diversification. ✍ The difference between the mean/median of firms affiliated with highly diversified groups is still significantly higher compared with the category of non-affiliated firms. Short term debt ✍ Mean/median lower for group-affiliated firms compared with non-affiliated firms. ✍ The difference becomes stronger with the level of group diversification. ✍ While the difference between all group-affiliated and non-affiliated firms is insignificant, the difference between firms affiliated with highly diversified groups and non-affiliated firms is significant.
Bank debt (-) Greater access to capital markets	✍ Mean/median lower for group-affiliated firms compared with non-affiliated firms. ✍ The difference becomes stronger with the level of group diversification. ✍ The difference between group-affiliated and non-affiliated firms is always significant
Government debt (+) Greater access to policy makers (political economy)	✍ Group-affiliated firms tend to rely more on government loans compared with non-affiliated firms. ✍ The difference becomes stronger with the level of group diversification but is always significant.
Foreign debt (+) Greater access to foreign markets via visibility & reputation	✍ Group-affiliated firms tend to rely more on government loans compared with non-affiliated firms. ✍ The difference becomes stronger with the level of group diversification but is always significant.
Intra-group debt Groups create internal capital markets.	✍ The mean loans from group firms, as fraction of total corporate loans is about 12%. ✍ The mean increases with the level of group diversity but the difference between diversified and non-diversified groups is never significant

Table 7: Summary of Empirical Findings (Concluded)

PANEL B – Multivariate analysis			
Variables	**Predicted sign**	**Predicted impact of group affiliation**	**Summary results**
Constant		(+) – Due to control considerations. Also as affiliation increases access to external funds via sharing of group-wide reputation & policy distortions	(+) - Group affiliation has a positive impact on the constant, which increases when the group is highly diversified.
NON DEBT TAX SHIELD	(-) – The availability of alternative tax shields reduce the value of the debt tax shield	(Reduced effect) – Tax benefits of debt should not play an important role for group firms due to alternative shields such as internal transfer of profits.	(+) – Group firms are only about ½ as sensitive
LIQUIDITY	(+) – Reduces the present value of financial distress costs	(Reduced or increased effect) – Sensitivity partly depends on the general financial position of the group	(+/-) – Relatively small effect. Positive effect in the case of group-affiliated firms.
IN-TANGIBILITY	(-) – Increases the present value of financial distress costs	(Reduced or increased effect) – Sensitivity partly depends on the general financial position of the group	(-) – Marked strong negative effect for firms affiliated with highly diversified groups.
FIRM SIZE	(+) – Large firms tend to be diversified, which reduces distress costs	(Reduced effect) – It is the group size and diversification that determine the present value of financial distress costs	(+) – Positive impact on non-affiliated firms but almost no effect for group-affiliated firms.
AGE	(+/-) – Proxy for reputation with agency costs implications.	(Reduced effect) – It is the group size and diversification that determine the present value of financial distress costs	(-) – Relatively small effect with no difference between group and non-group firms.
STOCK ILLIQUIDITY	(+) – Indicates agency cost of equity. Liquid equity means less agency behaviour by managers.	(Ambiguous) – Agency conflicts in groups are complicated and determined by visibility, complexity, and conflicts between firms and controlling entity.	(+/-) – Sign reversals once multicollinearity is accounted for. No difference between group and non-group firms
GROWTH	(-) – Growth increases the opportunities for managers to engage in risk shifting.	(Ambiguous) – Agency conflicts in groups are complicated and determined by visibility, complexity, and conflicts between firms and controlling entity.	(-) – Evidence of negative impact for non-affiliated firms but appears unimportant in the case of group-affiliated firms.
PROFIT-ABILITY	(-) – pecking order considerations	(Increased effect) – Preference for secrecy increases the effects of pecking order considerations.	(-) – Negative impact increases with group affiliation and further for diversified groups
GROUP PROFIT-ABILITY		(+) – Profitability creates reputations. (-) – Group internal capital markets	(-) – Negative and significant impact
GROUP LIQUIDITY		(+) – Profitability creates reputations. (-) – Group internal capital markets	Unimportant - drops out of specified models
GROUP DEBT		(-) – Increases financial distress costs due to debt guarantee links. Also due to group-wide optimal capital structure	(-) – Negative and significant impact but relatively small coefficient
GROUP DIVERSITY		(+) – reduces financial distress costs (-) – increases group complexity	Unimportant - drops out of specified models
GROUP SIZE		(+/-) – Increases group visibility and can have impact on agency costs of both equity and debt.	(-) – Negative and significant impact but relatively small coefficient