3

DETERMINANTS OF CAPITAL STRUCTURE: EMPIRICAL ANALYSIS

Introduction

The sound financing practices of corporate sector in terms of the implication for future financing and thereby investment depends on capital structure. The external stimuli in the post financial liberalization period, whether in the form of fiscal or financial system (institutions), may give rise to a pattern of financing, whereas what ultimately matter to a firm is the proportion of borrowed to owned (equity) capital or the capital structure, which is an internal decision of firms. If financial liberalization increases supply of external finance and integrates financial markets, then, capital structure would reflect the true value. Given the increase in debt and its variations among different size groups it is our interest to study about various determinants of financing pattern of firms especially the impact of financial liberalisation on debt structure. It is important to know what factors determine this, because debt structure has implications for the value of a firm and thereby its ability to raise funds for future investment activity. We intend to undertake an empirical analysis towards this end in the present chapter.

In section 3.1 we provide the theoretical understanding on determinants of capital structure. Section 3.2 presents the empirical model, data and construction of variables. The methodology of construction of financial liberalization index (FLIN) is also explained in this section. Section 3.3 discusses the results and the last one concludes the chapter.

3.1 Determinants of Capital Structure: Theory

The corporate financing literature is dominated by two competing arguments. The first is the well known Modigliani-Miller theorem (MM-Theorem), which observes that in a perfectly functioning capital market, the method of financing a firm chooses will not affect the cost of capital (Modigliani and Miller 1958). The second
one is the 'pecking order hypothesis'. In a world of perfect capital markets where there is neither differential risk on investment nor informational asymmetry in the financial market, financial structure is irrelevant (Modigliani and Miller 1963). Inspired by Modigliani-Miller (1958) argument that in an ideal world without imperfections, a firm's value is independent of its debt-equity mix, economists have sought conditions under which financial structure would matter. Thus after the Modigliani-Miller (1958) proposition, the debate has been shifted to how debt structure influences the value of the firm when their assumptions are relaxed. Economic theory suggests that several factors influence the debt-equity mix: differential taxation of income from different sources, informational asymmetries, bankruptcy costs/risks and the agency problem (i.e., differences in the objectives of managers and shareholders).

Regarding taxation, it is argued that, it will bias the financing choice towards debt. For instance, corporate income is taxed but interest payments are tax deductible (Mackie-mason 1990). Adding debt to a firm's capital structure lowers its tax liability and increases the after tax cash flow variable available to the provision of capital. Thus there is a positive relationship between the corporate tax shield and the value of the firm. When a firm raises excessive debt to finance its operations, it may default on this debt. Once the firm runs into financial distress, it is obvious that the firm's investment policy changes, which results in a reduction of firm value. Firms attempt to balance the tax benefits of higher leverage and the greater probability (and possibly higher associated costs) of financial distress. If firms accumulate more debt, say via the differential taxation mechanism, their ability to meet fixed interest payments from current earnings diminishes. This increases the probability (risk) of bankruptcy and, as a result, the cost of both debt and equity. Firms that adjust their capital structure away from excessive debt reduce the risk exposure of debt-equity mix, and thus lower their cost of finance (Agarwal and Mohtadi 2002).

78 Interest tax shield has been considered as one of the crucial variables in many empirical studies on capital structure of firms. See Cordes and Sheffrin (1983), Bradley, Jarrel and Kim (1984), Tittman and Wessels (1988), Rajan and Zingales (1995) etc.

79 These issues are extensively surveyed in Harris and Raviv (1991) and in a recent one by Hart (2001). Harris and Raviv (1991) contain references to empirical studies that use these variables as well as references to theoretical papers that motivate their use. However, we focus on a small number of determinants of leverage that are commonly considered by empiricists along with a financial liberalization measure that reflect certain ideas.
The second one relates to the ‘pecking-order hypothesis’ in capital choices of firms postulates that firms prefer internal finance to external finance; in case the latter is required, debt is preferred over equity. In essence, it says that when internal funds are insufficient, the manager will prefer debt to equity because debt is less sensitive to information asymmetries and results in a ‘pecking order’ in debt equity mix. The ‘pecking order’ theory suggests that firms’ financing patterns begin with retained earnings, followed by riskless debt, and then new equity80 (Myers 1977; Myers and Majluf 1984). The pecking order theory and the information asymmetries introduced further analytics in to the debt structure (leverage) debate in developing countries.

A firm is said to follow a pecking order if it prefers internal to external financing and debt to equity if external financing is preferred. The pecking order theory can be explained by either adverse selection considerations or agency cost considerations. Myers and Majluf (1984) attribute adverse selection to be the most common motivation for the pecking order. The owner-manager of a firm knows the true value of the firm’s assets and growth opportunities. Outside investors can only guess these values. If the manager offers to sell equity, then the outside investors must ask why the manager of an overvalued firm will be happy to sell equity, while the manager of an overvalued firm will not. Thus internal sourcing gets preference over external resources. Myers (1984) argues intuitively that if debt were available, then it ought to fall somewhere between retained earnings and equity thus creating the pecking order.

Agency cost considerations also explain pecking order. The argument in favour of internal resources is based on the managers’ reluctance to reveal the details of projects to outside investors. Traditionally, outside financing requires managers to explain the project details and expose themselves to monitoring. Therefore, the managers show a preference for retained earnings. Jensen and Meckling (1976) develop agency theory based on these ideas. Here again, the arguments placing debt over equity in the order of preference are intuitive.

80 Because of the information problems, there can be under pricing of equity, which therefore makes equity issues unattractive. Mackie Mason (1990), however, argued that if benefits of information asymmetry outweigh the costs, the choice of pecking order may not be the course that a firm would follow.
After the emergence of pecking order hypothesis and agency cost considerations, in recent years it has been increasingly recognized that the debt structure originates from the combination of various external sources of finance, depends on the extent of information asymmetry (risk preference) and agency problems (commitment to repayment or performing well) between ultimate creditors (or investors and ultimate borrowers (or issuers), availability of growth opportunities, and the state of the infrastructure (institutional and informational) suitable for external financing (Shleifer and Vishny 1987; Yoshitomi and Shirai 2001). In such a context financial liberalization assumes significance since it may alter the capital structure through the development of money and capital markets.

Financial Liberalisation and Capital Structure

The new theoretical literature indicates the role of financial liberalization in the financing choices of firms. It is noted in the literature that firms in developing countries face higher adjustment costs due to financial sector regulations. In developing countries, government subsidises credit to certain priority sectors. In addition, government restricts foreign investment in securities markets, and restricts debt to equity ratio of firms. Such regulations in financial sector are further aggravated when multinational firms are allowed to enter the country and they crowd out local firms from domestic market. It happens because foreign firms with favourable characteristics wish to be identified and would deal with informationally efficient intermediary (foreign banks) rather than an uninformed set of local lenders offering average value of risk (Pyle and Leyland 1997). This implies that private credit markets are more supply constrained for local firms due to government restrictions. Thus a local independent firm with weak signal may adopt different route to external financing depending upon exogenous constraints imposed on its capital structure.

However, when an economy moves towards a liberalized financial system, it may experience unexpected exogenous financial markets development shocks. As a result, the real sector dynamics appear as firms can signal about their true value directly and indirectly. As a direct effect, firms may seek external equity finance and retain certain block of ownership. The indirect effect is that an independent
evaluation of company through market monitoring. For example, credit rating agencies can ease its access to credit and enhance its value. Thus, instead of focusing only on firm specific characteristics, continuous monitoring of firm can provide better explanation of its speed of adjustment to its target capital structure. This is because, in a liberalized regime, firms will be able to adjust their capital accumulation behaviour depending upon business risk and investment opportunities observed by capital market.

Recent developments in financial liberalization and monetary theory have underscored the importance of exploring the differential impact of monetary policy on various types and classes of firms. There are two lines of thinking in this regard. The first one is the credit view, which observes that bank-dependent firms are likely to be affected by monetary tightening than firms that rely less on bank financing and more on capital markets (Bernanke and Gertler 1995). The second and the counter argument contend that it is in the interest of banks and firms to work out long-term relationships (Rajan 1992). This is because banks are able to reduce the costs of collecting and processing information about borrowers and monitoring by carrying out repeated transactions, offering settlement and checking accounts, and exploiting economies of scale (Chemmanur and Fulghieri 1994). This forms the basis of relationship lending whereby banks develop multiple lender-customer interactions over time and across products. Relationship lending enables banks to obtain customer-specific information and to evaluate the profitability of lending through multiple financial services. These relationships serve to maintain a supply of funds to constrained borrowers with few alternatives during monetary contractions and negate the cyclical variations in monetary policy (Prasad and Ghosh 2005).

Issues regarding the interface between corporate finance and monetary policy have, however, gained prominence in recent years, especially in the context of the fast changing institutional framework in these countries. Several developing countries have introduced market-oriented reforms in the financial sector. More importantly,

---

81 Boot and Thakor (1997) suggests that corporate debt may be classified in to ‘relationship’ loans and ‘transaction loans’. Relationship loans are characterized by repeated borrower-lender interactions, in which the lender has the ability to monitor the firm’s operations and thus improve the firm value and will mitigate information asymmetry about the borrower. Transaction loans, on the other hand, are loans in which there are few monitoring or informational benefits. (As quoted in Krishnaswami et al. 1999).
the institutional set-up within corporate houses operated in the regulated era has undergone substantial transformation since the 1990s. The move toward market-driven allocation of resources, coupled with the widening and deepening of financial markets, including the capital market, and the stringent disclosure and transparency practices consequent upon initial public offerings, have provided greater scope for corporates to determine their capital structure and introduce better corporate governance practices.

The theoretical links between financial liberalization and capital structure rests on the development of money and capital market infrastructure development. Financial reforms include a set of institutional measures directed to strengthen the money and capital markets. Capital markets require timely, precise, and standard information, which explicitly embodies information about issuers to the public. The development of capital market under financial liberalization provides standardized information, which explicitly embodies information in terms of coupon rates, risk premiums, length of maturity, ratings and financial statements, by imposing proper disclosure, accounting, and auditing requirements, with the assistance of information generating agencies (Shirai 2004). Thus the introduction of financial reforms and the more sophisticated the infrastructure, the easier it is for capital markets to distinguish high quality firms from low quality ones. In other words, well-developed capital markets enable high-quality firms to increasingly finance themselves from securities rather than bank loans. In response, banks have to provide more loans to relatively low-quality firms and, thus, conduct relationship lending in order to maintain profitability. Therefore, the characteristics of firms determine corporate financing patterns and, hence, the extent of information asymmetry and agency problems. One can assess the state of financial market development of a country by examining whether the determinants of corporate financing patterns vary between firms of different quality.

Financial liberalisation has broadened the range of financial instruments available to firms for affecting the financing choice of firms and thereby determines the capital structure. The Indian case could provide valuable insights; since financial reforms were started in 1991 with a view to improve resource allocation through market
forces. How do firms choose between debt and equity? What role the money market and capital markets play in this choice? After the introduction of financial liberalisation comprising money market and capital market reforms these questions have become increasingly important in India. The question of the financing choice of firms is critical in this regard because the cost of capital and hence the value of a firm depends upon its debt-equity mix, (Pagano 1993) that changes with financial liberalization. Keeping the above background, in the ensuing sections we empirically explore the link between financial sector liberalisation and its influence on firm level capital structure in the Indian private corporate sector. In this context, we would like to restate that, a better understanding of capital structure of Indian firms requires analysis for various groups of different characteristics to reflect the impact of information asymmetry in determining the capital structure. Such a study, to the best of our knowledge is not identified in the literature. So far in the liberalisation literature in India, very limited work has been done to explain the effect of financial liberalisation on firm level capital structure.

Using liberalisation index is a methodological improvement over imperfect proxy for liberalisation effects. Using liberalisation index to investigate financial market liberalisation is useful to attribute changes in financing choice of firms after a specific date, which will capture common reaction of firms to increased availability of external funds. The greater and easy availability of credit brings about changes in debt level and increase promotion of stock market decreases cost of equity capital. So far, the empirical results confirm more use of debt after liberalisation. The empirical work has fallen short in explaining why equity finance still appears to be underutilized in developing countries including India. Whether the shift towards market based credit policy has helped in directing credit to firms irrespective of their financial structure? This question is important because the extent of information asymmetry depends on firm level financial structure and thereby determinants financing choices. The empirical estimation we undertake addresses these issues by explicitly capturing the effect of financial liberalisation by controlling for firm level characteristics in the model.
3.2 Empirical Model, Data and Construction of Variables

3.2.1 Empirical Model

The empirical literature on determinants of capital structure has generally employed models that can be tested with various firm level characteristics of firms. A body of literature on the determinants of capital structure (Myers 1977; Tittman and Wessels 1988; and Mackie-Mason 1990 among others) shows that inter-firm variations in corporate indebtedness can be explained by variables that capture firm characteristics and financial market imperfections. The empirical studies generally control for a number of variables that the theories of asymmetric information predict should affect the firm financing. Besides ordinary least square methodology (Krishnaswami et al. 1999; Shirai 2004) on determinants of corporate debt, logit/probit discrete models (Jung et al. 1996; Rajakumar 2001) predict probability of debt and equity issuance given firm level characteristics. A factor analytic model (Titman and Wessels 1988) has been used to deconstruct firm level attribute to fine tune relationship between financing choice and firm specific factors. Based on the above models and taking into account financial liberalization we will explore the determinants of firms’ borrowing for our panel of manufacturing establishments. More specifically, we study the impact of financial liberalization by controlling for certain firm level characteristics. The dependent variable used in the study is debt-to-capital ratio. Debt-to-capital ratio gives each firm’s borrowing from financial institutions as a percentage of capital stock. Consistent with many of the previous studies, the present study assumes that the debt-to-capital ratio of the firm, D*, is a function of a Vector, X, of independent variables. Specifically the explanatory variables include various characteristics of firms (assuming that the degrees of information asymmetry problems prevalent) along with financial liberalization index that determine, the financing pattern and capital structure. In the basic panel data regression we estimate the debt-to-capital ratio as a function of above mentioned variables. We assume a linear relationship between the capital structure

---

82 Some of the oddest practical rules of thumb for judging capital structure or debt policy are those, which depend on the ratios of debt to the book value of equity or to total book capitalization (Myres 1977). In the models on capital structure debt as a ratio of either total assets or capital stock is widely used as dependent variable. For instance see Shyam-Sunder and Myers (1999), Prasad et al. (2001), Manos and Green (2001), Booth et al. (2001) etc. uses capital structure as total liabilities divided by total liabilities plus net worth.
and its determinants. The empirical model we use is a fixed effects panel data regression of capital structure on variables that are predicted to be important in determining the capital structure along with financial liberalisation index. The empirical strategy comprises of estimating the following reduced form equation for the \(i^{th}\) firm and \(t^{th}\) year:

\[
D_{i,t}^* = \alpha_0 + \alpha_x X_{i,t} + \beta_1 \text{FLIN}_t + \gamma_1 \text{FLIN}_t \times \text{SIZE}_t + \gamma_2 \text{FLIN}_t \times \text{EXPORT}_t + \\
\gamma_3 \text{FLIN}_t \times \text{AGE}_t + u_{i,t}
\]

where \('i'\) is the number of firms and \('t'\) is the time. The set of control variables \(X\) comprises of age of the firm (AGE), firm size (SIZE), non-debt tax shield (NDTS), profit (PROFIT), profit volatility (RISK), tangibility (TAN) and growth of sales (GROWTH). \(\text{FLIN}\) is the financial liberalisation index. The interaction variable \(\text{SIZE} \times \text{FLIN}\) analyses the advantages accrued to firms as a member of large size firm group. The interaction of the financial liberalization index with SIZE assess whether financial liberalization affects large size firms differently from small size firms. We have also focused on another interaction term based on export orientation \(\text{EXPORT} \times \text{FLIN}\). As for export orientation, the ratio of exports to sales is used. The term \(\text{AGE} \times \text{FLIN}\) gives the impact of financial liberalization according to age of the firms. \(\alpha_x\) gives the parameter relating to each firm specific characteristic included in the model. The direct effect of financial liberalisation on firm's capital structure is captured by \(\beta\), whereas the differential effect of financial liberalisation for various categories of firms is captured by \(\gamma\). The term \(u_{i,t}\) denotes the error component.

Taking in to account the firm level characteristics, financial liberalization index, and interaction terms, the final version of the model specification can be written as:

\[
D_{i,t} = \alpha_0 + \alpha_1 \text{AGE}_{i,t} + \alpha_2 \text{SIZE}_{i,t} + \alpha_3 \text{NDTS}_{i,t} + \alpha_4 \text{PROFIT}_{i,t} + \alpha_5 \text{RISK}_{i,t} + \\
\alpha_6 \text{TANGI}_{i,t} + \alpha_7 \text{GROWTH}_{i,t} + \beta_1 \text{FLIN}_t + \gamma_1 \text{FLIN}_t \times \text{SIZE}_t + \\
\gamma_2 \text{FLIN}_t \times \text{EXPORT}_t + \gamma_3 \text{FLIN}_t \times \text{AGE}_t + u_{i,t}
\]

3.2.2 Construction of Variables

Age of the Firm (AGE): Following Jaramillo et. at. (1996) we use firm age to capture the potential information asymmetries faced by the firm. It is argued that when a firm matures, its debt capacity increases. We expect younger firms with their limited financial histories to have greater asymmetries faced by the firm. This implies a
positive impact on leverage. However, there is another view that when a firm matures it builds reputation leading to better access to equity markets. If we follow the second proposition, then it implies that age should be negatively related to leverage. When the first argument is consistent with the trade off theory, the second is consistent with pecking order theory. In the present study we take the number of years a firm existed after its incorporation as proxy for age. Thus the variable age is in the continuous firm.

Firm Size (SIZE): There are many reasons for the inclusion of firm size in the model. When the firm grows bigger it becomes more diversified, less risky and thus less prone to bankruptcy. This suggests that, larger firms have higher debt capacity and we expect a positive relationship between size of the firm and its debt structure. Size can also be regarded as a proxy for information asymmetry between firm insiders and the capital markets. Large firms are more closely observed by analysts and should therefore be made capable of issuing internationally more sensitive equity, and have lower debt. The existence of adverse selection problem is ascertained by examining characteristics of firms. If this is the case, the pecking order theory of the capital structure predicts a negative relationship between leverage and size, with larger firms exhibiting increasing preference for equity relative to debt. One may hypothesis that size of firms is not important under adverse selection situation so much so that even small firms were able to glean resources. These arguments suggest that the effect of size on leverage is ambiguous. A large number of studies in developing country context showed that firm size has been a major determinant of capital structure (Scott and Martin 1975; Agrawal and Nagarajan 1990; Fan et al. 2003). Following the earlier studies, firm’s size is proxied by its gross fixed assets.83

Non-Debt Tax Shield (NDTS): Taxation and its relationship to debt borrowing is explicitly linked to the tax regime. Generally, firms will exploit the tax deductibility of interest to reduce their tax bill. Therefore, firms with other tax shields, such as depreciation deductions, will have less need to exploit the debt tax shield. If a firm in this position issues excessive debt, it may income “tax – exhausted” in the sense that it is unable to use all its potential tax shields (Rose 1985). It leads to ‘crowding

83 Many studies used gross fixed assets to proxy firm’s size. See for instance Akhtar (2005)
out' since the incentive to use debt financing diminishes as non-debt tax shields increase. This behaviour comes under the framework of the trade off theory. In the context of trade-off theory, non-debt tax shields provide alternative to interest tax shield. Therefore, firms with high non-debt tax shields, such as accelerated depreciation and investment tax credits relative to their cash flows, should use less debt. Thus the trade off theory predicts the variable measuring non-debt tax shield to have a negative impact on leverage. Following many existing studies we use the ratio of depreciation to total assets as proxy for non-debt tax shield.

Profitability (PROFIT): According to information asymmetry theory, capital structure choice depends on the firm's investment opportunities and profitability given managers have more knowledge about investment opportunities than outsiders. If cash flow proxy for current level of profitability, then according to this theory, there will be a negative relationship between cash flow and debt because firms with the capacity to generate internal funds use these funds before calling back on debt (Myers and Majluf 1984). In developing countries, firms may be more profitable due to monopolistic position or government protection. Therefore, existence of a negative relationship between cash flow and debt is due to existence of asymmetric information. Pecking order theory argued that profitable firms are likely to have sufficient internal funds so that they do not depend on external funds. Higher earnings should result in less leverage because firms prefer raising capital first from retained earnings, second from debt and third from issuing new equity. This is due to the costs associated with new equity issues in the presence of information asymmetries Thus it is expected that there is a negative relationship between profitability and leverage. As for profit we use cash flow or operating income over total assets.

---

84 It is also argued that the marginal corporate savings from an additional unit of debt decreases with increasing non debt tax shields because of the likely hood of bankruptcy increases with leverage (De Angelo and Masulis 1980).

85 From the theoretical point of view, one can also expect a positive relationship between leverage and non-debt tax shield. For instance, Scott (1977) and Moore (1986) argue that firms with substantial non-debt tax shields should also have considerable collateral assets which can be used to secure debt. However, the evidence is mixed on the effect of this variable on debt structure.

86 See Bradley et al. (1984), Titman and Wessels (1988) and Barton, Hill and Sundaram (1989).

87 Many earlier studies used the ratio of operating income to total assets as a measure of profitability (Titman and Wessels 1988). The empirical evidence on the issue of profitability, however, is mixed.
Earning Volatility (*RISK*): If firms have variability in their earnings, investors will have little ability to accurately forecast future earnings, based on publicly available information. This drives up the cost of debt (De Angelo and Masulis 1980). Another possibility is that to lower the chance of issuing new risky equity or being unable to realize profitable investments when cash flows are low, firms with more volatile cash flows tend to keep low leverage as predicted by pecking order theory. Financial markets usually regard a firm’s volatile earnings as the results of poor management therefore discounting such firm’s stock price and demanding an extra premium for such firms seeking debt financing. The argument is that high variability in earnings implies a higher probability of failure, and therefore makes a firm less attractive to the lenders. These arguments favour a negative relationship between leverage and the volatility of the firm’s cash flows. 88 We capture risk by taking the variance of ratio of profit to asset base. 89 The adverse selection hypothesis suggests a positive relation between risk and debt.

Tangibility (*TANGI*): Following the existing studies we measure asset tangibility as the ratio of fixed to total assets. Tangible assets often reduce the cost of financial distress because they tend to have higher liquidation value. In an uncertain world, with asymmetric information, the asset structure of a firm has a direct impact on its capital structure since firms’ tangible assets are the most widely accepted sources for bank borrowing and raising secured debt. If banks have perfect information regarding the behaviour of the firm, firms with little tangible assets find it difficult to raise funds via debt financing. Smaller firms face higher adverse selection and information asymmetry problems (Myers and Majluf 1984). Information asymmetry can be regarded as a function of assets specificity. If firms have more transparent and less specific assets, then information asymmetry will be low and vice versa. The existence of tangible assets reveals minor problems of information asymmetry. This suggests that a positive relationship between asset tangibility and leverage implies the existence of imperfect information, and hence directly confirms the relevance of models based on asymmetric information for explaining debt structure choice of firms.

88 Easterbrook (1984) and Jensen (1986) explained the case of over investment problem with volatility. They argued that the firms with stable cash flows supposedly have more leverage, which further strengthens the negative relationship between leverage and volatility.

89 Different measures were used by different scholars for capturing risk or volatility. Bradley et al. (1984) used the standard deviation of the first difference in annual earnings, scaled by the average value of the firm’s total assets over time.
Growth Opportunities (GROWTH): The agency cost theories argue that conflicts between owners and lenders should lead to a negative relationship between growth and debt levels. The trade-off theory also suggests a negative relationship between growth and debt. Because though growth opportunities add value, the firm cannot use growth opportunities as securities for lenders (Titman and Wessels 1988). As against this, the pecking order theory argued that growing firms, that need funds, prefer debt to equity and hence a positive relationship between growth opportunities and leverage. If a low growth firm mobilized resources in debt market, it can be said to be adverse selection problem. Our measure of growth opportunities is the growth in terms of percentage change in fixed assets as proxy for growth opportunities.

Financial Liberalisation Index (FLIN): We hypothesise that firm level capital structure moves closer to target level leading to optimum market value realization in liberalized financial system. If financial liberalization increases supply of external finance and integrates financial markets, then, capital structure would reflect their true value. The successful financial reform improves the matching between entrepreneur with good projects and capital. This leads to establishment and monitoring of economy by independent regulations that reduces moral hazard and adverse selection. The impact of financial liberalization can be evaluated by linking institutional development measures undertaken in financial markets with capital structure. For this purpose we have used financial liberalization index (FLIN) that captures both institutional and infrastructure building measures undertaken in money and capital markets of the financial system. Before we analyse the results of the model the methodology of construction of financial liberalization index is explained in the next few sections.

3.2.2.(a) Financial Liberalisation Index: Methodology

There are two widely used measures of liberalization: (1) the stock or flow measure of some macroeconomic variable and (2) liberalization dating. The first approach is more objective and does not rely on convention of dating. Second approach relies on country reports that provide an update on the status of reforms programs either voluntarily or under requirement of international financial institutions (Laeven
The timing methodology has been more often used to identify a year with distinct liberalization component, and then frequency of components in one year is aggregated and defined as liberalization index for that year. It is important to note that financial liberalization is a process and rather than a one shot event.

This section provides methodological and technical details for preparing financial liberalization index. Specifically, we identify two important sectors: banks and equity markets for this purpose. It has two distinct dimensions: internal and external (international) liberalization respectively (Bandiera et al. 2000; Schiantaralli et al. 1994). Internal liberalization measures are aimed at reducing government intervention from financial intermediation and increasing depth of stock markets by relaxing regulations. Major internal liberalisation measures for banks are interest rate liberalisation, reduction in reserve requirements, reduction in directed credit, foreign bank entry, increased prudential regulations etc. Stock market internal liberalisation measures are stock market opening to foreigners, stock trading system, incentives to foreign investors etc. The external liberalization measures are removing restriction on Foreign Direct Investment (FDI) and Portfolio Investment (PIs), removing quantitative restrictions on imports of capital goods, increasing degree of freedom to receive investments through Global Depository Receipts (GDRs), investments from NRIs, Overseas commercial Borrowings (OCBs) etc. The use of liberalisation indices derived from reform component/dimension has been widely used in empirical work in developing countries.90

The liberalisation index of India for our study is an aggregation of different sub indices constructed to represent the liberalisation measures in the respective sectors of the economy. We will use convention of dating deregulation in banking and stock markets to construct the financial liberalization index. The basic methodology followed for this purpose is from Bandiera et al. (2000) and Abiad and Modi (2003). In this methodology, various reform policy measures are assigned dummy values, which cannot be otherwise determined quantitatively. Financial liberalisation

90 For instance, capital account liberalisation index (Quinn, 1997); banking market liberalisation index (Bandiera et al. 2000), and financial liberalisation index (Abiad and Modi 2003). Studies that are more recent have either used discrete or continuous overall financial liberalisation indices in investment and growth models (Henry 2000; Eichergreen 2002).
includes both domestic and international sectors. More over, it consists of both deregulatory and institutional building reform measures. Thus any attempt to construct a liberalisation index should capture both deregulatory and institutional building components of liberalisation/reform policies. To construct financial liberalisation index, we consider different dimensions of these components, which are likely to exert influence on the investment behaviour. Following Abiad and Modi (2003), policy changes are assigned a score on a graded scale, from zero to three, in a given year. Here, zero corresponds to being fully repressed, one to partially repressed, two to largely liberalised, and three to fully liberalised. Though these are subjective, some guidelines were used as to reduce the subjectivity. For example, interest rates were considered fully repressed where the government set all interest rates, partially repressed where interest rates were allowed to vary within a band or subject to a ceiling or floor, largely liberalised if some interest rates were allowed to be completely market-determined (or if new floating rate instruments were introduced), and fully liberalised where all interest rate restrictions were removed (Abiad and Modi 2003). Various policy measures used and the dummy value given for each policy measure are also given in appendix 3.

IV. The focus is on those indicators of bank and stock market liberalization and external liberalization measures that reflects financial market deepening and increase in credit availability, and having theoretical relationship at firm level financing. The dummy values were reduced to an index in each year using principal component analysis as explained below.

3.2.2. (b) Principal Component Analysis (PCA)

Using the various components of financial sector reforms mentioned above, we develop a financial liberalization index. In our study, after putting dummy values, we obtained a matrix of 51 dummies. Each column represents a single dummy and each row represents a year. In order to reduce the dimensionality of the matrix, principal component has been used. We have used the method of principal component analysis to reduce a large set of variables to a small set that still contains most of the information in the large set. The use of principal component analysis is due to the fact that it enables us to create and use a reduced set of variables called 'principal factors' that suits an easier analysis and interpretation. Principal
component technique helps to reduce the dimensionality from say for example ‘n’ variables to something much less while preserving the variance-covariance structure intact. The variance-covariance structure is explained through a few linear combinations of the original variables. Following principal Component Analysis (PCA), it is possible to interpret the first few principal components in terms of the original variables, and thereby have a greater understanding of the data. The first principal component is the linear combination that explains the most variation. The second principal component is the linear combination that accounts for most of the remaining variation, while being uncorrelated to the first principal component. Each subsequent principal component accounts for as much as variation while being uncorrelated with previously determined principal components. To reproduce the total system variability of the original variables there appears the requirement of ‘n’ principal components. However, if the first principal components account for a large proportion of the variability, say for instance 90 per cent, the objective of dimension reduction is achieved. It means that all the original ‘n’ variables are replaced by first few principal components.

3.2.2. (c) Results

The financial liberalization index (using proxy measures) is calculated on the basis of components explaining maximum variance. The components extraction is given in appendix tables 3.A and 3.B. The results in appendix table 3.A show the total variance explained and table appendix 3.B that of component matrix. In appendix table 3.A column total gives the ‘Eigen’ value, or amount of variance in the original variables accounted for by each component and ‘percentage of variance’ column explains the ratio of the variance accounted for by each component to the total variance in all of the variables. The column of ‘cumulative %’ provides the percentage of variance accounted for by the first ‘n’ components. Appendix table 3.B gives the component matrix and depending on the values for each case and each component, the component score is computed by multiplying the case’s original variable values by the component’s score coefficients. The resulting component score variables will be representative of the total number of original variables indicating an index.
Table 3.A and 3.B in appendix 3.I show the principal components of the financial liberalization variables captured through dummies. The percentage (%) variance accounted by first 4 components to the total variance accounted for 96.06 per cent. Since first four components explain the maximum variation of more than 96 per cent, the component matrix gives the corresponding component figures for all variables. Depending on these values for each case and each component, the index is computed by having a linear combination of case's original variable values and component's score coefficients.

Table 3.1: Financial Liberalisation Index (FLIN) for India

<table>
<thead>
<tr>
<th>Year</th>
<th>Financial Liberalisation Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991-92</td>
<td>3.2399</td>
</tr>
<tr>
<td>1992-93</td>
<td>4.7740</td>
</tr>
<tr>
<td>1993-94</td>
<td>6.4849</td>
</tr>
<tr>
<td>1994-95</td>
<td>17.348</td>
</tr>
<tr>
<td>1995-96</td>
<td>27.603</td>
</tr>
<tr>
<td>1996-97</td>
<td>31.279</td>
</tr>
<tr>
<td>1997-98</td>
<td>34.951</td>
</tr>
<tr>
<td>1998-99</td>
<td>42.177</td>
</tr>
<tr>
<td>1999-00</td>
<td>49.494</td>
</tr>
<tr>
<td>2000-01</td>
<td>51.905</td>
</tr>
<tr>
<td>2001-02</td>
<td>57.201</td>
</tr>
<tr>
<td>2002-03</td>
<td>61.167</td>
</tr>
<tr>
<td>2003-04</td>
<td>63.670</td>
</tr>
</tbody>
</table>

Source: Principal Component Analysis Using Dummy values assigned for Policy variables obtained from RBI Annual Reports, Various Years.

Table 3.1 gives the values of financial liberalization index constructed using principal component analysis. The index we constructed thus clearly indicates the progress of financial liberalisation in India after 1991. The index we constructed thus clearly indicates the progress of financial liberalisation in India after 1991. Having constructed our index to use in the empirical examination we now come back to the estimation of the model.

3.3 Estimation of the model

We have estimated the model for the period 1993/94 to 2003/04. As mentioned in the last chapter, the data include 19852 observations on 2269 firms. Using firm level data provides us with several advantages. This helps us to avoid the substantial serial correlation problem, which typically arises when using aggregate time series data.
Since the firm level data has substantial cross-sectional variation, it gives more precise estimate of the parameters. More over, we can analyse the inter-firm differences using the time and cross-sectional variation in the data. We have estimated the panel data using the fixed effect model. Each firm is a distinct entity with its own corporate governance practices. There is also possibility for lot of variation in the performance to be lost if the performance of firms is aggregated into group measures. This prompts us to employ panel data technique in the estimation procedure.

Table 3.2: Summary Measures of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBT-to-Capital ratio</td>
<td>0.3750</td>
<td>0.2986</td>
</tr>
<tr>
<td>AGE</td>
<td>23.50</td>
<td>17.65</td>
</tr>
<tr>
<td>SIZE</td>
<td>155.36</td>
<td>369.23</td>
</tr>
<tr>
<td>NDT$S$</td>
<td>0.2523</td>
<td>0.1865</td>
</tr>
<tr>
<td>PROFIT</td>
<td>0.1232</td>
<td>0.1917</td>
</tr>
<tr>
<td>RISK</td>
<td>0.0902</td>
<td>0.1015</td>
</tr>
<tr>
<td>TANG</td>
<td>0.4123</td>
<td>0.2928</td>
</tr>
<tr>
<td>GROWTH</td>
<td>0.0684</td>
<td>0.1571</td>
</tr>
<tr>
<td>Number of firms</td>
<td>2269</td>
<td></td>
</tr>
<tr>
<td>Number of Observations</td>
<td>19852</td>
<td></td>
</tr>
</tbody>
</table>

Source: CMIE Prowess Database

The error term in our equation is assumed to consist of time invariant error component and an idiosyncratic error term $u_{it}$. Thus, $u_{it} = u_{it} - v_{it}$. Accordingly, panel regression with fixed effects is employed for the study. The estimates of both fixed effect model and random effect model were carried out. Since we encounter a question whether random effects model should be preferred to the fixed effects model, we have made a selection of the model on the basis of the results of Hausman specification test. Using STATA panel command, we generate the Hausman's test for fixed versus random effects. It was necessary to carry out this test to know the significance of the firm and time effects in the data set. Under the fixed effects specifications there is no need to assume that the firm specific effects are uncorrelated with the other regressors. However, under the RANDOM effects specifications the specific effects are random and part of the disturbance terms. Under such specifications, if the firm specific effects are correlated with any of the explanatory variables, this would lead to the omitted variable problem resulting in the estimated coefficients becoming inconsistent. The Hausman test utilizes this difference to test for
the random effects model versus the fixed effects model. In particular the null hypothesis is of no correlation between the random firm-specific effects and any of the explanatory variables. The critical 1 per cent value for the Chi-squared indicates a rejection of the null hypothesis that the fixed effect and random effect estimates are the same (Baltagi 2002). Since all the estimates have Hausman value greater than the critical value, fixed effect models are accepted in all estimates. In this empirical analysis we intend to focus on whether the determinants are consistent with those predicted by existing theoretical perception on financial liberalization and financing choice by controlling for firm specific factors.  

3.3.1 Results and Discussions

The results of the estimation procedure, presented in table 3.3 indicate that most of the control variables that we have used in the specification are highly significant.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.8833*</td>
<td>0.001</td>
</tr>
<tr>
<td>AGE</td>
<td>0.0962*</td>
<td>0.011</td>
</tr>
<tr>
<td>SIZE</td>
<td>0.0638*</td>
<td>0.003</td>
</tr>
<tr>
<td>NDTTS</td>
<td>-0.0006*</td>
<td>0.018</td>
</tr>
<tr>
<td>PROFIT</td>
<td>-0.4398*</td>
<td>0.001</td>
</tr>
<tr>
<td>RISK</td>
<td>0.1053*</td>
<td>0.012</td>
</tr>
<tr>
<td>TANG</td>
<td>0.6516*</td>
<td>0.006</td>
</tr>
<tr>
<td>GROWTH</td>
<td>-0.0492*</td>
<td>0.001</td>
</tr>
<tr>
<td>FLIN</td>
<td>0.0161**</td>
<td>0.051</td>
</tr>
<tr>
<td>SIZE*FLIN</td>
<td>3.4769*</td>
<td>0.008</td>
</tr>
<tr>
<td>EXPORT*FLIN</td>
<td>0.9931*</td>
<td>0.008</td>
</tr>
<tr>
<td>AGE*FLIN</td>
<td>0.0634</td>
<td>0.096</td>
</tr>
<tr>
<td>Hausman</td>
<td>chi²(10) = 885.88 (0.000)</td>
<td></td>
</tr>
<tr>
<td>Overall R-square</td>
<td>0.1775</td>
<td></td>
</tr>
<tr>
<td>Number of Observations</td>
<td>19852</td>
<td></td>
</tr>
</tbody>
</table>

Note: * and ** shows 1 and 5 per cent level of significance respectively.

91 It is noted that there was tightening of initial public offering (IPO) requirements in 1996 along with further liberalization of interest rates in India. IPO was expected to enable the capital market to differentiate firms by quality, so that relatively high quality firms increased their access to the capital market compared with low-quality firms (Shirai 2004). This is expected to have its impact on debt structure.
Firm Level Characteristics and Financing Choice

Among the firm level characteristics used as control variables, AGE is positively related to debt. It implies that age of the firm matters for choice of debt. That is, old firms had access to external financial markets for mobilizing more debt. In the context of positive and significant coefficient it may also implies that as the firm matures it builds reputation leading to better access to debt market. Another result is the positive and significant coefficient of SIZE on debt. From a positive and significant coefficient of SIZE, we find that debt ratio for small-firms are less compared to large firms. The results obtained support the theory of asymmetric information in the context of private corporate manufacturing firms in India. This result indicates that larger firms have better access to debt and they have borrowed more heavily from financial institutions compared to smaller firms. There are several reasons why small firms will have less debt. As discussed earlier, small firms may not be able to support more debt because they are more likely to go bankrupt. Second, it could be that small firms demand less debt, because the cost of external financing might be relatively higher for them as a result of the fact that they tend to be more fragile. This is suggestive of the possibility that small firms suffer from credit constraints in terms of inability to raise more debt. In other words, it suggests that that after liberalization banks have not been expanding their customer base to a wider range of firms by increasingly engaging in relationship lending to low-quality firms (new and small firms) in addition to high quality firms. The positive and significant coefficient for AGE and SIZE thus suggests the existence of information asymmetry problem.

92 Confirming our result is Sarkar and Sarkar (2000) who analysed the age effect of firms and found that young firms were more deeply affected by the reforms than old ones. They did this by looking at trend patterns of the proportion of funds mobilized from external sources since the reforms.
93 Because it is often argued that the established firms of high reputation and with good credit records accumulated through previous financial relationships with banks, so called “high quality firms, are not viewed as excessive risk takers and are regarded as being committed to repayment (Shirai 2004).
94 Hoshi et. al (1990) have suggested that Japanese firms tied to a main bank face a lower cost of financial distress because the main bank organizes corporate rescues. Thus one might argue that size is a proxy for whether a firm belongs to a main bank group. In other words, there is a possibility that most of the large firms are part of group firms and have better networks with a main bank which helps them to mobilize credit more easily.
95 Myers and Majluf (1984) pointed out that high-quality firms can reduce the costs of informational asymmetries by resorting to external financing. If external financing is necessary, the same argument implies that firms should issue debt before considering external equity. Informational asymmetries thus provide a justification for a financing-hierarchies approach.
It is seen that both PROFIT and GROWTH are negative and significant in the estimation. This negative coefficient implies that better earning prospects would lower a firm’s debt finance requirement, since it would be able to finance its investments largely with retained earnings. In other words, more profitable firms have less debt, which is likely because their need for external debt is lower or, as stressed by the pecking order hypothesis, because debt financing is more expensive relative to financing with internal resources. Indeed, in the Indian context, it seems that a large number of firms might be typically associated with particular families; do not like the restrictions or the disclosure of information that come with debt. In such a situation, when profits are sufficient to meet their financial needs, leverage tends to be lower. The measure of growth opportunities GROWTH is negatively significant in our model indicating that it is a predictor of debt levels. This is consistent with the prediction of theory that the growth variable is indeed inversely related to debt. This indicates that a low growth firm mobilizes resources in debt market. This supports the existence of adverse selection problem. It means that some types of low-quality firms (low growth and low profit firms) have obtained debt during reforms.

We have also considered other firm characteristics that are known to be associated with firms’ financing choices such as non-debt tax shield (NDTS), asset tangibility (TANG), and earning volatility (RISK). Asset tangibility shows a positive and significant relationship with debt ratio. It implies that having more tangible assets firms can acquire more external funds in terms of secured or collateral debt. The negative association between non-debt tax shield and debt could be a mechanical relationship between debt levels and taxes - firms with more debt get more interest payment deduction and, therefore, pay fewer taxes. Alternatively, as suggested by

---

96 Donaldson (1963) concluded that capital structure choice depends on the firm’s growth opportunities and its profitability. Highly profitable firms might be able to finance their growth by using retained earnings. In contrast, less profitable firms will be forced to resort to debt financing.

97 Manos and Green (2001) showed that unlike group firms in other countries the link between business groups and the capital structure decisions are due to cultural factors in India. They pointed out that one of the features that distinguish the Indian business houses is the absence of a main bank as in the case of Japanese keiritsu and others.

98 There are studies find profitability to be negatively related to leverage. For instance see Titman and Wesels (1988), Hirot (1999), Rajan and Zingales (1995) etc.

99 This result is seen in many studies. See for example, Demirguc – Kunt and Maksimovic (1996).

100 An alternative explanation of this unexpected result is that a high rate of growth allows firms to rely more on internal financing and less on external debt. This is also confirmed by our result of high profitability tends lower debt levels.
Booth et al. (2001), the tax rate could simply be another proxy for profitability, which enters negatively in the debt regression. Finally, the coefficient of variance of earnings (risk) is found to be positive and significant. The result indicates that volatility in earnings or risk is not a consideration for obtaining debt. This is a measure, which enables investors to forecast future earnings. As volatility increases debt increases which implies the presence of adverse selection problem.

To sum up the results on various control variables reveal the influence of asymmetric information and the presence of adverse selection problem in the choice of debt structure of firms. This implies that the attempts to develop financial markets have not produced any economy wide efficiency since small and young firms have not increased their debt levels as evident from the discussion. More over, results on profitability, risk etc showed the strong influence of adverse selection problem. Having discussed the significant firm level variables in determining the financing choices, we now turn to the variable of primary interest, financial liberalization index. As mentioned earlier we have constructed a composite index capturing the financial sector development during the post liberalization regime. In what follows we discuss the impact of financial liberalization on firms' financial choices.

Financial Liberalisation and Financing Choice

We empirically explore the effect of financial liberalization on the financing choices of firms. We investigate the extent to which the variation in the aggregate debt-to-capital ratio can be explained by the policies adopted in the financial markets. We find that in general there is a positive and significant relationship between leverage and financial liberalization index (FLIN). But the coefficient of FLIN compared to other control variables is very small (0.016) with 5 percent level significance. However, when we interact the FLIN with firms' characteristics like size, export orientation and age the results obtained reveals some interesting relationships. First

---

101 Our result is inconsistent with many of the existing studies in the developing countries context. Bardley et al. (1984) show that there is negative and significant relationship. Titman and Wessels (1988), Wiwattanakantang (1999) and Hirota (1999) also show weak relationship. However, Booth et al. (2001) showed a positive relationship between risk and debt for many developing countries including India.

102 Demirguc – Kunt and Maksimovic (1996) also found that in general there is a significant positive relationship between bank development and leverage. A similar result is also obtained by Agarwal and Mohtadi (2002). They showed that stock market development as captured by market capitalization ratio is significantly and negatively associated with debt levels, while banking sector development (proxied by deposits) are significantly and positively related to debt-equity ratio.
we interact the FLIN with size of firms (SIZE*FLIN). The coefficient is 0.9931, which is significant at 1 per cent level. The result provides evidence in support of the argument that financial liberalization has helped large sized firms to mobilize more financial resources. In other words when firm size increases the benefit derived from financial liberalization increases in terms of more access to debt. This behaviour reflects the possibility that in developing financial markets especially stock markets, large firms become more levered as the stock market develops, where as small firms do not appear to be significantly affected by stock market and financial market development. We can conclude that the general picture of a positive and significant impact emerge for all firms largely confirms to large firms, but not for small firms. More specifically, the response of large firms to financial liberalization was an increase in bank debt. Another result is impact of financial liberalization on financing choices of firms when we interact FLIN with age of the firms. The result obtained on the association between AGE*FLIN and debt ratio indicates that there is no difference between the old and new firms with regards to financial liberalization. Though the coefficient is positive, it is insignificant indicating that financial liberalization has not resulted in differential impact among different age firms for their financing choices.

We next check the impact of financial liberalization on capital structure according to export orientation of firms. It is argued that exporting firms have access to export and import credit facilities and various tax benefits; they are likely to achieve higher performance and hence gain better financing deals (Kakani et al. 2001). To capture this we have used an interactive variable of firm’s ratio of exports to sales with financial liberalization (EXPORT*FLIN). The coefficient is positive (0.9931) and significant at 1 per cent level, as similar to the case of the impact of financial liberalization for size. This suggests that after financial liberalization, financial

---

103 In a distinct study, Prasad and Ghosh (2005) suggest that a contractionary monetary policy lowers overall debt including bank debt. A dissaggregated analysis of responses of firms according to size largely validates this finding.

104 Hill and Kalirajan (1991) argue that older firms have had more time to learn and become more experienced, and therefore more efficient. On the Contrary Pitt and Lee (1981) have found that the younger firms are more efficient, for they possess the latest and presumably more efficient technology. Thus we maintain that the insignificant relationship in our study may be due to the fact that age does not determine the efficiency of firms. Because even a small firm can acquire the latest technology and other advantages once they have sufficient funds. Establishing this fact is also due to Siregar (1993) who argues that in the case of Indonesian firms, age turned out to have no significant effect on measured technical efficiency. In interpreting this result it is worth noting that the age classification is somewhat arbitrary.
resources to firms that were export oriented were larger than those to less export oriented. In the Indian context, it is seen that there are differences between export-oriented and less-export oriented firms in terms of access to funds from financial markets. Export firms seem to have increased their debt levels than their domestic counterparts as evident from a positive and significant coefficient. This is also likely because many of the export-oriented firms being foreign owned firms have more access to offshore credit markets. To conclude, the results of impact of financial liberalization on debt reveal almost the same behaviour as in the case of control variables. Though financial liberalization has an overall positive impact on debt level (financial liberalization increases access to debt), the results across various types of firms show that the impact is mainly confined to large and export oriented firms. This implies that the presence of asymmetric information and adverse selection is accentuated by financial liberalization as evident from the fact that small and non-export firms' access to debt has decreased in the post financial liberalization period. This suggests that financial liberalization has not helped in directing debt across firms having different qualities indicating the fact that financial markets have not developed to its full potential.

3.4 Conclusion

The study investigated the impact of financial liberalisation on capital structure of firms in the corporate sector. By controlling for firm specific factors, the study concluded that though financial liberalization had a positive impact on capital (debt) structure, it was mainly concentrated in large and export-oriented firms. It is seen that the export-oriented and large-sized firms are able to enjoy more debt levels owing to their good and transparent management. This makes it cheaper for such firms to raise funds from debt (borrowings). This result supports the view that asymmetric information prevails that prevents the benefit of deregulation of financial markets. We have also seen that the impact of firm specific factors on debt reflects information asymmetry and that adverse selection induced increase in debt after financial reforms. What implications do these results have for corporate investment? In order to understand this, in the following chapter we try to empirically study the factors affecting the investment of firms in the corporate sector manufacturing sector in relation to the financing pattern.