

## **The portability of capital structure theory: Do traditional models fit in an emerging economy?**

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### **ABSTRACT**

The received theories of capital structure have traditionally been tested in the context of firms in developed economies. Taking India as a case study, the present study contributes to this body of literature by testing whether the model of capital structure is portable to an emerging market. India suggests itself as a candidate for such a study because it has experienced significant economic liberalization and financial sector reform since the early 1990s. The process of reform in India has certainly not brought its financial system yet to the levels of competition, efficiency and relative transparency found in developed countries, but it is plausible that such reform has fostered optimizing behavior that might be revealed in the pattern of firms' choice of capital structure. Using a sample of 1110 to 1163 manufacturing firms for the period 1998-2002, the study finds that the traditional explanatory variables (fixed asset ratio, firm size, profitability, market-to-book ratio, non-debt tax shields, and earnings volatility) play a significant role in explaining the cross-sectional variation in financial leverage, and broadly have the expected signs. The results thus provide strong evidence in support of the portability of capital structure theory across developed and developing economies. The study's results also point to a few unique aspects of financing behavior in developing countries, from which follow specific implications for further research.

Keywords: Capital Structure, Emerging Markets, India, Financing Policy, Financial Liberalization

## INTRODUCTION

Recent empirical research suggests a growing interest in the financial management practices among businesses in less developed countries and emerging markets (e.g. Booth et al., 2001; Aivazian et al., 2003; Delcours, 2007). This departure from the traditional focus on developed economies is valuable because, among other things, it allows us to see how variations in factors such as the extent of capital market development, quality of accounting practices, institutional setting, and corporate governance influence “optimal” financing policy. In the context of developed economies, the value of contrasting capital structure determinants across countries can be seen in Wald, 1999, for instance, who compares the financing behavior of firms in the U.S., Germany, France, the U.K., and Japan, and whose findings suggest that legal and institutional differences do influence the choice of financing mix. Delcours, 2007, indicates that differences in legal systems, banking system constraints, corporate governance, sophistication of capital markets, and protection of investor right limit the “portability” of traditional capital structure theories to the emerging markets of Eastern and Central Europe.

An insight into the unique features of developing economies is also provided by Harvey et al., 2004, who consider emerging markets to provide “an excellent laboratory to test the governance potential of debt”; they argue that such markets are characterized by “extreme” agency problems stemming from pyramid ownership structures, weak legal protection, and underdeveloped markets for corporate control. Aivazian et al, 2003, contrast the dividend policy of firms in the US with that of firms in emerging markets such as India, Jordan, and Pakistan, so as to study the impact of the differences in institutional setting and degree of financial market development on corporate payout behavior.

Existing work thus points to the fruitfulness of investigating the financing behavior of firms in emerging markets. The present work contributes to such a line of research that contrasts developed and emerging economies by gauging the extent to which a traditional model of capital structure choice, widely applicable to firms in developed economies such as the U.S., explains the financing behavior of firms in India. India represents an interesting case because, traditionally weighed down by heavily regulated capital markets, opaque accounting and disclosure, and weak corporate governance, its economy has seen significant market reform and liberalization since July 1991. As a result, total market capitalization has exploded (for example, tripling between 2002 and 2006), and debt issuance and M&A activity have also seen very significant growth.

Still, Indian business possesses characteristics that distinguish it from the typical developed economy: shareholdings and control are very concentrated, and family and state ownership is quite common. For instance, in 2006, about 70% of India’s 500 largest firms—accounting for roughly 87% of total market capitalization—were affiliated with family business groups or the government (Chakrabarti et al., 2008). Further, India’s bank-oriented financial structure may still be classified as “underdeveloped”, and its capital markets still lack consistent analyst services and are burdened with high levels of information asymmetry (Sarkar & Sarkar, 2003; Reddy & Rath, 2005).

The present study seeks to investigate whether, in this nascent market-oriented setting, capital structure choice can be explained by mainstream Western models. The study distinguishes itself in several ways from the limited amount of existing work on the subject (e.g., Bhaduri, 2002; Booth et al., 2001). First, it provides a more powerful test of capital structure hypotheses by including a much larger sample of firms (1163 firms versus 363 and 99 firms in

the older studies). By their own admission, Booth et al face data constraints that limit their sample of Indian and Brazilian firms to a small proportion of listed companies on those countries. Second, the present study analyzes data from a more recent time period (1998-2002, as against 1990-1995 and 1980-1990 in the older studies). The process of financial liberalization in India began in earnest only in the early 1990s, a fact that suggests the need for the study of a more recent time period. Finally, the study explicitly employs the explanatory factors and methodology used in the typical context of developed economies so as to facilitate a direct comparison between the Indian corporate sector and an advanced economy such as the U.S. Somewhat surprisingly, the current study finds that in fact a common set of factors does influence financing choice among U.S. and Indian firms in a qualitatively similar way, and that the overall explanatory power of the model is closely comparable for businesses in the two countries. At least on the face of it, this evidence points to a quick convergence to optimizing behavior by firms in a country experiencing financial liberalization. An explicit test of a causal link between liberalization and optimizing behavior, however, is beyond the scope of the present paper, and will be pursued in a later study.

The paper begins with a review of the literature on the firm's choice of capital structure and the nascent interest in corporate finance policy in emerging economies. Next, a brief overview of economic reforms in India since the early 1990s is provided. This is followed by a description of the data, methodology, and variables employed in the study. Then, the results of the study are reported and discussed. The paper concludes with a discussion of the implications of the study and suggestions for future research.

## **CORPORATE FINANCE IN DEVELOPED AND EMERGING ECONOMIES**

Beginning with Modigliani & Miller's, 1958, proposition of the value-irrelevance of leverage, much theoretical and empirical work has been devoted to identifying the conditions under which capital structure may or may not have an effect on firm value. According to one line of reasoning, the tradeoff between the tax benefits and the business disruption costs or bankruptcy costs of debt yields an "optimal" mix of debt and equity (e.g., Scott, 1976; Leland, 1994). The studies by Altman, 1984, and Opler & Titman, 1994, suggest respectively that indirect bankruptcy costs and business disruption costs are significant enough to justify an optimal financing mix based on a tradeoff between the tax benefits of debt and the distress costs of debt.

A second tradeoff-type theory argues that an optimal financing mix may result from the balancing of the agency costs and benefits of debt (Jensen & Meckling, 1976; Jensen, 1986). On the one hand, debt mitigates the manager-versus-outside shareholder conflict by alleviating dependence on external equity and by establishing a commitment to pay out cash in the form of interest. On the other, debt engenders a conflict of interest between bondholders and owners (Myers, 1977), in the form of the "underinvestment" and "asset substitution" problems. The underinvestment problem occurs when shareholders forego positive NPV projects if they anticipate that profits will be used to pay off bondholders—a problem that is more pronounced in the case of growth firms. The asset substitution problem lies in the shareholders' incentive for risk shifting within a relationship where bondholders have a fixed claim on the firm's cash flows but shareholders hold the residual claim; the latter can then take action so as to increase the value of their claims while imposing additional, uncompensated risk on bondholders.

A third approach to explaining the effect of financing choice on firm value is due to Ross, 1977, Leland & Pyle, 1977, Myers, 1984, and Myers & Majluf, 1984. They suggest that when there is an information asymmetry between managers or inside owners and outside investors, the choice of, or adjustments to, the financing mix can influence the market's perception of the future stream of cash flows and affect the value of the firm. According to Ross, 1977, managers could use debt financing (beyond that which an "unsuccessful" firm could sustain) to credibly signal their optimism with regard to the firm's prospects. In the Leland & Pyle, 1977 model, the entrepreneur's own equity stake in projects signals project quality; the firm's value is then a positive function of the insider-owner's equity exposure. The model of Myers & Majluf, 1984 posits that the issuance of new equity in the presence of information asymmetry could signal bad news (overvalued shares). Considered together with transactions costs, this information effect suggests a preference by the firm for a hierarchy of funding sources: internally generated equity is preferred to debt, which, due to its lower uncertainty and associated cost, is in turn preferred to external equity.

The capital structure theories discussed above have been tested extensively in the context of the U.S. and other developed countries, and a very brief mention of some is made here. The findings of Bradley et al., 1984, indicate that bankruptcy risk and the presence of collateral are significant factors in explaining the cross-sectional variations in leverage. This suggests that bankruptcy costs and the asset substitution problems are relevant to the capital structure decision. Mackie-Mason, 1990, finds that the presence of non-debt tax shields reduces the probability that the firm will issue debt, pointing to the importance of tax to the capital structure decision. Indirect evidence of the relevance of the underinvestment problem to debt policy is provided by a widely observed negative relationship between debt and growth options (Graham, 1996; Johnson, 1997). The financial hierarchy (or "pecking order") theory receives support from the results of Titman & Wessels, 1988, among others, who find that more profitable firms rely less on external sources of financing. Support for this theory is also provided by event studies that show a negative market reaction to seasoned equity issues (e.g., Masulis & Korwar, 1986; and Mikkelsen & Partch, 1986).

More recent literature in corporate finance reveals a growing interest in financial management practices among firms in emerging economies as well. One obvious motivation for such a line of study is the desire to compare the financing behavior of firms placed in very different institutional settings, a comparison that is now being made possible by the increasing availability of reliable data. For example, Nguyen & Ramachandran, 2006, study the capital structure decisions made by small and medium-sized business in Vietnam. In a country characterized by a bank-based financial system, they find an average leverage ratio similar to that for firms in the U.S. (approximately 40%), but a significant reliance on short-term credit, almost to the exclusion of long-term debt. In contrast to the firms in the U.S., Vietnamese enterprises with greater growth options tend to have a higher leverage. Furthermore, the tangibility of assets (which presumably mitigates the "asset substitution" problem) is observed to have a negative effect on leverage, while business risk and firm size are found to be positively related to debt use. These results are in sharp variance with theory, and with the typical behavior of firms in the U.S. corporate sector. The authors note that unique institutional and economic circumstances, such as regulation of interest rates, networking relationships with banks, and the predominance of the trade and services sectors in Vietnam could explain why factors in established models of capital structure do not relate to leverage in a traditional manner for companies in such a transitional economy.

The variance in findings just described points to the value of a comparative study of firms operating under different institutional, regulatory, and structural regimes; a given set of “explanatory factors” may influence financing policy in markedly different ways depending on the climate within which firms operate, and a blanket generalization regarding the determinants of capital structure would be naïve. As a contrast to the Vietnamese study, for instance, one can cite the findings of Supanvanij, 2006, who tests the received theories of capital structure employing the data for firms in Hong Kong, Japan, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand. In line with the results for firms in the U.S., he finds that the financial leverage of the Asian firms studied is positively related to tangibility, and negatively related to growth options.

Eldomiaty, 2007, tests the static tradeoff, pecking-order, and agency costs theories of capital structure using a sample of Egyptian firms, and finds considerable conformity between the capital structure determinants in Egypt and more developed economies. In contrast, Delcours, 2007 finds that only some of the capital structure theories developed in the context of developed countries are “portable” to the emerging Central and Eastern European emerging economies in her study, viz., Poland, Russia, the Czech Republic, and Slovakia. Specifically, she finds little evidence to support the trade-off and agency theories of capital structure, and the firms in her study appear to follow a “modified pecking order” in their financing choice; the order of preference being retained earnings, external equity, bank debt, and market debt. Significantly, she ascribes this departure from the financing behavior observed in Western economies to differences in legal systems, investor rights protection, capital market development, constraints of banking systems, and corporate governance.

Similarly, Krishnan & Moyer, 1997, study firms from Hong Kong, Korea, Malaysia, and Singapore, and find no support for the pecking order theory, though their results indicate that tax considerations have some relevance to the capital structure decision. Booth et al., 2001, study the financing behavior of firms in 10 developing countries in order to test the applicability of capital structure theories across countries in different institutional settings. Their study covers the period 1980-1991, and includes countries that have varying degrees of stock market development, financial intermediary sector development, protection of shareholder and creditor rights, government intervention in the credit allocation process, and regulation of interest rates. A couple of commonalities, however, are noteworthy: corporate debt in developing countries tends to have a significantly shorter maturity; and, at least in the 10 countries studied, no loss carrybacks are allowed, a feature that reduces the tax advantage of debt for high-risk firms.

Booth et al, 2001, find that a common set of factors (such as tax, business risk, tangibility of assets, market-book ratio, and size) does explain cross-sectional variation in debt ratios within each of 10 developing countries studied. The impact of those variables (in terms of both magnitude and sign), however, is not uniform across the countries. One important exception is firm profitability, which consistently has a negative relationship to the debt ratio in the sample countries. Overall, the authors find some support for the Pecking Order hypothesis and the importance of information asymmetry in the financing decisions of corporations in developing countries. Still, their results suggest that country factors are at least as significant as the financial variables themselves that are used to model the capital structure choice.

Bhaduri, 2002, employs a factor analytic approach to study the capital structure choice in a sample of 363 Indian firms between 1989 and 1995. His results suggest that firm size, growth, and uniqueness influence the financing mix. Notably, tax shield factors and collateral value of assets do not show up as significant explanatory variables.

The foregoing review of studies on corporate financing in developing nations indicates a nascent interest in the subject, especially with regard to the question of the portability of traditional capital structure theories to emerging economies. The present study seeks to contribute to this inquiry by testing the traditional capital structure model using the financing mix of a large sample of firms in the Indian corporate sector. The time period of the study (1998-2002) follows several years of financial liberalization measures initiated by India in the early 1990s. These measures of reform and liberalization are summarized next.

## FINANCIAL LIBERALIZATION IN INDIA

Like many developing countries, India was traditionally characterized by financial repression: government control over interest rates, capital market, capital market flows, credit flows, and the banking sector. Starting in July 1991, India pursued a “new economic policy”, an integral and critical part of which was a reform of the nation’s financial sector (see, for example, Guha-Khasnobis & Bhaduri, 2000). Liberalization measures have been implemented across the economy, from trade and commerce to capital and labor markets, and banking. For instance, this process of financial reform has entailed a significant reduction in the cash reserve requirement (CRR) and the statutory liquidity ratio (SLR) to which banks are subject. Between 1991 and 1998, for instance, the SLR declined from 38.5% to 25%, and the CRR has declined from about 25% to 10.5% (Ahluwalia, 1999; Beim & Calomiris, 2001; and Laeven, 2003). Thus, the proportion of incremental resources to banks (from deposits) that was pre-empted by the government was roughly 65% prior to the reforms; that number now stands at about 36%. Put another way, the “tax” on financial intermediation has significantly been reduced over the 1990s.

Interest rate controls have seen progressive easing, which has moved the loan market away from a regime of subsidized rates and towards a more rational, market-based system. Banks have relatively more freedom in pricing loans on the basis of fund costs and credit risk. In 1993, restrictions on entry into the traditionally state-controlled banking sector were removed. As a result of this reform, the market share of private and foreign banks increased from roughly 11% to approximately 18% between 1991 and 1997. The introduction of capital adequacy standards for banks represented another significant step in the liberalization process. Prudential norms somewhat similar to the ones recommended by the Basle Committee were phased in by 1996, which, in addition to lending some transparency to the balance sheets of banks, lean on the institutions to improve asset quality. Continuing increases in the Capital to Risk Weighted Asset Ratio (CRAR) have been recommended that should go beyond capital adequacy levels of developed Western economies (Arun & Turner, 2002). Bank supervision has also been strengthened, with the establishment of the Board for Financial Supervision within the Reserve Bank of India (RBI), India’s central bank. The role of internal controls and audit, and that of external auditors have been shored up, and the time taken for the inspection and follow-up cycle has been cut in half.

A significant development in the deregulation of India’s capital markets was the abolition in 1992 of the Controller of Capital Issues (CCI), an entity that was responsible for regulating access to the equity market (Bhaduri, 2001). The change gave Indian firms more freedom in raising equity both domestically and from foreign investors, with potentially significant implications for the firms’ capital structure. Trading as well as the clearing and settlement of transactions has seen considerable improvement. Rather than requiring that firms make fixed-

price offerings, the government now allows firms to issue stock via book-building. Thus, flotation costs have seen a decline (Reddy & Rath, 2005).

Specific relevant institutions that have been created during this period of reform include: the National Stock Exchange of India (NSE), the National Securities Clearing Corporation (NSCC), the National Securities Depository, and the Securities and Exchange Board of India (SEBI). The NSCC eliminates counterparty risk by acting as the legal counterparty to brokerage firms' transactions. Additionally, it performs intraday monitoring and mandates collateral as effective risk containment measures. The SEBI, in its turn, has introduced strict disclosure requirements of brokers, and directives for prompt dissemination of information to the public. These changes have fostered an environment of transparency and efficiency (Chakrabarti et al., 2008). Further, easing of controls by the government has promoted the flow of foreign direct investment and portfolio investment into India, cross-border mergers and acquisitions, foreign collaborations by domestic companies, and the listing of Indian firms on international exchanges. The 1990s saw the launch of significant reform in the realm of corporate governance in India. For instance, changes were introduced to provide more protection for the minority investor, to strengthen bankruptcy laws, to promote a more active market for corporate takeovers, to improve accounting rules, and to enhance the quality of corporate disclosure (Sarkar & Sarkar, 2008). Such governance reforms are critical in an economy where there is fairly widespread equity participation by small outside investors.

In order to promote corporate disclosure and self-regulation by Indian firms, the Government has periodically amended the Companies Act of 1956. These amendments provide for such features as more liberalized share buy-back norms, and norms for inter-corporate loans and investments, the establishment of a fund for investor education and protection, making directors responsible for disclosures, requiring clearer reporting of adverse auditor observations or comments, a smaller limit to the number of companies in which a person can be a director, ten-fold increase in fines for noncompliance, and possibility of the election of a director by small shareholders (see Sarkar & Sarkar, 2003, for a detailed discussion of governance reforms).

Despite the changes described above, however, India remains an economy that is only transitioning towards the status of a developed nation. Its bank-oriented financial structure is still assigned to the "underdeveloped" category (Aivazian et al., 2003; Sarkar & Sarkar, 2003). The public bond markets are still in their infancy, as is the market for corporate control. In the absence of analyst forecast and services, the capital market in India faces a high level of information asymmetry (Reddy & Rath, 2005). Shareholdings and control are very concentrated, and family and state ownership quite common. Also, the enforcement of contracts is very weak due to a system that is corrupt and overburdened; thus, investor protection appears strong on paper, but is weak *de facto* (Chakrabarti et al., 2008).

With regard to banking sector reform, Ahluwalia, 1999, notes that the government-appointed Committee on Banking Sector Reforms (CBSR) has reported that the new Indian banking norms still do not compare favorably with international standards. The capital-to-risk-weighted-assets for banks, for instance, continue to be below international standards. Standards are more lax also with regard to the reclassification of substandard and doubtful assets; banks permit a greater period of delinquency before downgrading such assets. Directed credit policies—which require banks to earmark 40% of their commercial loans to "priority" sectors identified by the government—remain in place. Significantly, the government still maintains a majority ownership of public sector banks (which account for a significant share of the market). This public ownership "involves 'politicization' and 'bureaucratization' of banking" (Ahluwalia,

1999, p.44). Thus, it is quite possible that Indian banks, despite the recent progress in liberalization, are beset by “cronism” in loan making, and an impaired ability to respond to commercial and customer needs (or dictates of the market).

It is this “transitional” nature of the Indian financial sector and institutional framework that provides the context for the current paper, and motivates the question as to whether the determinants of capital structure choice identified for firms in developed economies also play a significant explanatory role in India. Those determinants, along with the data and methodology employed in this study, are described in the next section.

## VARIABLES, DATA, METHOD, AND HYPOTHESES

The review of the theory and empirical evidence on capital structure provided in an earlier section suggests that factors such as the degree of asset substitution problems, risk of bankruptcy, the existence of tax shields, the degree of the underinvestment problem, and the degree of information asymmetry have a bearing on a firm’s financing mix. These factors have consistently been found to be significant in explaining the cross-sectional variation in financial leverage among firms in developed countries such as the US. The variables that the present study employs to capture these factors are consistent with those widely employed by empiricists. The fixed asset ratio (FAR) is a measure of asset tangibility, and is calculated as net fixed assets divided by book value of total assets. A size variable (LNAS) is calculated as the natural log of book value of total assets. Profitability (PROF) is the ratio of earnings before depreciation, interest and taxes to book value of total assets. The market to book value ratio (MB) is calculated as the sum of the market value of common stock and the book values of preference capital and borrowings, divided by the book value of total assets. Non-debt tax shields (NDTS) is the ratio of amortizations, write-offs, and depreciation to the book value of total assets. The volatility variable (VOL) represents the volatility of the firm’s earnings, and is calculated as the standard deviation of the first differences in the ratio of earnings before depreciation, interest and taxes to total assets. The debt ratio (DRM) is calculated by dividing total borrowings by the quasi market value of total assets. The long-term debt ratio (LDRM) is the ratio of long-term borrowings to the quasi market value of total assets. The short-term debt ratio (SDRM) is calculated as total borrowings less long-term borrowings divided by the quasi market value of total assets. The debt ratio (DRB) is calculated by dividing total borrowings by the book value of total assets. The long-term debt ratio (LDRB) is the ratio of long-term borrowings to the book value of total assets. Finally, the short-term debt ratio (SDRB) is calculated as total borrowings less long-term borrowings divided by the book value of total assets.

The last six variables mentioned above are alternative forms of the independent variable, the debt ratio. Various forms of leverage are employed in this study because while some existing work (such as Johnson, 1997; Wald, 1999) employ only the ratio of long-term debt to (book) assets, others (such as Bhaduri, 2002) report the results for all three (book) measures of leverage. Still other studies (such as Goyal et al., 2002) use the ratio of debt both to the book value of assets and to the market value of assets. The other six variables listed (viz. FAR, LNAS, PROF, MB, NDTS, and VOL) enter in as explanatory variables, and are commonly used in empirical studies of capital structure.

The fixed asset ratio (FAR) is widely used as a proxy for assets that can be placed as collateral in order to mitigate the moral hazard faced by creditors in the form of asset substitution (excessive risk taking) and underinvestment (e.g., Johnson, 1997). The more capital that is



“entrenched” in physical assets, the less is the potential for asset substitution and underinvestment (Wald, 1999). Therefore, FAR is expected to be negatively related to leverage. We could think of FAR as measuring the “tangibility” of assets.

The natural log of total assets (LNAS) is used to measure the “size” of the firm, a factor that is commonly used to gauge the amount of information outside investors possess about the firm. If less information asymmetry applies to larger firms, then such firms would tend to face a lower cost of equity. Also, if larger firms have more dilute ownership, with concomitantly weaker monitoring of management, then managers in such firms may assume suboptimal risk and issue less debt (Friend & Lang, 1988). On the other hand, larger firms could be more diversified, and this would increase their capacity to take on more debt (Johnson, 1997; Bhaduri, 2002). Additionally, larger firms may benefit from economies in the transactions and information costs of floating long-term debt that are greater than those for equity (Wald, 1999). Thus, the a priori expectation about the direction of relationship between LNAS and leverage is ambiguous; it could be either negative or positive.

According to the Myers & Majluf’s, 1984, pecking order theory discussed above, internal financing is preferred to raising funds externally. Thus, a more profitable firm that has a greater availability of internal funds will tend to rely less on external borrowing. Of course, a more profitable firm may have greater investment opportunities, which would tend to reduce the preference for debt (because of the greater underinvestment problem). However, the variable discussed next (viz. MB) controls for this factor. Thus, the present study’s measure of firm profitability (PROF)—which is employed commonly (e.g., Johnson, 1997)—is expected to have a negative relationship with leverage, consistent with the notion that firms follow a hierarchy of financing sources.

As stated before, the underinvestment problem represents an agency cost of debt, and is potentially more severe for firms with greater growth options. Thus, firms with more investment opportunities might refrain from issuing debt so as to avoid this agency problem. Empirical studies of capital structure commonly measure growth options as the ratio of the market value of equity and debt to the book value of assets. In keeping with these studies, the present study calculates the numerator of the market-to-book ratio (MB) as the sum of the market value of equity and the book values of preferred stock and borrowings. The market value of equity for any year is based on the year-end Bombay Stock Exchange (BSE) closing price and the number of shares outstanding on that day. MB is expected to have a negative relationship to leverage.

The presence of non-debt tax shields (NDTS), such as depreciation and amortization, could substitute for interest as a tax-deductible expense and weaken the tax-shield motive for issuing debt (DeAngelo & Masulis, 1980). Therefore, we should expect a negative relationship between NDTS and leverage.

As noted earlier, the studies by Altman, 1984, and Opler & Titman, 1994, suggest that indirect bankruptcy costs and business disruption costs are significant. The volatility of a firm’s earnings (VOL) is included as an explanatory variable because, in the presence of bankruptcy costs, higher business risk would point to the need for lower financial leverage. Therefore we would expect a negative relationship between VOL and leverage.

Finally, the study distinguished between 22 different industries within manufacturing, based on a CMIE coding of the industries. Since industry factors are likely to have an independent effect on capital structure, 21 dummy variables are included as explanatory variables. In order to conserve space, the results for these dummies will not be reported, though

they will be discussed in the following section. Table 1 (Appendix) summarizes the expected relationship between leverage and all the explanatory variables discussed above.

In order to mitigate any measurement errors, all the variables of interest (except VOL) are averaged over a five-year period (1998-2002). Capital structure studies such as those by Johnson, 1997, and Jensen & Showalter, 2004, adopt a similar averaging approach to the measurement of variables. The former study uses an averaging period of five years, and the latter employs a ten-year time frame. VOL is based on the first differences of the ratio of earnings to total assets from 1998 to 2002, and is therefore not an average; it measures the volatility of earnings over the preceding five years. The quasi market value of assets that forms the denominator of the debt ratios DRM, LDRM, and SDRM is calculated as the sum of the market value of equity and the book values of preferred capital and borrowings. The market value of equity for any year is based on the year-end Bombay Stock Exchange (BSE) closing price and the number of shares outstanding on that day.

The data used in this study are extracted from the PROWESS database compiled by the Center for Monitoring Indian Economy (CMIE). The dataset features a comprehensive coverage of India's industrial sector, includes audited financial statement information, and provides some market data. All relevant data are gathered from January 1, 1998 through December 31, 2002. In order to enter the sample, a firm was required to be categorized as a manufacturing firm in the CMIE dataset as of 2002. Additionally, only those firms with complete data for the period 1998-2002 on variables of interest could enter the sample. Those restrictions yielded a sample of 1110 firms for Models 1, 2, and 3, and 1163 firms for Models 4, 5, and 6. These models, and the estimated coefficients for each, are presented in Tables 2 and 3 (Appendix).

Models 1, 2, and 3 represent, respectively, the regression of the total debt ratio, the long-term debt ratio, and the short-term debt ratio on the independent variables and industry dummy variables. The debt ratios in these models are based on the quasi market value of assets. Models 4, 5, and 6 repeat the regressions using the book value of assets. Ordinary least squares (OLS) is employed in all the regressions. The following section discusses the results for these regressions.

## **CAPITAL STRUCTURE DETERMINANTS: REGRESSION RESULTS**

As noted above, Models 1, 2, and 3 contain respectively the OLS regression of the total, long-term, and short-term debt ratios on the hypothesized determinants of capital structure, using the quasi market value of total assets to measure the debt ratios. The results for these regressions are reported in Table 2 (Appendix). Note that, in the interest of space, the results for the 21 industry dummy variables are not detailed here, though they are summarized in the discussion of results.

The results reported in Table 2 demonstrate that explanatory factors traditionally employed in capital structure studies in developed economies do explain to a significant extent the cross-sectional variation in debt ratios among firms in an emerging economy. For instance, the results closely match those of Johnson, 1997, whose U.S. study of the role of bank debt in capital structure yields cross-sectional regressions of the long-term (book) debt ratio with adjusted  $R^2$  figures of 0.20 to 0.23. Four of the six explanatory variables (FAR, PROF, MB, and NDTs) in Model 1 are significant and have the expected sign. There was no a priori expectation of a particular sign for LNAS, which enters the equation with no statistical significance. VOL does not enter in the equation with the expected sign, but nor is it statistically significant. Overall, the results for Model 1 support the pecking-order theory—more profitable firms tend to

rely less on debt. The results also support the agency theory of capital structure—firms with more assets “entrenched” as tangibles assets issue more debt (presumably because of a mitigated asset substitution problem), and those with more growth options assume less debt (presumably because of a more severe underinvestment problem).

Model 1, just discussed, pertains to the total (market) debt ratio. Contrasting the regressions for the long-term and short-term (market) debt ratios (viz. Models 2 & 3), we find that the overall explanatory power based on adjusted  $R^2$  is comparable, though roughly double that of Model 1. The signs for FAR and LNAS switch from Model 2 to Model 3. FAR has a positive effect on the long-term debt ratio, but a negative one on the short-term debt ratio. Booth et al, 2001, find such a sign reversal for tangibility between their long-term debt ratio (positive sign), and total debt ratio (negative sign) regressions. This suggests that firms with a greater proportion of their assets “entrenched” in tangible assets are perhaps able to take on more long-term (in preference over short-term) debt. Also, as Booth et al., 2001, note, these results are consistent with the matching of the maturity of assets and loans. LNAS also has a positive effect on the long-term debt ratio, but is related negatively to short-term debt. This result is similar to that observed by Bhaduri, 2002, and suggests that larger firms (smaller firms) rely more on long-term (short-term) debt.

In all three models, PROF is significant and is negatively related to the debt ratio. This provides strong support for the pecking-order hypothesis, and is in keeping with the consistently strong (negative) relationship between profitability and leverage found in Booth et al., 2001, for developing countries. They note that the observed negative relationship may be related to the significant agency and informational asymmetry in developing countries, and to the fact that their long-term bond markets are relatively underdeveloped. VOL is found not be significant in any of the models based on the quasi market value of assets. Thus, these three models do not provide strong direct support for the theory of tradeoff between bankruptcy costs and tax shield benefits of debt. Still, the significance of NDTS in Models 1 and 3 provide some support for the notion that firms weigh the tax benefits against the potential burden of debt. The contrasting roles of MB in Models 2 and 3 may appear to be somewhat puzzling. Looking at all three models, it seems that the role of MB in the short-term debt portion of the firm’s capital structure drives the results for MB in the total (market) debt ratio model. This finding is consistent with the twin observations that (a) firms in developing countries tend to lean more heavily on short-term and trade credit; and (b) it is more difficult to borrow against intangible growth opportunities, for which MB is a proxy (Booth et al, 2001).

A similarly striking similarity between the results of the present study and those for capital structure studies in developed countries such as the US can be observed in the regression estimates presented in Table 3 (Appendix). As in the previous models, Models 4, 5, and 6 respectively employ the total, long-term, and short-term debt ratios. However, these ratios are now calculated using the book value of total assets.

Profitability (PROF) continues to be highly significant in regressions with the redefined debt ratios, and is, as before, negatively related to leverage. Thus, the results point to the relevance of agency costs and information asymmetry to capital structure choice, and support a pecking-order explanation of financing. Asset tangibility (FAR) enters the regression of long-term (book) debt with the correct sign, and is significant at the 7% level. This result is consistent with most capital structure studies based on developed countries (e.g., Johnson, 1997; Wald, 1999; Booth et al, 2001). The sign reversal observed in the previous set of models is seen again, though FAR is not a significant explanatory factors in the short-term (book) debt equation. As

discussed in the context of Models 1, 2, & 3, these results suggest a matching of maturity between assets and loans.

The results for the size variable (LNAS) are somewhat similar to those in the previous set of models. For instance, size is negatively related to leverage in both sets of total and short-term debt equations (Models 1 & 4; Models 3 & 6), though it is insignificant in Models 1 and 6. In the long term (market) debt equation, LNAS enters with a positive sign (consistent with Wald, 1999, who however uses the book-based ratio), but appears with a negative sign in the long term (book) debt equation (consistent with Johnson, 1997). The positive sign for LNAS in Model 2 was discussed above as suggesting that larger firms tend to finance with long-term debt; in a developed long-term debt market with high information and transactions costs, such firms likely have an advantage over smaller firms in floating longer maturity public debt. Johnson, 1997, also notes that the positive sign on LNAS may result from larger firms being more diversified, and thus being able to support a higher level of debt. The negative sign on LNAS in Model 4 could indicate that the variable proxies for information availability to the investor; the availability of more information reduces the cost of equity, and increases the preference for such financing. The natural log of sales was used as an alternative to LNAS, with similar results (not reported here).

As expected, the presence of non-debt tax shields (NDTS) has a significant negative effect in the long term (book) debt equation (Model 5). Business risk (VOL) continues to exert a negative influence on leverage, as observed in Models 1, 2 & 3 before. The switching of signs on the growth proxy (MB) between the two sets of debt ratio models is also observed in Booth, 2001, and Goyal et al, 2002. Also, consistent with Models 4 & 5 above, Bhaduri, 2002, observes a positive relation between the growth factor and the book-based total and long term debt ratios. Goyal et al, 2002, suggest that positive relationship between MB and the book-based debt ratio is likely to be a “statistical phenomenon”; the denominator in the two variables being identical, the positive relation may simply indicate that firms with larger market values carry more (long-term) debt. Conversely, for the negative relationship between MB and the market value-based debt ratio, Booth et al, 2001, note that the result could be ascribed to a spurious correlation induced by market values in the numerator of MB and the denominator of the debt ratio. Then, short-term market movements would generate a negative correlation between the two variables, unless management adjusted financing fairly quickly. As they note, though, this behavior of MB in the market value-based and book value-based debt equations implies that the marginal borrowing power on a dollar of book value is greater than that on a dollar of book value.

Tables 4 and 5 (Appendix) compare the results of the present study with those of a sampling of existing capital structure studies. Two features of this comparison should be noted: (a) a common set of explanatory variables in capital structure models appears significant across US and Indian firms; and (b) there is a reasonable degree of uniformity between the results for book-based and market-value based debt ratios in the present study.

## CONCLUSIONS AND IMPLICATIONS

The findings of this study reveal that a common set of independent variables are significant in explaining the cross-sectional variation in leverage ratios in a developed economy such as the US and an emerging market such as India. Further, the adjusted  $R^2$  values suggest that the overall explanatory power of the models applied to the two types of economies are substantially comparable. The fact that the estimated models reveal meaningful and significant

relationships between financing mix and firm characteristics indicates a process of economic optimization anticipated by mainstream finance theory. Thus, this study provides strong evidence that capital structure theory is potentially portable across developed and developing countries, and that traditional theory is quite certainly applicable to an emerging market like India, which has experienced significant economic liberalization in the last decade and a half.

More specifically, the results of this study confirm the theme observed in the study of developing countries conducted by Booth et al, 2001: the profitability of a firm has a consistently negative relationship with financial leverage. In all six models estimated in this study, profitability (PROF) enters as highly significant, and with a negative coefficient. The fact that the variable maintains a negative effect in total, long-term, and short-term debt ratios suggests to us that there is a preference for internal over external financing, a finding that supports the pecking order theory of capital structure choice.

However, some unique features of developing countries argue for the need of further theoretical and empirical work. For instance, as Booth et al, 2001 point out, the role of profitability just described are related to the fact that there are substantial agency and informational asymmetry problems in developing countries, and that such countries have undeveloped markets for long-term bonds. Future work could consider (a) how capital structure adjusts within a country as it experiences a transformation in the long-term debt market; and (b) how capital structure adjusts as regulatory and institutional changes ensure greater transparency and superior enforcement of contracts.

Further, the results of this study indicate that the proxy for growth options (MB) does not always have the same sign as in studies of US firms. In the latter, the growth options proxy invariably enters with a negative sign, supporting the argument that firms with more severe underinvestment problems will assume less debt. In the present study, MB enters with the expected negative sign in market value based debt ratio equations, but with a positive sign in the book value based debt ratio equations. Booth et al, 2001 speculate that the unexpected sign on the growth options proxy could derive from a greater dependence among firms in developing countries on short-term sources of financing; such financing sources have a different set of determinants than long-term debt. Certainly, the variance in findings suggests the need for more research. If the observed cross-sectional variation in capital structure is due simply to differences in short-term debt, then the traditional set of explanatory variables would need to be modified to include factors that explain the use of short-term financing and trade credit.

The findings of the present study suggest the potential for a fairly rapid convergence to optimizing behavior following economic reform. Thus, in addition to the suggested extensions noted above, it would be fruitful to model and examine a causal link between economic liberalization and optimizing corporate behavior, such as in the realm of capital structure choice. Constrained hitherto by a paucity of reliable data, such research may well be possible in the near future as demand for research services increases and regulatory requirements induce greater transparency.

## APPENDIX

Table 1: Hypothesized Relationship of Explanatory Variables with Leverage

Variable	Effect	Reason
FAR	+	Fixed assets reduce the moral hazard of asset substitution faced by creditors.
LNAS	?	Information availability cuts cost of equity, but size could increase debt capacity.
PROF	-	Pecking order suggests preference for internal funds when available.
MB	-	Growth opportunities exacerbate the underinvestment problem.
NDTS		Alternative tax shield sources reduce attractiveness of debt.
VOL	-	Bankruptcy costs suggest lower optimal debt for riskier firms.

Table 2: Regression Models Using Market Debt Ratios

Variable	Model 1 DRM	Model 2 LDRM	Model 3 SDRM
Intercept	0.562***	0.055	0.507***
FAR	0.169***	0.470***	-0.301***
LNAS	-0.002	0.012***	-0.014***
PROF	-0.295***	-0.186***	-0.109**
MB	-0.035***	-0.005	-0.030***
NDTS	-0.772***	-0.293	-0.479*
VOL	0.021	0.037	-0.016
N	1110	1110	1110
F	5.44***	11.38***	9.39***
Adjusted R <sup>2</sup>	0.098	0.202	0.171

Each cell shows the estimated coefficient.

\*\*\*significant at the .01 level

\*\*significant at the .05 level

\*significant at the .10 level

Table 3: Regression Models Using Book Debt Ratios

Variable	Model 4	Model 5	Model 6
	DRB	LDRB	SDRB
Intercept	0.142	-0.004	0.146***
FAR	0.123	0.155*	-0.320
LNAS	-0.047***	-0.045***	-0.006
PROF	-1.693***	-1.566***	-0.127**
MB	0.794***	0.783***	-0.012***
NDS	-0.994	-1.418*	0.423
VOL	-0.147***	-0.143***	-0.004
N	1163	1163	1110
F	558.90***	520.28***	4.55***
Adjusted R <sup>2</sup>	0.928	0.923	0.076

Each cell shows the estimated coefficient.

\*\*\*significant at the .01 level

\*\*significant at the .05 level

\*significant at the .10 level

Table 4: Signs of Capital Structure Variables in LDRB Equations

Variable	Johnson (1997)	Wald (1999)	Booth (2001)	Present Study
Tangible Assets	+	+	+	+
Size	-	+	0	-
Profitability	-	-	-	-
Growth Options	-	-	+	+
Non-Debt Tax Shields	-	-	n/a	-
Business Risk	0	-	+	-

Table 5: Signs of Capital Structure Variables in LDRM or DRM Equations

Variable	Booth et al (2001)	Goyal et al (2002)	Present Study
Tangible Assets	+	0	+
Size	-	+	+
Profitability	-	-	-
Growth	-	-	0
Non-Debt Tax Shields	n/a	n/a	-
Business Risk	0	n/a	-

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