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The Determinants of Indebtedness in Unlisted Manufacturing Firms in India: A Panel Data Analysis

Working Paper

First Draft

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Introduction & Objective

The determinants of indebtedness of Indian firms in the post-liberalization period has been researched in Kakani (1999), Bhaduri (2002, 2002a), Guha-Khasnobis and Bhaduri (2002), Mahakud and Bhole (2003), Bhole and Mahakud (2004), Mahakud (2006), Mishra (2011), Majumdar (2012) and Mukherjee and Mahakud (2012). Findings of these studies suggest that the agency as well as the asymmetric information theories of capital structure are valid in the Indian context; the variables firm size, tangibility of assets, firm growth and profitability were observed to be consistently significant and in conformity with the theorized relation. In deriving these conclusions, however, the focal point was largely on listed and liquid manufacturing firms; the case of unlisted manufacturing firms still remains largely unexplored. The reason behind the same may be attributed to lack of continuous and credible data for these companies over a desirable period long enough to construct coherent models, or to a mindset that Zingales (2000) suggested often compelled the researcher to select large, liquid firms in 'normative' samples for testing existing capital structure theories.

The economic significance of the unlisted manufacturing sector in India can hardly be undermined. While data on employment generating capacity of these firms is not available, revenue statistics available with the Centre for Monitoring the Indian Economy for the year ended 31st March 2010 for 2747 unlisted manufacturing firms suggests that their combined revenue accounts for 7.64% of the country's GDP (at 2010 prices) for the same year, and is 22.26% of the total revenue generated by all listed manufacturing firms in the country over the same period. Even when this sector plays a critical role in fostering economic growth, a considerable body of empirical evidence in Bradley and Saunders (1992), Bradley (1997),

Carpenter and Peterson (2002) and Beck and Kunt (2006) suggests that inadequacy of capital has been a constraining/growth inhibiting factor for these firms. However, our understanding of unlisted firm's financing behavior in the Indian context remains shallow. We do not know what determines the borrowing behavior of these firms or whether there is a 'pecking-order' of borrowing among alternative sources. Does existing theories adequately explain indebtedness in this sector? Does a close bank-firm relationship allow unlisted firms to borrow extensively on a unsecured basis or is it that secured borrowing enables unlisted firms to overcome the problems of information opacity? Does monitoring that secured debt brings with itself influences firm performance and act as a substitute for the missing technical/managerial resources that may be beyond the reach of this sector? This paper attempts to address these issues and fill up this gap in existing literature on indebtedness in India.

The rest of the paper is organized as follows. The next section deals with a selective review of literature and empirical evidence on borrowing behavior of unlisted firms, followed by the methodology adopted and its rationale. Findings of the research and an analysis of the same is presented before discussing the important conclusions and limitations of this research.

Review of Theoretical Literature and Empirical Evidence

In a path-breaking paper Miller and Modigliani (1958) provided the formal proof of their now-famous debt- irrelevance propositions. The crux of their argument was that, under perfect capital markets the value of the firm was determined solely by the company's investment policy and its economic substance was independent of the composition of (debt and equity) the liability side of the firm's balance sheet. Market imperfections are however a reality and hence the development of corporate financing theory post-1958 focus on capital structure relevance under market

imperfections. Of these alternative theories that emerged in the last 64 years, the agency and asymmetric information based explanations of capital structure appear more relevant in explaining the firm-level determinants of (informationally opaque) unlisted firms. The former (almost omnipresent in all forms of business organizations) highlights the conflict of interest among stakeholders in a company and the role of debt financing in resolving the same (Jensen and Meckling (1976), Myers (1977), Jensen (1986) and Diamond (1989)), while the latter focuses on financing choice when stakeholders (including outside lenders) are not equally informed about the company/project prospects (Ross (1977), Myers and Majluf (1984) and Myers (1984)).

Empirical validation of capital structure theories typically involve testing the (nature of) relation and statistical significance of certain firm level factors (the independent variables) used as surrogates of theoretical attributes on alternative measure of firm level indebtedness (the dependent variable). Following Rajan and Zingales (1995) observation, that asset tangibility, growth, firm size and profitability plays a pivotal role in determining indebtedness, this paper employs these four variables in the analysis. Inclusion of these four variables is further conditioned by the overwhelming evidence of their significance in determining indebtedness in the Indian context, as well as in the context of developing nations (see, Booth, et. al (2001)). Furthermore Michaelas et al. (1999), Cassar and Holmes (2003) and Hall et al. (2004) also provides evidence concerning the significance of these variables in determining indebtedness of small and medium enterprises. The following paragraphs discuss the role of these variables and their relation with theory.

Asset tangibility is among the most critical variables influencing indebtedness. Rajan and Zingales (1995) suggested that the existence of tangible assets serves two critical purposes; it enables the borrower to pledge them as collateral diminishing the agency costs of debt (like risk shifting), and at the same time protects the lender in the event of liquidation. Collateralized borrowing also resolves the problems of asymmetric information by providing credible signals to lenders regarding project quality as suggested in Myers (1977), Scott (1977), Harris and Raviv (1990). Consequently a larger proportion of tangible asset in a firm's asset portfolio is expected to reduce supply side constraints. Collateralized borrowing is however not cost free, for it leads to a loss of flexibility for the pledging firm in so far as the assets use and liquidity is concerned (Stultz and Johnson, 1985), and may result in moral hazard problems with regard to the borrower's use of the pledged asset (Igawa and Kantas, 1990). While there is overwhelming empirical evidence on a positive association between asset tangibility and indebtedness, there are a few contrary evidences, especially with regard to collateralized borrowing. Leeth and Scott (1989) observed a direct relation between the use of secured loan and the likelihood of default. Inderst and Muller (2007) noted that while observably risky borrowers faced higher collateral requirements. An even more startling finding of the study was that after controlling for observable borrowers risk, collateralized loans were more likely to default *ex post*.

Financing growth is one eternal challenge that firms face. While growth opportunities or options add value to a firm, they have little or no collateral value primarily because of its intangible nature. From the investor point the challenge associated with financing growth options is that it is most difficult to dictate performance of the borrower *ex ante* and even more costlier to enforce compliance *ex post*. Consequently as Myers (1977) suggests, lenders perceive a high possibility of risk-shifting activities on the part of company managers and underinvestment, and hence are

reluctant to finance growth. However contrary to this inverse relationship between growth and indebtedness, the pecking order theory suggests that the inability of growth firms to meet their financing requirement from internal sources might force them to raise resources externally, preferably through debt. And, if long-term debt is not forthcoming, growing firms take recourse to short-term borrowing to meet their fund requirements.

The variable firm size is another important firm level variable incorporated in almost all empirical models dealing with indebtedness owing to its capacity to serve as a proxy for multiple firm-level attributes. Rajan and Zingales (1995) suggested that size can be taken as an inverse proxy of probability of financial distress, while Fama and French (2002) indicate to the use of this variable as an inverse proxy of cash flow volatility; larger the size of the firm higher the probability of it being diversified and hence less volatile its cash flows (as a consequence of diversification). Rajan and Zingales (1995) further states that 'size may also be a proxy for information outside investors have' (p. 1451) implying that larger sized firms may also benefit from lower information asymmetry problems between firm insiders and investors, hence favorably affecting the supply of both debt (the more preferred source of capital in the firm's pecking order) as well as equity.

The role of profitability in determining the extent of indebtedness is difficult to theorize. The pecking order theory of capital structure, due to Myers (1984), asserts that firms prefer internal finance to external sources of funds, and even in raising external finance, firms preferred debt, then hybrid securities such as convertible bonds, equity being the last resort. In a nutshell, firms are averse towards creating new/additional claim holders to its cash flows, and in situations when these claimants were created, firms would prefer to engage the least information intensive source of financing. Consequently internally generated funds (primarily profits) played a

significant role in determining external fund requirement, and in turn indebtedness. The theory of optimal capital structure however suggests that profitable firms should take recourse to debt financing in order to achieve greater tax savings associated with debt use. Moreover, increased use of debt financing (and hence the legally binding cash outflows every period) in these firms reduced the amount of free cash flow available to managers, and the associated problems as suggested in Jensen and Meckling (1976) and Jensen (1986). However empirical evidence in India and elsewhere generally point to the validity of the pecking order hypothesis.

While there is a considerable body of empirical work on the borrowing behavior of small and medium enterprises, evidence on the borrowing behavior of unlisted firms are far and few. In the context of Morocco, Achy (2009) observed an inverse relationship between tangibility and both total and short-term debt. Firm growth impacted short-term borrowing positively, and profitability had a positive effect on long-term borrowing and a negative impact on short-term borrowing. The study further observed that small firms tended to increase debt levels instead of opting for capital from outside investors while larger firms relied more on their retained earnings to meet their long-term fund requirement. Yartey (2011) observed that unlisted firms in Ghana financed most of their growth from external debt of short maturity. The study also observed that the dominant firm level factors affecting debt ratios of unlisted firms in Ghana were firm size, firm growth, tangibility of assets and profit margin; firm size, asset tangibility and growth were observed to be inversely related to debt-equity ratio, while profit margin positively impacted indebtedness. Evidence available from Jõeveer (2012), in the context of 9 European countries suggested that for unlisted firms, the firm level variables affecting indebtedness depended on the definition of leverage used. Specifically, if leverage incorporated only short-term debt (not all short-term liabilities), tangibility of firm's assets and firm size inversely affected indebtedness,

while if leverage was defined to incorporate non-debt liabilities like trade credit (an important source of funds for more financially constrained firms) as well, tangibility and firm size positively affected indebtedness. The inverse relation between profitability and indebtedness remained valid irrespective of the definition of leverage used. In the Indian context, Green et. al (2003) is the only study to have incorporated unquoted manufacturing firms as a separate sample in studying indebtedness. Using a sample of 139 private unquoted manufacturing firms, the analysis revealed that unquoted companies had a persistently higher proportion of financing from shareholders' funds than quoted companies over the period 1989-99. This finding is in line with Rajan's (1992) reasoning that one reason companies went public was to improve the terms of their access to debt.

Methodology

The population for our empirical study include the universe of manufacturing firms in India. From this population we included only unlisted firms in our sample. The total number of such firms whose financial information is available in the database of Centre for Monitoring the Indian Economy (as on 22nd August, 2012) stood at 7902. The sample was further filtered to exclude group affiliated firms and firms belonging to the co-operative and joint sector, to include only unlisted private standalone firms, reducing the sample size further to 5314 firms. Availability of data on a continuous basis for unlisted firms appeared to be a major impediment in creating the final sample. The final filter imposed on this sample of firms was continuous data availability from the period 2005-2006 through to 2009-2010. Consequently the sample size stood at 864 resulting in 3456 firm-year observations. The financial data necessary for the empirical analysis is obtained from the database PROWESS of the Centre for Monitoring the Indian Economy.

This paper employs panel regression model as a statistical tool for analysis. Panel or longitudinal data refers to data containing time series and cross sectional observations of a number of individual units. For instance, debt ratio of a firm i in a sample of j firms represent the cross sectional dimension, while the same ratio over time for the same firm, denoted by t , represent the time series dimension. The key feature of panel data that distinguishes it from pooled cross-section is that the same cross sectional units are followed over a certain period of time..

Balestra and Nerlove's (1966) paper on pooling cross-section and time series data marked the beginning of this variety of data modeling and in applied studies and methodological development of this new econometric tool. A primary reason behind its increasing adoption in social science research stems from the model's greater capacity of modeling complex behavior compared to single cross-sectional or time series data alone. In particular, panel data models provide major benefits for econometric estimation in controlling for individual heterogeneity, eliminating or reducing estimation bias and reducing the problems of data multi-collinearity. These advantages of panel data provide the basic motivation behind the choice of this regression model in our analysis.

The panel data model we test here is specified as follows:

$$y_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}$$

where Y represent the alternative measures of borrowing, X , is the explanatory variables, ε_{it} is the error term, and i and t denote firm and time. The alternative measures of borrowing employed in the model are (i) total borrowing as a ratio of total assets (TB), (ii) long-term borrowing as a ratio of total asset (LTB), (iii) short-term borrowing as a ratio of total assets (STB) and (iv) secured borrowings as a ratio of total borrowing (SB). The terms long-term and short-term borrowing have their usual meaning in accordance with corporate finance theory. The

independent variable tangibility is measured by the ratio of net fixed assets to total assets of the firm, firm growth is measured by the growth of net assets, natural log of sales revenue is used as a proxy of size and profitability is measured by profit after tax as a percentage of net worth.

To ascertain the significance of firm and time effects in the data set, and to find out a suitable panel data method for estimation purpose, the Likelihood Ratio (LR) test, Lagrange Multiplier (LM) test and Hausman specification tests are carried out for the sample of firms. For the estimation equation the overall F-Statistic and its statistical significance, along with R-squared value is used to judge its relevance and sufficiency. The statistical significance and the sign of coefficients associated with each of the independent variables are used to analyze the hypothesis made. We also present the coefficients of the regression model using industry dummies to ascertain the influence of industry effects in explaining borrowing behavior.

This research aims to test the following hypothesis:

Table 1. The set of hypothesis and expected sign

H ₁ :	total borrowing is positively related to tangibility of firm's assets	+
H ₂ :	long-term borrowing is positively related to tangibility of firm's assets	+
H ₃ :	secured borrowing is positively related to tangibility of firm's assets	+
H ₄ :	total borrowing is inversely related to firm growth	-
H ₅ :	long-term borrowing is inversely related to firm growth	-
H ₆ :	short-term borrowing is positively related to firm growth	+
H ₇ :	secured borrowing is positively related to firm growth	-
H ₈ :	total borrowing is positively related to firm size	+
H ₉ :	long-term borrowing is positively related to firm size	+
H ₁₀ :	short-term borrowing is positively related to firm size	+
H ₁₁ :	secured borrowing is positively related to firm size	+
H ₁₂ :	total borrowing is inversely related to profitability of the firm	-
H ₁₃ :	long-term borrowing is inversely related to profitability of the firm	-

Asset tangibility has been observed to enhance total and long-term debt capacity of firms of a firm. Since the definition of tangibility used in this research does not include inventory, receivables or other similar assets usually pledged as collateral against short-term borrowing, the exact relation between tangibility and short-term borrowing is difficult to hypothesize. The set of hypothesis concerning growth opportunities is largely in line with the challenges that borrowers face in pledging growth as collateral and the role of secured debt in resolving such challenges. In the context of firm size, the hypothesis is based on the argument of size being a reverse proxy for probability of bankruptcy, hence favorably affecting debt capacity. Such firms are also expected to reduce capital cost by borrowing on a secured basis and hence the hypothesized positive relation. With regard to profitability it is assumed that profitable firms would require less of external financing on a long-term basis as the pecking order theory suggests; it is however not know how short-term borrowing or secured borrowing is related to profitability.

Findings and Analysis

Table 2 provides a comparison of the final sample of 864 firms employed in the sample with a sample of all private stand alone manufacturing firms listed in the BSE small cap index (n=127). Total indebtedness in listed small cap firms is higher than the sample of unlisted firms used in this research for all the years under study, and the difference has been pronounced in the case of long-term borrowing ratio. Unlisted firms on the other hand, have a higher short-term borrowing ratio; the difference however seems to have narrowed in the last year under study. An interesting finding from table 1 is that the proportion of secured borrowing to total borrowing is higher for listed small cap firms compared to the sample of unlisted firms.

Table 2: Mean indebtedness of BSE small-cap sample (BSE(SC) and
unlisted firms sample(UFS)

	Year	2006-07	2007-08	2008-09	2009-10
Total borrowing to total assets	BSE(SC)	0.4010	0.3784	0.3952	0.3954
	UFS	0.3643	0.3672	0.3638	0.3544
Long-term borrowing to total assets	BSE(SC)	0.2557	0.2195	0.2444	0.2193
	UFS	0.1858	0.1829	0.1812	0.1780
Short-term borrowing to total assets	BSE(SC)	0.1453	0.1589	0.1508	0.1761
	UFS	0.1785	0.1843	0.1826	0.1764
Secured borrowing to total borrowing	BSE(SC)	0.7414	0.7911	0.8424	0.8707
	UFS	0.7166	0.7293	0.7311	0.7305

Table 3 provides a description of the sample in terms of their industry affiliation and their respective share in the total. Of the fourteen industry sectors to which the sample belongs to, firms belonging to manufacture of basic metals has the highest representation (12.96%) while manufacturers of non-metallic mineral products have the lowest representation (1.81%) in the present sample. The classification is based on the National Industries Classification (NIC) 2008 codes prepared by the National Statistical Organization.

Table 3. Sectoral distribution of the sample

(Based on National Industrial Classification (NIC)-India, 2008)

Industry	Number of firms in the sample	%
Manufacture of basic metals	136	12.96%
Manufacture of beverages	33	3.15%
Manufacture of chemical and chemical products	95	9.06%
Manufacture of computer, electronic and optical products	25	2.38%
Manufacture of electrical equipment	36	3.43%
Manufacture of fabricated metal products, except machinery and equipment	40	3.81%
Manufacture of food products	125	11.92%
Manufacture of machinery and equipment	41	3.91%
Manufacture of other non-metallic mineral products	19	1.81%
Manufacture of paper and paper products	45	4.29%
Manufacture of pharmaceuticals, medicinal, chemical and botanical products	62	5.91%
Manufacture of rubber and plastic products	52	4.96%
Manufacture of textile	112	10.68%
Manufacture of transport equipments	43	4.10%
Total (n)	864	100.00%

Table 4 disaggregates total borrowing of firms in the sample into different categories along with the percentage share of each of the components in the total. Borrowings from bank, in particular secured bank borrowing constitute the lion share of borrowed capital for firms in the sample across all the years under observation. Other major sources of borrowed capital are borrowings from financial institutions (other than banks), foreign currency borrowings, loans from promoters, directors and shareholders and inter-corporate loans (item no. 3, 4, 5 & 6). Together, these five sources of funds constitute more than 91% of borrowed capital for the firms under study. While no preferred hierarchy or pecking order of sources of financing are visible among these items in the Table 4, the number of firms with loans from promoters, directors and shareholders and with inter-corporate loans in their balance sheet far outweigh those with loans from other financial institutions and those with foreign currency borrowings, as observed in the Table 5. Table 4 also indicates that, of all the different categories of borrowing observed in the sample, the incidence of foreign currency borrowing is the least in all the years under observation.

Several important observations emerges from these tables 4 & 5. Unlisted firms circumvent the problem of missing capital markets by extensively deploying bank borrowings in order to meet their financing requirements. The role of other financial institutions appears at best marginal. The observed incidence of secured borrowing (in terms of both volume and frequency) has three feasible interpretations; unlisted firms tide over the problems of information asymmetry (resulting in higher cost of obtaining credit) through secured borrowings from banks/financial institutions, or banks might be following certain regulatory requirements while advancing credit to this sector, or it is a reflection of risk averse behavior exhibited by these institutions while advancing credit to unlisted firms. Irrespective of the cause, collateral capacity appears to be an

Table 4: Major components of aggregate borrowing between 2006-07 to 2009-2010 and their respective share in total

	2007		2008		2009		2010	
	Rs. in mil.	%						
1. Total Borrowings	218462		293572		342965		408012	
of which:								
2. Borrowing from banks	166276	76.11%	219207	74.67%	266361	77.66%	312901	76.69%
2.(a)Secured bank borrowings	156173	71.49%	206503	70.34%	254630	74.24%	299674	73.45%
2.(b)Unsecured Bank borrowings	10103	4.62%	12704	4.33%	11731	3.42%	13227	3.24%
3. Borrowing from financial institutions	8084	3.70%	10404	3.54%	8820	2.57%	8856	2.17%
3.(a)Secured financial institutional borrowings	7857	3.60%	10348	3.52%	8233	2.40%	8743	2.14%
3.(b)Unsecured borrowings from financial institutions	227	0.10%	56	0.02%	586	0.17%	114	0.03%
4. Foreign currency borrowings	11055	5.06%	14406	4.91%	16236	4.73%	22248	5.45%
6.(a)Secured foreign currency borrowings	7416	3.39%	10133	3.45%	11481	3.35%	18204	4.46%
6.(b)Unsecured foreign currency borrowings	3638	1.67%	4273	1.46%	4755	1.39%	4044	0.99%
5. Loans from promoters & directors	7139	3.27%	7076	2.41%	7729	2.25%	9806	2.40%
7.(a)Secured loans from promoters & directors	0	0.00%	0	0.00%	0	0.00%	0	0.00%
7.(b)Unsecured loans from promoters & directors	7139	3.27%	7076	2.41%	7729	2.25%	9806	2.40%
6. Inter-corporate loans	9699	4.44%	17649	6.01%	19472	5.68%	18038	4.42%
6.(a)Secured inter-corporate loans	2483	1.14%	2535	0.86%	4023	1.17%	3770	0.92%
6.(b)Unsecured inter-corporate loans	7216	3.30%	15114	5.15%	15449	4.50%	14267	3.50%
7. Other borrowings	16210	7.42%	24830	8.46%	24348	7.10%	36163	8.86%

* Other borrowings include borrowings from state and central government, interest accrued and due, hire purchase loans, debentures and bonds, deferred credit and all those borrowings that could not be classified under any of the categories mentioned in 1 through to 8, and are mentioned in company accounts as 'other borrowings'.

Table 5. Incidence of major category of borrowings
(Items 1 through to 6 of Table 2.)

	2006-07	2007-08	2008-09	2009-10
1. Total number of firms in the sample	864	864	864	864
of which:				
2. Number of firms that borrowed from banks	805	802	801	796
2.(a) On a secured terms	799	797	796	790
2.(b) On unsecured terms	67	75	74	78
3. Number of firms that borrowed from other financial institutions	112	106	104	94
3.(a) On secured terms	104	94	93	86
3.(b) On unsecured terms	10	13	11	9
4. Number of firms with foreign currency borrowings	76	83	62	74
4.(a) On secured terms	61	69	50	61
4.(b) On unsecured terms	17	18	14	15
5. Number of firms with loans from promoters & directors	359	349	348	342
5.(a) On secured terms	0	0	0	0
5.(b) On unsecured terms	359	349	348	342
6. Number of firms with inter-corporate loans in their balance sheet	333	346	346	330
6.(a) On secured terms	93	111	105	98
6.(b) On unsecured terms	264	272	278	268

important determinant in debt capacity of unlisted firms. To the extent these four years under study is capable of indicating the dynamics of this market, findings here suggest a gradual decline in the share of borrowings from other financial institutions in total borrowings.

While the incidence of foreign currency is low, its share in total borrowing is higher than those of financial institutions (as high as 5.45% in 2010). Two observations from the sample are noteworthy. This component of borrowing appears positive for 54 firms over three years consecutive years out of the four years under consideration, and each of these firms necessarily have positive foreign exchange earnings in each of the years. Consequently it appears that access to this source of funding is either conditional on the

firm's capacity earn foreign currency or arises in the natural course of business, for instance through suppliers line of credit.

As expected, loans from directors and promoters for these unlisted firms are always on unsecured terms, for in case of these firms, they will be the owners/partners of the company of the company. An intriguing observation from table 5 is the high incidence of unsecured inter-corporate loans indicating the existence of an internal capital market even among standalone private business organizations.

Table 6, representing the summary statistics of alternative measures of indebtedness as observed in our sample reveals that firms involved in manufacture of textiles has the highest value of total indebtedness (0.4549), followed by manufacturers of food products (0.4096) and manufacturers of basic metals (0.3771). Long-term indebtedness is highest in firms involved in manufacture of textiles (0.2816) followed by firms in manufacture of non-metallic mineral products (0.2133) and paper and paper products (0.2080), while short-term indebtedness is highest for firms involved in manufacture of basic metals (0.2288), followed by manufacturers of food products (0.2056) and manufacturer of fabricated metal product firms (0.1940). The observed values of mean and median long-term and short-term indebtedness, however does not indicate substantial difference with regard to their preference as a source of financing for unlisted firms included in the sample. Inter industry differences however do exist; for instance, textile manufacturing firms are more dependent on long-term sources of funds vis-à-vis short-term sources while the dependence is other way in case of manufacturers of basic metals.

Data on secured borrowings as a fraction of total borrowings reiterates our earlier observations: mean and median secured borrowing ratio is 0.71 and 0.72 respectively indicating the preponderance of collateralized borrowing as the primary source of raising finance. Table 4 reveals that, secured borrowing ratio is highest in firms involved in manufacture of basic metals (0.7644), paper and paper products (0.7651) and transport equipments (0.7634).

Table 6. Summary Statistics of indebtedness by industry category

Industry		TB/TA	LTB/TA	STB/TA	SB/TB
Manufacture of basic metals	Mean	0.3771	0.1483	0.2288	0.7644
	Stdev	0.16	0.12	0.14	0.27
Manufacture of beverages	Mean	0.3805	0.1906	0.1899	0.7014
	Stdev	0.18	0.15	0.19	0.35
Manufacture of chemical and chemical products	Mean	0.3451	0.1764	0.1687	0.6923
	Stdev	0.19	0.15	0.13	0.33
Manufacture of computer, electronic and optical products	Mean	0.2528	0.1239	0.1289	0.7171
	Stdev	0.15	0.13	0.09	0.31
Manufacture of electrical equipment	Mean	0.2578	0.0993	0.1585	0.7316
	Stdev	0.15	0.10	0.13	0.36
Manufacture of fabricated metal product, except machinery and equipment	Mean	0.3394	0.1454	0.1940	0.7047
	Stdev	0.19	0.13	0.13	0.31
Manufacturer of food products	Mean	0.4096	0.2056	0.2040	0.7336
	Stdev	0.20	0.16	0.15	0.30
Manufacture of machinery and equipment	Mean	0.2334	0.0747	0.1587	0.6491
	Stdev	0.16	0.09	0.13	0.38
Manufacture of other non-metallic mineral products	Mean	0.3667	0.2133	0.1534	0.6507
	Stdev	0.26	0.26	0.15	0.41
Manufacture of paper and paper products	Mean	0.3756	0.2080	0.1676	0.7651
	Stdev	0.20	0.15	0.13	0.28
Manufacture of pharmaceuticals, medicinal, chemical and botanical products	Mean	0.3191	0.1713	0.1478	0.7141
	Stdev	0.20	0.18	0.11	0.31
Manufacture of rubber and plastic products	Mean	0.3236	0.1645	0.1590	0.7347
	Stdev	0.19	0.17	0.12	0.30
Manufacture of textile	Mean	0.4549	0.2816	0.1733	0.7352

	Stdev	0.20	0.18	0.13	0.30
	Mean	0.3533	0.2017	0.1516	0.7634
Manufacture of transport equipments	Stdev	0.16	0.14	0.11	0.26
	Mean	0.3624	0.1820	0.1824	0.7269
	Median	0.3650	0.1467	0.1660	0.8371
	Standard Deviation	0.1942	0.1614	0.1382	0.3103

Note: TBR denotes total borrowing ratio, LTBR refers to long-term borrowing ratio, STBR refers to short-term borrowing ratio, SBR refers to secured borrowing ratio.

Table 7 shows correlations between the variables selected in the model. The correlation matrix reveals a few important findings with regard to our sample. Tangibility is positively correlated to both total and long-term borrowing and inversely correlated to short-term borrowing. All measures of indebtedness are positively correlated to firm growth; the correlation is insignificant in case of short-term borrowing. The variables firm size as well as profitability has expected correlations; it is insignificant between size and long-term borrowing, and between firm profitability and short-term borrowing.

Table 7. Correlation matrix

	TBR	LTBR	STBR	SBR	Tang	Growth	Size	Prof
Tang	0.15**	0.34**	-0.19**	0.01	1.00	-0.13**	-0.17**	-0.06**
Growth	0.05**	0.04*	0.02	0.12**		1.00	0.23**	0.11**
Size	0.17**	0.01	0.23**	0.32**			1.00	0.05*
Prof	-0.08**	-0.07**	-0.03	0.04*				1.00

Note: (a) **. Denote correlation is significant at the 0.01 level (2-tailed) and * denote correlation is significant at the 0.05 level (2-tailed).

(c) TBR denotes total borrowing ratio, LTBR refers to long-term borrowing ratio, STBR refers to short-term borrowing ratio, SBR refers to secured borrowing ratio.

Table 8 presents the result of regression for the alternative measured of indebtedness used in this research based on the Likelihood Ratio (LR) test, Lagrange Multiplier (LM) test and Hausman specification test results given in Appendix I. Based on the Hausman test results, the fixed effects model is employed in the model for total borrowing ratio, long-term borrowing and secured borrowing ratio, while the random effects model is employed for short-term borrowing ratio. Findings reveal that total borrowing is positively related to tangibility of assets and firm growth, while it is inversely related to firm profitability. The relationship between firm size and total borrowing is insignificant. Long-term borrowing is positively related to tangibility and firm growth, and inversely related to firm size; the relation between long-term borrowing and profitability is statistically insignificant. Short-term borrowing is inversely related to tangibility and profitability, and positively related to firm size; the relation between firm growth and short-term borrowing is statistically insignificant. Secured borrowing ratio is positively related to tangibility, firm size and growth opportunities; its relationship with firm profitability is statistically insignificant. Table 9 presents the findings of this research alongside the hypothesized nature of relationship.

Table 8: Results of Regression

Variables	Total borrowing ratio		Long-term borrowing ratio		Short-term borrowing ratio		Secured borrowing ratio	
	Model 1(FEF)	Model 2(FEFT)	Model 1(FEF)	Model 2(FEFT)	Model 1(REF)	Model 2(REFT)	Model 1(FEF)	Model 2(FEFT)
Tangibility	0.11(0.024)**	0.11(0.024)**	0.194(0.021)**	0.193(0.021)**	-0.098(0.014)**	-0.087(0.02)**	0.116(0.036)**	0.117(0.036)**
Firm Growth	0.02(0.006)**	0.015(0.006)*	0.024(0.005)**	0.023(0.0053)**	-0.008(0.0047)	-0.008(0.005)	0.019(0.008)*	0.022(0.009)*
Size	0.001(0.004)	0.002(0.004)	-0.009(0.0036)**	-0.0086(0.004)**	0.014(0.002)**	0.011(0.0036)**	0.276(0.006)**	0.0243(0.006)**
Profitability	-0.06(0.002)**	-0.059(0.002)**	-0.0002(0.0015)	-0.0002(0.0015)	-0.006(0.0014)**	-0.0057(0.0015)**	0.0009(0.0026)	0.0011(0.0026)
Constant	-----	0.295(0.028)**	-----	0.14(0.025)**	0.141(0.014)**	0.155(0.02)**	-----	0.52(0.042)**
No of Obs.	3456	3456	3456	3456	3456	3456	3456	3456
Adjusted R ²	0.8144	0.8148	0.7910	0.7904	0.7447	0.7453	0.8336	0.8337
F-Test Result	F(867,2588) = 18.49**	F(871, 2584) = 18.45**	F(867, 2588) = 16.05**	F(871, 2584) = 15.96**	F(867, 2588) = 12.62**	F(871, 2584) = 12.61**	F(867, 2588) = 20.98	F(871, 2584) = 20.89

Note: FEF and FEFT refers to Fixed Effect Firm and Fixed Effect Firm and Time, REF and REFT refers to Random Effects Firm and Random Effects Firm and Time. ** denote significance at the 0.01 level and * denote significance at 0.05 level. The fixed effect model does not have an intercept term. The figures in parenthesis alongside the coefficients show the standard errors.

Table 9. Hypothesized relation and observed relation

Hypothesis	Predicted	Observed
	sign	sign
H ₀ : total borrowing is positively related to tangibility of firm's assets	+	+
H ₀ : long-term borrowing is positively related to tangibility of firm's assets	+	+
H ₀ : secured borrowing is positively related to tangibility of firm's assets	+	+
H ₀ : total borrowing is inversely related to firm growth	-	+
H ₀ : long-term borrowing is inversely related to firm growth	-	+
H ₀ : short-term borrowing is positively related to firm growth	+	-
H ₀ : secured borrowing is positively related to firm growth	+	+
H ₀ : total borrowing is positively related to firm size	+	Insig.
H ₀ : long-term borrowing is positively related to firm size	+	-
H ₀ : short-term borrowing is positively related to firm size	+	+
H ₀ : secured borrowing is positively related to firm size	+	+
H ₀ : total borrowing is inversely related to profitability of the firm	-	-
H ₀ : long-term borrowing is inversely related to profitability of the firm	-	Insig.

Findings of this research the role of asset tangibility in indebtedness is in the expected direction; it enhances both long-term and secured debt raising capacity of the firm. These tangible-asset rich firms, however, appear to be less dependent on short-term borrowing. One possible interpretation is that unlisted firms are deploying long-term funds to cover their working capital requirements, which though inefficient from the cost perspective, may be the best strategy in case these firms face refinancing risk of short-term loans.

Evidence between firm growth and indebtedness does not stand in line with theory. Findings of this research indicate that long-term (secured) borrowing is positively related to firm growth; unlisted firms finance growth through secured long-term borrowing. This finding is not hard to interpret given the measure of growth employed in this research; for manufacturing firms, year-on-year growth in net assets is expected to be strongly correlated to growth in fixed assets, and hence the observed positive relation. The statistically insignificant relation between firm growth and short-term borrowing provides further supporting evidence that long-term assets may be financed through long-term sources of funds. It appears that secured borrowing is able to resolve the problems of risk shifting and underinvestment that lenders to these firms may be prone to.

The inverse (direct) relation between long-term (short-term) borrowing and size does not support the conclusions laid down by theory, even if the arguments may still remain valid. An inverse relation between size and long-term borrowing may be because larger sized unlisted firms are in fact diversified and more stable, but are faced with lower long-term external capital requirement, hence the inverse relation. However, in order to generate sales in large volume, these firms may be dependent on the supporting role of short-term (secured) financing that banks and financial institutions extend against the security of inventory/receivables.

The statistically insignificant relation between profitability and long-term borrowing, and the inverse relation between short-term borrowing and profitability is again, contradictory to what the pecking order theory would suggest; our findings suggests that unlisted firms internal resource generating capacity only reduces its short-term fund/financing need, with no bearing on long-term fund requirement. Consequently, these firms might be entirely dependent on outside capital for financing its growth and expansion. The statistically insignificant relationship between profitability and secured borrowing also does not provide any evidence of the positive

role (of monitoring) that secured debt may have on company a company's performance and hence profitability.

Conclusion and Limitations

This research examined the borrowing behavior of unlisted private stand-alone manufacturing firms in India over the period 2006-07 to 2009-10 using balance sheet data. Findings suggest that total indebtedness is lower in unlisted manufacturing firms compared to their listed counterparts, and the difference is more pronounced in long-term borrowing ratio compared to short-term borrowing ratio. Unlisted manufacturing firms depend predominantly on banks for financing purposes in order to circumvent their inability to tap financial resources from capital markets, and they borrow predominantly on a secured basis. It seems collateralized borrowings enables these firms to overcome the problem of information opacity; asset tangibility enhances debt capacity in general and secured debt capacity in particular as the agency theory would suggest. This research does not provide any evidence to suggest that a close bank-firm relationship ease collateral requirements for unlisted firms, nor is there any evidence of the monitoring role of secured debt enhancing firm performance and hence profits. The 'pecking order' of financing as the asymmetric information theory of capital structure suggests, does not seem valid for unlisted firms; internal resource generating capacity only influences reliance on short-term funding, with no bearing on long term fund need.

This research paper suffers from several limitations. Financial information used in analyzing borrowing behavior of unlisted firms are from secondary sources and hence would incorporate all errors that might have crept in while compiling such data in the data base. Unavailability of financial information for the required number of years has resulted in certain firms and sectors of the economy not being included in the sample, and has hence affected sample size and representation. Similar problems have limited the time

period of the study to only four years. The study does not include unlisted services sector firms in the sample, and hence its findings cannot be generalized in the context of unlisted firms in India.

The availability of financial resources or funding opportunities to unlisted firms seems largely dependent on collateral capacity and is grossly inadequate in terms of alternatives. While there are a plethora of institutions targeted at development of specific sectors in the country, these 'other financial institutions' does not appear to have played any substantial role in easing these constraints for unlisted firms. Furthermore, the huge share of bank loans in total loan portfolio of this sector and the commensurate exposure of banks to unlisted firms may have played a determining role in extent of collateralization of such loans. And in the absence of any evidence on linkage between collateralization and profitability, it seems unlikely that banks may have played any role in enhancing the productivity of this sector. Consequently, while risk has been minimized, growth in employment and output may have been compromised in the long-term. There appears to be a strong case for both the policy maker and financial economist to have a relook at the constraints that unlisted firms face and redefine the role of the banks and financial institutions from being a passive provider of capital to that of a partner in ushering growth.

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Appendix I: Test Results

Table 1: Likelihood Ratio (LR) Test, Lagrange Multiplier (LM) Test and Hausman Test results for the sample.

	CLRM vs model with Group effects	CLRM vs model with Group & time effects
<u>(a) Total borrowing ratio</u>		
Tests	Test Statistics	Test Statistics
LR Test	$\chi^2(863) = 6563.41^{**}$	$\chi^2(867) = 6576.18^{**}$
LM Test	$\chi^2(1) = 3274.99^{**}$	$\chi^2(2) = 3275.08$
Hausman Test	$\chi^2(4) = 31.11^{**}$	$\chi^2(4) = 27.12^{**}$
<u>(b) Long-term borrowing ratio</u>		
LR Test	$\chi^2(863) = 5922.46^{**}$	$\chi^2(867) = 5923.11^{**}$
LM Test	$\chi^2(1) = 2934.96^{**}$	$\chi^2(2) = 2936.56^{**}$
Hausman Test	$\chi^2(4) = 36.38^{**}$	$\chi^2(4) = 35.07^{**}$
<u>(c) Short-term borrowing ratio</u>		
LR Test	$\chi^2(863) = 5422.51^{**}$	$\chi^2(867) = 5435.46^{**}$
LM Test	$\chi^2(1) = 2696.37^{**}$	$\chi^2(2) = 2696.38^{**}$
Hausman Test	$\chi^2(4) = 5.79$	$\chi^2(4) = 3.61$
<u>(d) Secured borrowing ratio</u>		
LR Test	$\chi^2(863) = 6788.44^{**}$	$\chi^2(867) = 6794.30^{**}$
LM Test	$\chi^2(1) = 3401.5^{**}$	$\chi^2(2) = 3402.99^{**}$
Hausman Test	$\chi^2(4) = 17.71^{**}$	$\chi^2(4) = 18.10^{**}$