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Debt Maturity and Firm Performance

A Panel Study of Indian Companies

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Is long-term debt better than short-term debt in its effect on firm performance? The answer appears to be yes for privately owned companies in India.

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Summary findings

Economic policymakers traditionally hold the view that, because of imperfections in capital markets, a shortage of long-term finance acts as a barrier to industrial performance and growth. Long-term finance is thought to allow firms to invest in more productive technologies, even when they do not produce immediate payoffs, without the fear of premature liquidation. As a result, special state-supported term-lending institutions have been established, especially in developing countries.

But some believe that short-term finance may offer better incentives because it allows suppliers of finance to monitor and control firms more effectively, thus improving the firms' performance.

Schiantarelli and Srivastava empirically investigate the determinants and consequences of the term structure of debt. Using a rich panel of data on privately owned companies in India, they also examine the influence of debt maturity structures on those firms' performance, especially on productivity.

The results are not conclusive, but seem to support conventional beliefs about the importance of long-term finance to firm performance. Heavy leveraging, however, has a strong negative impact on productivity.

They base their econometric evidence on estimates of a maturity equation and of a production function augmented by financial variables.

The data on which these results are based have been generated by a financial system in which there is little competition, in which state-owned financial institutions are not guided by the profit motive and have no control over interest rates, so one cannot say whether short term finance would have been more beneficial in a less regulated system.

Moreover, by the end of the 1980s, the capital base of India's government-owned financial institutions had been severely eroded and they carried a heavy burden of nonperforming assets. This means that the benefits of long term finance must be weighed against the costs.

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DEBT MATURITY AND FIRM PERFORMANCE:
A PANEL STUDY OF INDIAN PUBLIC LIMITED COMPANIES

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I. Introduction

Economic policy makers have traditionally held the view that, due to capital market imperfections, there is a shortage of long term finance and that this acts as a barrier to industrial performance and growth. This belief has led to the establishment of special term lending institutions often supported by governments and other agencies, particularly in developing countries. Long term finance is thought to allow firms to invest in more productive technologies, even when they do not provide an immediate payoff, without the fear of premature liquidation. However, short term finance may have better incentive properties compared with long term finance, because it allows suppliers of finance to monitor and control firms more effectively, with favourable effects on firms' performance.

Although progress has been made in investigating the nature of capital market imperfections, which state interventions are supposed to provide a remedy for, the consequences of these interventions on firms' behaviour and performance have not been as thoroughly analysed. Ultimately the twin issues of the determinants and the consequences of the maturity structure of debt cannot be satisfactorily resolved at the theoretical level. An empirical analysis of these issues is both justified and necessary. Using data from a panel of Indian public limited companies for the period 1980-89 this paper empirically examines the determinants of the maturity structure of debt held by firms and the consequences of maturity on their performance, in particular on their productivity.

This study is, in our view, particularly interesting for the following reasons. Firstly, India during the period of the study had a repressed financial system where financial institutions were largely government owned and a major portion of credit was allocated according to state policy. This was a typical situation in LDC's before the introduction of financial liberalization measures in the 80's and early 90's. In India significant reforms of the financial system have taken place since 1991, but

we are not in a position to analyse the consequences of these changes as firm level data are not yet available for this period. Secondly, the sheer size of India's economy makes an understanding of its experience very valuable. Finally, the panel data set that we have access to is unique in that it has firm level information on the sources of long term debt. It enables us to distinguish between long term finance from Development Finance Institutions (DFIs) and from market and other sources. This allows us to separately assess the effects of long term credit according to whether it is provided through the market and other sources or through financial intermediaries.

The paper is organized as follows. The next section provides a background for the paper with a brief description of the financial system in India during the period of the study. Section III describes the data and presents aggregate summary descriptive statistics. Section IV presents the empirical findings regarding the determinants of maturity, and Section V those regarding the relationship between debt structure and productivity. The last section draws conclusions based on the study.

II. Institutional Framework and Structure of Financial Markets 1950-90

In India, at the time of independence, the market for industrial securities was not well developed and commercial banks were the only important financial intermediaries involved in industrial financing. At the time commercial banks provided only short term finance for working capital purposes. In 1958 commercial banks began to undertake some term lending activities, and provide medium term finance which was re-financed by a special institution set up for the purpose[1].

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[1] The Re-finance Corporation for Industry Limited (RCI) was established for this purpose in 1958 and was subsequently merged with the Industrial Development Bank of India (IDBI) which was set up in 1964.

Thus industry was largely dependent on internal sources for finance.

For meeting the long- and medium-term financial requirement of industry a number of Government sponsored special development finance institutions (DFIs) - also known as "development banks" - were established in the post-independence period[2]. Policy makers were of the view that due to imperfections in the capital markets, new enterprises, relatively smaller firms, and certain sectors of industry did not have easy and adequate access to term finance and therefore needed special attention. A second argument leading to the establishment of these special institutions was that there was, in general, a shortage of finance and that such institutions were required for filling the gap. In the Indian case there was the additional objective that both the amount and the allocation of investment be in accordance with plan priorities. Gupta (1969) identifies the following distinguishing characteristics of these institutions:

1) They were restricted to providing finance for new investments in fixed assets.

2) Though they were expected to work on commercial lines they were also expected to pay "due regard to the public interest" and work in accordance with the official plans.

3) They were not expected to compete with the traditional providers of finance and their role was that of "gap fillers".

In addition to meeting the term finance requirements these DFIs were also expected to meet the equity capital and foreign currency resource requirements of industry. The role of these special financial institutions has grown very significantly, particularly during the decade of the eighties, and

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[2] The first of these was the Industrial Finance Corporation (IFC), established in 1948. This was followed in 1951 with the setting up of regional institutions - the State Financial Corporations (SFCs). Subsequently, the National Industrial Development Corporation (NIDC) was set up in 1954 and the Industrial Credit and Investment Corporation of India (ICICI) was floated in 1955 with sponsorship by the World Bank. In 1964 the Industrial Development Bank of India (IDBI) was established as an apex institution in the sphere of long- and medium-term finance.

virtually all the finance provided by them goes to industry[3]. In spite of their "priority sector"[4] commitments involving non-industrial activities, approximately 50% of the commercial banks' finance also goes to industry though commercial banks even today largely fulfill only the traditional function of providing short-term finance for meeting working capital requirements.

The financial system has been characterized by an almost total lack of competition. The long term lending business has very few players. In addition, because they are all publicly owned, the term lending institutions have generally acted as a consortium and have the characteristics of a lending cartel. If a loan is turned down by the consortium then there is no option available to the potential borrower. Further, there is virtually no competition between the term lending institutions which concentrate on medium- and long-term finance and the commercial banks with their emphasis on working capital finance. With the nationalization of 14 large commercial banks in 1969 about 85% of the assets of the banking system were under public control[5]. Long term lending by commercial banks has been restricted to smaller enterprises and their share in consortium lending has been restricted to 25%.

With the objective of maintaining low interest rates and directing credit towards certain preferred sectors, there was till quite recently, a complex system of administered interest rates[6]. In the case of commercial banks both deposit and lending rates were regulated. Credit provided at lower rates to the priority sectors is cross-subsidized by the traditional sectors. The administered interest

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[3] Disbursal of credit (at current prices) by the DFIs grew at the rate of 20% per annum during the decade of the eighties whereas outstanding bank credit to industry (at current prices) grew at an annual average rate of 17% during the same period.

[4] Commercial banks are committed to providing 40% of their finances to "priority sectors" which, in addition to agriculture and other non industrial activities, include small scale industry as well. Approximately 30% of this is at concessional rates of interest.

[5] Other financial institutions (including life insurance companies) had been nationalized earlier. All property insurance companies were taken over by the central government in 1971.

[6] Since 1988 there has been some simplification in the structure of administered interest rates.

rate structure was characterized by an inverted yield pattern with the long term lending rates being lower than the minimum short-term lending rates of the commercial banks[7]. As noted by the Narsimhan Committee (1991:p. 46): " The inverted yield pattern is largely a consequence of inflation and the desire of the Government to shield long term investments from the penalty of high interest rates caused by inflation". Although the reasoning contained in the first part of this statement is not compelling when applied to a relatively long period, the statement itself is indicative of the way in which the problem of the inverted yield curve was being viewed. DFIs provided credit at relatively stable lending rates during the 1980's. The prime lending rate of the major DFIs during the 1980's was 14% whereas the regular short term lending rates of commercial banks were in the range of 16%-19.5%. Inflation rates based on the Wholesale Price Index ranged from 4.5% to about 8% during the period. Although the GDP deflator was somewhat higher, and ranged from 6.5%-9.3%, real interest rates on non-concessional loans were positive. As the fiscal system has also encouraged debt finance over equity Indian firms have been highly leveraged and dependent on the DFIs for their investment needs.

Until the process of gradual de-regulation of the financial sector was begun during the late 1980's both the mobilization and allocation of the economy's financial savings were heavily regulated. For instance the entry of new banks, expansion of existing banks, and closure and location of bank branches were tightly controlled. In addition, interest rates on loans and deposits and the direction of credit were also regulated and there existed wide interest rate differentials across sectors and loan sizes. Firms' access to capital markets was also strictly regulated. Regulations not withstanding, over the last four decades there has been considerable widening and deepening of the Indian financial system as can be seen from the improvements in the financial ratios reported in Table 1.

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[7] This relationship is now changing.

Table 1
Financial Development Ratios

Ratio	1951-52 to 1955-56	1966-67 to 1968-69	1980-81	1989-90
Finance ratio (%)	4.9	13.8	32.7	43.9
Financial interrelation ratio	0.63	0.93	1.93	2.50
Intermediation ratio	0.27	0.33	0.41	0.45

Source: Rangarajan and Jadhav (1992)
Notes: (I) Finance ratio = total financial claims/national income; (ii) Financial interrelation ratio = increase in stock of financial claims/net capital formation; (iii) Intermediation ratio = claims issued by financial institutions/ issues of non-financial sectors.

However, the fact that financial institutions are largely publicly owned and guided by so called "public interest considerations" is likely to have led to serious incentive problems and to a mis-allocation of resources. These institutions are not under pressure to rush to foreclose a mortgage when a borrower defaults. Thus loans are likely to be re-scheduled more often than if the financing institution were guided purely by commercial motives. For this reason, liquidation even of insolvent firms was (and continues to be) quite rare in India. This tendency is reinforced by legislation that makes liquidation and exit quite difficult. Moreover, there are also a large number of cases of perverse loaning where loans are extended to firms that are insolvent and not viable. For instance, in 1991 an estimated 7% of bank lending was to medium and large "sick" units (see World Bank (1991)). Such lending merely finances the servicing of prior loans and extends the life of non-viable firms. The extent to which short term loans are often rolled over makes them indistinguishable in many cases from long term loans. Despite efforts over the last few years to reduce them, even today non-performing assets (NPAs) form about 20% of the asset portfolio of commercial banks. The NPA burden of DFIs was and continues to be lower. The large burden of non-performing loans limits the

volume of credit available for new or more viable enterprises.

In 1988/89 a process of gradual de-regulation of the financial sector was begun. The process for simplifying the administered structure of interest rates was initiated. In October, 1988 ceilings on interest rates on advances of commercial banks were removed and only floors were specified. Subsequently, this was extended to the interest rates on loans of the term lending institutions as well. In addition, uniformity was introduced in interest rates across sectors and types of borrowers. Interest rates were adjusted more frequently in accordance with the rate of inflation. During 1988-89 the Credit Authorization Scheme was replaced with a Credit Monitoring Arrangement. Thus, banks were no longer required to obtain prior approval of the RBI for working capital advances and term loans, provided they were made according to certain norms. From October 1988 borrowers were permitted to transfer their accounts from one bank to another without seeking the approval of the original bank which introduced an element of competition into the system. Since 1991 the scope of the reform has been considerably widened. Unfortunately the period covered by our panel does not allow us to investigate the consequences of the more recent financial sector reforms.

III. The Data: Description of the Panel and Aggregate Descriptive Statistics.

The data used in this study consist of selected variables from the annual balance sheets and profit and loss accounts of an unbalanced panel of public limited companies[8] for the period 1980/81 to 1989/90[9]. The firms represented in the sample have submitted their balance sheets voluntarily and, therefore, the data do not allow any inference to be made regarding exit of firms. The fact that a firm is not present in the data set after a few years does not necessarily imply that the firm has left the

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[8] All the companies represented in the sample are non-financial companies in the private sector.

[9] The financial year in India does not correspond to the calendar year.

industry.

The original data set consisted of 16,147 observations and 2,521 firms were represented in it. This study is based on a sub-set of the sample consisting of 13,552 observations and 2,149 firms[10]. Short term and long term borrowing are distinguished in the data with loans of less than one year maturity being classified as short term loans and the rest as long term loans. The data allow us to distinguish between borrowing from DFIs, borrowing from banks and market borrowing[11], and also include trade dues and current liabilities.

Inferences drawn from this study may not be valid for the entire Indian corporate sector as the sample is drawn from a sub-set of this population and also because the public sector plays a significant role in India and its behaviour is governed by a set of rules different from those driving the private sector. To the extent that the sample is representative of public limited companies (which we believe is the case), the lessons drawn from this study are significant given the large role of public limited companies in the Indian private sector[12].

Before proceeding with the panel data analysis, in order to provide a more general and complete picture, it is useful to present summary descriptive statistics for selected variables obtained from aggregate (consolidated) balance sheet data. These statistics are based on the consolidated balance sheet data published in the Reserve Bank of India Bulletin (various issues) which cover both

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[10] Firms with zero or negative values for total output, fixed assets or the wage bill have been dropped. Firms with no debt at all have also been excluded. Firms without a continuous time series have not been included and regressions are based on firms with a continuous presence of at least four years.

[11] For this purpose we have classified debentures (bonds) held by banks and DFIs as market borrowing.

[12] The role of public limited companies in the Indian corporate sector, the representativeness of this sample and the effects of industrial reform have been discussed in detail in Srivastava (1996). Details regarding the data set, including the deflation of variables and creation of the capital series, are also available in that study.

public limited and private limited companies [13]. (Our panel only contains data for public limited companies). Separate data are available for both these classes of firms. Private limited (closely held) companies are typically smaller. Separate data are also available for large public limited companies[14]. The large companies are a sub-set of the sample of public limited companies. There is a significant size difference between the three categories of firms. The average paid up capital of the large public limited companies is Rs. 62 million whereas the average paid up capital for the full sample of public limited companies for the same period is slightly less than Rs. 35 million. For the sample of private limited companies the average size of the paid up capital is considerably smaller and is approximately Rs. 2.4 million compared to just under Rs. 22 million for the public limited companies for the same period.

On the basis of the data presented in Table 2 the following generalizations can be made:

1) The current ratio, which is an indicator of liquidity (working capital availability), is positively correlated with size. As per accounting norms a current ratio between 1.2 - 2.0 is considered satisfactory[15]. The lower current ratio for the small (closely held) firms suggests that these firms might be relatively strapped for long term finance, and divert short term finance for the purpose. In absolute terms even the current ratio for the larger firms is at the lower end of the acceptable range. The fact that smaller firms are characterized by a tighter liquidity position is also confirmed by the fact that the ratio of net working capital to fixed assets plus currents assets (gross working capital) is significantly lower for the small firms.

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[13] Private limited companies are distinguished from public limited companies by the fact that the maximum number of shareholders in the former is limited to 50 persons and their shares are non-traded. These restrictions do not apply to public limited companies.

[14] These are companies with a paid up capital of over Rs. 10 million.

[15] See for example UNIDO (1978).

Table 2
Selected Financial Ratios for the Aggregate Data

	Pvt Ltd. Co.s 1984-1986	Pub. Ltd. Co.s		Large Co.s 1987-1989
		1984-1986	1987-1989	
Current Ratio (cr)	1.08	1.21	1.24	1.32
nwc/K (liq)	0.052	0.092	0.107	0.132
Cash flow/K (cfk)	0.055	0.051	0.054	0.062
L.t. Borrowing/Total Borrowing (mat1)	0.343	0.656	0.656	0.691
L.t. Borrowing/Total Borrowing (including trade dues) (mat2)	0.165	0.383	0.402	0.426
Fixed assets/K (assm)	0.273	0.463	0.445	0.455
Bank Borrowing/Total Borrowing (banktb)	0.619	0.380	0.372	0.335
D.F.I. Borrowing /Total Borrowing (dfitb)	0.108	0.247	0.271	0.253
D.F.I. Borrowing /Total l.t. borrowing (dfiltb)	0.316	0.376	0.413	0.392
S.t. Bank Borrowing/ Total Bank Borrowing	0.835	0.780	0.801	0.799
Total Borrowing/K (lev)	0.374	0.397	0.440	0.421
L.t. Borrowing/Fixed assets	0.470	0.563	0.648	0.640
L.t. Borrowing/Equity	0.583	0.827	0.962	0.874
Trade dues etc./Total Liabilities	0.395	0.275	0.267	0.251
S.t Borrowing/Inventories	0.776	0.534	0.601	0.529

Notes:(I) s.t.=short term; (ii) l.t.=long term; (iii) D.F.I.s = Devt. Finance Institutions; (iv) Current Ratio = Current Assets (CA)/Current Liabilities (CL); (v) CA = Inventories + Loans and advances and other debtor balances + Book value of Quoted Investments + Cash and Bank Balances + Advance of Income Tax; ((vi) CL = Tax and other current provisions + s.t. Bank borrowing + s.t. other borrowing + Trade dues and other current liabilities; (vii) NWC = CA - CL; (viii) K = Fixed assets + Current Assets; (ix) L.t. borrowing = Borrowing from all D.F.I.s + Borrowing from govt./semi-govt. bodies + Borrowing from companies + L.t. borrowing from banks and others; (x) S.t. borrowing = Total borrowing - l.t. borrowing; (xi) Equity = Paid up capital + forfeited shares + reserves and surplus; (xii) Inventories = Raw materials, components etc. + Finished goods + Work-in-progress + Stores & spares + Misc.; (xiii) Trade dues etc. = Trade dues and current liabilities; (xiv) Cash flow = accounting profits + depreciation.

2) The total debt to total assets ratio is higher for the larger firms, but the difference is not ver large. This is because the ratio of short term borrowing to gross working capital is higher for the small firms as indicated by the ratio of short term debt to inventories. However, the ratio of long term borrowing to fixed assets is significantly lower for the smaller firms, which also suggests that the smaller firms find it more difficult to access long term finance. The debt-equity ratio also shows that larger firms are more leveraged than the small firms. However, of the total liabilities of the small firms almost 40% are in the form of trade dues and current liabilities whereas these form only 25-27% of the total liabilities of the larger firms[16].

3) For the smaller firms almost two-thirds of their non trade debt consists of short term borrowing whereas for the larger firms the situation is quite the reverse, with two-thirds of their borrowing being long-term (see mat1 which gives the percentage of long term debt relative to total debt, excluding trade dues). If trade dues are included in total borrowing, short term debt represents more than 80% of total debt for small firms, versus 57% for large firms (see mat2). This also suggests that access to long-term finance is harder for small firms. The maturity structure of debt matches the maturity structure of assets as represented by the ratio of fixed assets to total assets which is 27.3% for the small firms and about 45% for the larger firms.

4) When one compares the large firms with the entire set of public limited companies, there appears to be a positive relationship between the cash flow ratio and the debt maturity ratio. If the cash flow ratio is interpreted as a performance measure, then this suggests a positive correlation between performance and maturity. However, the result is quite weak as the difference between the maturity structure of the debt of the large firms and of all public limited companies is small. Comparison

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[16] Trade dues and current liabilities are not included in the definition of total borrowing unless specifically indicated.

between the sample of small firms and the sample of all public limited companies does not indicate such a relationship.

5) A much larger share of the smaller firms' borrowing is from banks (62%) rather than from the development finance institutions (11%). Since the special financial institutions provide only term loans, while banks in India largely provide short term finance, this also suggests that access to term finance may be harder for the small firms.

IV. Empirical Evidence on Maturity using Panel Data.

In this section we discuss the empirical evidence on the maturity structure of debt using firm level panel data. We first present some descriptive statistics and simple bivariate correlations and then discuss the econometric evidence on the determinants of maturity.

IV.1 Descriptive Statistics for the Panel and Simple Correlations

Table 3 presents descriptive statistics for the panel of firms. Looking at the (weighted) mean values of the two measures of the maturity composition of debt (mat1 and mat2), we see that they are virtually identical to those presented in Table 2 using the aggregate data for public limited companies. Approximately 39% of the total stock of debt (inclusive of trade debt) is represented by long term debt and 37% of this long term debt comes from development finance institutions. Bank finance accounts for 37% of all debt and approximately 27% of all debt is arm's length debt. The time series of debt maturity for the balanced panel (not reported in the table) indicates an increase during the period in the share of long term debt held by firms in the sample. There is also evidence of a decline in the share of bank finance and an increase in the share of finances provided by DFIs.

Table 3
Selected variables: data averages & correlations for the panel

		Correlation of the variables in the first column with:			
Variable	Mean	matl	mat2	mktbtb	dfitb
matl	.6556	1.00	.834	.380	.545
mat2	.3897	.834	1.00	.195	.589
assm	.5683	.459	.596	-.058	.492
cfk	.0422	.137	.097	.154	.031
lev	.3208	.056	.298	-.241	.192
liq	.0817	.156	.117	.316	-.077
cr	1.23	.243	.258	.303	-.029
banktb	.3744	-.637	-.557	-.383	-.546
dfitb	.2413	.545	.589	-.186	1.00
dfiltb	.3681	.153	.262	-.383	.830
mktbtb	.2704	.380	.195	1.00	-.186
lprod	11.10	.219	.138	.377	.028
lnnk	10.65	.440	.445	.313	.289
lshrk	9.14	.375	.360	.358	.225

Notes: (I) mktbtb = (borrowing against debentures + borrowing from the public)/total borrowing; (ii) lprod = log of output; (iii) lnnk = log of net capital stock; (iv) lshrk = log of share capital; (v) matl = LTB/TB; (vi) mat2=LTB/ (TB+Trade dues); (vii) for definitions of other variables see footnotes to Table 2; (viii) "means" are ratios of sums except for means of lprod, lnnk and lshrk; (ix) the means are weighted means using the denominator of the ratio for weighting.

Before proceeding to a comprehensive econometric analysis of the determinants of maturity, we discuss some interesting bivariate correlations between maturity structure and selected variables (see the last four columns of Table 3). There is a marked positive correlation between the share of long term debt in the loan portfolio of firms and the share of fixed assets in the asset portfolio. This matching of the composition of debt and assets supports the prediction of Hart and Moore's (1994) model and is in conformity with the conventional wisdom that term loans should finance longer lived assets.

The association between profitability (as measured by the ratio of cash flow to fixed assets -

cfk) and the maturity composition of firm debt is positive but weak. Cash flow can be treated as an indicator of a firm's quality and credit worthiness. The theory suggests that there is a complex and possibly non-monotonic relationship between a firm's quality and the maturity structure of its debt. From Diamond's (1991) model it emerges that firms at the lowest end of the quality spectrum will only be able to borrow short term. As firms' credit worthiness increases, they find it both optimal and possible to use long term debt. However, more highly rated firms would again choose short term debt in order to take advantage of the revelation of future good news. If this positive information effect outweighs the risk of being liquidated by opportunistic lenders, a non-monotonic relationship between firm quality and maturity composition would result. It is not clear however that this, and other similar theoretical models[17], are entirely relevant in the Indian context as these models implicitly or explicitly assume the existence of profit maximizing lenders and credible threats of liquidation. The public ownership of banks and the multifarious demands placed on them makes these assumptions rather dubious in the Indian context. In a situation where financial institutions are reluctant to foreclose and loans are routinely rolled over, short term debt may not be an effective disciplining device as envisaged in these models. Moreover, these models assume a competitive market structure, while, as noted earlier, Indian financial markets were characterized by a marked lack of competition during the period of the study.

To the extent that firms are threatened by liquidation and to the extent that there is some liquidation risk associated with short term debt (although not as high as in an economy in which financial intermediaries are guided purely by profit considerations), the positive correlation between maturity (mat2) and leverage can be explained by firms taking on more long term debt to hedge against the enhanced liquidation risk associated with a higher degree of leveraging. It is interesting

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[17] On this issue of maturity choice see also Myers (1977) and Diamond (1993).

however to note that, whereas higher leveraging is positively associated with borrowing from DFIs, it is negatively associated with market borrowing.

The positive correlation that maturity has with the current ratio (defined as the ratio of current assets to current liabilities) and, to a lesser extent, with liquidity is consistent with long term finance going to firms with a more solid balance sheet position. It may also suggest that firms are able to get less term finance than they desire, and when this happens a squeeze is put on working capital. This inference is also supported by the negative correlation[18] (-.324) between asset composition and liquidity which suggests that when the longer maturity composition of assets is not adequately supported by long term debt, pressure is put on working capital.

The positive correlations of maturity with share capital and the capital stock (in logs) indicate that the collateralized value of assets and the level of equity are important for lenders' financing decision. Further evidence in support of this conclusion is provided by the positive correlation between the level of market borrowing and finance from DFIs with share capital, the capital stock and output. Though DFI finance is also positively related to share capital and the fixed capital stock, it has no correlation with output. The ability to access arm's length funds appears to be positively related to size[19].

A more complete discussion of the determinants of maturity is deferred until the discussion of the regression results.

IV.2 Econometric Evidence on Maturity

Although the preceding discussion has provided some explanation for the determinants of

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[18] Not reported in the table.

[19] See Rajan (1992) on the choice between bank finance and arm's length finance. The main implication of the model is that as the quality of high quality firms improves, they will issue more arm's length debt if the market for short term finance is not competitive.

maturity, for a better understanding it is important to see how some of these variables jointly explain maturity. For this purpose we have estimated two different versions of a maturity equation, the results of which are reported in Table 4. The explanatory variables include lagged maturity, the maturity structure of assets, leverage, cash flow, liquidity, and the log of the capital stock as a measure of firm size. We have experimented with different timing of the regressors. In particular, leverage and liquidity have been entered either as beginning of period or end of period values. The maturity equation, particularly when end of period values of stock variables are used as regressors, should be thought of as one structural equation that is part of a more general system determining at least firms' financial choices (and possibly real ones as well). Since we focus on just one equation, our analysis is obviously a partial one. Moreover, one must take into account the endogeneity that results from the simultaneity of such choices. Endogeneity also results from measurement errors, and in any case one must allow for time invariant-firm specific components of the error term. For this reasons we have estimated the equation in first differences, using the Generalized Method of Moment (GMM) approach (see Arellano and Bond (1988) and (1992)), using appropriately lagged values of the variables as instruments. All equations include year dummies.

The multivariate regression results tend to support the conclusions based on the bivariate correlations of the previous section. Lagged maturity has a strong positive influence on maturity today. This is not surprising since much and immediate within-firm variation in maturity is unlikely. The second important effect is that of asset composition on maturity, showing that firms tend to match the maturity structure of assets and liabilities. Schiantarelli and Sembenelli (1996) also report similar results for the U.K. and Italy and Jaramillo and Schiantarelli (1996) for Ecuador. Liquidity also has a strong positive influence on maturity. This is consistent with healthier balance sheet conditions increasing the access to long term finance. It is also consistent with the availability of long

term finance being associated with the ability to maintain adequate levels of working capital. As the liquidity variable is an indicator of the adequacy of working capital this suggests that firms in India may face a shortage of term finance. The positive coefficient on leverage also confirms our preliminary conclusion that highly leveraged firms rely more on long term funds to hedge against the liquidity risk arising from a high degree of leveraging. However, when one period lagged leverage and liquidity are used as regressors the coefficients are smaller and statistically insignificant. The influence of lagged cash flow on maturity choice is somewhat weak and ambiguous. Similar results are obtained if contemporaneous cash flow is used instead.

The estimates of the capital stock coefficient indicate that size has a negative effect on maturity, which is in contradiction with what the bivariate correlations indicated[20]. One explanation could be that fixed capital stock is strongly correlated with asset composition and, controlling for this, the impact of size on maturity is negative, though of a relatively small magnitude. Alternatively, considering that our sample does not contain the tail of the most informationally disadvantaged firms, this results may reflect the fact that larger (and better) firms may find it optimal to use short term debt for the reasons outlined in Diamond (1981). However, we have already expressed our reservations about a mechanical application of the theoretical models of maturity to the Indian context, because of the nature of financial intermediaries.

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[20] Similar results are obtained if share capital or output is used as the size variable.

Table 4
MATURITY EQUATIONS

dep var: mat2	Eq.1 1st DIFF GMM-I.V.	Eq.2 1st DIFF GMM-I.V.
$mat2_{-1}$	.394(11.74)	.501(11.47)
assm	.672(8.22)	.484(5.31)
cfk_{-1}	-.029(-0.59)	.005(0.09)
liq	.279(7.41)	
liq_{-1}		.020(0.47)
lev	.300(6.82)	
lev_{-1}		.035(0.82)
lncap	-.082(-4.42)	-.056(-2.76)
constt	.011(3.19)	.009(2.34)
wald1(d.f)	578.59(6)	424.13(6)
wald2(d.f)	34.07(8)	34.20(8)
2nd order serial corr. (p value)	0.409 (.682)	0.289 (.773)
Sargan(d.f)	167.19(157)	170.54(156)
R^2		
obs	8739	8739
period	1982-89	1982-89

Notes: (I) t statistics in parentheses are based on standard errors which are robust to heteroscedasticity; (ii) the minimum lag length of the instruments is 3 and the choice of specification is based on the value of the Sargan statistic; (iv) wald1 for regressors; (v) wald2 for time dummies; (iii) time dummies have been included but are not reported.

V. Maturity and Performance

In this section we test whether the conventional wisdom that term finance is important for

firm performance is borne out by the data[21]. To do this we first present some summary statistics relating the share of long term debt in total debt at the beginning of year to the average cash flow to capital ratio (avcfk) and the average rate of growth of output (avgout) calculated over the three year period from t to t+2[22]. We then estimate a Cobb-Douglas production function to isolate the impact of maturity and other related variables on firm level total factor productivity (TFP).

In the first exercise, the data have been sorted by firm-year observations into quartiles based on beginning of period (end of last period) maturity. The within quartile averages (and standard deviations) for maturity and the performance variables are presented in Table 5. There is a very large variation in the maturity structure of debt, with firms in the lowest quartile holding under 5% of their debt portfolio in the form of long term debt, to the share of long term debt being over 57% for firms in the top quartile. There is evidence of a positive correlation between maturity and both the cash flow ratio and the rate of growth of output. The average cash flow ratio for the firms in the top quartile is more than three times that of the firms in the lowest maturity class while the average rate of growth of output for the high maturity firms is (approximately) 8% versus 1% for the lowest maturity firms. Thus the bivariate correlations provide some evidence suggesting that a higher share of term finance has a positive impact on a firm's performance in terms of profitability and sale growth. It is, of course, also possible that better firms are able to attract more long term finance. The issue of causality is better taken care of with the regression analysis.

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[21] See Calomiris and Himmelberg (1995) for a detailed analysis of subsidized credit for machine tool producers in Japan.

[22] The rate of investment is defined as the ratio of investment to the net capital stock.

Table 5
MATURITY AND PERFORMANCE
(Data sorted by maturity)

	Below 1st quartile	1st to 2nd quartile	2nd to 3rd quartile	Above 3rd quartile	Correlation with last period maturity
avcfk	.01245 (.08662)	.02807 (.06934)	.03805 (.05777)	.03803 (.05798)	.128
avgout	.01093 (.22828)	.02822 (.19935)	.05865 (.17853)	.08745 (.21804)	.150

Notes: (I) $avgout_t = (\ln q_{t+2} - \ln q_{t-1})/3$; (ii) $avcfk_t = (cfk_t + cfk_{t+1} + cfk_{t+2})/3$; (iv) standard deviation in parentheses.

In order to investigate in more detail a channel that may explain the improved performance in terms of profitability and sales growth of firms with more initial long term finance, we will investigate the impact of maturity (and other related variables) on firm level TFP. More specifically, we assume the existence of a production function,

$$Q_{it} = A e^{h(i,t,X_{it})} f(K_{it}, L_{it}, M_{it})$$

where Q, K, L, and M are output, capital stock, labour and materials and $e^{h(.)}$ is the firm specific productivity parameter, X_{it} is the vector of financial variables which are expected to influence productivity and I and t are firm and time subscripts. The production function is assumed to be Cobb-Douglas and h(.) is parameterized as a linear function. The estimating equation is:

$$\ln\left(\frac{Q}{K}\right)_{it} = \alpha + h(i,t,X_{it}) + \beta_1 \ln\left(\frac{L}{K}\right)_{it} + \beta_2 \ln\left(\frac{M}{K}\right)_{it} + \beta_3 \ln(K)_{it} + \epsilon_{it}$$

where h(.) Is parameterized as,

$$h(.) = \mu_i + \lambda_t + \Gamma X_{it}$$

Estimates for different combinations of the variables in X are presented in Tables 6 and 7. The two tables differ with regard to the timing for the financial variables.[23] The coefficient on maturity and the coefficient on the share of financing by DFIs are both positive and statistically significant in most cases. The estimates suggest that the impact of market (arm's length) borrowing is negative though the estimates in this case are not statistically significant[24]. Higher leveraging clearly has a negative impact on productivity and the effect of current period liquidity is unambiguously positive.

What does the overall evidence tell us about the influence that the debt-equity and debt-maturity choices have on productivity? The positive coefficients on maturity and the share of DFI debt support the traditional view that scarcity of term finance could have adverse effects on firm performance. This could be because more productive technologies may not be adopted unless they provide an immediate payoff. In other terms the "quality" of fixed capital may be adversely affected[25]. Moreover, the lack of term finance may lead firms to use a smaller amount of working capital than would be optimal from the point of view of the production process.

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[23] In Table 6 we present estimates where end of period values are used for the variables in X, while in Table 7 beginning of period values are used for the variables in X.

[24] Recall though that market borrowing includes debentures held by banks and DFIs.

[25] The capital stock variable included in the equation is calculated using the standard perpetual inventory method, starting from a benchmark calculated revaluing for inflation the accounting value of the capital stock (see Srivastava (1996) for details). The maturity variable can be thought as applying a quality adjustment to these capital stock figures.

Table 6
PRODUCTIVITY EQUATIONS - I

$$\ln(Q/K)_{it} = \alpha_{it} + \Gamma(X_{it}) + \beta_1 \ln(L/K)_{it} + \beta_2 \ln(M/K)_{it} + \beta_3 \ln K + \epsilon_{it}$$

	Eq.1 : $X_{it} = [mat_{it}, lev_{it}]$	Eq. 2: $X_{it} = [mat_{it}, lev_{it}, liq_{it}]$	Eq. 3: $X_{it}=[dfitb_{it}, mktbtb_{it}, lev_{it}, liq_{it}]$
mat2	.156(4.30)	.148(4.26)	
dfitb			.080(2.97)
mktbtb			-.037(-1.38)
lev	-.120(-2.64)	-.120(-3.18)	-.039(-1.17)
liq		.063(2.81)	.077(3.44)
ln K	.056(2.75)	.057(3.23)	.076(4.34)
ln (L/K)	.128(4.13)	.135(5.19)	.180(7.27)
ln (M/K)	.918(45.32)	.907(54.79)	.882(55.19)
constant	-.050(-5.26)	-.052(-5.65)	-.053(-5.72)
wald1(d.f)	4592.14(5)	6381.02(6)	11143.0(6)
wald2(d.f.)	81.29(9)	102.16(9)	248.55(8)
2nd order serial corr. (p value)	-1.70 (.089)	-1.66 (.097)	-1.59 (.112)
Sargan(d.f.)	187.30(170)	219.16(204)	248.6(238)
R^2			
obs.	10305	10305	10305
period	1981-89	1981-89	1981-89

Notes: (I) $\alpha_{it} = a + \Delta\lambda_t$;(ii) wald1 is for the slope coefficients; (iii) wald2 is for the time dummies; (iv) t statistics in parentheses are based on robust standard errors ; (vi) minimum lag length for instruments used is 2.

Table 7
PRODUCTIVITY EQUATIONS - II

$$\ln(Q/K)_{it} = \alpha_{it} + \Gamma(X_{it}) + \beta_1 \ln(L/K)_{it} + \beta_2 \ln(M/K)_{it} + \beta_3 \ln K + \epsilon_{it}$$

	Eq. 1: $X_{it} = [mat_{it-1}, lev_{it-1}]$	Eq. 2: $X_{it} = [mat_{it-1}, lev_{it-1}, liq_{it-1}]$	Eq. 3: $X_{it}=[dfitb_{it-1}, mktbtb_{it-1}, lev_{it-1}, liq_{it-1}]$
$mat2_{-1}$	.052(1.03)	.174(3.57)	
$dfitb_{-1}$			.157(3.70)
$mktbtb_{-1}$			.033(0.84)
lev_{-1}	-.129(-1.81)	-.224(-3.92)	-.055(-1.55)
liq_{-1}		-.236(-4.92)	-.125(-3.04)
ln K	.050(1.52)	.069(2.46)	.120(4.16)
ln (L/K)	.127(2.70)	.127(3.36)	.202(5.60)
ln (M/K)	.914(29.92)	.932(36.88)	.889(33.15)
constant	-.014(-3.32)	-.017(-3.89)	-.019(-4.34)
wald1(d.f)	5922.40(5)	6243.62(6)	5082.13(7)
wald2(d.f.)	42.99(8)	62.57(8)	68.89(9)
2nd order serial corr. (p value)	-3.07 (.002)	-3.22 (.001)	-3.11 (.002)
Sargan(d.f.)	142.18(130)	171.7(156)	172.28(182)
R^2			
obs.	8739	8739	8739
period	1982-89	1982-89	1982-89

Notes: (I) $\alpha_{it} = a + \Delta\lambda_t$;(ii) wald1 is for the slope coefficients; (iii) wald2 is for the time dummies; (iv) t statistics in parentheses are based on robust standard errors; (vi) minimum lag length of instruments used is 3 due to the existence of second order serial correlation.

The production function results provide no evidence to support the view that short term debt is superior. With a non-competitive market for short term debt in which criteria other than profit maximization determine the behaviour of financial intermediaries, and with an administered interest rate structure there is perhaps little reason for firms to prefer short term debt. With an inverted yield

pattern firms would, all else being equal, no doubt, prefer long term debt because it is cheaper and also because it carries a lower liquidation threat. For the same reasons it is also unlikely that more short term debt forces better performance. In this situation a lack of term finance is only likely to adversely affect the quality of fixed capital and to put pressure on a firm's working capital requirements, which leads to poor performance. The positive association with end of period liquidity lends support to the latter conclusion.

It is not immediately obvious why leveraging has a negative impact on productivity[26]. Actually the attempt to avoid bankruptcy may force firms to be more efficient. However, it is possible that with more leveraging the moral hazard problem is exacerbated and there may be fewer incentives for controlling-shareholders to strive for efficiency since they reap a smaller fraction of the rewards. If it is true that term financing by DFIs positively influences productivity, then it must be the increased leveraging from arm's length and short term sources that adversely affect performance. This is supported by the fact that the magnitude of the negative effect of leveraging is less when we control for market borrowing (results not reported). Another explanation for the negative sign of the leverage coefficient is that since rehabilitation packages and re-financing are common for so called "sick" firms, high leveraging may indicate an inherently bad firm/project, if differencing is not enough to control for this unobserved characteristic. Moreover, an increase in leveraging without a congruous increase in maturity could imply a shortage of working capital with its adverse impact on performance. This possibility is supported by the fact that the negative coefficient on the leverage ratio is reduced when we control only for liquidity and becomes greater when only maturity is controlled for. Lastly, since Indian firms rely largely on institutional finance for their investment needs, growth-oriented (good?) firms looking for fresh financing would try to align their debt-equity

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[26] Schiantarelli and Sembenelli (1996) find this to be true for the U.K. as well. Nickell and Nicolitsas (1995) find the opposite to be true for the U.K. when using a flow measure of indebtedness.

ratios with acceptable norms whereas non-growth-oriented (bad?) firms would not be subject to this pressure. The negative coefficient on leveraging may be reflecting this.[27]

VI. Conclusions

State supported term lending institutions, particularly in developing countries, have been created with the objective of providing (often subsidized) access to term finance for industrial borrowers. As a contribution to evaluating this strategy, this paper has explored empirically the determinants and consequences of the maturity structure of debt, using firm level panel data.

The analysis reveals that one of the most important determinants of debt maturity is asset composition with a higher proportion of fixed assets in the asset mix supporting higher maturity debt. The positive coefficient on the working capital (liquidity) variable in the maturity equation is consistent with term finance going to firms with the healthier balance sheet position. It may also suggest that firms face term finance constraints. Everything else equal, the effect of cash flow on maturity is weak, although the bivariate association is positive but not large. There is some evidence in the maturity equation to suggest that larger firms prefer a debt composition with relatively less long term debt, though the bivariate association between size and length of maturity is positive.

Although the results in this paper are not conclusive, they seem to support the conventional

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[27] The adverse consequences of high leveraging have also been mentioned by the Narsimhan Committee (1991) in its report. At p. 102 of its report the committee notes: "While the liberal lending norms, particularly the high leverage in the form of a debt equity of 2:1 did indeed help in attracting new entrepreneurs, it acted as a deterrent in making the projects financially viable particularly in the context of fiscal and market uncertainties. In a way this could be attributed to the fiscal system which favoured debt rather than equity as a source of investment financing as a result of which most of the projects were seriously undercapitalised thereby affecting their ability to withstand difficult times."

beliefs concerning the importance of term finance for firm performance. Longer maturity is positively associated with subsequent higher profitability and output growth. Moreover estimation of a Cobb Douglas production function, augmented with financial variables, suggests that the share of long term finance and DFI finance have a positive influence on firm level productivity. This could be because the availability of term finance may have favourable effects on the quality of fixed capital accumulation, in the sense of allowing access to better technologies. Another explanation is suggested by the positive impact of liquidity on performance. Firms facing a shortage of long term finance are likely to divert working capital to meet their term finance requirements which leads to poor performance. High leveraging, however, has a strong negative impact on productivity. This finding is important and has obvious implications for fiscal policies that encourage debt and also for the financing norms of financial institutions.

It is important to note that the data on which these results are based have been generated by a financial system which is marked by a lack of competition, and in which the financial institutions are state owned and not guided by the profit motive. In addition, in this system financial institutions have virtually no control over interest rates. In view of these facts, the counter-factual question as to whether short term finance would be more beneficial in a less regulated system, with greater flexibility for all the players, cannot be addressed. In any event, the observed benefits of term finance must be weighed against the costs. At the end of the decade of the eighties the capital base of a large number of the government owned financial institutions in India (both banks and DFIs) was severely eroded, their financial position was poor and they carried a large burden of non-performing assets. Further research on the issues addressed in this paper, using data that also cover the period after the introduction of financial sector reforms, would be very beneficial.

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