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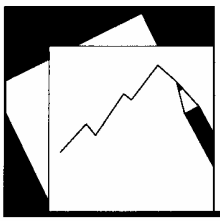

IMF Working Paper

Monetary Policy and Corporate Behavior in India

A. Prasad and Saibal Ghosh

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IMF Working Paper

Office of the Executive Director for India

Monetary Policy and Corporate Behavior in India

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Abstract

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The paper examines the association and corporate behavior for a sample of manufacturing firms in India for the post-reform period 1992-2003. The findings suggest that a contractionary monetary policy lowers overall debt including bank debt, although the lagged response is positive, and listed firms increase their short-term bank borrowings, after monetary tightening. The responses of corporates to a monetary contraction in the post-1997 period has been more pronounced. A disaggregated analysis of responses of firms according to size and leverage largely validates these findings. Two policy implications emerge from the analysis. First, the interest rate transmission channel has strengthened since 1998, and, second, corporates in India, especially listed ones, seem to exhibit relationship lending.

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I. INTRODUCTION

The literature on corporate financial structure is dominated by two competing arguments. The first, deriving from the well-known Modigliani-Miller theorem, observes that in a perfectly functioning capital market, the method of financing a firm chooses will not affect the cost of capital (Modigliani and Miller, 1958). The second postulates a 'pecking-order' in capital choice by firms: firms prefer internal finance over external finance; in case the latter is required, debt is preferred over equity (Myers and Majluf, 1984).

Recent insights in monetary theory have underscored the importance of exploring the differential impact of monetary policy on various types and classes of firms. The first line of thinking, the *credit view,* observes that bank-dependent firms are more likely to be affected by monetary tightening than firms that rely less on bank financing and more on capital markets (Bernanke and Gertler, 1995). The contrary argument contends that it is in the interest of banks and firms to work out long-term relationships (Rajan, 1992). This forms the basis of *relationship lending* whereby banks develop multiple lender-customer interactions over time and across products. Relationship lending enables banks to obtain customer-specific information (often of a proprietary nature) and to evaluate the profitability of lending through multiple financial services. Such relationships serve to maintain a supply of funds to constrained borrowers with few alternatives during monetary contractions and negate the cyclical variations in monetary policy.

The present paper juxtaposes these viewpoints and investigates the association between corporate finance and monetary policy in India against the backdrop of economic reforms under way in India. Empirical research in this area has, however, been largely confined to developed economies like the United States (Kashyap et al., 1993, 1996) and to a limited extent, the European economies (de Haan and Sterken, 2000). The results of the latter research (de Haan and Sterken) indicate that private firms, which appear to be more dependent on bank debt for external funds, are more susceptible to monetary shocks than public firms, irrespective of whether they are listed.

Despite the emerging literature on this aspect for developed economies, limited research has been forthcoming in this area in the context of developing countries for two main reasons. First, until recently, the corporate sector in many developing markets encountered several constraints in accessing equity and debt markets. Any research on the capital structure and corporate governance features of firms could, therefore, have been largely constraint-driven and hence, less insightful. Second, several developing countries, even until the late 1980s, suffered from "financial repression", with negative real interest rates as well as high levels of statutory preemptions. This could have entailed restricted play of competitive forces in resource allocation and limited flexibility of the central bank in the conduct of monetary policy.

Questions regarding the interface between corporate finance and monetary policy have, however, gained prominence in recent years, especially in the context of the fast-changing institutional framework in these countries. Several developing countries have introduced market-oriented reforms in the financial sector. More importantly, the institutional set-up within which corporate houses operated in the regulated era has undergone substantial

transformation since the 1990s. The move toward market-driven allocation of resources, coupled with the widening and deepening of financial markets, including the capital market, and the stringent disclosure and transparency practices consequent upon initial public offerings, have provided greater scope for corporates to determine their capital structure and introduce better corporate governance practices.

The paper examines the association between corporate finance and monetary policy in India over the period 1992 to 2003. The corporate sector is characterized by a large number of firms, in both the public and the private sectors, operating in a deregulated and increasingly competitive environment. The rigorous listing criteria for corporates have meant that they have had to enforce strict corporate governance practices. At the same time, the monopoly of development banks in the provision of long-term debt finance has diminished, with banks being allowed to provide long-term capital to corporates. This, in turn, has provided more options to corporates in choosing their capital structure. In the financial sector also, the deregulation of the administered interest rates, lowering of statutory preemptions and greater recourse to open market operations have imparted flexibility to the central bank in its conduct of monetary policy. The changing institutional environment for corporates coupled with the increasing freedom of the central bank in monetary policy formulation provide a suitable background for testing the linkage between these issues.

The major contributions of the paper are threefold: first, the firm-level data base employed in the study for the post-liberalization period provides more incisive evidence on capital choices by firms and the extent to which these choices are affected by a monetary policy shock. Second, the study distinguishes between firms with different ownership and governance features in analyzing the impact of monetary policy shocks. Finally, the study explicitly delineates the response of corporates across different time periods, to a monetary contraction.

The broad findings can be summarized as follows. First, there is an immediate cutback on debt by firms after a monetary contraction, although the lagged response tends to be in favor of raising debt. Second, vis-à-vis their public sector counterparts, private firms tend to be proactive in altering their capital structure by lowering bank debt. Third, listed firms raise their overall debt by increasing short-term bank borrowing after monetary tightening. Fourth, corporates have become increasingly discerning in their response to monetary policy over the decade of the 1990s. Finally, evidence suggests that there is a tendency for small as well as leveraged corporates to increase their debt profile in response to a tight monetary policy, which is, by and large, supportive of relationship lending. It is possible to discern two important implications of the aforesaid framework. First, the analysis suggests that the interest rate transmission channel has strengthened since 1998, and, as could be expected, the response across corporates is varied, depending among others things, on their size, ownership, financial market access and leverage. Second and more broadly, the study focuses on corporate balance sheets, which according to many economists, is a critical factor for the stability of the financial system.

The rest of the paper unfolds as follows. The next section provides an overview of the received literature and explains the position of this paper in the field. The data base employed

for the study is detailed in Section 3. Section 4 describes the basic hypothesis to be tested and delineates the empirical specification and the methodology adopted. A discussion of the results is contained in Section 5. The final section presents our conclusions.

II. LITERATURE SURVEY

Economists have devoted significant attention to the different transmission channels of monetary policy. The credit channel of monetary policy refers to balance sheet channel and the bank-lending channel (Bernanke and Gertler, 1995). In effect, the credit channel concentrates on the effect of monetary policy on the strength of the firm's balance sheet, making the firm more or less collateralized when seeking external financing, The bank-lending channel, on the other hand, focuses on the effect of monetary policy on the credit supply, which filters through into the external financing premium for firms (and households).

The empirical literature on monetary transmission has expanded rapidly in recent years. It is possible to discern three broad classes of models. The first is essentially microeconomic in nature and seeks to analyze the impact of monetary innovations within a Vector Auto Regression (VAR) framework (Bernanke and Blinder, 1992). The major implication of these studies is that banks actively reshuffle their asset portfolio following a change in the monetary policy stance. A second line of thinking analyzes bank behavior in response to monetary shocks. It is likely that smaller banks have more trouble attracting external funds during a monetary contraction (Kashyap and Stein, 1997). The implication of this line of thinking is that the largest 1 percent of banks, in terms of assets, are less affected by a monetary contraction, in that they are able to access external finance, than small banks. The final strand of research analyzes the response of corporate financial structure to changes in monetary regimes. These studies have focused on the US economy (Kashyap et al., 1996; Oliner and Rudebusch, 1996). Kashyap et al. (1993) empirically examine the existence of a loan supply (or a bank lending) channel of monetary policy transmission for the U.S. economy for the period 1974-98. Their findings suggest that tighter monetary policy tends to induce firms to rely more on financing through issuance of commercial paper and less on bank loans. The net effect is an overall decline in loan supply. Oliner and Rudebusch (1996), on the other hand, investigate changes in the investment behavior of small and large manufacturing firms consequent upon a change in monetary policy (proxied by the federal funds rate). Using quarterly data covering the period 1962:1 to 1992:4, they uncover evidence that monetary tightening has different effects on small and large firms. Specifically, for small firms, there is an observed tightening of the association between internal funds and investment after a monetary contraction. In contrast, no such association is evidenced for large firms. This would suggest a scarcity of external finance (broad credit channel) for small firms after a monetary tightening.

The present paper focuses on the third class of models. In particular, the present study is concerned with the different impact of monetary policy on firms with different ownership and governance features. Studies correlating corporate financial structure with changes in monetary policy have been limited. In one of the earliest studies, Dedola and Lippi (2000) examined the linkages for four European countries and the United States. They estimated the elasticities of output with respect to monetary policy indicators for various industries and employed firm-level indicators to explain the magnitude of these elasticities. The findings

indicated financial structure to be important at the industry level: industries with a greater concentration of small firms or firms with a lower leverage or industries that are more capital intensive were more likely to be significantly affected by a monetary contraction. Likewise, industries with many financially distressed firms that have relatively many firms (measured by a large interest burden) were also more sensitive to monetary policy shocks. Evidence using business survey data for Germany demonstrates that smaller firms are more affected by monetary shocks than large firms (Ehrmann, 2000). Using a database of 16,000 UK firms covering the period 1990-99, Mizen and Yalcin (2003) demonstrate that younger and highly indebted firms are more affected by monetary tightening than older, less indebted firms.

In the Indian context, there have been several studies on the analytics of monetary policy (Rangarajan, 1988; Reddy, 2002), the financing pattern of corporate houses (Cobham and Subramaniam, 1998), as well as the role of large shareholders in corporate governance (Sarkar and Sarkar, 2000), and the different corporate governance pattern in public versus private banks (Jalan, 2002). Topalova (2004) provides an analytical overview of the Indian corporate sector for the period 1989-2002 and finds a weakening of corporate sector performance (in terms of profitability) post 1997. Her analysis suggests that adverse interest rate/foreign exchange movements have a moderate influence on corporate balance sheets. It would be interesting to extend this analysis over a common set of firms, distinguishing between firms with different ownership and governance structures.

III. THE DATABASE

The source of data for study is the publicly available *Prowess* database (Release 2.1), generated and maintained by the Centre for Monitoring the Indian Economy (CMIE). This data base is increasingly employed in the literature for firm-level analysis on Indian industry for analysis of issues like the effect of foreign ownership on the performance of Indian firms (Chibber and Majumdar, 1999) and the performance of firms affiliated with diversified business groups (Khanna and Palepu, 2000). The dataset contains financial information on over 8,000 companies, including both companies listed on stock exchanges and major unlisted public limited companies having sales in excess of Rs.10 million.[2] In addition, if an entity is not listed, it qualifies for inclusion in the database if the average sum of sales and total assets is more than or equal to Rs.200 million according to the latest audited financial results. Additionally, the data base contains detailed information on the financial performance of these companies culled from their profit and loss accounts, balance sheets, and stock price data.

The selection of the sample is guided by the availability of data. From the entire database, we have chosen all manufacturing firms that maintained their identity and reported their annual accounts without any gaps for the entire sample period, 1992 through 2003 that were in existence over the sample period, whether listed or not. Screening for data

[2] USD 1≈Rs.45

consistency on the basis of this criterion led to the selection of a sample of 525 manufacturing firms, in both the public and private sectors.[3]

The composition of the sample is presented in Table 1. Around 33 percent of the firms are in the chemicals, machinery and textile sectors.

On the choice of the sample period, it is relevant to note that until 1991, the corporate sector in India encountered several constraints on its financing choices. Access to the equity market was controlled by a regulatory body, the Controller of Capital Issues (CCI), an agency under the government, that imposed restrictions on corporates intending to raise funds through the equity route. Long-term debt was largely under the purview of state-owned development banks, which, either through direct lending or through refinancing arrangements, virtually monopolized the supply of debt finance to corporates.

In the financial sector, until the initiation of reforms, financial entities faced restrictions on the asset side of the balance sheet. In July 1991, for instance, commercial banks had to hold as much as 63.5 per cent of increases in deposits in cash reserves and government debt instruments. In addition, they had to extend 40 percent of their credit to designated priority sectors (such as agriculture and small-scale industries) with sub-targets for each at subsidized rates differentiated by purpose, size of loan, and borrower. The central bank also regulated the interest rates on loans and deposits; lending rates were fixed for both priority and non-priority sectors.

In 1992, as part of reforms in the equity market, the CCI was abolished and corporate houses were allowed the freedom to access capital markets and price their securities, subject to prudential regulations of the Securities and Exchange Board of India (SEBI), the regulator of stock markets. Furthermore, Indian firms in sound financial condition were allowed to issue equity and convertible bonds abroad. Likewise, as regards raising resources domestically through debt capital, institutional reforms have been aimed at curtailing the development financial institutions' monopoly over supplying long-term funds, with commercial banks being permitted to provide long-term financing[4].

In the financial sector, the administered interest rate structure of banks has been progressively rationalized since the 1990s. The prescription of rates on all term deposits, including conditions on premature withdrawal and the imposition of uniform rates, irrespective of the size of deposits, has been dispensed with. Likewise, lending rates have also been deregulated. The Bank Rate (the rate at which the central bank refinances

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[3] A private company is one (a) with minimum paid-up capital of Rs.0.1 million, (b) that restricts the right to transfer its shares, if any, (c) that prohibits the invitation or acceptance of deposits from persons other than its members, directors or their relatives, and, (d) that prohibits any invitation to the public to subscribe to any shares in, or debentures of, the company. A public company, on the other hand, is one that (a) is not a private company, (b) has minimum paid-up capital of Rs.0.5 million, and (c) is a private company that is a subsidiary of a company not a private company (introduced by Companies (Amendment) Act 2000). In the present study, public and private sector refers to Central Government undertakings and Indian private entities, respectively.

[4] More recently, banks have been permitted to raise long-term resources through bond issuance.

commercial banks), after being dormant for several decades, was activated as a signaling rate in 1997 and, simultaneously, the statutory pre-emption on bank deposits was gradually lowered, providing banks with greater freedom in credit allocation. The removal of these twin restrictions gives the price mechanism (interest rate) a greater role to play in the resource allocation process and allows corporates to raise resources from domestic capital markets, enabling the corporate governance mechanism to play a greater role in company affairs.

Table 2 breaks the sample loan by ownership and industry. About 5 per cent of the companies in the sample are public; they account for nearly 27 per cent of total assets of firms. As regards private firms, over 80 percent are listed; the majority are in the chemicals and pharmaceuticals sectors.

In terms of governance features, for a firm to be listed on the Mumbai Stock Exchange, its minimum paid-up equity capital should not be less than Rs.100 million, whereas post-issue, the capitalization of the company should not be lower than Rs. 200 million, irrespective of ownership.[5] In addition, applicant need to satisfy certain minimum criteria as laid down in the SEBI Act, 1992, and Companies Act, 1956[6]. Additionally, they need to provide certain critical information regarding distribution of shares, pending litigation, and grievance-redressal mechanisms, besides submitting audited balance sheets for the three preceding years prior to year of listing.

The financing pattern of firms over the sample period is summarized in Table 3. Regarding the source of financing, it is observed that bank debt has been the predominant source of financing for both listed and unlisted public firms, whereas reliance on bank financing was lower for private sector firms. This was more evident in the case of listed private firms.

IV. EMPIRICAL STRATEGY

The empirical strategy comprises of estimating the following reduced form equation:

$$Y_{i,t} = \alpha * \boldsymbol{X}_{i,t} + \beta_1 * MPI_t + \beta_2 * MPI_{t-1} + \gamma * MPI_t * LISTED_t + e_{i,t} \quad (1)$$

where i=1,2,„525 (number of firms) and t=1,2, „12 (number of time periods). Owing to missing data on certain variables over the sample period, the panel is unbalanced, so that observations on cross-sectional variables vary across the time period, as in Oliner and Rudebusch (1996). However, in contrast to their study, which examines the investment behavior of small and large firms consequent upon changes in monetary policy, the present

[5] For purposes of listing, we consider the Mumbai Stock Exchange, which is the oldest stock exchange in India. More specifically, among the listed companies, we considered the 'A' (scrips in which carry forward is permitted) and 'B1' (scrips of good quality and high volume of transactions) group. These two are the mostly actively traded scrips on the stock exchange. For listed companies, the minimum market capitalization should be Rs.500 million and the post-issue net worth (equity capital plus free reserves) should be Rs.200 million.

[6] Companies Act, 1956 provides a set of rules and regulations for registration of companies, irrespective of whether they are public/ private limited companies.

exercise examines the response to monetary policy of firms, both listed and unlisted, with different ownership structures.

In equation (1), the dependent variable *Y* is the firm-specific debt ratio, *X* is a vector of firm-specific controls, MPI is the natural logarithm of the monetary policy indicator and MPI*LISTED denotes its interaction with a dummy variable (LISTED) capturing the firm's governance characteristics. Since monetary policy is likely to have both a contemporaneous and a lagged effect, we include a lag of monetary policy indicator in the specification. As regards the dependent variable, we focus on three debt ratios:

a) total borrowing to total assets (DEBT),
b) bank borrowing to total borrowing (BKDEBT), since a major focus is on the role of bank debt,
c) short-term bank borrowing to total bank borrowing (STBANK).[7]

The set of control variables X comprises those commonly employed to explain debt ratios, *viz*., interest expense to total earnings (INT), tangible assets to total assets (TAN) where tangibility is defined as the aggregate of plant, property and equipment of the firm (Kroszner and Strahan, 2001), firm size, defined as the logarithm of total assets (SIZE), age of the firm (AGE), defined as the number of years since the incorporation of the firm, depreciation (DEPCN), operating income (EARN) and ratio of R&D to sales (RND) and dividend payment to net operating income (DIVI). The direct effect of monetary policy on the firm's capital structure is captured by **β**, whereas the differential effect of monetary policy for particular governance types is captured by γ. More specifically, we have two sets of dummy variables. The first dummy variable (PRIVATE) takes the value 1 for private firms and 0 for public firms. In other words, this dummy focuses on the ownership of firms. The second dummy variable (LISTED) assumes value 1 if the firm (public or private) is listed on the stock exchange and 0, if not. Since the process of listing on the stock exchange is associated with stringent disclosure and transparency requirements, this, in effect, suggests that the dummy variable LISTED captures the governance characteristics of firms. The interaction of the monetary policy variable with the two sets of dummy variables intends to ascertain whether monetary policy affects private and listed firms differently from public and unlisted counterparts, respectively. In addition, the industry-specific dummies attempts to capture the differential industry-level response to monetary policy. Although it is likely that different industries will respond differently to a monetary shock (see, Ganley and Salmon, 1997 for UK evidence), the present study is not explicitly concerned into discerning the reasons behind such differences.[8] Finally, e_{it} denotes the error component.

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[7] *Total debt* refers to all kinds of debt, interest bearing or otherwise. Therefore, it includes debt from banks (short-term and long-term) and financial institutions, intercorporate loans, fixed deposits, foreign loans, government loans, etc. Funds raised in capital markets through debt issues such as debentures (convertible and non-convertible) and commercial paper are also included. *Bank borrowings* refer to total loans from banks, e.g., cash credit, bank overdraft facilities, term loans, etc. *Short-term bank borrowings* refer to bank loans with maturities of less than one year; the rest are long-term bank borrowings. Long-term bank debt is one minus short-term bank debt.

[8] For identification purposes, the dummy variable for 'Others' is excluded, so that the estimated coefficients measure the response of the remaining nine industry groups relative to 'Others'.

Fully specified, equation (1) can be re-written as:

$$Y_{i,t} = \alpha_1*INT_{it} + \alpha_2*TAN_{it} + \alpha_3*SIZE_{it} + \alpha_4*AGE_{it} + \alpha_5*DEPCN_{it} + \alpha_6*EARN_{it} + \alpha_7*RND_{it} + \alpha_8*DIVI_{it} + \beta_1*MPI_t + \beta_2*MPI_{t-1} + {}_1*MPI_t*PVT_t + \gamma_2*MPI_t*LISTED_t + MPI_t*LISTED_t + \delta_i*MPI_t*DUMMY_i + e_{it} \quad (2)$$

where $DUMMY_i$ is the dummy variable for industry i.

The focus of the study is the impact of monetary policy on debt and its sub-components. The impact of monetary policy can arise from the interest rate and credit channels. The interest rate channel conveys the direct impact of interest rate changes on the cost of capital. The credit channel, on the other hand, takes into account firm-specific characteristics. Availability of credit depends, *ceteris paribus*, on the financial structure of the firm. A rise in interest rates increases the debt servicing of firms and with that, their cash flows as well. Alternately, there may be situations when despite adequate liquidity, interest rates remain high, which might jack up the cost of credit. In such situations, the choice of adjustment rests more with the corporates rather than with the bank. Therefore, the manner in which corporates react to monetary policy tightening would depend on their initial capital structure, cash flows, availability of credit, future expectations regarding interest rates and alternate financing mechanisms. Firms that are more heavily indebted would tend to have a larger direct impact on account of monetary policy shock. Typically, in a high interest, credit constrained situation, the entire market would tend towards the shorter end: in other words, there would be an increase in short-term debt. Banks would be reluctant to lend long-term under tight liquidity conditions and corporates would also be averse from locking into high cost long-term debt. The total debt would rise or fall depending among others on interest payments on past debt and level of inventory that needs to be maintained, but the tendency would be to cut back on debt. This would suggest a negative coefficient for the monetary policy indicator.

The operation of the credit channel can amplify the effects of a monetary contraction through a reduction in bank loans. For example, in a monetary contraction, poorly capitalized firms with weak (low net worth) balance sheets could be excluded from obtaining credit from banks and would therefore need to pay a high premium for external funds relative to large, well-capitalized firms. Thus, an initial decline in economic activity consequent upon a tight monetary policy will have a greater impact as it alters the balance sheet and the credit available to these firms (Bernanke and Gertler, 1995). Likewise, small and young firms with limited reputation that are likely to be more bank dependent would be more exposed to reductions in loan supply than larger and older firms with access to alternative sources of finance. Thus, a monetary contraction could amplify the effects of bank lending on real activity if firms have no ready access to alternate sources of finance. This contrasts with the situation obtaining under relationship lending wherein, even under situations of tight monetary policy, access to firm-specific proprietary information with the bank enables the latter to maintain credit lines with the firm, and the firm, with few alternate sources of funding, to access credit from the bank despite the premium on external funds.

Two points deserve a mention at this juncture. The first is the choice of the monetary policy indicator. The second is the econometric estimation procedure employed in the analysis.

First, as regards the monetary policy indicator, we focus on the yield on 364-day treasury bills. It may be mentioned that since the inception of reform process in 1992, the RBI has introduced fortnightly auctions of 364-day treasury bills, the yield on which is market-related. Accordingly, the instruments of monetary control, which had traditionally focused on the multiplier of base money, have shifted to the control of the money base itself. We use the primary market cut-off yield instead of the secondary market yield since changes in the latter could be due to short-term demand-supply changes in the interbank market rather than to any fundamental shift in the monetary stance. Primary market yields, in this context, might reflect better the direct stance of monetary policy. The use of T-bill yield as an indicator of monetary policy has gained prominence in the literature of late, both internationally (Sims and Zha, 1998; Calvo and Reinhart, 2002; Aksoy and Leon-Ledesma, 2004) as well as in the Indian context (Jena et al., 2004).

Second, the analysis focuses primarily on the performance of individual firms. Toward this end, we run the estimation using firm-level performance measures for several reasons. First, each firm - public or private - is a distinct entity with its own corporate governance practices. Second, a lot of variation in the performance is lost if the performance of firms is aggregated into a group measure. This prompts us to employ panel data techniques in the estimation procedure. As it stands, the error term, e_{it} in equation (1) is assumed to consist of a time-invariant error component *plus* an idiosyncratic error term v_{it}, hence, $e_{it}=u_i+v_{it}$. Accordingly, panel regression with fixed effects is employed in the study. Time dummies are included in the specifications to capture time-specific effects.

V. EMPIRICAL RESULTS

Table 4 presents the correlation coefficients for the relevant variables. Several remarks are in order. First, the correlation between debt ratio and all its components is positive**.** Second, DEBT and all its components are negatively related to most of the control variables. Likewise, the correlation between the monetary policy indicator and all the components of debt is negative, suggesting that firms tend to reduce their debt profile consequent upon a monetary tightening.

A. Overall response of corporates

The results of the estimation procedure, presented in table 5, indicate that most of the control variables are highly significant at conventional levels. Thus, higher interest payment increases debt levels. Intuitively, high interest payments signify the presence of a large debt component in the firm's capital structure. This increase in debt is, however, at the expense of lower short-term bank debt. Second, the coefficient on TAN has the expected positive sign. The greater the tangibility of a firm's assets, the less likely it is that the firm would be prone to informational asymmetry problems. Such firms would consequently have little difficulty

obtaining external finance. Also, SIZE was found to have a positive relationship with overall debt, suggesting that large firms, which are likely to be well diversified, are better placed to attract external funds. In case of short-term debt, however, the influence was found to be the opposite, indicating that small firms make more use of this debt type. Fourth, in the case of depreciation, the expected negative coefficients were observed: high depreciation implies the presence of a large non-debt tax shield, making the use of debt tax shields relatively redundant. Among other variables, AGE was positively related to debt. However, there is evidence that small and young firms in emerging markets are likely to find debt cheaper than equity, since they may have easy access to credit (Huisman and Hermes, 1997). Better earning prospects would lower a firm's debt finance requirement, since it would be able to finance its investments largely with retained earnings. This is borne out by the negative coefficient on EARN. The negative coefficient on DIVI supports the agency models: dividend payment and debt issue act as substitutes in mitigating agency problems (Miller and Rock, 1985). Finally, the negative coefficient on RND conforms to the view of Titman (1988), which suggests that firms characterized by unique products (and hence spending more on RND) are likely to be less leveraged (and hence have lower debt).

The primary focus of this study is on the response of monetary policy to bank debt and hence, on the coefficients of MPI and its interaction terms with the concerned dummy variables. From the estimated coefficients of MPI, it can be concluded that the signs of the coefficients of MPI are significant and negative in all cases, i.e., the contemporaneous impact of monetary policy tightening is negative on bank debt. The lagged response on MPI is, however, positive, in the DEBT and BKDEBT specifications. In other words, while the immediate response by firms to a monetary tightening is to reduce their total debt by reducing bank debt, and in particular short-term bank debt, over the medium-term firms internalize the effect of a rise in capital costs and increase bank borrowings. The results of the study seem consistent with the standard substitution effect. When there is an interest rate shock, the supply of bank debt decreases because higher interest rates imply higher intermediation cost. In equilibrium, either the cost of bank debt increases or the funds are rationed or both. Therefore, corporates would tend to move to non-bank debt, but the substitution effect between bank and non-bank debt occurs with a lag. The dynamics will depend on the speed of adjustment. The results of the study show that corporates reduce their total debt and bank debt in the period when the monetary policy shock occurs. The lowering of short-term bank debt as compared to long-term bank debt is also consistent with the more elastic demand for short-term debt. In the longer term, the substitution effect dominates as total debt increases, but corporates are able to renegotiate the terms of their bank debt and consequently bank debt also increases. By ownership criteria, the negative coefficient on the interaction term with ownership dummy in the equation for bank debt would indicate that vis-à-vis public firms, private firms reduce their bank debt in the face of monetary tightening, although the overall response seems to be muted. By listing criteria, it can be observed that listed firms increase their overall debt by increasing short-term bank debt, suggesting the existence of relationship lending: despite their flexibility in raising finance from other sources in the face of a monetary contraction, they seem to prefer access to bank finance. It is also possible to interpret this that listed firms have more information from the market that leads them to expect an interest rate hike by the central bank and that, based on these

expectations, they increase their debt. Summing up, corporates exhibit long-term relationship lending; the same is particularly evident in the case of listed corporates.

B. Does the response vary across periods?

Although reforms were initiated in the early 1990s, their effects would be felt only with the passage of time. The structural transformation of the stock market beginning in 1992 when SEBI was vested with statutory powers to regulate the capital markets, would have its effect on capital markets only after a time lag. Salient developments in the securities market, relating to improvements in market design–for example, electronic trading, novation at the clearing house to reduce settlement risk, institution of depositories to eliminate the operational vulnerabilities associated with physical share certificates, and the introduction of derivatives trading - are a feature of the late 1990s. Finally, the movement toward rolling settlement in the spot market and the associated gains in market integrity also occurred in the late 1990s (Shah and Thomas, 2001).[9] On the interest rate front, the deregulation of interest rates in 1996 and the freedom of corporates to raise resources from alternate sources would be reflected in corporate balance sheets only over a period of time. This would suggest that the behavior of corporates is likely to vary over the sample period. Testimony to such an occurrence for the Indian banking industry is evidenced in the work of Sarkar and Bhaumik (1998).

To examine this possibility in the present context, we divided the sample into two equal sub-periods, 1992-97 and 1998-03. The relevant coefficients of the estimation results are reported in table 6. Several features of the table are of importance. First, monetary policy had limited contemporaneous effect in the first sub-period; its lagged effect was much more pronounced. Thus, a contractionary monetary policy lowered overall debt and, in particular, short-term bank debt only with a lag. This was to be expected. With limited institutional development of the stock market and the limited flexibility of the central bank in the conduct of monetary policy, corporate response to a monetary contraction was largely muted. Similar response is evidenced across firms, irrespective of their ownership or governance.

The results are, however, markedly different for the second sub-period. In particular, a contractionary monetary policy had both a contemporaneous and a lagged impact: lowering overall debt on an immediate basis, but raising it subsequently to enable corporates to maintain credit lines from banks (the positive and significant coefficient on bank debt)[10]. Additionally, compared with public firms, private corporate houses tended to actively respond by lowering debt and, in particular, bank debt during this period. The increasing flexibility of listed firms to actively respond to a monetary contraction was also an important

[9] Shah (1999) provides a table detailing the developments in the capital market in 1994 and 1998.

[10] The year 1997 was a watershed in India's monetary policy regime. Since April 1, 1997, the automatic monetization of the budget deficit was terminated and replaced by a system of Ways and Means Advances (WMA) that financed, within limits, only temporary mismatches in government receipts and expenditure at market-related interest rates. This reform provided monetary policy operational independence to the central bank. Since 1997, the Reserve Bank of India formally assumed responsibility for developing the money, government securities, and forex markets.

feature of corporate behavior during this period. In contrast with the earlier sub-period, listed firms attempted to maintain relationship lending with banks by increasing bank debt.

C. *Did the response vary across firms of different sizes and with different leverage ratios?*

The equations were also estimated for select sub-samples, depending on firm size and leverage ratio. Table 7 reports only the estimated coefficients for MPI and the cross terms with the relevant dummy variables. The first two sub-samples comprise the bottom 20 and the top 20 percent of the size distribution, respectively. The general picture that emerges for the whole sample is largely confirmed in Table 7 for large firms, but not for small firms. More specifically, the immediate response of large firms to monetary tightening was a decline in their bank debt, followed later by an increase in bank debt. At the other end of the spectrum, small firms increased their overall debt and, in particular, bank debt, supporting the existence of relationship lending. The lagged effect of monetary tightening on small firms appear to be limited. Large private firms lowered their bank debt *vis-à-vis* their public counterparts, whereas small firms, tended to lower their overall debt profile, although the effect on bank debt is unclear. On the other hand, while large listed firms borrowed more, the response of small listed firms was relatively muted.

The third and fourth sub-samples consist of the top and bottom 20 percentiles of the leverage distribution, where leverage is measured by DEBT. In this case, the results suggest that leveraged firms increased their overall debt after a monetary tightening. Specifically, highly leveraged firms exhibited an increase in their bank debt, with a strong and positive lagged response, whereas firms with a low leverage ratio exhibited a lagged reduction of bank debt in response to a monetary contraction. Second, relative to highly leveraged public firms, their private counterparts ended up accumulating more bank debt, primarily by increasing short-term bank debt. Interestingly, listed highly leveraged firms exhibited limited response to a monetary tightening, whereas their counterparts with low leverage ratios reduced bank debt in response to a monetary contraction. A summary profile of the response of firms is contained in table 8.

VI. CONCLUDING REMARKS

Employing firm-level data on Indian firms, the paper addresses the financing behavior of manufacturing firms in response to the tightening of monetary policy. The primary focus of the paper is on the differences in the use of bank debt in response to a monetary policy tightening for public versus private firms and listed *versus* unlisted firms, after controlling for different industry groups and time periods. The sample comprises all of these types of firms for the period 1992 to 2003.

The study points to some evidence in favor of the credit view and other evidence in favor of the relationship lending view. The main findings of the study can be stated as follows:

First, for the entire sample, it is observed that firms tend to lower their total debt and in particular, bank debt in response to a monetary tightening; however, the lagged response to a monetary contraction has been to raise the debt profile.

Second, private corporates' response to monetary policy tightening is more muted than that of their public sector counterparts, although there is evidence that they reduce bank debt.

Third, the overall debt of listed firms tends to increase in response to a monetary tightening, driven by an increase in their short-term bank borrowings.

Fourth, diving the sample into different sub-periods indicate that the response was largely muted in the first half of the 1990s; corporates exhibited a more pronounced response during the latter half (1998-2003) by lowering overall debt and in particular, bank debt in the same time period and increased total and bank debt again after a lag.

Fourth, a split of the sample into large and small firms indicates the existence of relationship lending, a lagged response being evidenced for large firms.

Finally, as regards the classification of firms according to their leverage ratio, private firms are found to exhibit relationship lending vis-à-vis their public counterparts.

It is possible to discern two important implications of the aforesaid framework. First, the analysis suggests that while the interest rate transmission channel has strengthened since 1998, the response across corporates is varied, depending, among others things, on their size, ownership, access to financial markets, and leverage. There might be instances where the transmission of monetary policy, and in particular, the interest rate channel, is negated. More specifically, while monetary tightening leads to a decline in overall debt, supporting the existence of an interest rate channel, listed firms, irrespective of their size, exhibit an increase in overall debt in response to monetary tightening. But they seem to adjust their bank debt by lowering the long-term debt and increasing their short-term debt, thus maintaining their relationship with banks. Thus, despite their ability to access non-bank finance in the face of an observed monetary tightening, listed firms find it useful to maintain credit lines with banks.

Second and more broadly, it has been argued that the state of the balance sheet of corporates is a critical factor in the stability of the financial system. A widespread deterioration of their balance sheets can worsen both the adverse selection and moral hazard problems and, accordingly, analyses of financial system stability need to include corporate balance sheets (Davis and Stone, 2004). The present analysis examines the corporate balance sheets and their reaction to a monetary policy shock. Although the analysis does not explicitly incorporate stability analysis, it nonetheless focuses on the role of debt and in particular, bank debt in corporate balance sheets and its response to a monetary contraction. Explicit incorporation of stability features remains part of future research.

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Table 1. Distribution of Sample Firms by Industry

Industry group	Number of Firms	Percent of total
Heavy industries	46	8.8
Drugs and pharmaceuticals	49	9.3
Chemicals 66		12.6
Cement 18		3.4
Textile and textile products	52	9.9
Auto ancillaries	46	8.8
Food and beverages	35	6.7
Electrical machinery	62	11.8
Diversified 25		4.8
Others 126		24.0
Total 525		100.0

Source: Compiled from *Prowess* database.

Table 2. Breakdown of Sample Firms by Ownership and Industry Type

Industry group	Public Companies		Private Companies		Total	
		Of which listed		Of which listed		Of which listed
Heavy industries	6	2	40	31	46	33
Drugs and pharmaceuticals	1 0		48	37	49	37
Chemicals 7		3	59	51	66	54
Cement 0		0	18	17	18	17
Textile and textile products	0 0		52	47	52	47
Auto ancillaries	1	1	45	42	46	43
Food and beverages	0	0	35	32	35	32
Electrical Machinery	2	1	60	54	62	55
Diversified 0		0	25	19	25	19
Others 7		3	119	92	126	95
TOTAL	**24**	**10**	**501**	**422**	**525**	**432**

Source: Compiled from *Prowess* data base.

TABLE 3. EXTERNAL FINANCING PATTERN BY LISTING:

AGGREGATE AVERAGES FOR 1992-2002
(PERCENT OF TOTAL)

Sources Public		of which Listed	Private	of which Listed
Paid-up capital	18.4	11.6	28.8	30.2
Long-term debt	14.4	9.7	7.6	6.3
Short-term debt	34.2	44.7	28.6	25.5
of which				
working capital	15.7	16.6	18.6	15.6
Memo				
Bank Debt	42.9	44.9	18.5	14.8

Source: Authors' calculations.

TABLE 4. CORRELATION MATRIX AMONG THE VARIABLES

Variable DEBT	BANK	STBANK
DEBT 1.000		
BANK -0.284	1.000	
STBANK -0.125	-0.055	1.000
INT 0.240	-0.058	-0.090
TAN 0.276	0.290	-0.222
SIZE 0.076	-0.229	-0.120
DEPCN 0.177	-0.175	-0.151
EARN -0.284	0.020	0.009
RND -0.021	-0.005	-0.036
DIVI -0.289	-0.041	-0.054
AGE 0.005	-0.007	-0.005
MPI -0.012	-0.037	-0.026

Note : Monetary policy indicator is proxied by 364-day t-bill yield.

DEBT = aggregate borrowing/total asset; BANK =bank borrowing/total borrowing; STBANK=short-term bank borrowing/total bank borrowing; INT= interest expense/total earnings; TAN=tangible asset / total asset; SIZE= logarithm of total asset; AGE = number of years since the incorporation of the firm; DEPCN = depreciation; EARN=operating income; RND=Research and development expenses/Sales; DIVI= dividend payment/ net operating income.

Table 5. Fixed-Effects Estimation for the Whole Sample

Variables DEBT		BANK	STBANK
Control variables			
INT	0.143 (0.04)	-0.011 (0.80)	-0.069 (0.00)
TAN	0.095 (0.00)	0.233 (0.00)	0.195 (0.00)
SIZE	0.375 (0.04)	-0.358 (0.00)	-1.841 (0.00)
DEPCN	-0.883 (0.00)	-0.341 (0.27)	-0.318 (0.36)
EARN	-0.505 (0.00)	-0.156 (0.01)	-0.022 (0.37)
AGE	2.234 (0.06)	-0.248 (0.09)	0.837 (0.17)
DIVI	-0.878 (0.00)	-1.064 (0.00)	-0.993 (0.00)
RND	-0.136 (0.12)	-0.099 (0.11)	-0.228 (0.00)
Monetary Policy Indicator			
MPI_t	-3.392 (0.06)	-2.744 (0.02)	-1.892 (0.10)
MPI_{t-1}	1.153 (0.01)	1.042 (0.09)	0.473 (0.50)
Ownership Dummy			
MPI_t*$PRIVATE_t$	-0.671 (0.58)	-1.284 (0.09)	0.520 (0.19)
Governance Dummy			
MPI_t*$LISTED_t$	1.564 (0.07)	1.048 (0.49)	1.873 (0.09)
Industry Dummies	Included	Included	Included
Time dummies	Included	Included	Included
Diagnostics			
R- square	0.37	0.30	0.29
Number of Observations	5166	5107	4946
Number of Firms	525	525	525
Time period	1992-2003	1992-2003	1992-2003

Note: p-Values in brackets. See table 4 for notations of the variables.

PRIVATE = 1, for private firms, 0 for public firms. LISTED=1, for firms listed on the Mumbai Stock, Mumbai, 0 for unlisted firms.

Table 6. Fixed-Effects Estimation for the Sub-periods–Select MPI Coefficients

Variable	DEBT	BKDEBT	STBANK
Sub-period 1: 1992-97			
MPI_t	-1.135 (0.87)	1.618 (0.17)	1.563 (0.31)
MPI_{t-1}	-1.796 (0.00)	1.161 (0.00)	-1.503 (0.09)
MPI_t*PRIVATE	-1.578 (0.73)	-1.039 (0.46)	-1.603 (0.41)
MPI_t*LISTED	-1.373 (0.33)	-1.304 (0.84)	-1.386 (0.85)
Industry Dummies	Included	Included	Included
Time dummies	Included	Included	Included
Diagnostics			
R- square	0.43	0.40	0.36
No. of Observations	2375	2347	2256
No of Firms	525	525	525
Sub-period 2: 1998-2003			
MPI_t	-1.355 (0.10)	-2.955 (0.07)	1.366 (0.10)
MPI_{t-1}	1.973 (0.00)	1.001 (0.05)	1.739 (0.21)
MPI_t*PRIVATE	-1.219 (0.08)	-1.135 (0.09)	1.242 (0.09)
MPI_t*LISTED	1.270 (0.07)	1.075 (0.10)	-1.538 (0.09)
Industry Dummies	Included	Included	Included
Time dummies	Included	Included	Included
Diagnostics			
R- square	0.58	0.40	0.38
Number of Observations	2326	2303	2248
Number of Firms	525	525	525

Note: p-Values in brackets. See tables 4 and 5 for notations of the variables.

Table 7. Fixed-Effects Estimation for Four Sub-samples-Select MPI Coefficients

Variables DEBT		BANK	STBANK
Sub-sample 1: Small firms (bottom 20 percentile with respect to SIZE)			
MPI_t	0.660 (0.10)	0.319 (0.06)	-0.378 (0.10)
MPI_{t-1}	1.371 (0.19)	1.332 (0.31)	2.187 (0.12)
MPI_t*$PRIVATE_t$	-1.749 (0.07)	1.814 (0.29)	0.345 (0.81)
MPI_t*$LISTED_t$	0.761 (0.22)	-1.008 (0.35)	-1.269 (0.27)
R^2	0.43	0.23	0.18
Period 1992-2003		1992-2003	1992-2003
Number of Firms	105	105	105
Sub-sample 2: Large firms (top 20 percentile with respect to SIZE)			
MPI_t	1.436 (0.37)	-4.882 (0.02)	3.350 (0.74)
MPI_{t-1}	-2.844 (0.19)	4.435 (0.00)	4.261 (0.00)
MPI_t*$PRIVATE_t$	0.784 (0.40)	2.436 (0.06)	-0.593 (0.76)
MPI_t*$LISTED_t$	0.642 (0.10)	-0.097 (0.19)	-1.004 (0.35)
R^2	0.51	0.24	0.27
Period 1992-2003		1992-2003	1992-2003
Number of Firms	105	105	105
Sub-sample 3: Low-leveraged firms (bottom 20 percentile with respect to DEBT)			
MPI_t	1.794 (0.00)	-1.309 (0.36)	-1.740 (0.16)
MPI_{t-1}	2.316 (0.00)	2.243 (0.12)	3.548 (0.00)
MPI_t*$PRIVATE_t$	-0.061 (0.58)	-2.229 (0.39)	-1.093 (0.64)
MPI_t*$LISTED_t$	-0.049 (0.38)	0.069 (0.58)	0.720 (0.08)
R^2	0.26	0.24	0.29
Period 1992-2003		1992-2003	1992-2003
Number of Firms	105	105	242
Sub-sample 4: High-leveraged firms (top 20 percentile with respect to DEBT)			
MPI_t	1.959 (0.00)	-1.143 (0.22)	3.278 (0.00)
MPI_{t-1}	2.624 (0.00)	1.767 (0.03)	-2.769 (0.00)
MPI_t*$PRIVATE_t$	0.106 (0.57)	1.437 (0.03)	0.428 (0.01)
MPI_t*$LISTED_t$	0.068 (0.55)	-0.792 (0.30)	-1.269 (0.20)
R^2	0.31	0.27	0.26
Period 1992-2003		1992-2003	1992-2003
Number of Firms	105	105	105

Note: p-Values in brackets. MPI is proxied by 364-day T-Bill yield
See tables 4 and 5 for notations of the variables.

Table 8. Response of Firms to Monetary Contraction: Summary Features

Variable DEBT		BKDEBT	STBANK	Observation
Whole Sample				
MPI Negative		Negative	Negative	
Lagged MPI	Positive	Positive		RL
Ownership		Negative		
Listed Positive			Positive	
Sub-period 1				
MPI				
Lagged MPI	Negative	Positive	Negative	RL
Ownership				
Listed				
Sub-period 2				
MPI Negative		Negative	Positive	
Lagged MPI	Positive	Positive		
Ownership Negative		Negative	Positive	
Listed Positive		Positive	Negative	RL
Large Firms				
MPI		Negative		
Lagged MPI		Positive	Positive	RL
Ownership		Positive		RL
Listed Positive				
Small Firms				
MPI Positive		Positive	Negative	RL
Lagged MPI				
Ownership Negative				
Listed				
Highly-leveraged Firms				
MPI Positive			Positive	
Lagged MPI		Positive		RL
Ownership Positive		Positive		RL
Listed				
Firms with Low-leverage ratios				
MPI Positive				
Lagged MPI	Positive		Positive	
Ownership		Positive	Positive	RL
Listed				

Note: RL denotes relationship lending.