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Abstract

Using a panel dataset of over 800 listed manufacturing firms for 1995-2005, the paper examines whether bank-firm relationships influence a firm's financing constraints. The results indicate that a firm with fewer related banks maintains less cash and its equivalents even in the presence of potential investment opportunities. This suggests that establishing a close loan relationship with few banks could reduce the cost of private loans, enabling the firm to maintain lower liquidity levels. The analysis concludes with several robustness checks of the baseline results.

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¹ The views expressed and the approach pursued in the paper are strictly personal. The author can be reached at sai_ghosh@hotmail.com

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I. Introduction

Academics have long recognized the central role of banks as the optimal mechanism for channeling funds from investors to firms when information asymmetries exist between them. In fact, potential investors may find it more efficient to delegate a bank to provide them funding rather than have multiple lenders collect information about their firm's prospects prior to granting it credit and simultaneously monitoring their action once an investment has been made. Boot and Thakor (2000) argued that the *raison d'être* of banks might well be their role in mitigating informational asymmetries, which can simultaneously be accompanied by maintaining a close bank relationship. It follows then that if firms have close banking relationships, they may obtain funds from banks relatively easily, which permits them to keep lower liquidity on hand. In other words, they are not financially constrained.

The present paper presents the case of India and examines whether a suitable "bank relationship" can mitigate a firm's "financing constraints", where the term "financing constraint" signifies that a paucity of internal funds may negatively affect a firm's investments when the capital market is imperfect. The firm's investment is thus affected by the cash flow it retains, which is often referred to as "investment cash-flow sensitivity". *A priori*, a firm with multiple bank relationships is expected to hold less cash flow for future investment expenditures, a notion which stems from the argument that with multiple bank relationships, asymmetric information is mitigated to a minimum.

The paper comprises of four sections after this introduction. Section II presents an overview of the literature. The empirical strategy and the database employed are detailed in Section III. Section IV discusses the results, followed by the concluding remarks.

II. Literature review

The financial position of firms affects investment when there exists a wedge between the costs of external and internal finance in an imperfect capital market. The literature focuses on three reasons for costly external finance. First, market participants have differential access to information. Myers and Majluf (1984) demonstrate that the cost of external funds is higher than that of internal funds owing to informational asymmetry between lenders and borrowers. Second, managerial agency problems arise when managers who are not owners pursue their

own interests (Jensen and Meckling, 1976). The firm is required to pay a premium for external financing if outside investors suspect that managers might not pursue the interests of shareholders. Finally, transactions costs associated with the issuance of debt and equity might raise the cost of external financing.

The combined effects of asymmetric information, managerial agency problems and transactions costs suggest a disparity between the cost of internal and external funds. Under such financial constraints, investment decisions depend on the availability of internal funds. Furthermore, the heterogeneity of firms implies that investment of financially constrained firms' is more likely to be affected by the availability of internal funds.

A large body of empirical literature has examined whether financial constraints influence corporate capital investments. Utilizing the dividend-payout ratio as a measure of financial constraint faced by firms, Fazzari *et al.* (1988) had demonstrated that investments of financially constrained firms respond more sensitively to changes in cash flow. Existing empirical studies have used various segmenting variables to identify unobservable financial constraints, for example, group affiliation in Hoshi *et al.* (1991) and firm size in Devereux and Schiantarelli (1990). Despite the differences in estimation techniques, most studies arrive at the conclusion that the sensitivity of investment to cash flow is higher for constrained firms.

Studies on financing constraints have typically veered in two broad directions. The first set of studies document the effects of financial liberalization on financing constraints in a country-specific context. Thus, Harris *et al.* (1994) find that for Indonesia, borrowing costs increased after liberalization dampening the sensitivity of cash flows to investment. Evidence for Mexico by Gelos and Werner (1999) suggests that liberalization eased the financing constraints for small firms, but not for large firms, which they attribute to the political economy considerations that large firms has preferential access to directed credit before deregulation.

The second strand of literature has sought to explore the financing constraint aspect in a cross-country context. Employing Euler equation methodology, Laeven (2003) finds that, in a sample of 13 developing countries for the period 1988-98, progress in financial liberalization reduces firms financing constraints, especially for small firms.

Notwithstanding these advancements in the literature, limited research has been forthcoming towards exploring the effects of bank-firm relationships on financing constraints of firms. As Rajan (1992) has observed, a closer and continuous relationship with firms typically involves contact over a number of years and the supply of multiple services, including credit extension, provision of deposit services and other related facilities.

The empirical literature has produced mixed results regarding the effects of intensive banking relationships on the cost and availability of loans. Using US small firm data, Petersen and Rajan (1994) finds that a higher concentration in banking relationships leads to lower borrowing costs. Harhoff and Korting (1998), using survey data for small and medium-sized German firms with no more than 500 employees find no correlation between the cost of debt and the number of relationship banks. These studies provide evidence to support the hypothesis that an exclusive banking relationship provides a good incentive for banks to supply loans to credit constrained firm since it enables banks to obtain rents in the future.

Some studies investigate the determinants of a firm's choice of number of banking relationships. Detragiache *et al.* (1997) address this question by developing an analytical framework in which a firm with good investment opportunity establishes multiple banking relationships from the start in order to avoid the risk of financing difficulties should it encounter liquidity problems. Using cross-section data for small and medium-sized manufacturing firms, the authors then test the model and find that the number of banking relationships is positively correlated with bank fragility. Berger *et al.* (2001) finds that small Argentine firms choose multiple banking relationships over single banking relationship as a reaction to bank distress, even though this raises their cost of credit.

In the Indian context, bank-corporate relationship has, in recent years, witnessed several notable features include financing by multiple banks, through several instruments including investments, and access to a wider choice of sources of finance for corporates such as capital markets and external financing. Since such choices nudge towards transaction-based banker-customer relationship, these could impinge on the access to the information required by the bankers for financial assessment as also on the ability of corporates to get an assured and appropriately priced financial package (Reddy, 2005). However, limited research has been forthcoming in India on the factors influencing bank-corporate relationships. An aspect not adequately addressed in earlier studies is whether firm-bank relationships influence financing constraints and this becomes a major concern of the paper.

III. Empirical strategy and database

The empirical specification builds on Gilchrist and Himmelberg (1999). In their framework, the firm maximizes its present value, which is equal to the expected value of dividends subject to capital accumulation and external financing constraints. Financial frictions are embodied in the assumption that the shareholders regard debt as a marginal source of

external finance and that the external finance premium is an increasing function of the amount borrowed. Finally, we can derive the Euler equation for investment by using Tobin's Q and liquid assets to capital (Lqd/K) as proxies for marginal productivity of capital and financial constraints, respectively. The control variable includes lagged production ($Prodn$), where production is defined as sales *plus* change in inventories of financial goods. We include the debt ratio (Lev) as another explanatory variable.¹

Accordingly, the baseline investment model we estimate is as follows:

$$I_{it} / K_{t-1} = \alpha + \beta_1 Q_{it-1} + \beta_2 (Lqd / K)_{it-1} + \beta_3 (Pr odn / K)_{it-1} + \beta_4 (Lqd / K)_{it-1} * Bank_t + \beta_5 (Lev)_{i,t-1} + d_t + u_{it}$$

$$and \ \theta_{it} = \beta_2 (Lqd / K)_{it-1} + \beta_4 (Lqd / K)_{it-1} * (Bank)_t$$

where (I/K) is investment to capital ratio, d_t is time-specific effects and u_{it} is the white noise term. The aforesaid equation allows for the adapted threshold number of banks to be unknown, and endogenises it by assuming that liquidity is a function of the number of banks. If the coefficient θ equals zero, then the threshold number of banks is derived as: $Bank = -\beta_2/\beta_4$. A description of the variables is in table 1.

Table 1 : Variables and empirical definitions

Variable	Notation	Definition
Capital	K	Capital at the beginning of period t= =Plant property assets at t-1 minus capital expenses during period t-1 plus accumulated depreciation and amortization until t-1
Investment	I	$K_{t+1} + Depcn_t - K_t(1 + \pi_t)$
Production	$Prodn$	Net sales at t-1+change in inventories of final goods at t-1
Liquidity	Lqd	Cash in hand at t-1+marketable investment at t-1
Age	Age	Logarithm of number of years since incorporation of firm
Depreciation	$Depcn$	Depreciation during period t
Inflation	Π	Average inflation over the period t
Debt	D	Book value of total borrowings at the beginning of period t
Asset	A	Total asset of the firm
Leverage	Lev	Firm leverage =total borrowings/total asset
Market value of equity	MVE	Market value of equity at the beginning of period t =Number of shares outstanding at t-1* Market price of per share at t-1
Tobin's Q	Q	Average Q at the beginning of period t = $(MVE_t + D_t)/A_t$
Bank-firm relationship	$Bank$	Number of firm-bank relationships

In the absence of financial restrictions, firm investment depends exclusively on the marginal profitability of capital as measured by Q . In case a firm faces constraints on external financing, its investment will be determined partly by its internal resources (Lqd/K) and to the

extent that capital markets are imperfect, the degree of leverage (*Lev*) would also affect the availability of external finance. A better functioning financial system would imply investment is less determined by the firm's internal resources and less negatively affected by its leverage, which, in turn, would imply, significant and non-negative magnitudes on the coefficients β_1 and β_5 respectively.

The source of the data is the publicly available *Prowess* database (Release 2.5), generated and maintained by the Center for Monitoring the Indian Economy (CMIE), a leading private think-tank in India. This database is broadly similar to the *Compustat* database of US firms and 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), the performance of firms affiliated to diversified business groups (Khanna and Palepu, 2000), the interlinkage between monetary policy and corporate governance (Ghosh and Prasad, 2005) and more recently, the role of financial liberalization in easing financing constraints for manufacturing firms (Ghosh, 2006). The dataset contains financial information on around 8,000 companies, which are either listed on the stock exchanges. 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 at least Rs.200 million as per the latest audited financial results. Accordingly, the firms in the sample generally do not include the smallest firms due to the requirements for firms to be included in *Prowess*. Thus, in effect, the sample is skewed towards large Indian firms. The database contains detailed information on the financial performance of these companies culled out from their profit and loss accounts, balance sheets and stock price data.

Table 2: Distribution of sample firms by industry classification

Industry	Number of Firms	Percent to Total Sample
Heavy	85	10.5
Drugs and Pharmaceuticals	95	11.8
Chemicals	104	12.9
Cement	40	5.0
Textile and textile products	66	8.2
Auto Ancillaries	55	6.8
Food, Sugar and Beverages	62	7.7
Electrical Machinery	36	4.5
Electronics	45	5.6
Diversified	32	4.0
Others	188	23.3
Total	808	100.0

The selection of the sample firms proceeds in three steps. In the first step, we select all firms listed on the National Stock Exchange. This provided us with a total of 979 companies. In step two, given the focus on financing constraints encountered by manufacturing firms, we only retain firms whose main activity is in manufacturing, but exclude those for which their main activity is in the service sector, including finance.

This classification left us with a total of 876 firms in the manufacturing sector. In the last step, we delete 68 firms for which data on the dependent variable are not reported for all least three consecutive years of the sample or for that matter, firms that do not report banking relationships. Following from this criterion, we were finally left with a total of 808 manufacturing firms for the entire sample period. The composition of the sample is presented in Table 2. It can be observed from the table that around 40% of the firms belong to chemicals, drugs, heavy industries and textile, indicating that given the classification adopted for incorporation of firms in the database, a significant proportion belong to these three sectors.

IV. Results and discussion

Table 3 presents the descriptive statistics for all firms. We have data for the years 1995-2005 for 808 firms. The average data coverage for each firm is 9.2 years, hence the total number of observations is 7454. As regards the descriptive statistics, it is evident that the mean leverage of all firms is 0.539 with a maximum of 5.370. The high range in leverage ratios may reflect the differential recourse to borrowings by firms in the sample. The mean number of firm-bank relationships equals 4.84, with a high of 29, suggesting that multiple banking relationships are a common feature of sample firms.

Table 3: Descriptive statistics - all firms

	<i>I/K</i>	<i>Q</i>	<i>Lqd/K</i>	<i>Prodn/K</i>	LEV	Bank
Mean	0.384	2.893	1.254	5.861	0.539	4.840
Maximum	0.829	11.681	1.731	17.067	5.370	29
Minimum	-1.544	0.012	0.001	0.132	0.000	1
Std. Dev.	0.181	1.216	2.206	1.511	0.449	3.647

We estimate several specifications of the structural model (table 4). The results can be summarised as follows. First, it is evident that investment is responsive to changes in *Q*, which indicates that firms with better investment opportunities tend to invest more. Second, we find firms to be less constrained over the entire period. All else being equal, a 10% increase in liquidity implies a rise in investment by about 0.2%. Third, investment is positively affected by

the firm's leverage, which suggests that the accumulation of debt does not deter outside financing.²

Of particular relevance from the standpoint of the present study is the coefficient on the interaction term of liquidity with the number of firm-bank relationships. The coefficient is negative and statistically significant (at the 5% level). This implies that a firm with fewer related banks maintains less cash and its equivalents even in the presence of potential investment opportunities. Economically, a firm with multiple banking relationships is expected to be fully confident as far as funding sources go, thereby enabling it to keep less liquidity even when it expects future investments. The implication of this result is that, the number of banks could serve as a signal of the degree of information asymmetry. The optimal number of bank-firm relationships, as obtained from these estimates, equals 2.3, which is roughly half the average number of bank-firm relationships maintained by the sample firms. In other words, establishing a close loan relationship with few banks could reduce the cost of private loans, enabling the firm to maintain lower liquidity levels.

We conduct several robustness checks of the baseline results. First, we include an additional variable, *Age* among the regressors. The basic idea is that, in general, older firms being relatively reputed in the market, are likely to have access to a wider range of suppliers of finance, and as a consequence, such firms are likely to be less financially constrained vis-à-vis younger firms. The results (Model 2) indicate that the coefficient on *Age* is negative and statistically significant, which supports our presumption that older firms are less financially constrained. All other coefficients are unaltered in sign and significance. The optimal number of bank-firm relationship obtained from this specification is 2.0, which is close to that obtained in the baseline model.

In the third specification, we include dummies for firm ownership to ascertain whether ownership matters for financial constraints. Accordingly, we include dummies for business group (*Dum_BG*), Indian private (*Dum_IPVT*) and foreign (*Dum_Forgn*) firms, respectively (state-owned firms being the omitted category). The estimates reveal that the coefficient on business group dummy is negative, whereas those on Indian private and foreign firms are positive. All these coefficients are strongly significant. This suggests that, vis-à-vis state-owned firms, business groups experience lower financing constraints; reverse is the case for the other two categories. Presumably, by virtue of their access to cheaper inter-company loans, these firms might be able to use other firms in their group as guarantors and therefore, experience lower

financing constraints. The optimal bank-firm relationships obtained in this case equals 2.3, consistent with those obtained from the earlier specifications.

Table 4: Relationship Lending and financing constraints: regression results

Variables	Model 1	Model 2	Model 3	Model 4
Constant	-0.031 (0.075)	0.071 (0.084)	-0.298 (0.129)**	-0.339 (0.333)
Q	-0.004 (0.001)***	-0.003 (0.001)***	-0.003 (0.001)***	-0.002 (0.001)**
(Lqd/K)	0.023 (0.007)***	0.022 (0.007)***	0.023 (0.008)***	0.024 (0.008)***
LEV	0.015 (0.006)***	0.014 (0.006)**	0.014 (0.006)***	0.012 (0.005)**
(Lqd/K)*Bank	-0.010 (0.002)**	-0.011 (0.002)**	-0.010 (0.002)***	-0.010 (0.002)***
(Prodn/K)	0.089 (0.017)***	0.089 (0.016)***	0.089 (0.018)***	0.090 (0.018)***
Bank (threshold number)	2.3	2.0	2.3	2.4
Age		-0.006 (0.001)***		
<i>Firm ownership</i>				
Dum_BG			-0.222 (0.105)**	0.219 (0.103)**
Dum_IPVT			0.373 (0.133)***	0.376 (0.131)***
Dum_Forgn			0.392 (0.167)**	0.377 (0.165)**
<i>Main bank ownership</i>				
Dum_NPVT				0.212 (0.321)
Dum_PSB				0.095 (0.310)
Dum_FOR				-0.109 (0.307)
<i>Diagnostics</i>				
N.Observations, time period	7454; 1995-2005	7454; 1995-2005	7454; 1995-2005	7454; 1995-2005
R-square	0.210	0.212	0.215	0.215

Heteroskedasticity-adjusted standard errors in parentheses

***, ** and * denote significance at 1, 5% and 10%, respectively

The final specification introduces, in addition to firm ownership dummies, dummies for the ownership of the main bank. Accordingly, we introduce dummies for the new private (*Dum_NPVT*), public (*Dum_PSB*) and foreign (*Dum_FOR*) bank categories, depending on the ownership category of the main bank, to examine whether main bank fragility matters for financing constraints (old private banks being the omitted category). The results (Model 4) illustrate that none of these dummies are statistically significant. In other words, main bank ownership has limited effect on firm financing constraints. The optimal firm-bank relationship obtained from this specification is of the same order of magnitude as in earlier models.

V. Concluding remarks

Empirical studies to investigate the influence of bank relationship on the financing of investment have been limited. Using firm-level data on India for the period 1995-2005, the findings indicate that a firm with fewer related banks maintains less cash and its equivalents even in the presence of potential investment opportunities. The evidence therefore indicates that firms monitored by fewer banks can avoid the problem of 'free rider' and a closer bank relationship enables firms to depend less on their internal measures of liquidity to finance the investment expenditures. In terms of the significance, the methodology yields result which

provides a threshold number of firm-bank relationship that improves the financing mechanism of firms, providing them with an option to choose a lower cost of capital to finance their investment expenditures.

Extensions of the paper could take several directions. One interesting area would be to explore with different measures of liquidity. Alternately, it would also be of interest to study the differences between a greater number and a smaller number of banking relationships on a firm's financial arrangements. These issues remain part of future research.

Endnotes

1. The degree of leverage may affect the availability of external financing after controlling for Tobin's Q.
2. If external financing costs increase with the degree of leverage, the leverage ratio should be negatively associated with investment. Harris *et al* (1994) find a negative association between investment and the debt-to-capital ratio for Indonesian data.

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