Affiliated firms and financial support: Evidence from Indian business groups ☆

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Abstract

We investigate the functioning of internal capital markets in Indian Business Groups. We document that intragroup loans are an important means of transferring cash across group firms and are typically used to support financially weaker firms. Evidence suggests that an important reason for providing support may be to avoid default by a group firm and consequent negative spillovers to the rest of the group. Consistent with such spillovers, the first bankruptcy in a group is followed

by significant drops in external financing, investments and profits of other firms in the group and an increase in their bankruptcy probability.

1. Introduction

The legal systems in emerging economies are weak and ineffectual in protecting investor rights. Evidence suggests that the absence of adequate legal safeguards makes it more onerous for firms to raise external financing (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997). In such environments, firms are often organized into business groups, which comprise of a set of firms managed by a common group of insiders. These groups typically have significant operational and financial inter-linkages. Prior research on groups has highlighted their role in sharing risk among member firms (Khanna and Yafeh, 2005) and in helping member firms overcome constraints on raising external capital (Hoshi, Kashyap, and Scharfstein, 1991). Research on financial linkages among group firms (a type of internal capital market) has, however, been hampered because of the difficulty in observing the flows between firms. We contribute to this literature by analyzing the nature and rationale for the flow of funds across Indian business group firms.

Our use of Indian business group data is motivated by two important considerations. First, the Indian accounting standards specifically require firms to provide details about funds flow among group firms and this enables us to directly observe the functioning of the internal capital market. Our analysis indicates that intragroup flows are significant among Indian business groups and intragroup loans are an important means of such flows. For instance, group loan inflows, on average, constitute 59% of operating profits in the year a firm receives loans. This is in line with prior literature suggesting that these loans are the dominant observable channel through which Indian groups transfer cash across member firms (Khanna and Palepu, 2000). In our empirical analysis, we attempt to understand the working of the internal capital market by analyzing these intragroup loans. Second, we have detailed hand collected data on firm bankruptcies from India. This provides us a proxy for default by a group firm and allows us to investigate the importance of intragroup flows in avoiding default. The bankruptcy data also allow us to investigate the impact of default by a group firm on the rest of the group.

In general, there are three broad, non-mutually exclusive, motives for the transfer of resources across group firms. First, groups could use the cash for financing profitable new investment opportunities. As has been argued in the case of diversified, multi-division firms in the US, an internal capital market can economize on the costs of raising external capital (see Stein, 2003, and cites therein). Second, intragroup flows could be used to support member firms in financial difficulty so as to avoid default. Business group insiders may seek to protect the value of their equity stake in the firm. They may be loath to lose their private control benefits from the firm that becomes bankrupt. They may also be concerned about the negative signal about the group from the default by a member firm. Finally, a

third use of intragroup flows could be to enable the insider to steal resources from outside investors by tunneling cash out of firms with low insider holding and into firms with high insider holding. Bertrand, Mehta, and Mullainathan (2002) provide indirect evidence of such tunneling in business groups.

In our empirical analysis we carry out a number of tests to examine the extent to which these different motives account for the pattern of intragroup loans in Indian business groups. For this purpose we study the characteristics of firms that provide and receive group loans and examine the time-series variation in loans. The main providers of group loans, as we might expect, are firms that are larger, more profitable, and have more tangible assets. External borrowing is the dominant source of financing for intragroup loans. The recipients of group loans tend to be firms that have lower profitability, higher leverage, lower asset tangibility, and high insider holding.

Our evidence indicates that groups extend loans to financially weaker firms and significantly increase the extent of loans when member firms are hit with a negative earnings shock. Moreover, groups provide more loans to firms with higher insider holding. Meanwhile, there is little evidence for group loans being a means of financing investment opportunities. Large recipients of group loans significantly underperform, in terms of both stock returns and operating performance, after receiving group loans. This casts further doubt on whether group loans are used to finance profitable investment opportunities on a stand-alone basis. There is little evidence in favor of tunneling either. There is, for instance, no increase in group loan outflows from low insider ownership firms that experience a positive earnings shock, which would be expected to occur if group loans were being used to tunnel cash.

If group support is effective in preventing firm default, then group firms are likely to have lower bankruptcy probability than stand-alone firms. Consistent with this prediction, we find a significant difference in the failure rates of stand-alone firms and firms from groups with no prior bankruptcy (henceforth, solvent groups), the difference arising primarily on account of intragroup loan inflows. Specifically, a solvent group firm with sample mean characteristics has a 34.5% lower probability of becoming bankrupt in the following year, compared with a stand-alone firm. Our analysis indicates that the first firm in a group becomes bankrupt when it experiences severe negative shocks to its profitability, shocks large in comparison with the total equity value of the other firms in the group.

To provide some direct evidence on the support motive of group loans, we analyze the terms for a random subsample of group loans. We find that the loans are made on terms more favorable than those of comparable market loans, consistent with the loans being used to provide subsidized support. On average, firms receive group loans at 10% below the corresponding market borrowing rate. Further, a large proportion of loans ($>80\%$) have no stipulated interest payment at all.

We also examine why groups provide support to weak member firms. There are different (non-mutually exclusive) motives for group support. One motive influencing support might be group insiders' equity stake. We find evidence consistent with this motive. Groups tend to provide greater support to firms with larger insider ownership and, controlling for firm financials, firms with higher insider ownership are less likely to go bankrupt. A second reason for insiders to provide support might be concern about a dilution in private benefits after firm bankruptcy, on account of increased monitoring by lenders. A caveat here is that the bankruptcy regime in India during the sample period favored management over

creditors, with cessation of payments to lenders and restrictions on lenders in taking possession of collateral (Goswami, 1996). Hence, bankruptcy may only moderately curb the ability of insiders to derive private benefits.

A third reason is that groups may provide support if they are concerned about revealing negative information about the group, especially to external capital providers. The information could be about the group insider's unobserved wealth, the group's future growth prospects, or the group's reputation of being a reliable, high-quality borrower. Such negative information may make it difficult for other firms in the group to raise subsequent external capital, further damaging the group's investment prospects and the solvency of the remaining firms. Our evidence shows that there are significant negative spillovers after the first bankruptcy in the group. We find strong evidence of credit rationing after the first bankruptcy. In particular, our estimates indicate that the outside debt financing to the healthy firms in the group is reduced by at least 21%. There is also a discontinuous fall, beyond any expected decline based on industry performance or past performance, in investments (45%) and profitability (32%) of group firms after the first bankruptcy. The level of group support drops and, controlling for financials, there is a significant increase (53%) in the bankruptcy probability of the other firms in the group. Our tests indicate that non-information-related factors such as geographic and industry proximity of a firm to the bankrupt firm and customer–supplier relationships between the bankrupt firm and other group firms are unlikely to explain the negative spillovers. A caveat is that, while our evidence is generally consistent with external financiers rationing credit to the group and the consequent adverse effects, they are only suggestive in nature as we cannot rule out the possibility of the insider declaring bankruptcy when he expects the group performance to decline.

We also investigate some specific predictions about the nature of the spillover costs. First, using detailed data on the board of directors of individual firms to identify firms with direct managerial links to the bankrupt firm, we find that the spillovers are significantly stronger for group firms that have closer managerial connections (and, hence, a firmer connection in terms of economic prospects and reputation) to the bankrupt firm. Second, consistent with spillovers arising because of credit rationing, we find that these effects are stronger in firms that depend more on external finance as identified by an exogenous measure of financial dependence (Rajan and Zingales, 1998).

Our paper contributes to different strands of the literature. First, it contributes to the literature on business groups by showing certain benefits and costs of the group structure. Existing research on business groups documents a number of benefits and costs of the group structure. Khanna and Palepu (2000), Van der Molen and Gangopadhyay (2003), and Shin and Park (1999) examine the role of the group internal capital markets in improving group firms' access to external finance. The literature also discusses risk sharing across group firms (Khanna and Yafeh, 2005; Kali, 2003). For instance, Khanna and Yafeh (2005) show that Indian business groups use intragroup loans to smooth liquidity across firms. Our paper suggests that providing support to member firms is the primary motivation for these loan transfers. More broadly, it contributes to the literature on benefits of internal capital markets. However, in contrast to conglomerates in the US (e.g., Shin and Stulz, 1998) or Japanese Kereitsus (Hoshi, Kayshap, and Scharfstein, 1991), we find that internal capital markets in our sample are largely used to support member firms in trouble. An advantage of our analysis is that we rely on direct internal transactions instead of indirectly relying on an investment-cash flow sensitivity approach (e.g., Hoshi,

Kayshap, and Scharfstein, 1991) about which some doubts have been raised (Kaplan and Zingales, 2000).

On the negative side, the group structure has been argued to exacerbate agency conflicts between insiders and minority shareholders (Claessens, Djankov, and Lang, 2000, show this for group firms in East Asia). Johnson, La Porta, Loper-de-silanes, and Shleifer (2000) and Bertrand, Mehta, and Mullainathan (2002) similarly view groups as poorly protecting property rights and facilitating 'tunneling' of funds from minority shareholders to the group insiders. In a paper related to our study, Friedman, Johnson, and Mitton (2003) argue that group insiders might prop member firms in distress so as to tunnel their resources in better times. A similar point is also made by La Porta, Lopez-de-Silanes, and Zamarripa (2003) who study loans made by banks to firms affiliated with their owners. Similar to Friedman, Johnson, and Mitton (2003), we also argue that group insiders support member firms in times of distress, but the incentives of insiders to support are different in our case. Our analysis suggests that the group supports member firms, at least in part, out of concern about negative spillovers on the rest of the group. Finally, our paper also contributes to the nascent literature on bankruptcy in emerging economies and documents the importance of insider cash flow rights and group affiliation in predicting firm bankruptcy.

The rest of the paper is organized as follows: In Section 2 we discuss our data and present descriptive statistics. In Section 3, we analyze the motives for group loan flow while in Section 4, we investigate the potential reasons for groups to support member firms. Section 5 concludes.

2. Data and summary statistics

In this section we describe our main data sources and provide the summary statistics for our sample.

2.1. Data

We use two main sources of data for our empirical analysis. Our first source of data is Prowess, a database maintained by CMIE, Center for Monitoring the Indian Economy. Prowess has annual financial data of private and public Indian firms starting from 1989. While the coverage for public firms is comprehensive (because of reporting requirements), the coverage for private firms is limited. We collect information under five broad categories from Prowess: financials from the annual reports, insider cash flow rights from the latest company disclosure filing, group affiliation, industry affiliation and share price. We adopt Prowess' group classification for identifying group affiliation. This group affiliation has been previously used in Khanna and Palepu (2000), Bertrand, Mehta, and Mullainathan (2002), and other papers. Prowess' classification is based on a continuous monitoring of company announcements and qualitative understanding of groupwise behavior of individual firms and is not solely based on equity ownership. Such broad-based classification, as against a narrow equity-centered classification, is intended to be more representative of group affiliation. For identifying industry affiliation, we use information on the principal line of activity of the firm. We then classify firms into industries at a level equivalent to four-digit standard industrial classification (SIC). Our classification yields data on firms from 95 industries. Based on the identity of controlling shareholder, Prowess

classifies firms into Indian private sector, government sector, and foreign and joint ventures. Indian private sector firms are further categorized into stand-alone and group firms. For our analysis we use an unbalanced panel of all Indian private sector firms in Prowess, with positive sales during any of the years 1989–2001. For the empirical analysis requiring market values, the sample is restricted to 1992–2001 because the market price data in Prowess start in 1992.

Our second source of data is a unique hand-collected list of all Indian firms that sought bankruptcy protection from the Board of Industrial and Financial Reconstruction (BIFR) during the 1989–2001 period. BIFR is a quasi-judicial authority and functions as the official bankruptcy court. A brief write-up of the Indian bankruptcy regime in effect over the sample period is provided in Appendix A. Our list from BIFR contains information on the name of the firm and the date it was referred to the bankruptcy court. To construct our sample from this population, we do a time intensive name match of firms in the BIFR list with the list of Indian private sector firms in Prowess. Our final sample includes 266 group (24% of all group firms) and 558 stand-alone firms (19.1% of all stand-alone firms) that become bankrupt during the sample period. The bankruptcy code in India permits firm managers to stay in control of their firms during the bankruptcy process and the firms continue to operate and release audited results. Thus, financial data on the bankrupt firms are available even after they are referred to the bankruptcy court. The number of bankrupt firms in our study is greater than most studies on firm bankruptcies in the US or in other emerging markets.

2.2. Summary statistics

In Table 1, we provide the descriptive statistics for our sample. All the nominal values are deflated by the consumer price index values provided on a government of India website. Column 1 gives the summary statistics for the full sample and Column 2 and 3 provide similar statistics for group firms and bankrupt firms in the sample respectively. Columns 1 and 2 indicate that, on average, group firms are larger, more profitable, and older than stand-alone firms (since Column 1 reports medians for the combined sample of group and stand-alone firms). Comparing Columns 1 and 3, we observe that the average bankrupt firm is considerably smaller and less profitable than an average sample firm. Not surprisingly, the debt to total assets ratio is much higher for the bankrupt firms than for the nonbankrupt firms. Prowess does not provide a direct measure of insider holding, and in our analysis we rely primarily on the percentage shareholding of all the directors of the firm (*Director*) as the proxy for insider cash flow rights. Bertrand, Mehta, and Mullainathan (2002) use the same measure and we draw attention to their detailed discussion about this measure.[1] An important caveat, as noted in Bertrand, Mehta, and Mullainathan (2002) is that this measure of insider holding is likely to be noisy. To moderate the influence of noise, in some regression specifications (instead of the continuous measure) we employ a dummy variable *Low Director* to identify firms with

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[1]Prowess has the following classification of shareholders: Directors, Indian Financial Institutions, Other Corporates, Foreign Institutional Investors, and Other Public. Another proxy for insider cash flow rights used by Bertrand, Mehta, and Mullainathan (2002) is the shareholding of Other Public Shareholders. We repeat our analysis using this measure and obtain results that are qualitatively similar to the ones reported.

Table 1
Summary financials of all firms, group firms and bankrupt firms

This table reports the median values of the summary financials of all the firms in the sample. All the nominal values are deflated by the consumer price index (CPI) values provided on the government of India website (www.goidirectory.nic.in). For definitions of the variables please see Appendix B. EBIDTA is earnings before interest, depreciation, taxes, and amortization. All values are based on book values from Prowess (2001 edition), a database maintained by CMIE, Center for Monitoring the Indian Economy. Prowess has annual financial data of private and public Indian firms starting from 1989. While the coverage for public firms is comprehensive (because of reporting requirements), the coverage for private firms is limited. We collect information under five broad categories from Prowess: financials from the annual reports, insider cash-flow rights from the latest company disclosure filing, group affiliation, industry affiliation and share price. We adopt Prowess's group classification for identifying group affiliation. The identity of bankrupt firms is based on the hand collected data from the Indian bankruptcy court. The information collected from the court includes the company name and the year the firm was referred to the bankruptcy court. Data are for the period 1989–2001.

	Sample		
	All firms (Standalone and Group) (1)	Group firms (GF) (2)	Bankrupt firms (Standalone and group) (3)
Total assets (TA) (in millions of rupees)	1,307	2,656	668
EBIDTA (in millions of rupees)	122	255	24
Debt/TA	0.26	0.27	0.38
Director (in percent)	36.7	37.9	29.8
Age (in years)	20.1	27.1	20.5
Investments (growth rate of log assets in percent)	10.0	12.2	6.2
Fraction of bankrupt firms (in percent)	20.5	24.0	–
Number of firm years	40,406	11,988	7,237

below median director holding in a group. Table 1 shows that the median director holding in bankrupt firms is much lower than in group firms overall. Our sample has about 40,500 firm-year observations with 28,500 stand-alone firm-year observations and 12,000 group firm-year observations. The number of observations for the different tests vary because of missing data.

3. Internal capital markets in business groups

In this section, we discuss the main results of our paper. The discussion is divided into four subsections. In Section 3.1, we discuss the importance and significance of intragroup loans among Indian business groups. Section 3.2, examines the use of group loans by analyzing providers and receivers of loans and the flow of group loans in response to earnings shocks. Section 3.3 investigates the role of group loans in alleviating bankruptcy risk, and in Section 3.4, the terms of a random sample of group loans are analyzed.

3.1. Intragroup loans: importance and possible uses

While groups can use either equity or debt to transfer funds across group firms, Indian business groups typically use subordinated intragroup loans as a means of intragroup

Table 2
Summary intragroup loan characteristics for group firms

This table reports the details on the intragroup loans for group firms in our sample. All the nominal values are deflated by the Consumer Price Index (CPI) values provided on the government of India website (www.goidirectory.nic.in). For definitions of the variables see Appendix B. EBIDTA is earnings before interest, depreciation, taxes, and amortization. All values are based on book values from Prowess (2001 edition), a database maintained by CMIE, Center for Monitoring the Indian Economy. Prowess has annual financial data of private and public Indian firms starting from 1989. While the coverage for public firms is comprehensive (because of reporting requirements), the coverage for private firms is limited. We collect information under five broad categories from Prowess: financials from the annual reports, insider cash-flow rights from the latest company disclosure filing, group affiliation, industry affiliation, and share price. We adopt Prowess's group classification for identifying group affiliation. Data are for the period 1989–2001.

	Sample: group firms			
	Mean (1)	Median (2)	Min (3)	Max (4)
Gross group loan inflows (in millions of rupees)	295.2	279.1	0	669.1
Gross group loan outflows (in millions rupees)	55.6	47.3	0	377.6
Net group Loans (in millions of rupees)	242.2	229.5	−372.1	663.1
Fraction of net receivers[a] in the group (in percent)	13	11	4	19
Fraction of net providers[b] in the group (in percent)	35	28	10	42
Group loan inflow/EBIDTA (in percent)	59	56	0	72.0
Group loans inflow/interest payment (in percent)	86	85	0	94

[a]Signifies firms where net intragroup loans are positive.
[b]Signifies firms where net intragroup loans are negative.

transfer (Khanna and Palepu, 2000).[2] Descriptive statistics about group loans in our sample show that there is a significant transfer of resources across group firms through these loans. Because Indian accounting standards require firms to provide details of both the inflow and outflow of group loans from each firm, we are able to observe direct data on internal transactions. Specifically, Table 2 provides information on loans made to and received by group firms in our sample. As indicated, the magnitude of group loans is economically significant, with group loan inflows constituting 59% of *EBIDTA* and 86% of the interest payments on average for receiving firms (in the year a firm receives loans). On average about 13% of the firms in a group are net receivers of group loans (i.e., net intragroup loans are positive) while 35% are net providers. In our empirical analysis, we attempt to understand the working of the internal capital market inside Indian business groups by analyzing the pattern, characteristics, and impact of intragroup loan flows.

In general, there are three broad, non-exclusive motives for the transfer of resources among group firms: (1) financing profitable new investment opportunities within the group; (2) supporting member firms in financial difficulty, and (3) diversion of resources by tunneling funds out of firms with low insider holding into firms with high insider holding as has been suggested by Bertrand, Mehta, and Mullainathan (2002). We now elaborate on the first two motives in greater detail.

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[2]In the data we also observe intragroup equity outflows. Because these are smaller in comparison with intragroup loan flows, in our analysis, we add them to the group loan outflows and refer to the composite measure as group loan outflows.

The first motive refers to the usual rationale for internal capital markets, such as in the case of multi-divisional firms in the US. A significant benefit of a diversified, multi-division firm arguably is that it economizes on the costs of raising external capital (for an extensive survey, see Stein, 2003, and cites therein). The reason is that, relative to an external market, corporate headquarters could more efficiently reallocate resources internally between the firm's divisions in response to investment opportunities. Evidence suggests that US conglomerates move resources among divisions in response to investment opportunities, though there are questions about the efficiency of internal resource allocations. In less developed financial markets, the cost of accessing external capital could be relatively high, suggesting the possibility of significant benefits from relying on internal capital markets to fund investment opportunities within the group.

The second motive is based on the notion that groups may be unwilling to let a member firm go bankrupt, even when support is costly. There could be several reasons for this. Group insiders may provide subsidized support to save their equity stake in the firm. For instance, even if group loans are negative net present value (NPV) in isolation, they could be positive NPV for the group insiders on account of the benefit to their equity stake. A default could also increase the monitoring of the firm by lenders and, thereby, hamper the ability of insiders to obtain private benefits, such as perquisite consumption. This would incentivize insiders to support weaker member firms and prevent their default. Finally, group insiders may wish to avoid the negative signal about future prospects or damage to their reputation (especially to providers of external capital) that could result from a group firm default (see, for example, the borrower reputation model developed in Diamond, 1989).

In our empirical analysis we carry out a number of tests to examine the extent to which these three motives (investments, support, and tunneling) account for the pattern of intragroup loans in business groups. Overall, the evidence indicates that not only are intragroup loans used to provide support but, interestingly, this also appears to be the primary function of these loans.

3.2. What are group loans used for?

In this subsection, we study the characteristics of firms that provide and receive group loans and examine the time-series variation in the loans in response to earnings shocks. These tests help us identify the main purpose of group loans.

3.2.1. Providers and receivers of group loans

To understand the use of intragroup loans, we first examine the characteristics of firms that are the largest providers of loans within a group. Specifically, in Panel A of Table 3, we estimate the following model:

$$Prob(\text{Provider}_{it} = 1) = \Phi \left(\begin{array}{l} \gamma \text{Firm Financials}_{it-1} + \text{Group Fixed Effects} \\ + \text{Industry Fixed Effects} + \text{Time Fixed Effects} \end{array} \right), \quad (1)$$

where Φ denotes the logit distribution function and the dependent variable is Provider_{it}. This variable takes a value one for firm i at time t if that firm falls within the top 75th percentile in terms of the amount of group loans provided to other firms in the group and zero otherwise. Firm financials are *Size* in Column 1, *EBIDTA/TA* in Column 2, *Tangibility* in Column 3 and *Low Director* in Column 4. In Column 5, we include all the

Table 3

Group support: providers and receivers of intragroup loans

In Panel A, we estimate the following logit model on group firms: $Prob(\text{Provider}_{it} = 1) = \Phi(\gamma \text{Firm Financials}_{it-1} + \text{Group F.E.} + \text{Industry F.E.} + \text{Time F.E.})$, where Φ denotes the logit distribution function. EBIDTA is earnings before interest, depreciation, taxes, and amortization. The standard errors reported are robust. In Panel B, we estimate the following regression on group firms: $y_{it} = \alpha_0 + \beta_1 X_{it} + \text{Group F.E.} + \text{Industry F.E.} + \text{Time F.E.}$ Other control variables include *Size*, *Age*, and *Sales Growth*. The standard errors are corrected for heteroskedasticity and autocorrelation (AR-1) in the panel. Data in this table (both the panels) are from Prowess for the period 1989–2001 (except when market to book is used in which case the data are for the period 1992 to 2001). ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: *Characteristics of providers of group loans*

	Dependent variable: provider$_{it}$				
	(1)	(2)	(3)	(4)	(5)
Size$_{it}$	0.36***				0.35**
	(0.012)				(0.012)
EBIDTA/TA$_{it}$		2.54***			2.53***
		(0.52)			(0.53)
Tangibility$_{it}$			0.53***		0.51***
			(0.07)		(0.06)
Low Director$_i$				0.008	0.008
				(0.006)	(0.006)
Number of observations	7,520	7,520	7,520	7,520	7,520
Group fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Log-likelihood	−693.7	−671.2	−651.3	−643.7	−712.3
p-value, χ^2 test	0.00	0.00	0.00	0.00	0.00

Panel B: *Characteristics of firms receiving group loans*

	Dependent variable: net group loans to firm i/total assets of i in year t						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EBIDTA/TA$_{it}$	−0.14***						−0.12***
	(0.03)						(0.02)
Debt/TA$_{it}$		0.11***					0.12***
		(0.004)					(0.005)
Tangibility$_{it}$			−0.006**				−0.006**
			(0.003)				(0.003)
Market to Book$_{it}$				0.008			0.008
				(0.012)			(0.011)
Investment/Cash Flow$_{it}$					−0.013		−0.011
					(0.024)		(0.023)
Low Director$_i$						−0.0001*	−0.0001*
						(0.00006)	(0.00005)
Number of observations	7,520	7,520	7,520	6,500	7,520	7,520	6,500
Group fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.35	0.36	0.35	0.33	0.29	0.33	0.38

financials together. *Size* is the log of book value of total assets and *Low Director* is a dummy variable that identifies firms with below median insider holding in the group. We use *Low Director* to reduce the noise in our insider holding measure. The standard errors reported in the table are robust. We note that, unless mentioned otherwise, the standard errors for all subsequent ordinary least squares regressions are similarly corrected for heteroskedasticity and autocorrelation in the panel. All regressions in the table are estimated with group, industry, and time fixed effects. For convenience, the definitions of the variables used in our analysis are provided in Appendix B.

Our estimates show that intragroup loans are provided by firms that are larger, more profitable, and have more tangible assets. These results are consistent with group loans serving to transfer cash from firms that are doing well and are in a better position to borrow from external markets. The coefficient estimate on *Low Director* is insignificant and suggests that low insider holding firms are typically not the large providers of group loans, as one might suspect if the main purpose of group loans is to transfer cash from out of low insider holding firms (Bertrand, Mehta, and Mullainathan, 2002).

In unreported tests, we attempt to identify how the providers finance loans. To finance group loans, providers can rely on either external borrowing, external equity, or internal cash that they generate. Identifying the dominant source, while interesting in itself, can also help us understand how the flow of intragroup loans might be affected by a potential loss of access to external sources of finance. In particular, if group loans are primarily financed using external sources, then a loss of access to these sources, say, because of a negative signal about group prospects, could adversely affect the provision of intragroup loans. On the other hand, if internal cash is the primary means of financing, then a loss of access to external sources of finance might not significantly impact group loan activity. Our regression results (not reported) indicate that though all three sources contribute to the funding of intragroup loans, external borrowing is, by far, the dominant source. It is estimated that a \$1 increase in gross loan outflows is financed by \$0.76 of external debt, \$0.08 of outside equity, and the remainder by internal cash.

In the next set of tests, we identify the characteristics of firms that receive group loans. If intragroup loans are used as a means of support, then we expect greater loan provision to the less profitable and high leverage firms in a group, because these firms are likely to be at a greater risk of bankruptcy. Group firms with more tangible assets are in a better position to raise external finance and may, therefore, require and receive fewer group loans. Alternatively, if an important use of group loans is to exploit profitable investment opportunities (motive (1)), we would expect greater loan inflow to firms with more investment opportunities and to firms with investment expenditures that are large in comparison with internal cash generated. If groups are more likely to finance investments or provide support to high insider holding firms (motives (1) and (2)) or to tunnel resources into firms with high insider holdings (motive (3)), then we expect net loan inflow to be positively related to insider holding in the firm. We now test for the existence of such intragroup loan patterns.

To identify the characteristics of group loan receivers, in Panel B of Table 3, we examine the variation of net intragroup loans with firm characteristics. Specifically, we estimate the following model for group firms:

$$y_{it} = \begin{pmatrix} \alpha_0 + \beta_1 X_{it} + \gamma \text{Controls}_{it} + \text{Group Fixed Effects} \\ + \text{Industry Fixed Effects} + \text{Time Fixed Effects} \end{pmatrix}, \qquad (2)$$

where the dependent variable y is the ratio of net intragroup loans received to total assets (*Group Loans/TA*). X is *EBIDTA/TA* in Column 1, *Debt/TA* in Column 2, *Tangibility* in Column 3, *Market to Book* in Column 4, *Investment/Cash Flow* in Column 5 and *Low Director* in Column 6. *Tangibility* is a measure of the firm's tangible assets and is measured as the ratio of book value of net property plant and equipment to the book value of total assets. *Market to Book* is a measure of investment opportunities and is the ratio of market value of total assets to the book value of total assets. *Investment/Cash Flow* is a measure of firm's investments relative to the amount of internal cash generated and is equal to the ratio of the annual investment in fixed assets to the total cash flow from operations. Other controls include *Size* and *Age*, measured as the firm's age since incorporation. The standard errors are corrected for heteroskedasticity and autocorrelation (AR-1) in the panel. To control for any time invariant group characteristics, we estimate our regressions with group fixed effects besides industry and time fixed effects. We are unable to use firm fixed effects because Prowess provides only the most recent information on *Director*.

From Panel B in Table 3 it is clear that, consistent with group loans being a means of supporting the weak firms in the group, groups provide more loans to member firms that have higher leverage and lower profitability. Firms with higher asset tangibility receive less in loans from the group. In unreported regressions we find that firms with more tangible assets receive more external debt financing, suggesting that group loans could be a substitute when external financing is more difficult to obtain. For robustness, in Column 7, we include all the explanatory variables and get consistent results. Examining the estimates on *Market to Book* and *Investment/Cash Flow*, group loans clearly are not likely to be a major source of financing for investment opportunities. The negative coefficient on *Low Director* indicates that insiders provide less in loans to firms in which they have lower stake.

Our estimates in Column 1 indicate that a firm with operating profits 1 standard deviation (SD) below the sample mean gets 6.8% more group loans as compared with the average group firm. The estimates in Column 2 indicate that a firm with leverage 1 SD above the sample mean gets 5.1% more group loans as compared with the average group firm. Finally, the estimates in Column 6 indicate that a firm with above median director holding in the group receives 0.2% more group loans than a firm with below median director holding. Though the impact of insider holding on the flow of group loans does not appear economically significant, this could be because of the noise in the insider holding measure. We measure only the holding of all the board of directors in the firm and not the total insider holding. We have further discussion on the impact of insider holding on the flow of group loans in Section 3.2.2, where we examine the time-series variation of group loans.

In unreported regressions, we include additional controls to measure the extent of geographic and industry proximity of firms within the group. We do this to ensure that our results are not driven by greater support provided by groups that are more clustered on these dimensions. Higher clustering could indicate the extent of integration or coordination within the group. To measure industry and geographic proximity, we construct *Industry*[close] (*Geography*[close]) for each group-year as the Herfindahl Index of the distribution of net profits of the firms in the group across 95 industries (27 geographical states). In these tests we obtain results similar to the ones reported here.

Overall, our findings show that the main providers of group loans are firms that are larger, are more profitable, and have more tangible assets. External borrowing is the

dominant source of financing for intragroup loans. Groups provide more loans to member firms that have lower profitability, higher leverage, lower asset tangibility, and high insider holding. Our results are broadly consistent with the principal function of intragroup loans being to provide support to member firms in poorer financial condition. We find little support for loans being used to finance profitable investment opportunities (motive (1)). There is some evidence for group loans being associated with high insider holding firms.

3.2.2. Time-series variation of group loans

If group loans are mainly used for supporting weak firms, we would expect both net flow and gross inflow of loans to be positively associated with negative earnings shock to firm profitability. However, if intragroup loans are mainly used to tunnel cash between firms (motive (3)), we expect loan outflows to be associated with positive earning shocks.

To examine the response of group loans to earnings shock, we estimate the following model on group firms:

$$y_{it} = \begin{pmatrix} \alpha_0 + \beta_1 \text{Shock}_{it}^- + \beta_2 \text{Shock}_{it}^+ + \gamma \text{Controls}_{it} \\ + \text{Firm Fixed Effects} + \text{Time Fixed Effects} \end{pmatrix}, \tag{3}$$

where the dependent variable y_{it} in Column 1 is the percentage change in net group loans extended to firm i at time t. We also include control variables used in the estimation in Panel A of Table 4. $Shock^-$ is a dummy variable that indicates a negative shock to firm profitability that year. It takes a value one if there is a fall in $EBIDTA$ of more than 10% in year t for firm i relative to the previous year and zero otherwise. $Shock^+$ is analogous to $Shock^-$ and takes a value one if there is a positive shock of 10% or more to a firm's profitability and zero otherwise. If group loans are mainly used for tunneling, then we expect a negative coefficient on $Shock^+$. On the other hand, if loans increase mainly in firms hit with negative earning shocks, then we expect a positive coefficient on $Shock^-$. There is no support for motive (3) as our results in Column 1 show that the coefficient on $Shock^+$ is insignificant. We also find that the coefficient on $Shock^-$ is positive and significant, indicating that the flow of group loans is consistent with loans being used to support the poorly performing firms in the group.

For robustness, we also use gross loan flows as the dependent variable and repeat the estimation. If group loans are a means of support, then we expect the gross loan inflows to be positively related to negative shock to firm profitability. If loans are used to tunnel cash out of firms instead, then we expect gross loan outflows to be positively related to positive shocks to firm profitability. In Column 2 the dependent variable is percentage change in gross loan inflows, and in Column 3 it is percentage change in gross loan outflows. Our results show that while gross inflows are positively associated with negative shocks to firm earnings, gross outflows are not significantly associated with positive shocks to firm earnings. Overall, our results are suggestive of intragroup loans being used as a means of support for firms in distress and not primarily for moving cash out of cash surplus firms. To contrast group loans with external financing we conduct additional regression analysis, replacing intragroup loans with loans from banks and financial institutions. The results (unreported) show that external loans are sensitive to *Investment/Cash Flow*, *Sales Growth*, and *Market to Book*. We also find that external loans are not responsive to transient negative shocks to firm profitability. This further highlights the unique nature of group loans as a support mechanism.

Table 4

Group support: response of intragroup loans to earning shocks and performance of receivers

In Panel A, we estimate the following model on group firms: $y_{it} = \alpha_0 + \beta_1 Shock_{it}^- + \gamma Controls_{it} + $ Firm F.E. + Time F.E. In Columns 1 and 4, the dependent variable is percent change in net loans to firm i in a group. In Columns 2 and 3, the dependent variables are gross loans to and from firm i in the group respectively. Standard errors reported are corrected for heteroskedasticity and autocorrelation (AR-1) in the panel. In Panel B, we report the abnormal operating performance and abnormal stock return of the firms in the first quartile sorted by group loans in the subsequent one and two year period after receiving group loans. We measure abnormal operating performance as the difference between $EBIDTA/TA$ of the firm i and median $EBIDTA/TA$ of all firms in the same industry j. EBIDTA is earnings before interest, depreciation, taxes, and amortization. We measure abnormal stock return as the difference between the firm i's stock return and the return of the market index (R_m), proxied by the BSE-200 index. Data in this table are from Prowess for the period 1989–2001. ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: Response of intragroup loans to negative earning shocks

	Group firms			
	(1)	(2)	(3)	(4)
$Shock_{it}^-$	2.270***	2.012***		2.071***
	(0.930)	(0.730)		(0.751)
$Shock_{it}^+$	0.462		0.1471	
	(0.927)		(2.87)	
$Shock_{it}^- * Low\ Director_i$				−0.081***
				(0.035)
Number of observations	7,390	7,390	7,390	7,390
Firm fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
R^2	0.51	0.50	0.22	0.51

Panel B: Abnormal operating and stock return performance of receivers

	Loan year: t_0	
	$t_0 + 1$ (1)	$t_0 + 2$ (2)
Performance of i adjusted for industry		
$\left\{\frac{EBIDTA}{TA}\right\}_i$	−11.32***	−22.10***
(in percent)	(1.39)	(6.37)
Investment of i adjusted for industry		
$Investment_i$	−14.29***	−19.07***
(in percent)	(4.00)	(3.74)
Stock Returns of i adjusted for market index		
R_i-R_m	−8.29**	−17.31***
(in percent)	(4.21)	(3.44)

If group support is motivated by the insider's concern to save his equity stake, then it would imply that support through group loans in response to a negative earnings shock should vary with insider holding. To test this, we reestimate Eq. (3) after including an interaction term between *Shock* and *Low Director*. Our results in Column 4 show that the coefficient on the interaction term is negative and statistically significant. However, the effect is not economically large, with the estimate indicating that group support for firms

with below median insider holding is lower by 3.8%. As noted earlier, this could be a result of the noise in the measure of insider holding.

Next, we examine if group insiders use group loans to finance profitable investment opportunities. In particular, we argue that, in this scenario, recipient firms should perform better in the period after they receive the loans. This would reflect the profitable investment opportunities in these firms. To test this, we examine the subsequent performance of firms that receive group loans. For every year of our sample, we sort firms based on the amount of net group loans received as a percentage of total assets. We then measure the performance of receivers in the top quartile. Panel B of Table 4 provides the abnormal operating performance and abnormal stock return of the firms in the first quartile in the subsequent one- and two-year period after receiving group loans. We measure abnormal operating performance (investments) as the difference between $EBDIDTA/TA$ (*Investment/TA*) of the firm and median $EBDIDTA/TA$ (*Investment/TA*) of all firms in the same industry. We measure abnormal stock return as the difference between the firm's return and the return of the market index, proxied by the BSE-200 index. The results indicate that the firms receiving group loans significantly underperform benchmarks in the subsequent two-year period (Columns 1 and 2). Also, the performance deteriorates over the two-year period. This casts doubt on the investment motive and the likelihood that groups are extending loans because, for instance, they have positive information about the firm's future prospects.

In conclusion, the cross-sectional and timing pattern suggests that group loans are used to provide support to member firms. There is also evidence of marginally greater support for high insider holding firms in a group. The evidence does not support investment and tunneling motives of group loans. Groups extend loans to firms that are performing poorly. The loans are not directed toward investments, and recipients continue to perform poorly after infusion of the loans.

3.3. Bankruptcy probabilities of solvent group and stand alone firms

In this subsection, we examine whether loans have real effects that are consistent with groups providing support. More specifically, we examine the role of group loans on bankruptcy probability of group firms. If groups support member firms so as to prevent their default, then we expect group firms, ceteris paribus, to have a lower bankruptcy probability in comparison with stand-alone firms, with the difference arising because of group loan flow. To test this prediction, we compare the bankruptcy probability of solvent group firms with the bankruptcy probability of stand-alone firms.

Before testing this prediction, we provide some indirect summary evidence of the impact of group support on bankruptcy probability. If group support prevents group firms from becoming bankrupt, then the performance of the group firms prior to an actual bankruptcy should be substantially worse than that of stand-alone firms before bankruptcy. In other words, group support enables group firms with poorer operating performance to fend off bankruptcy. We examine this prediction by doing univariate comparisons of *EBIDTA/Total Assets*, *Cash/Total Assets*, and *Current Assets/Current Liabilities* for stand-alone bankrupt firms and the first group firm that becomes bankrupt for four years preceding their bankruptcy. A lower value of these variables indicates a poorer financial position. In Figs. 1–3, we plot the mean value of these variables on the vertical-axis for the stand-alone and group firms. The figures show that in each of the four
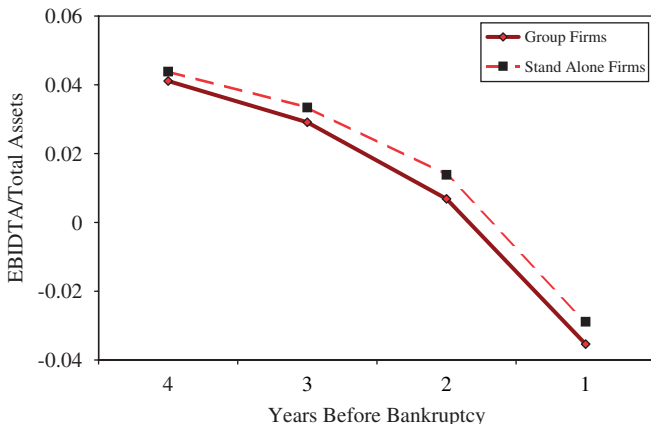
Fig. 1. The figure depicts the mean value of *EBIDTA/Total Assets* for stand-alone and group firms. We show the value of this financial variable for each of the four years before the firms declare bankruptcy. The differences between the ratios' of stand-alone and group firms for each of the four years is statistically significant at the 1% level.
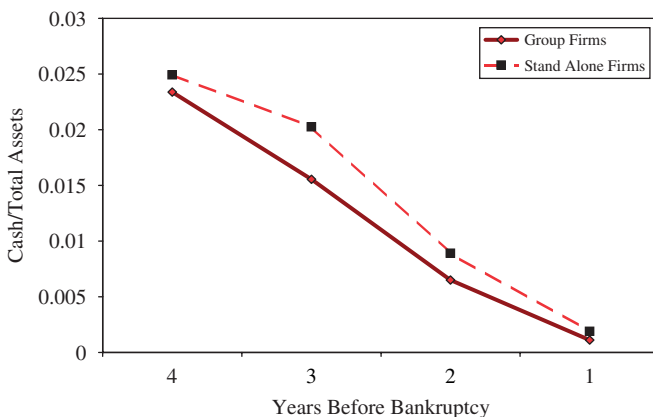

Fig. 2. The figure depicts the mean value of *Cash/Total Assets* for stand-alone and group firms. We show the value of this financial variable for each of the four years before the firms declare bankruptcy. The differences between the ratios' of stand-alone and group firms for each of the four years is statistically significant at the 1% level.

years before declaring bankruptcy, while both types are performing poorly, stand-alone firms are in a better financial position than group firms. These differences are statistically significant at 1% level. Other variables such as *Net Income/Total Assets* and *Retained Earnings/Total Assets* are highly correlated with *EBIDTA/Total Assets* in our sample and exhibit a similar pattern.

We now proceed to formally compare the bankruptcy probability of solvent group and stand-alone firms using standard techniques developed in the bankruptcy prediction literature (e.g., Altman, 1968; Shumway, 2001). We compare the one-year ahead bankruptcy probabilities using a static bankruptcy prediction model. Following the bankruptcy prediction literature, we use one-year lagged values of the financial ratios that
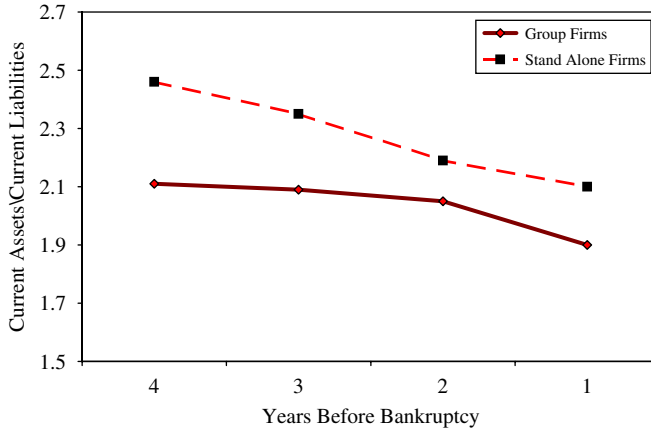
Fig. 3. The figure depicts the mean value of *Current Assets/Current Liabilities* for stand-alone and group firms. We show the value of this financial variable for each of the four years before the firms declare bankruptcy. The differences between the ratios' of stand-alone and group firms for each of the four years is statistically significant at the 1% level.

are intended to capture firm profitability, liquidity, and market values as controls. To test our prediction we use a dummy variable *Group* indicating group-affiliated firms. Specifically, we estimate the following model and report our results in Table 5:

$$Prob(\text{Bankruptcy}_{it} = 1) = \Phi \left(\begin{array}{c} \gamma \text{Firm Financials}_{it-1} + \beta_1 \text{Director}_i + \beta_2 \text{Group}_i \\ + \text{Industry Fixed Effects} + \text{Time Fixed Effects} \end{array} \right),$$

(4)

where Φ denotes the logit distribution function and *Bankruptcy* is a dummy, which takes a value one if a firm becomes bankrupt in the year. The one-year lagged firm financial ratios we use are *Net Income/TA*, *Working Capital/TA*, and *Market Value of Equity/Total Liabilities*.[3] We also include *Size* and leverage, as measured by *Debt/TA*. To compare the bankruptcy probability of a firm belonging with a solvent group and a stand-alone firm, we drop all firm-year observations of a group after the first year in which one or more of its member firms become bankrupt. Apart from dropping firm-year observations after the first bankruptcy in a group, we treat all group and stand-alone firms equivalently and estimate the regressions at firm level. An alternative estimation method would involve including all firm-year observations along with a dummy variable that identifies firm years after the first bankruptcy in the group. We employ this alternative estimation method in Table 8 and obtain results consistent to those reported here. All regressions are estimated with industry and time fixed effects and the standard errors reported in the table are robust and clustered at group level. Since *Group* does not vary across time or within a group, we are unable to use firm or group fixed effects in Column 1.

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[3]In choosing these financial ratios, we began by including the ratios used in the prior bankruptcy literature (Altman, 1968; Shumway, 2001). Of these we found *Net Income/TA*, *Retained Earnings/TA*, and *EBIDTA/TA* to be highly correlated in our sample. Hence, we retain only *Net Income/TA*. We also dropped *Net Sales/TA*, *Total Liabilities/TA*, and *Current Assets/Current Liabilities* as they were insignificant and including them had little effect on other coefficient estimates.

Table 5

Comparing firm level bankruptcy probabilities of solvent group and standalone firms

In this table we estimate the following model: $Prob(\text{Bankruptcy}_{it} = 1) = \Phi(\gamma\text{Firm Financials}_{it-1} + \beta_1\text{Director}_i + \beta_2\text{Group}_i + \text{Industry F.E.} + \text{Time F.E.})$, where Φ denotes the logit distribution function. Other control variable used in the estimation is $Debt/TA$. To compare the bankruptcy probability of a firm belonging to a solvent group and a stand-alone firm, we drop all firm year observations of a group after the first year in which one or more of its member firms become bankrupt. The sample includes all firms in Columns 1 and 2 and includes only group firms in Columns 3 and 4. The standard errors reported are robust and clustered at group level. Data in this table are from Prowess for the period 1992–2001. ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

	Dependent variable: bankruptcy$_{it}$			
	(1)	(2)	(3)	(4)
Net Income/TA$_{it-1}$	−1.37***	−2.73***	−2.03***	−2.08***
	(0.247)	(0.327)	(0.787)	(0.789)
Working Capital/TA$_{it-1}$	−1.29***	−1.15***	−1.20***	−1.22***
	(0.180)	(0.256)	(0.370)	(0.400)
Market Value of Equity/Total Liabilities$_{it-1}$	−0.203***	−0.128***	−0.220***	−0.240***
	(0.038)	(0.034)	(0.090)	(0.100)
Size$_{it-1}$	−0.001*	−0.001*	−0.001	−0.001
	(0.0006)	(0.0007)	(0.008)	(0.009)
Director$_i$	−0.015***	−0.016***	−0.019***	−0.015***
	(0.003)	(0.004)	(0.003)	(0.003)
Director$_i$ ∗ Group$_i$	−0.001			
	(0.003)			
Group$_i$	−0.515***	−0.216*		
	(0.165)	(0.132)		
%Δ Group Loans$_{it-1}$		−0.101***	−0.97***	−0.92***
		(0.033)	(0.022)	(0.023)
%Δ Predicted$_{it-1}$				−1.32*
				(0.68)
Relative Shock$_{it-1}$				−0.94***
				(0.23)
Number of observations	12,337	12,337	5,335	5,335
Group fixed effects	No	No	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Log-likelihood	−1233.7	−1273.2	−553.1	−543.7
p-value, χ^2 test	0.00	0.00	0.00	0.00

The results in Column 1 indicate that the various financial ratios are strong predictors of bankruptcy and are estimated with the expected negative sign, suggesting that firms in poor financial health are more likely to go bankrupt. The coefficient estimate on *Size* is negative and marginally significant, indicating that larger firms are less likely to fail. The co-efficient on *Group* is negative and significant, suggesting that firms belonging to solvent groups have significantly lower bankruptcy probability than stand-alone firms. Our estimates are economically significant and indicate that a solvent group firm with sample mean characteristics has a 34.5% lower probability of becoming bankrupt in the following year, compared with a stand-alone firm. For robustness, we estimate our logit model separately for each year and find that the coefficient estimate on *Group* is negative for each

of the years and the time-series average value of the coefficient estimate on *Group* is (-1.8), lower than our panel estimated coefficient of (-0.52). The inclusion of other firm financial variables such as operating cash and profits does not affect these estimates. We also find that *Director* is negative and highly significant, indicating that both group and stand-alone firms with a lower insider holding are more likely to become bankrupt. We conduct additional analysis (unreported) to examine whether insider holding has an incremental impact on the bankruptcy probability of solvent group firms and reestimate Eq. (4) after including an interaction term between *Group* and *Director*. The coefficient estimate is found to be insignificant, indicating that the greater support provided by groups to high insider holding firms does not have an impact on the bankruptcy probability of solvent group firms. For robustness, we also reestimate our model after including interaction between all the firm financial variables and *Group*. We find that these interaction terms are insignificant, indicating that the sensitivity of these variables does not differ between group and stand-alone firms.

Next, we examine if, consistent with a support motive, the lower bankruptcy probability for solvent group firms is on account of the loans they receive. Specifically, we reestimate Eq. (4) after including the percentage change in net group loans extended to firm i between periods $t - 1$ and $t - 2$, %ΔGroup Loans$_{it-1}$. For stand-alone firms this variable takes a value of zero. If group support is a significant reason for the lower bankruptcy probability of solvent group firms, as compared with stand-alone firms, then we expect this coefficient to be negative and significant. In Column 2, we find the estimate on %ΔGroup Loans$_{it-1}$ to be negative and significant and find that the inclusion of this variable greatly reduces the size and statistical significance of the coefficient on *Group*. This suggests that the support provided by group loans is likely to be an important factor in reducing the bankruptcy probability of solvent group firms. For robustness, we reestimate the model using only group firms and including group fixed effects to control for time invariant group unobservables. The results, reported in Column 3 indicate that the coefficient on %Δ*Group Loans* continues to be negative and significant. This suggests that group loans explain the cross-sectional difference in bankruptcy probability not only between solvent group and stand-alone firms but also among solvent group firms. Our estimates in Column 3 are economically significant. In particular, an increase in %ΔGroup Loans from 25th to 75th percentile, keeping other variables at their mean levels, would lower the bankruptcy probability of a group firm by 25.1%.

If groups always support member firms in distress, then it is reasonable to ask why group firms ever become bankrupt. We expect group support to fall and a solvent group firm to become bankrupt when it experiences severe negative shocks to its profitability, shocks that are large in comparison with the total value of equity of the other firms in the group. To test this prediction, we construct an exogenous measure of the negative shock impacting a group firm. To do this, we first calculate the predicted profitability of firm i, *Predicted*$_{it}$, as the product of firm i's total assets and *EBIDTA/TA* of firm i's industry, where *EBIDTA/TA* of firm i's industry is measured as the asset weighted mean *EBIDTA/TA* of all firms in the industry (excluding firm i). Next, we take the percentage change in *Predicted* (Δ*Predicted*$_{it-1}$) between $t - 1$ and $t - 2$ as an exogenous measure of the shock impacting firm i's profitability. We also construct *Relative Shock*$_i$, as the ratio of Δ*Predicted*$_i$ and *NetWorth*$_{-i}$. Here, *NetWorth*$_{-i}$ is the sum of the book value of net worth of all firms in the group excluding firm i and is a measure of the equity value of the group. We interpret this ratio as capturing the cost of providing support (measured by minus

$\Delta Predicted_i$) relative to the potential resources of the group (proxied by $NetWorth_{-i}$). We use book equity value instead of market value because any anticipated negative spillovers might be impounded in the market prices and this might bias our estimates. We reestimate Eq. (4) in Column 4 after including both $\Delta Predicted_i$ and $Relative\ Shock_i$. Our results indicate that the coefficient estimate on $Relative\ Shock$ is negative and significant. This supports the notion that the first firm in the group becomes bankrupt when the negative shock impacting its profitability is severe in comparison with the resources of the group. Since we include $\Delta Predicted_i$ in our estimation, the results suggest that the likelihood of bankruptcy of a group firm is not just driven by the drop in expected profitability of the firm. In unreported tests, we also include other group level explanatory variables that could affect the bankruptcy probability of a group firm, $Industry^{close}$, $Geography^{close}$, and debt and cash in other firms in the group. We also control for group diversification using the Herfindahl Index as a measure of group diversification (Khanna and Palepu, 2000). Our estimates are unaffected by the inclusion of these variables.

To summarize, the results in this subsection show that, controlling for various financial variables, solvent group firms are less likely to become bankrupt than stand-alone firms. A primary reason for the lower bankruptcy probability appears to be the support extended by other group firms through group loans. Higher insider holding lowers the bankruptcy probability of both group and stand-alone firms. Finally, the first firm in the group becomes bankrupt when the firm is hit by a negative shock that is large in comparison with the total value of equity in the other firms of the group. These results show that the support provided by the group has real effects in terms of reducing the bankruptcy probability.

3.4. More evidence on support: terms of intragroup loans

To examine further if group loans are extended with a support motive, we analyze the terms for a random subsample of group loans. Specifically, we examine if the terms on which loans are provided are more favorable than comparable market terms, consistent with the loans being used to provide subsidy and support to weaker firms in the group. To do so, we take a random sample of one hundred firms from the top quartile of receivers. This constitutes roughly 15% of the total firms in that quartile. Using this random sample, we search the annual reports in Prowess for the terms on the intragroup loans. These terms usually appear either in the footnotes to the annual report or in the auditor's notes. Since the annual report coverage in Prowess starts in 1999, our analysis of loan terms is limited to the period after that.

We find that, on average, firms receive group loans at an interest rate that is significantly below the corresponding borrowing rate in the market. To calculate the market rate for a given year, we collect the minimum commercial lending rate of the market during the relevant period. This information is obtained from the Reserve Bank of India website (www.rbi.org.in). Our analysis suggests that the group loans are below the market rates by around 10% (significant at 1% level). We also find that a large proportion of cases (more than 80%) have no interest obligations at all. For instance in 1999 Consolidated Fibres and Chemicals Ltd. took an unsecured loan of Rs. 287.2 million from firms in its group with no interest accrued or repayable (i.e., effective interest rate of 0%). During the same time period the commercial lending rate was 12.25%. Moreover, in a significant number of cases loans have clauses that prevent any payment on the loans until the loans from financial institutions are fully repaid. In effect, the loans are zero coupon for an initial

period. This evidence is consistent with group loans being a means of subsidy and support. The detailed terms of 34 such group loans (30 firms) is provided in Table 6. In unreported analysis, we also find that the terms of loans are not related to insider holding in these firms i.e., both high and low insider holding firms are equally likely to receive subsidized loans. We would like to note that while the evidence in this subsection is consistent with these loans being negative NPV for the firms that provide them, these loans could still be positive NPV for the insider on account of his equity stake or the private benefits he derives from control. We discuss this in more detail in the context of why groups provide support in Section 4.

Table 6
Terms of intragroup loans for a random sample

This table presents the loan terms obtained from the annual reports for a random sample of 30 firms from the top quartile of receivers in our sample. Since the annual report coverage in Prowess starts in 1999, terms on group loans before this period are unavailable. The last column provides the minimum commercial lending rate of the market during the relevant period. This information is obtained from the Reserve Bank of India website (www.rbi.org.in).

No.	Company name	Year(s)	Terms of intragroup loan	Market rate (in %)
1	Consolidated Fibres & Chemicals Ltd.	1999	Unsecured loans of Rs. 287.2 million from associate companies and no interest accrued or repayable (interest rate: 0%).	12.25
		2000–2001	Unsecured loans of Rs. 369.7 million from associate companies and no interest accrued or repayable (interest rate: 0%).	11.50
		2004	Unsecured loans of Rs. 488.2 million from associate companies and no interest accrued or repayable (interest rate: 0%).	10.50
2	India Seamless	1999	The company, during this period has not provided for interest on loans from companies amounting to Rs. 44.14 million and moreover interest payable & provided for in earlier years amounting to Rs. 15.14 million has been written back and grouped under 'Provision no longer required' (interest rate: 0%).	12.25
3	Modi Alkalies & Chemicals Ltd.	2000–2002	As per past practice, the company has not provided for interest liability of Rs. 26.63 million on certain unsecured loans from Promoter companies (interest rate: 0%).	11.50
		2003	As per past practice, the company has not provided for interest liability of Rs. 28.92 million on certain unsecured loans from Promoter companies (interest rate: 0%).	11.00
4	Nesco Ltd.	2004	The company had taken unsecured intra group loan of Rs. 40.99 million and the interest accrued is Rs. 2.38 million (interest rate: 5.8%).	10.50
5	Welspun	2002	The company had taken interest free unsecured intra group loan of Rs. 20.10 million (interest rate: 0%).	11.12
6	Balaji Industrial Corp. Ltd.	2001–2002	The company had taken interest free unsecured intragroup loan of Rs. 39.20 million (interest rate: 0%).	
		2003–2004	The company had taken interest free unsecured intragroup loan of Rs. 143.92 million (interest rate: 0%).	10.66
7	Tata Construction and Projects Ltd.	2000–2001	The company has taken interest free intragroup loan of Rs. 3.50 million in each of the years (interest rate: 0%).	11.50
8	DCM Silk Mills.	2001–2004	The company has received interest free intragroup loans of Rs. 232.49 million. Ultimate loss may arise on these accounts (interest rate: 0%).	11.00
9	Indital Tintoria Ltd.	1999–2001	The company has been granted interest free intragroup loans of Rs. 248.96 million. Ultimate loss may arise on these accounts (interest rate: 0%).	12.00

Table 6 (*continued*)

No.	Company name	Year(s)	Terms of intragroup loan	Market rate (in %)
10	Hindustan Foods Ltd.	2003–2004	The company has taken interest free loan from its holding company in respect of which there is no stipulation as to repayment. The amount is 57.48 million (interest rate: 0%).	10.66
11	Visaka Industry Ltd.	2002–2004	The company has taken interest free group loan of 25.80 million (interest rate: 0%).	11.25
12	ISPL Industries Ltd.	2001–2004	Intra corporate loans include an amount of Rs. 18.18 million (interest free) extended to companies in which the management of the company has active participation. The said loans have been considered doubtful (interest rate: 0%).	11.00
13	Jaypee Cement Ltd.	2000–2002	The company has received interest-free group loans of Rs. 22.90 million (interest rate: 0%).	11.50
14.	Jaiprakash Power Ventures Ltd.	2000–2002	The company has been given interest-free group loans of Rs. 29.70 million (interest rate: 0%).	11.50
15	Kinetic Engineering Ltd.	2002–2004	The company has taken unsecured loans from two group companies. Total loans: Rs. 263.50 million (interest rate: 6.00%).	11.25
16	Madras Chipboard Ltd.	2002–2004	The company has been granted interest free group loans aggregating to Rs. 1500 million (interest rate: 0%).	11.25
17	McDowell Alcobev Ltd.	2001–2004	The company has been granted interest free group loan of Rs. 691.3 million (interest rate: 0%).	11.00
18.	McDowell International Brands Ltd.	2003–2004	The company has been granted interest free group loan of Rs. 20.91 million (interest rate: 0%).	10.66
19	Milkfood Ltd.	2004	The company has taken interest free loans from group companies and, year end balance of such loans aggregate to Rs. 7.00 million (interest rate: 0%).	10.50
20	Nilachal Refractories Ltd.	2001–2005	The company has taken interest free loans from group companies aggregating to Rs. 13.22 million (interest rate: 0%).	10.90
21	Omax Auto Ltd.	2004–2005	The company has taken interest free loans from group companies interest free unsecured loan amounting to Rs. 54.79 million (interest rate: 0%).	10.50
22	Rama Pulp & Papers Ltd.	2000–2004	Interest free loan of Rs. 36.18 million has been extended by companies in the group (interest rate: 0%).	11.50
23	Premier Lighting Industries Ltd.	2000–2004	Interest free loan of Rs. 10.21 million has been extended by companies in the group (interest rate: 0%).	11.50
24	Nirmal Plastic Industries	2000–2004	Interest free loan of Rs. 5.23 million has been extended by companies in the group (interest rate: 0%).	11.50
25	Supreme Management Ltd.	2002–2004	Interest free loan of Rs. 38.61 million has been extended by companies in the group (interest rate: 0%).	11.25
26	National Plywood Industries Ltd.	2000–2004	Interest free loan of Rs. 2.50 million has been extended by companies in the group for each year (interest rate: 0%).	11.50
27	Atlanta Super Computers Pvt. Ltd.	2000–2003	Interest free loan of Rs. 2.00 million has been extended by companies in the group for each year (interest rate: 0%).	11.50
28	Carbon Everflow Ltd.	2004	The company has been granted interest free loan aggregating to Rs.20 million by companies in the group (interest rate: 0%).	10.50
29	Steel Tubes of India Ltd.	2003–2004	The company has not provided interest amounting to Rs. 28.78 million on unsecured loans. Theaccumulated losses on these loans is Rs. 51.24 million (interest rate: 5.4%).	10.66
30	Punjab Chemicals & Pharmaceuticals Ltd.	2004	The company has taken interest free loan from group firms worth Rs. 14 million (interest rate: 0%).	10.50

To summarize, our analysis in Section 3 has thus far established that groups support the financially troubled member firms in the group through group loans. Moreover, loans have a real effect in terms of reducing the bankruptcy probability of group firms when compared with financially similar stand-alone firms. We find that loans tend to be made on favorable terms indicating a support motive.

4. Why do groups support weak firms?

In this section we explore further the motivation for groups to support the weaker member firms. Group insiders may support member firms to protect their equity stake. Thus, even though support could be negative NPV in isolation, it may be positive NPV on account of group insider's equity stake. This is supported by the evidence in Section 3 that shows that groups tend to provide greater support in the form of group loans to firms with larger insider ownership. Further, controlling for financials, firms with higher insider ownership are less likely to go bankrupt. Although the economic significance of insider ownership on the provision of loans is small (as is suggested by coefficient estimates) this could be a consequence of the noise in the insider holding measure.

Another reason for support may be that group insiders are likely to derive private benefits from their control of firms. To the extent firm bankruptcy dilutes such benefits, we would expect insiders to seek to provide support and avoid bankruptcy. The very nature of private benefits, however, makes it difficult to estimate the extent to which their consumption is affected by firm bankruptcy.[4] The legal impediments on creditors during the bankruptcy process in India, such as cessation of payments to lenders and restrictions on lenders in taking possession of collateral, could result in only moderately curbing the ability of insiders to derive private benefits, even after bankruptcy. The relevant law is succinctly summarized in Goswami (1996), a corporate governance report prepared for the government of India: "From the time a company is registered as bankrupt until the case is disposed, the BIFR [the bankruptcy court] does not allow creditors to exercise any claims.... Once the case is registered, promoters are protected from creditors claims for at least four years."

There is, however, another important reason for groups to support weak member firms: concern about the negative signal that might be sent by the group firm default to outsiders, especially external capital providers. The signal could be about the group insider's unobserved wealth, the group's future growth prospects, or the group's reputation of being a reliable, high-quality borrower. Such a negative signal could make it difficult for other firms in the group to raise external capital, further damaging the group's investment prospects and the solvency of its remaining firms. We refer to this as the negative spillover hypothesis. The notion is that default by a group firm might trigger significant negative

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[4]In an effort to examine if group insiders support firms to preserve their private control benefits, in unreported regressions, we conduct an additional test to examine if intragroup support tends to be lower in firms that have higher institutional and bank ownership. The notion is that institutional shareholding could control the insider's benefit consumption and hence insiders could have lesser incentives to support firms with higher institutional holding. We do this by estimating (Eqs. (2) and (3)) after including a variable that measures the aggregate percentage shareholding of banks, financial institutions, and mutual funds in a firm. The results indicate that institutional ownership has an insignificant impact on group loan flow. Though this test is admittedly noisy, it casts some doubt on whether preserving benefits consumption is an important motive for insiders to support member firms.

spillovers, hence providing a strong motive for the group to support its member firms in financial trouble.

We examine the evidence on whether there are significant negative spillovers by analyzing the impact of the first bankruptcy in the group on the other healthy firms in the group. The negative signal associated with the first bankruptcy in a group is likely to be most informative and damaging. Hence, we might expect solvent groups to be especially concerned about preventing their first bankruptcy. After the first bankruptcy, to the extent negative information is revealed about the group and its prospects, we would expect the group's remaining firms to have a significantly diminished ability to raise external capital. This, in turn, could impact their performance and survival. In our analysis we focus on whether there is evidence of such capital rationing, and negative consequences for the group's firms.[5]

Negative spillovers could occur for reasons other than because of a negative perception about the group's prospects or loss of reputation among providers of external capital. The first bankruptcy in the group could lead to negative spillovers because of other linkages (henceforth, non-information-based factors) across the group firms. In particular, observable linkages between firms such as the presence of internal capital markets in the form of intragroup loans, geographic or industry proximity of group firms, and existence of customer–supplier relationship among group firms can account for such spillovers. The existence of intragroup loans can lead to negative spillovers, for instance, if the bankruptcy of a recipient group firm causes a loss to the loan provider or if an important provider of group loans becomes bankrupt. Alternatively, when a group's firms are clustered in a few states or industries, group firms could receive correlated shocks, that have little to do with negative signal or loss of reputation. Similarly, if group firms are linked by supplier–customer relationships, firm bankruptcy can lead to spillovers as well.

In our analysis, we adopt two approaches to argue that a significant portion of the negative spillover effects we document could be attributable to a negative signal about the group's prospects. First, we examine if observable factors such as group loans, geographic or industry proximity of a firm to the bankrupt firm and customer–supplier relationships between the bankrupt firm and other group firms are able to explain the observed pattern of spillovers. Second, we investigate some specific predictions about the nature of the spillover costs. In particular, if the spillovers arise because of credit rationing following negative information about the group, then we expect the consequences to be more severe for firms that depend more on external financing. Moreover, we expect spillovers to be more severe for firms that have closer managerial links (and, hence, a firmer connection in terms of economic prospects or reputation) to the bankrupt firm.

A business group may have its own subgroups, with the bankrupt firm being more closely associated with particular firms in the group. For instance, it is not uncommon for business groups to have segments more closely aligned with a particular branch of the founder's family. To identify these firms, we construct a new dummy variable *Chairman*. To construct this variable, we first identify the chairmen of all the group firms that become

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[5]An alternative view could be that the predominantly state-owned banks in India (La Porta, Lopez-de-Silanes, and Zamarripa, 2003) do not follow a cut-throat strategy of credit rationing after the bankruptcy in the group but renegotiate and extend further credit to the firms. According to this view, there should not be any significant reduction in the extent of external financing raised by group firms after the first bankruptcy. Our tests measuring the impact of group firm bankruptcy on the amount of external finance raised by the other firms are able to differentiate between the two views.

bankrupt during our sample period. Next, we identify all the groups' firms in which the identified chairmen are members of the board of directors. Finally, for each year following the first bankruptcy, we code *Chairman* equal to one for all the firms in which the board of directors includes chairman of the bankrupt firm and zero otherwise. We use the latest information on the board of directors of firms to construct *Chairman*. Hence, *Chairman* is not time varying for an individual firm.

Before proceeding with the tests, we outline sample characteristics of firms with close managerial linkages. In the sample, on average, a chairman of a bankrupt firm is on the board of directors of four other firms. Firms with close managerial linkage to the bankrupt firm are also likely to be close to the bankrupt firm in other respects such as sharing internal capital markets and being clustered in a few geographic locations or industries. To examine the extent to which *Chairman* captures closeness along these dimensions, we relate different characteristics of the bankrupt firm to the firms in its chairman cohort. Our results (unreported) indicate that firms in the *Chairman* cohort are not closer to the bankrupt firm in terms of geography or industry than other firms in the group. However, these firms do have closer linkage in terms of sharing internal capital markets through group loans. In particular, firms in the cohort extend more intragroup loans to the bankrupt firm. To account for this, in our analysis we control for the amount of the group loans provided by a firm.[6] Therefore, any additional variation in spillovers captured by *Chairman* is less likely to be on account of the amount of group loans provided to the bankrupt firm by cohort firms.

Thus, in the analysis that follows, we investigate whether the first bankruptcy in the group is followed by negative consequences for the rest of the group and if the negative consequences are more severe for firms that depend on external finance and that have managerial linkages to the bankrupt firm. Our argument is that such evidence is consistent with groups providing support to avoid such negative consequences. However, such evidence can only be suggestive of negative spillovers. Despite our attempts to control for firm financials and other factors, we cannot rule out the possibility that insiders declare bankruptcy when the performance of much of the group is expected to decline precipitously and that the first bankruptcy of a group firm does not, per se, make it harder for the rest of the group's firms to raise external financing. Such a pattern would be observed if insiders support firms only until the expected benefits, such as those from preserving the ongoing enterprise value of group firms, are large enough. Consequently, when they expect the performance of the member firms to deteriorate significantly in the future, it is optimal for them to declare bankruptcy.

4.1. Credit rationing and group support

We begin by examining if there is any evidence of rationing of external financing after the first bankruptcy in a group. If the bankruptcy reveals significant negative information

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[6]More specifically, besides examining whether firms in the chairman cohort extend more intragroup loans to the bankrupt firm, we investigate if the first bankruptcy impacts the firms in the chairman cohort because the bankrupt firm represents the loss of a potential source of funds. We relate the inflows to the firms in the cohort to gross outflows of group loans from the bankrupt firm and to the outflows from the other group firms. We find that the bankrupt firm does not contribute significantly to the loan inflow into the *Chairman* cohort firms. Thus, it is unlikely that firms in the chairman cohort are affected negatively after the first bankruptcy because they lost an important source of funds.

about the group and its prospects, we expect bankruptcy of a group firm to lead to a reduction in the external financing of member firms after controlling for firm financials and other characteristics. Specifically, we estimate the following model on all healthy group firms and present the results in Panel A of Table 7:

$$y_{it} = \begin{pmatrix} \alpha_0 + \beta_1 \text{Pre}_{it} + \beta_2 \text{Post Bankruptcy}_{it} + \gamma \text{Controls}_{it} \\ + \text{Firm Fixed Effects} + \text{Time Fixed Effects} \end{pmatrix},$$ (5)

where y_{it} is $Debt_{it}$, the external borrowing by firm i in year t, in Columns 1 and 3 and $Equity_{it}$, the external equity raised by firm i in year t, in Columns 2 and 4. *Pre* is a dummy variable that takes a value one for the two-year period before bankruptcy of the first firm in a group and zero otherwise. *Post Bankruptcy* is a dummy variable equal to one for all the firms in the group in the years in which at least one of the firms in the group is bankrupt and zero otherwise. We code *Post Bankruptcy* equal to one for all the firms in a bankrupt group to test for whether their level of external financing is affected by the first bankruptcy in the group. The regressions are estimated with firm and time fixed effects to control for unobserved firm characteristics and time trends. In all our tests of negative spillovers (except bankruptcy tests), we exclude the bankrupt firms from the estimation. As we might expect, including the bankrupt firms in our tests increases the economic magnitude of our results. Columns 1 and 2 are estimated without any controls. Our results in Columns 1 and 2 indicate that there is strong evidence of a reduction in the total external financing obtained, both debt and equity, by the healthy firms in bankrupt groups.

In Columns 3 and 4, we examine if the reduction in external financing is greater for firms that have direct managerial linkages with the bankrupt firm. As discussed, we would expect the bankruptcy to have stronger information and reputation implications for these group firms. To examine this, we include an interaction between *Post Bankruptcy* and *Chairman* in Columns 3 and 4. In Columns 3 and 4 other controls such as *Size*, *EBIDTA/TA*, and *Sales Growth* are also included. To examine if non-information-based reasons account for spillovers, we include *Post Bankruptcy*Provider*, *Post Bankruptcy*-Same Industry* and *Post Bankruptcy*Same State*. Inclusion of *Post Bankruptcy*Provider* ensures that we control for the spillovers arising because of group loans provided by a firm. The notion here is that, while we do not know the exact loan linkage between firms (we have only aggregate data on the group loans received and provided by firms), inclusion of this interaction term ensures that *Chairman* does not capture the spillover effects because of the firm being a significant provider of loans to the bankrupt firm. *Same Industry* is a dummy variable taking a value one for firms in the group that are in the same industry as the bankrupt firm and zero otherwise; *Same State* is a dummy variable taking a value one for firms that are in the same state as the bankrupt firm and zero otherwise. Consistent with more credit rationing in firms with close managerial links with the firm going bankrupt, the coefficient estimate on the term *Post Bankruptcy*Chairman* is negative and significant. We also find that non-information based factors that might contribute to spillovers are not significant. In particular, F-test results reject the joint significance of *Post Bankruptcy*Provider*, *Post Bankruptcy*Same Industry*, and *Post Bankruptcy*Same State* in Columns 3 and 4.

The effects we document are economically significant. The estimate of β_2 in Columns 3 and 4 indicates that, subsequent to the first bankruptcy in the group,

Table 7

External financing and group support after the first bankruptcy in a group

In Panel A, we estimate the following model on all healthy group firms: $y_{it} = \alpha_0 + \beta_1 \text{Pre}_{it} + \beta_2 \text{Post Bankruptcy}_{it} + \gamma\text{Controls}_{it} + \text{Firm F.E.} + \text{Time F.E.}$ The dependent variable is *Debt* in Columns 1 and 3 and *Equity* in Columns 2 and 4. Other control variables in Columns 3 and 4 are *Provider*, *Post Bankruptcy*Provider*, *Post Bankruptcy*Same Industry*, and *Post Bankruptcy*Same State*. EBIDTA is earnings before interest, depreciation, taxes, and amortization. The standard errors in all the regressions are corrected for heteroskedasticity and autocorrelation (AR-1) in the panel. In Panel B, we estimate the following model on group firms: $y_{it} = \alpha_0 + \beta_1 \text{Shock}_{it}^- + \beta_2 \text{Shock}_{it}^- * \text{Post Bankruptcy}_{it} + \gamma\text{Controls}_{it} + \text{Firm F.E.} + \text{Time F.E.}$ Other control variables include *Post Bankruptcy* and in Columns 2 and 3 include *Provider* and *Post Bankruptcy*Provider*. Data in this table are from Prowess for the period 1989–2001. We exclude the bankrupt firms from our estimation. ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: *External financing to group firm i before and after the first bankruptcy in its group*

	(1)	(2)	(3)	(4)
Pre_{it}	−7.49	−11.96	−7.77	−11.68
	(12.70)	(13.41)	(12.81)	(13.77)
Post Bankruptcy$_{it}$	−17.64***	−13.81**	−16.76***	−9.88**
	(5.33)	(6.64)	(4.30)	(5.27)
Size$_{it}$			86.70***	48.06***
			(17.65)	(19.50)
EBIDTA/TA$_{it}$			29.36**	31.06*
			(14.90)	(18.69)
Sales Growth$_{it}$			0.720**	1.480**
			(0.280)	(0.480)
Post Bankruptcy$_{it}$ * Chairman$_i$			−13.20***	−7.34*
			(3.39)	(3.75)
Number of observations	6,855	6,855	6,855	6,855
Firm fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Post Bankruptcy$_{it}$ * Provider$_{it}$	No	No	Yes	Yes
Post Bankruptcy$_{it}$ * Same State$_i$	No	No	Yes	Yes
Post Bankruptcy$_{it}$ * Same Industry$_i$	No	No	Yes	Yes
R^2	0.66	0.59	0.71	0.63

Panel B: *Intragroup support before and after bankruptcy in a group*

	Dependent variable:	% change in net group loans to firm i	
	(1)	(2)	(3)
Shock$_{it}^-$	2.513***	2.023***	2.421***
	(0.770)	(0.860)	(0.760)
Shock$_{it}^-$ * Post Bankruptcy$_{it}$	−0.911**	−0.603**	−0.610**
	(0.453)	(0.327)	(0.330)
Shock$_{it}^-$ * Group RZ$_i$		0.321***	
		(0.117)	
Shock$_{it}^-$ * Group RZ$_i$ * Post Bankruptcy$_{it}$		−0.127**	
		(0.630)	
Shock$_{it}^-$ * Post Bankruptcy$_{it}$ * Same Industry$_i$		0.015	0.014
		(0.121)	(0.120)
Shock$_{it}^-$ * Post Bankruptcy$_{it}$ * Same State$_i$		0.011	0.013
		(0.370)	(0.330)
Shock$_{it}^-$ * Post Bankruptcy$_{it}$ * Chairman$_i$			−0.206**

Table 7 (*continued*)

Panel B: *Intragroup support before and after bankruptcy in a group*

	Dependent variable:	% change in net group loans to firm i	
	(1)	(2)	(3)
			(0.103)
Number of observations	6,855	6,855	6,855
Firm fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Post Bankruptcy$_{it}$ * Provider$_{it}$	No	Yes	Yes
R^2	0.53	0.55	0.58

the incremental borrowing by the member firms falls by at least 21.7% and the incremental equity raised falls by at least 5.6%. The estimates on the interaction term *Chairman*Post Bankruptcy* suggests that incremental borrowing and equity fall by an additional 17.1% and 4.1%, respectively, for firms more closely identified with the bankrupt firm. Our results are unaffected when we reestimate our regressions after including other group level variables such as group investments, group size, and group profits. We repeat the analysis at a group level using the aggregate debt and equity raised by the group and find that our estimates are similar to those reported. These findings are consistent with lenders and outside investors curtailing their financing to the group because of the negative signal about the group. In principle, our results can arise because of either curtailment in financing for group firms or lower demand of funds by these firms on account of worse investment opportunities. However, as we show later, firms that rely more on external financing, identified by an exogenous measure (*RZ Index*), experience a greater reduction in investment and performance and a greater increase in bankruptcy probability. There is little reason to expect these results to arise if the cutback in external borrowing was reflective only of reduced investment opportunities.

As discussed earlier in Section 3.2, external borrowing appears to be the main source of funds for group loans. Hence, with the reduction in external borrowing after the first bankruptcy in a group, we can expect the flow of group loans to decrease as well. Furthermore, group insiders might have little incentive to support member firms, because the negative information about the group has already been revealed after its first bankruptcy. To examine this, we evaluate the impact of firm bankruptcy on the extent of group loan flow. In Panel B, we reestimate Eq. (3) after including an interaction between *Shock$^-$* and *Post Bankruptcy*. Our results in Column 1 indicate that, after the first bankruptcy in a group, intragroup loan flow decreases by as much as 37%. To examine if the reduction in loan flow is more severe for groups that depend more on external finance, we use the Rajan and Zingales (1998) industry index (*RZ Index*) as our measure.[7] Specifically, we include *Shock$^-$ *Post Bankruptcy*GroupRZ* to examine if the

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[7]For a detailed discussion on this measure, see Rajan and Zingales (1998). In particular, they compute the external financing needs (i.e., amount of desired investments that cannot be financed through internal cash generated by the same business) of US. companies over the 1980s. The index goes from −0.45 to 1.49 with higher

reduction in loan flow is more severe for groups that depend more on external finance. To examine if there might be non-information-based factors that might lead to spillovers, we include *Shock⁻ *Post Bankruptcy*Same State* and *Shock⁻ *Post Bankruptcy*Same Industry*. Consistent with our prediction, we find a greater reduction in group loan flow in groups that are more dependent on external finance. Our results also indicate that there is no evidence that state or industry proximity to the bankrupt firm has any significant effect.

In Column 3, we reestimate our model after including *Shock⁻ *Post Bankruptcy*Chairman* to evaluate if the reduction in group loan flow after the first bankruptcy is stronger for firms with managerial linkages to the bankrupt firm. Our results show that there is a greater reduction in support for firms with managerial links with the bankrupt firm, consistent with these firms suffering a greater reduction in external financing. Another possible reason for this reduction could be a fall in transfers from the rest of the group firms, those without close managerial links, attempting to distance themselves from the bankruptcy.

4.2. Investment and performance levels

If external financiers ration credit to group firms after the first bankruptcy in the group, then this is likely to reduce investment levels and the profitability of the group firms. In unreported tests, we document that negative spillovers lead to an investment and performance drop in healthy group firms after the group's first bankruptcy. In particular, we examine the trend in investments (*Investment*) and operating performance (*EBITDA/TA*) for the group firms relative to the industry they are operating in after the first firm in the group becomes bankrupt, controlling for firm financials and time fixed effects.

We find that the first bankruptcy in the group is followed by a fall in the investments (performance) of the healthy firms in the group. Our estimates are economically significant and indicate a more than 45% (32%) drop in investments (performance) after the group's first bankruptcy. We also find that the reduction in investment (performance) is more severe in firms with closer managerial links to the bankrupt firm and for firms that are more dependent on external finance. Moreover, non-information based factors are not important in explaining the investment (performance) drop of bankrupt group firms.[8]

Our results are generally consistent with external financiers rationing credit to group firms after the first bankruptcy in the group. The results are suggestive in nature because

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(*footnote continued*)

value signifying higher dependence. To obtain the *RZ Index* for a industry in our sample, we first map the RZ industries to our 95 industry classification. In our analysis, we use the firm's industry RZ index to proxy for the firm's dependence on external financing. We then calculate the weighted average *RZ Index* for all the firms in the group using the book value of total assets as weights to obtain *GroupRZ*.

[8]For robustness, we also conduct tests to examine whether the spillovers are on account of vertical relationships among these firms. We use the methodology in Fan and Goyal (2006) to derive a measure of the extent of vertical relatedness among the firms in the bankrupt group V_{ij}. To do this, we map our industry classification to four-digit SIC codes and use the *Table of Benchmark Input–Output Accounts* for the US. economy in 1992 to construct the vertical relatedness measure. We refer to Fan and Goyal (2006) for details about the methodology. We repeat the negative spillover regressions after including an interaction term *Post Bankruptcy*V_{ij}* and find that our results are unchanged. This suggests that negative spillovers in firms with close managerial linkages are not likely on account of vertical relatedness. Furthermore, we also include other possible variables that could affect investment inside the firm such as three-year average sales growth, firm profits, age of the firm, borrowing of the group, and group profits. We reestimate our model including all the variables together and find that our results are unaffected.

we cannot claim that it is the first bankruptcy in the group that causes the drop in performance and investments. Our tests cannot rule out the possibility that insiders declare bankruptcy when they expect a large drop in the investments (performance) than would be predicted by industry investment (performance).

4.3. Bankruptcy probabilities

In this subsection, we examine if the first bankruptcy in a group is associated with an increase in the bankruptcy probability of other member firms. Presence of negative spillovers would predict an increase in the bankruptcy probability for the healthy firms in the group than would be predicted on the basis of financials. The reason would be a fall in the availability of external credit, as well as a decline in group's incentives to avoid bankruptcy. In this regard, it is worth examining some overall numbers of group firm bankruptcy in the sample. Among the groups that experience their first bankruptcy before the year 2000 (64 groups), 56% (36 groups) experience more than one bankruptcy and 30% (19 groups) have all their firms become bankrupt during the sample period. An example of bankruptcies within a group is provided in Appendix C. Such correlated bankruptcies among firms in the group is suggestive of negative spillovers. As before, in our analysis we control for various nonreputation factors such as geographic and industry linkages that could lead to correlation in bankruptcy among group firms.

To formally test our prediction, we use a model similar to that in Table 5. Specifically, we estimate Eq. (4) after including *Post Bankruptcy*. We have a number of groups that experience their first bankruptcy in 2000. Thus, these groups have just one year of data after the first bankruptcy in their group. Since there might not have been sufficient time for the negative spillovers to have impacted the bankruptcy probability of the groups' healthy firms, we code *Post Bankruptcy* = 0 for these groups. The results are not, however, qualitatively different if we code *Post Bankruptcy* = 1 for these groups. All regressions are estimated with industry and time fixed effects and the standard errors are robust and clustered at group level.

In Column 1 of Table 8, we provide estimates of the model on the full sample of group and stand-alone firms. The regression is estimated on the full sample of group and stand-alone firms to enable comparison with the results in Table 5. The coefficient on *Group* is negative, while that on *Post Bankruptcy* is positive and both are significant. The coefficient on *Group* indicates that an average group firm has a 37% lower probability of bankruptcy than a stand-alone firm. On the other hand, the coefficient on *Post Bankruptcy* indicates that, once a group firm becomes bankrupt, the other members of the group tend to experience a 53% increase in bankruptcy probability. These results indicate that, prior to the first bankruptcy in the group, the bankruptcy probability of a group firm is lower than that of a stand-alone firm. However, the probability significantly increases and is higher than that of a stand-alone firm (by 16%) once a group experiences its first bankruptcy.

To evaluate differences between group firms in solvent and bankrupt groups, we reestimate Eq. (4) only for group firms. We also employ group fixed effects to ensure that time invariant unobservable group characteristics do not affect our estimates. The estimates in Column 2 indicate that a healthy firm, after the first bankruptcy in the group, tends to have about a 20.6% greater probability of becoming bankrupt than a similar firm from the solvent group.

Table 8

Negative spillovers: the impact of firm bankruptcy on the bankruptcy probability of other firms in the group

This table reports the results of the following logit regression: $Prob(\text{Bankruptcy}_{it} = 1) = \Phi(\gamma \text{Firm Financials}_{it-1} + \beta_1 \text{Director}_i + \beta_2 \text{Group}_i + \beta_3 \text{Post Bankruptcy}_{it} + \text{Industry F.E.} + \text{Time F.E.})$. Other control variables used in this estimation are *Size*, *Relative Shock*, and *Debt/TA*. In Column 3, we also include %ΔPredicted, *RZ Index*, *Provider* and *Post Bankruptcy*Provider*. The standard errors reported are robust and clustered at group level. Column 1 includes all firms while Columns 2 and 3 include only group firms. Data in this table are from Prowess for the period 1992–2001. We drop the bankrupt firms after they become bankrupt from our estimation. ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

	Dependent variable: bankruptcy$_{it}$		
	(1)	(2)	(3)
Net Income/Total Assets$_{it-1}$	−1.18***	−1.28***	−1.26***
	(0.236)	(0.235)	(0.235)
Working Capital/Total Assets$_{it-1}$	−1.35***	−1.36***	−1.35***
	(0.172)	(0.170)	(0.170)
Market Value of Equity/Total Liabilities$_{it-1}$	−0.205***	−0.232***	−0.228***
	(0.040)	(0.041)	(0.041)
Director$_i$	−0.019***	−0.018***	−0.017***
	(0.003)	(0.003)	(0.004)
Group$_i$	−0.535***		
	(0.172)		
%ΔGroup Loans$_{it-1}$		−0.97***	−0.96***
		(0.026)	(0.025)
Post Bankruptcy$_{it}$	0.592***	0.371***	0.290**
	(0.237)	(0.162)	(0.147)
Post Bankruptcy$_{it}$ ∗ Chairman$_i$			1.12***
			(0.320)
Post Bankruptcy$_{it}$ ∗ RZ Index$_i$			0.81**
			(0.420)
Post Bankruptcy$_{it}$ ∗ Same Industry$_i$			0.001*
			(0.0006)
Post Bankruptcy$_{it}$ ∗ Same State$_i$			0.002
			(0.025)
Number of observations	12,900	5,890	5,890
Group fixed effects	No	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Post Bankruptcy$_{it}$ ∗ Provider$_{it}$	No	No	Yes
Log-likelihood	−1223.7	−592.1	−598.3
p-value, χ^2 test	0.00	0.00	0.00

Finally, to examine if these spillovers are larger for firms in the group that are more closely linked to the bankrupt firm and those that are more reliant on external financing, we reestimate our model after including *Post Bankruptcy*Chairman* and *Post Bankruptcy*RZ Index*. We also include *Post Bankruptcy*Provider*, *Post Bankruptcy*Same State* and *Post Bankruptcy*Same Industry* as controls. Our results reported in Column 3 show that both *Post Bankruptcy*Chairman* and *Post Bankruptcy*RZ Index* are positive and significant. The estimates are also economically significant. The coefficient on *Post Bankruptcy*Chairman* indicates that once a group firm becomes bankrupt, group firms

with close managerial links experience a 36.7% increase in bankruptcy probability.[9] Hence, the evidence is supportive of an increase in bankruptcy probability, on account of negative spillovers.

Summarizing, our findings show significant negative spillovers in the form of diminished access to external financing and deterioration in investment and performance for the whole group following the first bankruptcy. This evidence suggests that one important reason for group support could be to prevent default by weak firms and avoid such negative spillovers. Moreover, consistent with spillovers on account of negative information, we find that consequences are more severe for firms with closer managerial links to the bankrupt firm and for firms that are more reliant on external financing. We cannot rule out the possibility that insiders declare bankruptcy precisely when they expect a significant decline in group performance and hence a decline in the benefit from supporting group firms. In this sense our evidence should be viewed as only suggestive in nature.

5. Concluding remarks

In the paper we investigate the use of internal capital markets by Indian business groups, in which intragroup loans serve as the dominant observable means of fund transfer between group firms. We examine the extent to which group loans serve three, non-mutually exclusive functions: as a way to fund investment opportunities across business group firms; as a way to provide support for financially troubled firms; and as a way to tunnel resources toward group firms with higher insider ownership.

From the cross-sectional and time-series patterns of the group loan flows, we find that group loans are primarily used by groups to support member firms that are in financial distress. On average, there is no evidence of group loans being used to fund investment opportunities or to tunnel cash. An examination of the evidence of bankruptcy among group firms indicates that the support provided in the form of group loans is associated with a significant decrease in the bankruptcy probability of group firms. The subsidy and support nature of group loans is also indicated by the favorable terms on which the group loans tend to be made, with either no or below market interest rates being charged.

We investigate possible motives for the group to extend support for member firms. Group insiders may support member firms on account of their equity stake in the firm or because they expect private benefits. We argue that another motive could be to avoid default and consequent negative spillovers on the rest of the group on account of the negative information revealed about the group and damage to its reputation. Evidence suggestive of such negative spillovers is that the first bankruptcy of a group firm is associated with a significant and discontinuous drop in the external financing raised and in the investments and profitability of the remaining healthy firms in the group. The negative

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[9]Similarly, the coefficient on *Post Bankruptcy*RZ* indicates that once a group firm becomes bankrupt, member firms that are in the 75th RZ percentile experience a 22.5% increase in bankruptcy probability as compared with firms that are in the 25th RZ percentile, keeping other variables at their mean levels. For robustness, we reestimate Eq. (4) after including other variables such as *Size*, *Cash*, *Debt/TA*, *Age*, borrowing of the group, group profits, and *Post Bankruptcy*V_{ij} and find that our results are unchanged.

spillovers tend to be stronger for firms with closer managerial links to the bankrupt firm and for firms that are more reliant on external financing. After the first bankruptcy, there is also a large increase in the bankruptcy probability of the remaining group firms after controlling for their financials.

Our finding that solvent business groups support their member firms and reduce their bankruptcy probability suggests that one of the advantages of belonging to business group is easier access to capital markets. The reason is that external capital providers will be more willing to provide financing if they expect solvent business groups to provide support to their member firms. An implicit guarantee of support by firm's group is likely to be especially valuable in emerging economies with poor protection for creditor rights. Hence, our evidence on the support role of intragroup loans agrees well with the observation that groups constitute a large fraction of the corporate sector in many emerging economies, unlike in economies with more efficient and developed financial markets.

Appendix A

A.1. A note on the board for industrial and financial reconstruction

In wake of financial woes of the country's industrial sector in the eighties, the government of India in 1981, set up a committee of experts to examine the matter and recommend suitable remedies. Based on the recommendations of the committee, the government of India enacted special legislation namely, the Sick Industrial Companies (Special Provisions) Act of 1985 commonly known as the SICA. A board of experts, named the Board for Industrial and Financial Reconstruction (BIFR) was set up in January, 1987. SICA applies to companies both in public and private sectors satisfying certain criteria. As per SICA the board of directors or other interested parties such as lenders have the right to register a company with BIFR. Once registered, BIFR uses the following criteria to determine the sickness of a firm

- Accumulated losses of the company to be equal to or more than its net worth, i.e., its paid up capital plus free reserves.
- The company should have completed five years after incorporation under the 1956 Companies Act and should have a factory license.
- It should have 50 or more workers on any day of the 12 months preceding the end of the financial year with reference to which sickness is claimed.

The key features of the reorganization process are (for more details on BIFR refer to www.bifr.nic.in.):

- The board of directors remain in control of the firm during the reorganization process.
- All legal proceedings initiated by creditors (including those against guarantors) for recovery of dues are halted until completion of the reorganization process.
- The firm need not pay any interest or repay the principal on its debt during the reorganization process.
- The firm's managers get to propose the initial restructuring package which is then negotiated with the lenders.

Appendix B

B.1. Variable descriptions

Age_{it}:   Firm i's age since incorporation in year t.

$Bankruptcy_{it}$: A dummy that takes a value one if firm i becomes bankrupt in year t and zero otherwise.

$Chairman_i$: We construct this variable as follows. First, we identify the chairmen of all the group firms that became bankrupt during our sample period. Next, we identify all the firms in the group whose board of directors include the identified chairmen. Finally, we construct a new variable *Chairman* which takes a value one after the group's first bankruptcy for firm i whose board of directors include the chairmen of the bankrupt firm and zero otherwise.

$Debt_{it}$:   Total outstanding debt from bank and institutions of firm i in year t.

$Director_i$: Percentage shareholding held by the directors of firm i. Proxy for insider cash flow rights.

$EBIDTA_{it}$:   Earnings before interest, depreciation, taxes, and amortization of firm i in year t. This variable measures firm profitability.

$Equity_{it}$:Measured as the external equity raised by firm i in year t. Calculated as the change in net worth less retained earnings in year t.

Firm Financial Ratios: We choose these variables based on the existing bankruptcy prediction literature (Altman, 1968; Shumway, 2001). The ratios include *Net Income/Total Assets*, *Working Capital/Total Assets* and *Market Value of Equity/ Total Liabilities*.

$Geography_{jt}^{\text{close}}$: Herfindahl index for group j in year t based on the group's distribution of profits across 27 states. Proxy for geographic clustering of profits in the group–a higher number signifying more clustering.

$Group_i$: A dummy variable which takes a value of one if firm i is a group firm and zero otherwise. For consistency in defining a group firm in all our tests, we ensure that there are at least 3 firms in a group.

Group Loans/TA$_{it}$: Ratio of net group loans extended to firm i at time t to the total assets of firm i at time t.

%ΔGroup Loans$_{it-1}$: Measured as the percentage change in net group loans extended to firm i between periods $t-1$ and $t-2$. For stand-alone firms this variable takes the value of 0.

High Diversified$_{jt}$ and *Low Diversified$_{jt}$*: Dummies indicating the top 33 and bottom 33 percentile of diversified groups respectively as measured by the Herfindahl index. Herfindahl index for group j in year t is calculated on the group's distribution of sales across industries.

$Industry_{jt}^{\text{close}}$: Herfindahl index for group j in year t based on the group's distribution of profits across 95 industries. Proxy for clustering of group profits in industries – a higher number signifying more clustering.

$IndInvestment_{it}$: Measured as the median growth rate in total assets of firms in industry of firm i in year t (excluding firm i).

$Investment_{it}$: Measured as the growth in gross total assets of firm i, in year t [calculated as $Log(Total\ Assets_{it}/Total\ Assets_{it-1})$].

Investment/Cash Flow$_{it}$: Ratio of the annual investment in fixed assets to the total cash flow from operations of firm i in year t.

Low Director$_{ij}$: A dummy variable that takes a value one if firm i has below median insider holding in group j and zero otherwise.

Market to Book$_{it}$: Ratio of market value of total assets to the book value of total assets of firm i in year t.

Net Group Loans$_{it}$: Difference between intragroup loans received and loans provided by firm i in year t.

Post Bankruptcy$_{jt}$: A dummy variable equal to 1 for all the firms in group j in the years in which at least one of the firms in the group is bankrupt and 0 otherwise.

Pre$_{it}$: A dummy variable which takes a value one for all the firms in group j in the two year period before bankruptcy of the first firm in the group and zero otherwise.

Predicted$_{ijt}$: Predicted profitability of firm i in year t based on its industry j. Measured as the product of firm i's total assets and *EBIDTA/TA* of firm i's industry, where *EBIDTA/TA* of firm i's industry is measured as the asset weighted mean *EBIDTA/TA* of all firms in the industry (excluding firm i).

ΔPredicted$_{it-1}$: Measured as the percentage change in *Predicted* between $t-1$ and $t-2$. Proxies for an exogenous measure of the shock impacting firm i's profitability.

Provider$_{it}$: A dummy variable that takes a value of one for firm i if it is in the top 75th percentile in terms of the amount of group loans provided to other firms in the group in year t, and zero otherwise.

Relative Shock$_{it}$: Ratio of Δ*Predicted$_i$* and *NetWorth$_{-i}$* in year t, where we measure *NetWorth$_{-i}$* by the total book value of equity of all firms in the group, excluding firm i.

RetEarnings$_{it}$: Measured as the total retained earnings of firm i in year t.

RZ Index$_i$ and *Group RZ$_j$*: An exogenous measure of a firm's dependence on external finance. It is based on the Rajan and Zingales (1998) industry index (*RZ Index*). We map the RZ industries to our 95 industry classification and employ the extent to which the firms in firm i's industry depend on external capital to proxy for its reliance on external financing. We then aggregate this measure across firms in the group to get a measure of the group's dependence on external finance. Specifically, we calculate the weighted average *RZ Index* for all the firms in the group using the book value of total assets as weights to get *Group RZ*.

Sales Growth$_{it}$: Measured as the annual growth rate of sales of firm i in year t.

Same Industry$_{it}$ and *Same State$_{it}$*: Dummy variables that take a value one for a group firm i in year t if the firm is in the same industry and state as the first bankrupt firm in the group respectively and zero otherwise.

Shock$_{it}^{-}$: A dummy variable that takes a value one if there is a fall in *EBIDTA* of more than 10% in year t for firm i relative to the previous year and zero otherwise. This variable indicates a negative shock to firm profitability in that year.

Shock$_{it}^{+}$: A dummy variable that takes a value one if there is a increase in *EBIDTA* of more than 10% in year t for firm i relative to the previous year and zero otherwise. This variable indicates a positive shock to firm profitability in that year.

Size$_{it}$: Measured as the log of book value of total assets of firm i in year t.

Tangibility$_{it}$: Measured by expenditure in net plant, property and equipment normalized by total assets of firm i in year t.

Total Assets$_{it}$: Total book assets of firm i in year t.

Appendix C

C.1. Examples of solvent and bankrupt groups in the sample

This table reports company name, industry affiliation, insider holding and the year of bankruptcy for two representative groups in our sample. Panel A reports the data for M.P. Birla group (solvent group). None of the eight firms of this group went bankrupt over the sample period. Panel B reports the data for Kilachand group (bankrupt group). Four out of the seven firms in the group became bankrupt during the sample period (all of them after 1997). Industry affiliation and insider holding data come from Prowess. In some cases there is no director ownership reported for a group firm (e.g., Assam Jute Supply Company Ltd.) in Prowess. For these firms the insider ownership is taken to be missing and is indicated by –. Information on year of bankruptcy is based on hand-collected data from the Indian bankruptcy court. In the 'year of bankruptcy column', *s* indicates that the firm was solvent over the sample period. Our sample period is 1989–2001.

Company name	Industry	Insider holding	Year of bankruptcy
M.P. Birla Group (solvent group)			
Assam Jute Supply Company Ltd.	Jute	–	*s*
Birla Corporation Ltd.	Cement	66.5	*s*
Birla Ericsson Optical Ltd.	Electrical machinery	38.9	*s*
Birla Kenna Metal Ltd.	Non-Electrical machinery	44.1	*s*
Hindustan Gum & Chemicals Ltd.	Other foods	–	*s*
Indian Smelting & Refining Ltd.	Metals	–	*s*
Universal Cables Ltd.	Electrical machinery	52.4	*s*
Vidhya Telelinks Ltd.	Electrical machinery	53.4	*s*
Kilachand Group (bankrupt group)			
Amber Distilleries Ltd.	Beer	–	*s*
Gujarat Poly-AVX Electronics Ltd.	Electronics	38.3	1997
Hilton Rubbers Ltd.	Rubber	15.5	1999
Kesar Enterprises Ltd.	Sugar	48.0	*s*
Kesar Marbles & Granites Ltd.	Marbles & Granite	–	*s*
Polychem Ltd.	Chemicals	21.4	1998
Synthetics and Chemicals Ltd.	Rubber	13.8	1999

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