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The role of banks in reducing the costs of financial distress in Japan*

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We explore the idea that financial distress is costly because free-rider problems and information asymmetries make it difficult for firms to renegotiate with their creditors. We present evidence that Japanese firms with financial structures in which these problems are likely to be small perform better than other firms after the onset of distress. In particular, we show that firms in industrial groups – those with close financial relationships to their banks, suppliers, and customers – invest more and sell more after the onset of distress than nongroup firms. We find similar results for nongroup firms that nevertheless have strong ties to a main bank.

1. Introduction

The increase in leverage of many U.S. corporations in the 1980s has touched off a public debate about its effect on economic activity.[1] In one

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[1]There has been little change in average debt/equity ratios, but a dramatic increase in the leverage of the most highly leveraged companies. See Bernanke, Campbell, and Whited (1990).

view, large debt burdens constrain investment and threaten financial stability; in another, they prevent corporate waste and improve economic performance. Either way, high leverage increases the likelihood that firms will be unable to make their debt payments, and it raises concern about what happens to these distressed firms. Some argue that, as long as a firm has good prospects, financial distress will have no real impact; the firm's debt will be renegotiated to ensure its survival.[2] Others take a less sanguine view: creditors' conflicting claims make renegotiation difficult and may lead creditors to liquidate the firm even though it is collectively inefficient for them to do so.[3]

Both theories of financial distress have some appeal, but there are virtually no facts to lead us to one or the other. In this paper, we attempt to bring some evidence to bear on this question. We analyze how financial distress affects firms' investment behavior and their performance in product markets. Our empirical evidence suggests that financial distress is costly for firms that are likely to have significant conflicts among their creditors.

The evidence is from Japan. We focus on Japanese firms because of the kind of financial environment in which they operate. Many firms in Japan have very close ties to a 'main bank'. The bank provides debt financing to the firm, owns some of its equity, and may even place bank executives in top management positions. For many of these firms, the main-bank relationship is part of a larger industrial structure known as the *keiretsu*, a group of firms centered around affiliated banks and financial institutions. Firms in industrial groups also have strong product-market ties to each other that are strengthened by cross-share ownership.

This financial and industrial structure can reduce the costs of financial distress. These costs stem from the inherent difficulty of renegotiating financial claims, particularly when there are many creditors. As Bulow and Shoven (1978) and Gertner and Scharfstein (1990) point out, free-rider problems reduce the incentive for creditors to grant financial relief or extend credit: an individual creditor bears the full costs, but shares the benefits. Moreover, when debt is diffusely held, bondholders are not likely to be well informed about the firm and may not know whether it is profitable to provide new capital or to give interest and principal concessions. These problems can also spill over and disrupt supplies and sales: suppliers may not be willing to provide trade credit and make long-term commitments; and customers may be wary about whether the firm will be able to meet its implicit and explicit warranties.

[2]This version of the Coase Theorem has been espoused by Haugen and Senbet (1978) and, more recently, by Jensen (1989).

[3]This view is implicit in theories of leverage that argue that firms balance the tax advantage of debt and the greater costs of financial distress.

Such problems are probably less severe for firms with strong relationships to banks. Because substantial debt and equity stakes are held by just a few financial institutions, free-rider problems are less prevalent. In addition, since the main bank is probably well informed about the firm and its prospects, problems stemming from asymmetric information between creditors and firms are likely to be small. Finally, the customers and suppliers of group firms in which they own equity are more likely to maintain their product-market ties.

Thus, our approach is to see whether firms that have close financial relationships to banks and their trading partners can more effectively avoid the problems associated with financial distress. Our main empirical finding is that financially distressed group firms invest more and sell more than non-group firms in the years following the onset of financial distress. Moreover, firms that receive a larger fraction of their debt financing from their largest lender invest and sell more, even if they are not group members. These findings suggest that, when financial claims are spread among many creditors, financial distress is more costly than when they are concentrated.

This evidence on the costs of financial distress differs from findings in previous studies. Warner (1977) focuses on the administrative costs of the bankruptcy process. He estimates that bankrupt railroads between 1933 and 1955 incurred administrative expenses during bankruptcy of 4% of their prebankruptcy market value. Weiss (1990) finds administrative costs of about 3% of market value for a subsample of firms that filed for Chapter 11 bankruptcy protection between 1980 and 1986. As the authors indicate, given that bankruptcy filings are relatively uncommon even for financially distressed firms, these expenses do not amount to a significant cost of financial distress.

Thus, if the costs of financial distress are large, they must stem from real efficiency costs in the product market. Cutler and Summers (1988) try to detect these costs in the events following Pennzoil's successful $10 billion judgement against Texaco and Texaco's subsequent attempts to have this judgement overturned. One might expect that the outcome of litigation favoring one company over the other would not change their combined value because they were fighting over a lump-sum transfer. Cutler and Summers, however, found that when the court ruled against Texaco, thereby increasing Texaco's expected liability to Pennzoil, the combined value of the two firms fell. The cumulative losses were over $3 million, much larger than any reasonable expectation of the administrative costs incurred in the dispute. The authors interpret this finding as evidence that the financial distress brought on by Texaco's $10 billion liability made it less able to raise capital and operate efficiently. This finding supports our evidence, but it is only suggestive: it would be useful to have more direct evidence on the sources of inefficiency and more systematic evidence from other cases.

Altman (1984) tries to measure the losses from financial distress by calculating the extent to which firms' profits are abnormally low in the three years before they file for bankruptcy. He attributes the lower profits to efficiency losses from financial distress. Unfortunately, this empirical finding does not distinguish between the cause of financial distress and its consequences: a firm's performance may be poor because it is financially distressed, but the firm also may be financially distressed because its performance is poor.

We try to distinguish between these effects. Our point is *not* that financially distressed firms perform worse than financially sound firms, although this is certainly true. Rather, if a firm is financially distressed, it performs better than other financially distressed firms if its financial structure makes it relatively easy to renegotiate its liabilities. This differential response suggests there may be efficiency losses during financial distress for some firms.

This evidence complements our earlier work [Hoshi, Kashyap, and Scharfstein (1990, 1991)] examining the role of bank relationships in facilitating corporate investment. We showed that investment by group firms is less sensitive to their liquidity than it is for nongroup firms. We interpreted this finding as evidence that bank relationships relax liquidity constraints by lessening information and incentive problems in the capital market. The results of this paper can help to explain our earlier findings for at least two reasons. First, because group firms can take on more debt (since their costs of distress are lower), they are better able to exploit its tax advantages. This lowers their cost of capital. Second, group firms that need to raise capital can do so by issuing debt. They then avoid equity issues which tend to depress share prices [Myers and Majluf (1984) and Asquith and Mullins (1986)]. Thus, reducing the costs of financial distress facilitates investment and relaxes liquidity constraints even when firms are not distressed.

The paper is organized as follows. The next section describes Japanese corporate financing patterns in more detail. We also summarize the evidence – largely case studies – on the role of Japanese banking relationships in moderating the costs of financial distress. Section 3 describes our data, and we present our empirical findings in section 4. Section 5 concludes with a discussion of the implications of these findings.

2. Japanese corporate finance and financial distress

One of the most important features of Japanese corporate financing arrangements is associated with an organizational structure known as the *keiretsu*, or industrial group. We focus on the six largest industrial groups (Mitsubishi, Mitsui, Sumitomo, Fuyo, Dai-ichi Kangyo, and Sanwa), which have their origins in the 1950s. The former three emerged from the remains

of the *zaibatsu* that were outlawed after World War II. The latter three were established somewhat later by the banks now at their core. Most large Japanese companies in the 1950s developed some affiliation with an industrial group. Membership in these groups have been remarkably stable for over three decades.

The six groups we examine are both diversified and vertically integrated. Almost half of the 200 largest firms in Japan are members of one of these groups. The six groups account for roughly 40% to 55% of sales in the natural resources, primary metal, industrial machinery, chemical, and cement industries [Gerlach (1987)]. As evidence of vertical integration, Gerlach notes that group firms are three times as likely to trade with group members as with nonmembers. These trading relationships are reinforced by cross-shareholdings in the group; firms with close product-market ties often hold significant stakes in each other.

From our perspective, the most important aspect of the group is the relationship between its manufacturing firms and financial institutions, both banks and insurance companies. For example, a Mitsubishi manufacturing firm may have ties to the Mitsubishi Bank, Mitsubishi Trust Bank, Meiji Life Insurance, and Tokio Fire and Marine Insurance, all core financial institutions of the Mitsubishi group. This relationship has several aspects. First, group firms do a substantial fraction of their borrowing from group financial institutions. Usually, one of these institutions is considered the firm's 'main bank': it takes a more active role in arranging financing for the firm, even though the firm borrows from other institutions in and out of the group. Using a loose definition of group affiliation, Sheard (1985) estimates that in 1980 group firms did 21% of their borrowing from their group's financial institutions.

In addition, group financial institutions typically own equity in the firms to which they lend. In our sample period, financial institutions were allowed to hold up to 10% of a firm's outstanding shares. By 1987, they were forced to reduce their holdings to no more than 5%. Sheard (1985) calculates that for 72% of Japanese firms the largest lender was one of the firm's top five shareholders.

Finally, the placement of key bank personnel in top managerial positions of group firms reinforces the banks' power as shareholders and creditors. In addition, former and current bank executives sit on the boards of many firms. Using information in the 1982 edition of the publication *Kigyo Keiretsu Soran*, we find that of the 1103 Japanese firms listed on the Tokyo Stock Exchange 8% have at least one director from the firm's main bank and 34% have a former main bank executive as a director (and often a top manager). As we discuss below, board representation and transfer of management personnel are particularly common in times of financial distress.

The question we focus on is whether these close financial links reduce the costs of financial distress. These costs can come from at least three sources.

First, when there are many creditors it is difficult to negotiate with all of them simultaneously.[4] Holdout creditors can then free-ride on others. As discussed by Myers (1977), Bulow and Shoven (1978), and Gertner and Scharfstein (1990), difficulties in negotiating with creditors may lead to underinvestment and inefficient liquidation. Even if the firm has valuable investment opportunities, an individual creditor may be reluctant to finance them because part of the greater future cash flows accrue to the holdout creditors. Similarly, even if it is efficient for creditors collectively to write down the debt, a sole creditor may be unwilling to do so because he bears all the cost and receives only part of the benefit.

Second, these problems are exacerbated when creditors are not well informed about the firm's prospects. In this case it is difficult to raise capital from one creditot,[5] let alone get numerous creditors to agree to a financial restructuring that promotes investment and avoids inefficient liquidation.[6]

Finally, there are more subtle forms of credit that are difficult to obtain when a firm is in financial distress. Consumers deciding whether to buy a durable good must also decide whether the firm will be able to meet its implicit and explicit warranties.[7] This confidence is a form of credit that consumers may be unwilling to extend to firms in financial distress. Moreover, suppliers may be unwilling to extend trade credit.[8] And, when it is not clear whether a firm will remain in business, product-market competitors may compete aggressively to convince creditors that it is indeed unprofitable for the firm to remain in business.[9]

In theory, group financing arrangements can moderate these problems in several ways. First, because there are fewer creditors and the main bank

[4]In fact, in the United States, the Trust Indenture Act prohibits bondholders from renegotiating with the firm. See Roe (1987) and Gertner and Scharfstein (1990) for an analysis.

[5]See Bolton and Scharfstein (1989) for a model in which financial distress leads to inefficient liquidation even though there is only one creditor.

[6]Gertner (1989) explores the added inefficiencies when there are more than two parties bargaining and there is asymmetric information.

[7]See Titman (1984).

[8]Cutler and Summers (1988) quote from an affidavit Texaco filed with the bankruptcy court:

> The increasing deterioration of Texaco's credit and financial condition has made it more and more difficult, with each passing day, for Texaco to finance and operate its business... As normal supply sources become inaccessible and other financing is unavailable, Texaco's operations will begin to grind to a halt. In fact, Texaco is already having to consider the prospect of shutting down one of its largest domestic refineries because of its growing inability to acquire crude and feedstock.

[9]See Bolton and Scharfstein (1989). An example of this is the case of Massey Ferguson. Its main competitor, John Deere, used Massey's financial distress as an opportunity to compete more agressively making it even more difficult for Massey to resolve its short-term financial problems.

holds a large financial stake in the firm, free-rider problems are less severe. In addition, because of its financial stake, the main bank is probably well informed about the firm's financial position and its prospects. Problems in obtaining credit because of information asymmetries are therefore reduced.

A more subtle reason that free-rider problems may be less severe stems from the repeated participation of banks in lending consortiums. For example, the Mitsubishi Bank may be the main bank for a firm in the Mitsubishi group, but the firm will typically borrow from banks outside the group as well. The Mitsubishi Bank will in turn participate in lending consortiums headed by other banks that serve as the main lenders to firms outside the Mitsubishi group. It is clear to all members of the consortium that the main bank is responsible for helping the firm in times of distress. Repeated participation in these consortiums ensures that the main bank fulfills its implicit contract to provide relief even though doing so may not seem best in the short run.[10]

Finally, there are numerous direct and indirect financial links between suppliers, customers, and financially distressed firms. Suppliers and customers often have an equity stake in the firm, and the firm may even have a stake in its suppliers and customers. Moreover, the firm's main bank may also be the main bank for the suppliers and customers. This financial web could make suppliers more willing to extend trade credit and invest in long-term supply relationships, and customers more willing to buy from the firm.

Group affiliation may be sufficient to overcome some of the problems associated with financial distress, but it is by no means necessary. There are firms that do not belong to a group that nevertheless have very strong ties to a single bank. For example, one of the nongroup firms in our sample, Meiji Leather Tanning, received 36% of its bank financing and 10% of its equity financing (the legal maximum) from its largest lender.[11] Such firms may not receive financial support from the other manufacturing firms in a group, but in theory they should receive help from closely affiliated financial institutions. We try to detect this possibility by collecting data on how much firms borrow from their largest lender and how much equity these lenders hold.

Before determining whether our hypotheses are supported by the data, we discuss a number of cases of financial distress. These cases highlight the main bank's role in helping firms work out of financial distress. They are discussed at greater length in Sheard (1985).

Perhaps the best-known case in which banking ties and group affiliation played a crucial role in helping a firm through financial distress is

[10]Aoki (1988, p. 149) makes a similar point, arguing that the main bank bears a disproportionate share of the costs because its reputation as a responsible monitor is at stake.

[11]In fact, Meiji Leather Tanning did quite well after the onset of financial distress: both its investment and sales growth exceeded its industry's average.

Sumitomo Bank's restructuring of Mazda, the automobile manufacturer.[12] Mazda experienced considerable financial difficulty after the 1973 oil shock sharply reduced the demand for its gas-guzzling rotary-engine cars. In response to these troubles, Sumitomo Bank and Sumitomo Trust sent a number of their top executives to serve as Mazda directors and others to manage key divisions of the company. They lent Mazda money at favorable rates and encouraged the company to sell its shares in the banks. Sumitomo Corporation, the large trading company of the Sumitomo group, took charge of distribution and the newly appointed management team implemented efficiency improvements in production. The banks, along with Sumitomo Corporation, also promoted Mazda sales among their customer firms and employees and leaned on suppliers to sell to the firm at favorable prices. Mazda is now a profitable company. The combination of bank-induced managerial changes, financial support, and pressure on suppliers is typical of the role banks play when their clients are in financial distress.

We know that several firms in our sample received help from group financial institutions when they were in financial distress. For example, Nippon Light Metal benefited from interest-rate reductions from Dai-ichi Kangyo Bank, saving the company about Y900 million per year (approximately $4.5 million at exchange rates prevailing then). Mitsui Toatsu received interest concessions from the Mitsui Bank. Sumitomo Bank implemented a large-scale restructuring of Daishowa Paper, placing bank executives in top managerial positions, writing down half its outstanding debt, and moving the firm into more profitable lines of business.

Although there are numerous anecdotes suggesting that main banks play an important role when Japanese firms are in financial distress, there is little statistical evidence along these lines. Indeed, Miwa (1985) fails to find changes in the lending behavior of the main banks of 134 financially distressed firms. The only statistical evidence we know that is consistent with the anecdotal evidence is presented by Suzuki and Wright (1985). They identify a set of Japanese firms that filed for bankruptcy liquidation or reorganization and a set that was given interest or principal concessions by creditors. They find that group firms with close ties to banks are more likely to fall into the latter set. This suggests that the concentration of financial claims enables firms to avoid the bankruptcy courts and yet still work out of financial distress. This finding is consistent with Gilson, John, and Lang's (1990) analysis of U.S. firms showing that firms that rely more on bank financing than on bond financing are more likely to restructure outside the bankruptcy courts.[13]

[12]See Pascale and Rohlen (1983) for details.

[13]The Corporate Reorganization Law of 1952 resembles the reorganization code that existed in the U.S. before the recent bankruptcy reform. This is not a coincidence because the Japanese code was adopted during the U.S. post-war occupation.

3. Data

The data on which our empirical analysis is based come mostly from the Nikkei Financial Data Tapes. This source contains financial data on all Japanese companies listed on the Tokyo Stock Exchange. We restrict our attention to manufacturing firms. The tapes also contain data on some, but not all, companies that were once on the Tokyo Stock Exchange and were subsequently delisted. We augmented these data with other data available from Nikkei on delisted firms. Thus, in principle we can analyze the entire sample of financially distressed firms. In many cases, however, distressed firms are restructured through liquidations, asset sales, spinoffs, or mergers, making it virtually impossible to track their subsequent performance. This introduces the possibility of selection bias in our results; we discuss this possibility in more detail below.

The choice of sample also depends on how financial distress is defined. Among the many possible definitions, we chose one that selects firms experiencing an immediate cash-flow crisis. In particular, we identified all firms whose operating income was greater than their interest payments in one year (coverage ratio greater than one), but less in the next two. We also required that the firm be listed on the Tokyo Stock Exchange at the onset of distress. The requirement that the firm was healthy at least once in the sample helps weed out firms that were distressed even at the beginning of the sample. We tried to exclude these distressed firms because we wanted to begin tracking firms at the start of their troubles. We also considered an alternative procedure that required that all firms have no history of financial distress for at least four years. This stricter selection rule left us with only 78 firms, but did not have much effect on the empirical results.

In describing the data, we compare various performance measures before, during, and after the onset of financial difficulty. As a convention, we date the second year in which the coverage ratio is below one as period t. Thus, for example, period $t-2$ refers to the year of healthy performance preceding the two years of distress and period $t+3$ is three years after the second year in which the coverage ratio is below one.

The sample period in which firms could enter our sample as distressed begins in April 1978 and ends in March 1985. For most firms, the fiscal year runs from April 1 to the following March 31. As the first entry in table 1 shows, over the entire sample of 6,209 observations, 12.3% of the observations have coverage ratios below one. As the next line shows, however, in 2.9% of the observations, a company has one healthy year followed by two distressed years. A firm can fall into this latter category more than once during the sample. We take the first time this occurs as the onset of distress. Of the roughly 950 listed manufacturing companies in the Nikkei database and the other delisted firms, 168 experience at least one bout of financial distress under this selection rule.

Table 1

Selected summary statistics of firms listed on the Tokyo Stock Exchange between 1978 and 1985. Number of firms varies from year to year, but averages almost 950. Coverage is the ratio of operating income to interest expense. Depressed industries are those targeted for structural adjustment by Japan's Ministry of International Trade and Industry.

Firm characteristic	Percent of sample
Coverage < 1	12.3%
Coverage < 1 for two straight years	2.9
Depressed industry	8.3
Of observations in depressed industry those with coverage < 1	20.6
Of observations in depressed industry those with coverage < 1 for two straight years	4.1
Of observations in healthy industry those with coverage < 1	11.6
Of observations in healthy industry those with coverage < 1 for two straight years	2.8

A natural question is whether this rule reliably identifies distressed firms. To assess this question, we sort the sample on the basis of whether the firm is classified by the Ministry of International Trade and Industry (MITI) as being in a structurally depressed industry and therefore targeted for structural adjustment.[14] Overall, firms in these industries account for 8.3% of the observations. The incidence of distress is higher in these industries than in others. As the table shows, for more than 20% of the observations, firms in depressed industries have a coverage ratio below one and for 4.1% of the observations a previously healthy firm runs into financial difficulty two years in a row. These percentages are larger than the percentages for firms in healthy industries, 11.6% and 2.8%, respectively.

In the remainder of the paper we focus on the performance of the distressed firms. For some of the 168 companies that we identify as distressed, we cannot get complete or consistent data. The data shortages leave us with a sample of 125 firms. Before describing the results of the analysis, we explain why the other 43 firms are omitted and discuss how the omissions could bias the results.

The main data difficulty arises when firms in financial distress participate in some kind of restructuring: a merger or takeover, a spinoff of a division, or a sale of a major asset. These changes make it virtually impossible to track performance after the onset of distress because the size of the firm changes discontinuously. The Nikkei database codes 25 firms as having undergone restructurings of this sort. These firms are dropped from the sample.

[14]These industries are reported in Ueksa (1987, p. 493). The Depressed Industries Law covering 1978 to 1983 identified 14 industries as depressed and in need of structural adjustment. This industry classification is more narrowly defined than ours. Under our scheme we identify 9 industries as depressed. The Structural Reform Law covering 1983–1988 identifies 23 industries as depressed; in our classification scheme this amounts to 11 industries.

An additional 3 firms are dropped because they were liquidated and then delisted according to *Nihon Keizai Shimbun*, the leading Japanese financial daily. Another firm was dropped from the Nikkei database, but we could not determine whether this was because of a merger or a bankruptcy. Finally, we had incomplete or unreliable data on certain key variables of interest for 14 other firms. In four cases, the data indicated more than a 200% increase in the capital stock in a single year. We assume that these data were misreported (or that there had been an unrecorded merger), so we exclude these four firms. We were also unable to obtain complete data on depreciable asset for four firms, making the construction of the investment variable impossible. The data omission occurred well before these firms became financially distressed. For six companies we were unable to collect detailed shareholding information.

Omission of these 14 firms is not likely to introduce selection bias. The omission of the 30 other companies that were restructured or liquidated is potentially more troubling. If, for example, all of the restructured firms were relatively unhealthy group firms, their omission could explain why group firms tend to outperform nongroup firms. To address this concern we collected information on these restructurings from *Nihon Keizai Shimbun*. From the articles we find no reason to believe that there is any systematic pattern that might bias the results. Of the 25 mergers, spinoffs, or asset sales, 16 are nongroup firms and nine are group firms (according to a loose classification scheme that we discuss below). These proportions reflect the roughly 2 to 1 proportion of nongroup to group firms in the entire sample of distressed firms. There is no obvious selection bias that we can detect, but nevertheless we cannot rule it out.

One piece of evidence suggests that, if anything, there may be a selection bias against finding a difference between group and nongroup firms. Of the three bankruptcy liquidations, all were nongroup firms. This is consistent with Suzuki and Wright's (1985) finding that financially distressed unaffiliated firms are more likely to go bankrupt than financially distressed group firms. If these unaffiliated bankrupt firms are worse on average than the rest of the sample, the sample of unaffiliated firms that we actually analyze is probably biased slightly toward relatively healthy ones.

The next step in forming the data is to classify firms as either group or nongroup firms. The dichotomous nature of this classification probably overstates the extent to which the two sets of firms differ. Membership is not clearly defined, but there are varying degrees of affiliation, which we try to pick up with this classification scheme. One indication of group affiliation is whether the firm sits on the group's President's Council, the set of firms that meets regularly to discuss issues facing the group. We consider these firms part of the group.

There are firms, however, that have some group affiliation, but do not sit on the President's Council. Identifying them requires some judgement. One

approach is to use the affiliations as identified by publications that provide analyses of the *keiretsu*. *Keiretsu no Kenkyu* stands out as one that focuses on the financial ties between firms and banks. *Keiretsu no Kenkyu*'s classification scheme is fairly loose, however, and tends to classify as group firms those with only marginal affiliations.

As a result, we use Nakatani's (1984) refinement of *Keiretsu no Kenkyu*'s classification scheme. Nakatani's refinement selects firms with stable group ties. Unfortunately, Nakatani does not classify firms that were involved in merger activity. Since his sample ends in 1983, we verified that the affiliations he identified were unchanged in the 1986 edition of *Keiretsu no Kenkyu*.[15] Thus, our set of group firms includes this updated list of Nakatani-identified group firms and the President's Council firms.

The remaining firms in the sample that do not fit these criteria are classified as nongroup firms. Although some of them are actually classified by *Keiretsu no Kenkyu* as being related to a group, their ties are weaker. Thus, we lump them together with the smaller number of firms that have no relationship with a group. In the end, we are left with 45 group firms and 80 nongroup firms.

For further information on the strength of a firm's bank relationship, we use detailed bank-borrowing and equity data. The Nikkei database contains data back to 1977 on the amount each firm borrows from each bank in Japan. Thus, for both group and nongroup firms, we calculate the fraction of all bank borrowing that comes from the firm's largest lender in period t. We call this variable *TOPLEND*.[16] In addition, from *Keiretsu no Kenkyu*, we calculate the fraction of the firm's outstanding shares held by the largest lender in year t. We call this variable *SHARE*.

Table 2 lists summary statistics on the 125 firms in our sample. The first two rows compare the mean (gross) investment rate of financially distressed firms with the industry average. The investment rate in period t is the change in the capital stock of depreciable assets during the period plus depreciation normalized by the capital stock at the beginning of the period. The capital stock numbers from which the investment series are derived are estimates of the replacement cost of capital. These estimates require converting book values of capital to market values through an iterative procedure. The calculations are described in more detail in Hoshi and Kashyap (1990).

The cumulative investment rate listed in the table is the sum of the investment rates in periods $t+1$ through $t+3$. As the table indicates, financially distressed firms invest substantially less than the industry average

[15]We found two firms whose affiliation weakened by 1986.

[16]Some of the firms in our sample had no bank borrowing. We set *TOPLEND* equal to zero for these firms. An alternative procedure is to calculate *TOPLEND* as the ratio of group borrowing to total debt. This has no substantive effects on the empirical results.

Table 2

Definitions and summary statistics of variables in the sample of 125 financially distressed Japanese firms from 1978 to 1985. Year t denotes the second consecutive year in which a firm's coverage ratio (operating income divided by interest expense) is below one. Financially distressed firms are those for which coverage is less than one in year t and $t-1$, but not in $t-2$.

Variable	Definition	Mean	Std. dev.
Cumulative investment	Sum of gross investment from $t+1$ to $t+3$	0.329	0.341
Industry mean cum. investment	Sum of industry mean gross investment from $t+1$ to $t+3$	0.528	0.151
Cum. sales[a] growth	Sum of sales growth from $t+1$ to $t+3$	0.139	0.260
Industry mean[a] cum. sales growth	Sum of industry mean sales growth from $t+1$ to $t+3$	0.181	0.145
GROUP	Dummy variable = 1 if firm is member of group	0.359	—
TOPLEND	Fraction of bank loans from largest lender	0.219	0.126
SHARE	Fraction of shares owned by largest lender	0.041	0.026w
Debt/capital ratio	Based on book value measured at t	3.30	2.12
Coverage ratio	Operating income in t /interest payments in t	0.180	0.795
Depressed industry dummy	Dummy = 1 if firm is in depressed industry as determined by MITI	0.160	—

[a]These numbers include only 124 firms because we eliminated an outlier.

in the three years following the onset of distress. Assuming depreciation rates of about 10% [Hoshi and Kashyap (1990)], the average financially distressed firm barely keeps pace with depreciation, while the capital stock of the average firm grows by over 20%. The sales growth rates reported in the next two rows reveal a similar pattern of relatively poor performance by financially distressed firms.

Table 2 also reports some financial statistics on the firms in our sample. On average the largest lender holds about 21.9% of the firm's bank debt and 4.1% of its equity. The average coverage ratio in period t is 0.180, considerably less than one. Of the 125 firms in our sample, 16.0% are in depressed industries and 35.9% are group members.

Table 3

Average annual investment rates of 125 financially distressed Japanese group and nongroup firms in years $t-3$ through $t+3$, subtracting the mean investment rate of firms in the same industry. Standard errors in parentheses. Year t denotes the second year in a row in which the firm's coverage ratio is below one. Financially distressed firms are those for which coverage is less than one in year t and $t-1$, but not in $t-2$. Year t is any year from 1978 to 1985.

	Year						
Firm type	$t-3$	$t-2$	$t-1$	t	$t+1$	$t+2$	$t+3$
Group firms ($n=45$)	−0.035 (0.019)	−0.030 (0.021)	−0.041[a] (0.024)	−0.067[a] (0.014)	−0.051[a] (0.025)	−0.062[a] (0.017)	−0.012 (0.022)
Nongroup firms ($n=80$)	−0.045[a] (0.018)	−0.038 (0.025)	−0.046 (0.026)	−0.053 (0.022)	−0.125[a] (0.016)	−0.085[a] (0.018)	−0.030 (0.024)
Difference (group vs. nongroup)	0.010 (0.026)	0.008 (0.033)	0.005 (0.035)	−0.014 (0.026)	0.074[a] (0.030)	0.023 (0.025)	0.018 (0.033)

[a]Statistically significant difference from zero at the 5% confidence level.

4. Empirical findings

To learn whether the process of financial distress lowers firm efficiency, we examine whether distressed firms perform better if their financial structure facilitates renegotiation in time of distress. We provide details of our empirical results for investment and briefly report the results for sales performance. We first compare the behavior of group and nongroup firms and then present a regression analysis that focuses on how the details of firms' financial structures affect their investment or sales performance.

Table 3 reports the mean deviation of the firm's investment level from its industry's average investment level three years before and after period t. We report the results for group and nongroup firms separately. The table corroborates the results reported in table 2, that in general financially distressed firms invest less than the industry average.

More interesting, however, are the differences in the investment rates for the group and nongroup firms. In six of the seven years, the industry-adjusted investment rates are higher for group than for nongroup firms. These differences are smallest before the onset of distress and largest after. The only statistically significant difference in investment rates is in year $t+1$; the mean industry-adjusted investment rate of group firms exceeds that of nongroup firms by 0.074. This difference is quite large. Financially distressed group firms invest on average at about 10% per year. Thus, a difference of 0.075 means that nongroup firms invest roughly 75% less than group firms.

Group affiliation is not the only difference in the financial structures of financially distressed firms that might affect their ability to work out of

Table 4

Estimated coefficients from regressing the sum of investment in years $t+1$ through $t+3$ of 125 financially distressed Japanese firms on the mean investment rate in the firm's industry during the same period and various measures of corporate and financial structure. Year t denotes the second consecutive year in which a firm's coverage ratio is below one. Financially distressed firms are those for which coverage is below one in years t and $t-1$, but not in year $t-2$. Variables are defined in table 2. t-statistics are in parentheses.[a]

Variable	Model 1	Model 2	Model 3
Constant	−0.138	−0.309	−0.439
	(−1.10)	(−1.89)	(−2.81)
Industry mean cum. investment	0.687	0.674	0.576
	(3.27)	(3.19)	(2.84)
Depressed industry dummy	−0.076	−0.111	−0.102
	(−1.12)	(−1.56)	(−1.39)
GROUP	0.131	0.404	0.464
	(2.28)	(2.62)	(3.03)
TOPLEND	0.378	1.284	1.333
	(1.35)	(2.42)	(2.49)
SHARE	−0.312	3.591	1.961
	(−0.25)	(1.29)	(0.61)
*GROUP * TOPLEND*		−1.390	−1.365
		(−2.07)	(−2.10)
*GROUP * SHARE*		−0.332	−1.233
		(−0.14)	(−0.56)
*TOPLEND * SHARE*		−17.267	−13.811
		(−2.02)	(−1.37)
Cum. investment $t-2$ to t			0.217
			(2.34)
Coverage ratio			−0.027
			(−0.74)
Debt/equity ratio			0.037
			(2.57)
Adjusted R^2	0.114	0.145	0.224

[a] t-statistics are calculated using White's (1980) heteroskedastic-consistent standard errors.

distress. To address this issue we regress a measure of the firm's investment on a number of financial factors that should be related to the costs of organizing a workout.

Table 4 reports a series of regressions in which the dependent variable is the sum of the investment rates in years $t+1$ through $t+3$, which we call cumulative investment. The first column reports the results from regressing cumulative investment on a dummy variable that equals one if the firm is in a group (labeled *GROUP*), on *TOPLEND* and on *SHARE*. We also include the industry's average investment rate to control for industrywide shifts in the

expected value of investment and a dummy variable equal to one if the firm is in a depressed industry as determined by MITI.

As expected, the coefficient of the industry's average investment rate is statistically significant and large. All else being equal, a 10% increase in industry average investment leads to an increase of nearly 7% in investment by financially distressed firms. The coefficient of the depressed industry dummy is negative, but statistically insignificant. We would expect a negative sign because depressed industries are those in which the government tries to reduce capacity. [See Ueksa (1987).]

The main findings of this table are that the coefficients of *GROUP* and *TOPLEND* are both positive, although only the coefficient of *GROUP* is statistically significant. The positive coefficients are what one would expect if financial distress is costly. By contrast, the coefficient of *SHARE* is negative, the opposite of the predicted sign, although it is statistically insignificant.

More importantly, the point estimates of both *GROUP* and *TOPLEND* suggest that they have economically important effects on investment. To see this consider two firms that are identical except that one is in a group and the other is not. Suppose that the industry these firms are in has an investment rate equal to the sample mean of 0.528 and that the *SHARE* and *TOPLEND* variables are equal to their sample means of 0.041 and 0.219. From the regression results, we predict that the nongroup firm will invest a cumulative 0.282 over the three years $t+1$ to $t+3$. Given estimated depreciation rates of about 10% [Hoshi and Kashyap (1990)], this means that its capital stock would depreciate by roughly 2%. By contrast, the group firm's cumulative investment would be 0.413, still below the industry investment rate, but 46% larger than the nongroup firm. Note that instead of eroding, the group firm's capital stock would actually grow by roughly 11% during the three years.

A similar calculation for *TOPLEND* indicates that its effect is also large. Of course, the coefficient estimate is measured with considerable noise in this regression, so it is difficult to be confident of this effect. Consider a hypothetical firm with all the variables in the regression equal to their sample means. Now suppose that *TOPLEND* increases from the sample mean of 0.219 to 0.345, one standard deviation away. Our regression analysis predicts that this increase of 58% would increase cumulative investment from the sample mean of 0.329 to 0.377, an increase of 14%. Put differently, the elasticity of investment with respect to *TOPLEND* is 0.24: a 1% increase in the fraction of lending by the largest bank translates into an increase in investment of 0.24%.

The second column of table 4 reports a regression that adds three interaction terms of the variables *GROUP*, *TOPLEND*, and *SHARE*. The first two, *GROUP* * *TOPLEND* and *GROUP* * *SHARE*, tell us whether concentrated bank borrowing and share ownership are more or less important for group firms than for nongroup firms. There are two reasons to believe that both of

these coefficients will be negative. First, our measure of group affiliation is based on the strength of the firm's affiliation with its main bank. Thus, the group dummy already captures some of the effects of concentrated bank borrowing and share ownership. Second, group firms may have other ways of moderating the costs of financial distress that are not available to nongroup firms with close ties to banks. As we discussed in the previous section, group firms have close financial links to their customers and suppliers. These firms may be more willing to extend trade credit and to continue buying in times of distress, providing a degree of financial relief unavailable to nongroup firms lacking these product-market ties. Unfortunately, we cannot distinguish between these two explanations.

The second column of table 4 establishes that the coefficients of both interaction terms have the predicted negative sign, but only the coefficient of *GROUP* * *TOPLEND* is statistically significant. The sum of the coefficient of this interaction term and the *TOPLEND* coefficient itself measures the total effect of *TOPLEND* for group firms (assuming for the moment that *SHARE* is zero). The sum of these coefficients is −0.106, but it is not significantly different from zero. In contrast, for nongroup firms, the direct effect of concentrated bank borrowing as measured by the coefficient of *TOPLEND* is large and statistically significant.

The second column of table 4 also includes the interaction term *TOPLEND* * *SHARE*. This variable is a rough indication of whether concentrated bank borrowing and share ownership are substitutes or complements. One hypothesis (substitutability) is that if firms borrow a lot from one bank, an increase in share ownership by that bank has little effect on the costs of financial distress because the bank already has a large enough debt stake in the firm to provide incentives for efficient renegotiation. Conversely, banks with large equity stakes do not need to hold much debt. This suggests a negative sign for the coefficient of *TOPLEND* * *SHARE*. Alternatively, it is possible that concentrated bank borrowing is effective only if the bank also owns shares in the firm (complementarity). This might be the case because banks that have only debt claims receive little of the benefit if the firm succeeds. Equity ownership would allow them to reap more of the benefits of good future performance.

The data are more consistent with the substitutability hypothesis. The coefficient is negative and statistically significant. Once this interaction term is included in the regression equation, the coefficient of *SHARE* shifts from being negative (in the first regression equation) to being positive, although this is statistically insignificant.

The regression estimates suggest that the cumulative effect of *TOPLEND* on investment is large for nongroup firms. To see that its effect is important, we note that the predicted cumulative investment of a nongroup firm is 0.301 when evaluated at the sample means of the regressors for a nongroup firm. A

one standard deviation increase of *TOPLEND* from its mean for nongroup firms of 0.235 to 0.381 increases cumulative investment by 0.085 to 0.386. This increase is the sum of a positive direct effect and a negative indirect effect that lowers the positive impact of *SHARE* on investment.[17] Thus, the 62% increase in *TOPLEND* increases cumulative investment by 28%, indicating an elasticity of investment with respect to *TOPLEND* of 0.45 at the sample means.

The last column of table 4 reports the results of including a set of variables that are intended to address some alternative explanations of our results. The inclusion of these variables does not affect the results in the second column substantially.

First, we include the firm's cumulative investment from $t-2$ to t. Table 2 suggests that group firms invest more than nongroup firms even before they get into trouble, although the mean differences are smaller and statistically insignificant in this earlier period. It is possible that group firms tend to invest more than nongroup firms in any event (for example, because their bank relationships lower their cost of capital). If this is true, our findings have little to do with financial distress and more to do with the overall distinction between group and nongroup firms. Of course, this explanation does not address the findings on other variables such as *TOPLEND*. We find that the estimated coefficient is indeed positive and statistically significant; however, its inclusion does not substantially affect our previous findings.

We also include the firm's coverage ratio in period t to measure the extent of the firm's distress. All else being equal, we would expect firms with relatively high coverage ratios to invest more; they are less distressed and their investment prospects are likely to be better. In contrast to this prediction, the point estimate of the coefficient is slightly negative but statistically indistinguishable from zero.

Finally, we include the debt/capital ratio at time t, where debt is measured in book values and capital is measured as the replacement value of the physical capital stock.[18] The idea is that the higher a firm's leverage, the more likely it will be to get into financial trouble. Thus, the average profitability of a financially distressed firm increases with its leverage. We would therefore expect highly leveraged firms to invest more because their investment prospects are better on average. If leverage is correlated with

[17]There are two competing effects. The direct effect increases investment by (1.423)(0.147) and the indirect effect lowers investment by (19.496)(0.147)(0.041), where 0.041 is the mean value of *SHARE* for nongroup firms.

[18]We use replacement costs of capital rather than the asset market's valuation (debt plus the market value of equity) for the following reason. Equity values contain information about the ability of firms to work out of financial distress and they should be higher for firms that are expected to invest more. This will tend to induce a negative relationship between market-value debt/capital ratios and investment which would dampen the effect we are interested in.

GROUP, *TOPLEND*, or *SHARE*, its omission would induce spurious correlation between these variables and investment. In line with the prediction, the coefficient of the debt/capital ratio is positive and statistically significant. Together, none of the results of interest are materially affected by these additions.

We perform similar analyses using sales growth as our performance measure. Because the findings are similar to those for investment, we review them briefly.

As with investment, financially distressed firms experience slower sales growth than the industry average in each of the years $t-2$ through $t+3$. More importantly, in each year the point estimates of the means for group firms are larger than those for nongroup firms, although the only statistically significant differences are in years t and $t+1$. The regression evidence is also consistent with our findings on cumulative investment. We use the sum of sales growth in years $t+1$ through $t+3$ as the dependent variable in our regressions. We also use the same basic regressors as those reported in table 4 for cumulative investment, substituting industry average sales growth for industry average investment as a control.

The same basic results hold for sales growth. The coefficients of *GROUP* and *TOPLEND* are positive and statistically significant, while the coefficient of *SHARE* is negative and statistically insignificant. A comparative static exercise similar to the one performed for investment establishes that the effects of the *GROUP* and *TOPLEND* variables are economically important. The results predict that a group firm will sell roughly 58% more than an otherwise identical nongroup firm (evaluated at the sample means). In addition, the regression indicates that a 1% increase in borrowing from the largest lender raises the sales of a typical nongroup firm by about 0.5%. The effects of *GROUP* and *TOPLEND* on sales growth are similar to their effects on investment.

We add the interaction terms (*GROUP* * *TOPLEND*, *GROUP* * *SHARE*, and *TOPLEND* * *SHARE*), as well as the coverage ratio, the debt/equity ratio, and lagged sales growth. The interaction terms have the same negative sign as in the investment regression equations; only *TOPLEND* * *SHARE* is statistically significant. *GROUP* and *TOPLEND* continue to be statistically significant in both of these equations. Finally, none of these results are overturned by the inclusion of lagged sales growth, the debt/capital ratio, and the coverage ratio.

5. Concluding remarks

This paper explores the idea that financial distress is costly because free-rider problems and information asymmetries make it difficult for firms to renegotiate with their creditors in times of distress. We present evidence consistent with this view by showing that firms with financial structures in

which free-rider and information problems are likely to be small perform better than other firms after the onset of distress. In particular, we show that firms in industrial groups – those with close financial relationships to their banks, suppliers, and customers – invest and sell more after the onset of distress than nongroup firms. Moreover, firms that are not group members, but nevertheless have strong ties to a main bank, also invest and sell more than firms without strong bank ties.

An alternative view is that group firms are helped in times of financial distress not because it is efficient to help them, but simply because the group is unwilling to let one of its members fail. This could be because bankruptcy reflects badly on other group firms; because the managers of other group firms feel a personal loyalty to the managers of the troubled company; or because bank executives are reluctant to admit that they made a mistake in extending credit. This view is similar to the view that conglomerates are often reluctant to liquidate unprofitable divisions. Thus, the group may be bailing out indiscriminately both good and bad firms, with ambiguous efficiency effects. We can think of no clearcut way of distinguishing between this interpretation and the one put forth in the paper. But, it is worth noting that when members of the group help troubled companies they do not just infuse money; as the examples discussed in section 2 indicate, they also actively try to restructure the company. This behavior is inconsistent with the view that they just throw good money after bad.

Our analysis may help to explain some differences between Japanese and U.S. firms. In the United States, debt is more diffusely held, with large companies relying more heavily on bond financing. This form of financing exacerbates problems stemming from financial distress and suggests that it may have been wise for U.S. firms to shy away from high debt levels. Japanese firms have taken on a larger amount of risky debt, but have established an institutional structure to cope with high leverage.

Interestingly, while leverage has been increasing in the U.S., it has been declining in Japan. Deregulation of Japanese capital markets has enabled Japanese firms to issue bonds domestically and abroad. They have exploited this new opportunity by substituting bond financing for bank borrowing [Hoshi, Kashyap, and Scharfstein (1990)]. This shift toward the public capital markets means that Japanese corporate debt is becoming more diffusely held and that relationships with banks are weakening. Thus, it is possible that leverage ratios have declined in part in response to a perceived increase in the costs of financial distress. It is too early to tell whether this is the case.

At the same time, of course, the recent leveraged buyout wave has increased corporate debt burdens in the U.S. The central question is whether this increase in leverage also comes with a change in the institutions that are needed to cope with financial distress. On the one hand, the senior bank debt

and high-yield (junk) debt used to finance these acquisition, appear to be diffusely held, at least much more so than Japanese corporate debt. On the other hand, as the incidence of financial distress increases, U.S. companies and their investment bankers are trying to find new ways to reorganize outside of bankruptcy court.

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