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4 Bank Monitoring and Investment: Evidence from the Changing Structure of Japanese Corporate Banking Relationships

Takeo Hoshi, Anil Kashyap, and David Scharfstein

4.1 Introduction

Economists typically view banks as intermediaries that serve to channel funds from individual investors to firms with productive investment opportunities. This commonly held view, however, is difficult to reconcile with the assumption of frictionless capital markets: in frictionless markets, firms would raise capital directly from individual investors and avoid the costs of intermediation.[1]

This paper offers empirical evidence on the benefits of intermediation. Our explanation for the existence of financial intermediaries derives from the view that there may be important capital-market frictions created by information problems between firms and investors. We view banks and other financial intermediaries as institutions designed in part to circumvent these capital-market imperfections. Specifically, banks serve as corporate monitors who pay the costs of becoming informed about their client firms and who try to ensure that the managers of these firms take efficient actions.

This view of the role of banks is not new. Schumpeter (1939) argued informally along these lines, and Diamond (1984) has constructed a formal model

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that captures these and related ideas. Diamond shows that delegating the task of monitoring to a financial intermediary minimizes monitoring costs. The alternative—issuing securities like public debt and equity—may be inefficient either because monitoring costs are needlessly duplicated among individual security holders or because monitoring is a public good that no one has an incentive to provide. Of course, this raises a potentially troubling question: Who ensures that banks monitor the firms in which they invest? Diamond shows that bank diversification plays a key role in ensuring that banks indeed monitor their client firms. His is the first model that takes full account of monitoring costs and shows that financial intermediation can be the most efficient monitoring mechanism. Ramakrishnan and Thakor (1984) and Williamson (1986) make similar points.

Our goal in this paper is to analyze empirically the role of banks in monitoring firms when there are information problems in the capital market. The focus of our study is the Japanese economy where historically banks have played a much more important role in financing investment than in the United States.[2] However, in the past decade the importance of bank financing in Japan has declined dramatically. While bank borrowing comprised 84% of all external financing between 1971 and 1975, it was only 57% in the 1981–85 period. In large part, this resulted from considerable deregulation of Japanese capital markets—enabling firms to raise capital directly from financial markets in the form of bonds and other debt-linked instruments. The result has been a substantial disintermediation of the Japanese financial system.

These regulatory changes offer us an excellent opportunity to study the role of financial intermediation. Our research strategy is to examine the investment behavior of a panel of firms before and after deregulation. In the period before deregulation all of the firms in our sample had close ties to a bank or set of banks. After deregulation, some of these firms loosened their ties to banks and relied more heavily on direct capital-market financing. Another set maintained their close banking ties. Our goal is to see whether the investment behavior of firms that have maintained their bank relationships exhibit the features of a bank-monitored firm. Moreover, we wish to detect changes in the investment behavior of firms that have loosened their bank ties: Do they exhibit behavior that reflects the fact that they were monitored before but not after deregulation?

Of course the crucial step in this analysis is identifying investment behavior that distinguishes between firms that are monitored and those that are not. In this regard we build on our earlier work in Hoshi, Kashyap, and Scharfstein (1990), which also examined the relationship between liquidity and investment for firms with different degrees of bank affiliation. We argued in that paper that essentially all models that posit some sort of information problem in the capital market predict that liquidity should be positively related to investment. This prediction arises, for example, in Myers and Majluf (1984). In their model, managers are privately informed about the value of investment.

This means that equity will sometimes be underpriced. Managers will therefore be reluctant to issue equity to finance investment: indeed, they may turn down positive net present value investments that they would otherwise accept if they had the internal funds to finance the investment. This model generates the prediction that, all else equal, more liquid firms should invest more. One can derive similar predictions from models that assume different information asymmetries and moral-hazard problems.

Bank monitoring is one way of overcoming these information problems. If banks lend a large fraction of a firm's debt as well as own a portion of its equity (as they do in Japan), then they have strong incentives to become informed about the firm and its investment opportunities. It is also in their interest to ensure that managers make efficient business decisions. In this case, the theory would predict that there should be little relationship between investment and liquidity for bank-monitored firms. If firms need funds to finance investment they can go directly to their informed bank to raise the money. Provided the project is valuable, the bank should be willing to provide the capital.

To explore these ideas, we start with a sample of firms all of which had close bank ties before deregulation. Investment by these firms is not sensitive to their liquidity during the 1977–82 period. We identify 1983 as the first year in which the effects of deregulation were fully felt. By that time, there is a set of firms that have significantly reduced their bank borrowing and increased their direct capital-market financing. These firms exhibit a strong sensitivity of investment to cash flow in the later period. By contrast, the firms that maintained bank ties show no sensitivity of investment to cash flow in both periods—before and after deregulation.

These results complement our earlier work (Hoshi, Kashyap, and Scharfstein 1990), which compared the investment behavior of this sample of firms to the investment behavior of firms without close banking ties during the period 1977–82. In that paper we found that the investment of the latter set of firms was quite sensitive to liquidity whereas it was not so for firms with close bank ties. The most interesting aspect of this paper is that we explore the investment behavior of the *same set* of firms over different periods. In some respects, it is more compelling to establish that, *for the same firm*, liquidity is more important as it weakens its banking ties.

These results raise the natural question of why a firm would choose to weaken its bank ties and incur this cost. Obviously, the answer must be that there are compensating benefits from raising funds directly from the capital market or costs of maintaining bank ties. These costs and benefits, while potentially important, are poorly understood and difficult to quantify. The conclusion, Section 4.4 below, includes some conjectures about what these costs and benefits may be. The more limited goal of this paper is to establish the facts about what happened to investment behavior as a result of deregulation.

The remainder of the paper is organized as follows. The next section re-

views the regulatory changes in Japan that have enabled firms to issue directly placed securities. We trace the changes in aggregate financing patterns between 1971 and 1985. We then present financing statistics for the firms in our panel. These results are consistent with the aggregate changes. Section 4.3 presents our main empirical evidence. In that section we also entertain other explanations for our findings. Finally, Section 4.4 contains concluding remarks. It also includes some speculative comments about the factors that might explain why some firms have shifted to direct financing and others have not.

4.2 Deregulation and Changes in Japanese Corporate Finance

Until recently bank debt was the predominant form of financing for Japanese firms. In large part this was due to regulations that made it difficult or even impossible to raise funds directly from securities markets. During the early 1980s a series of regulatory reforms were implemented that increased significantly the financing options of Japanese corporations. The result has been a dramatic transformation in the structure of Japanese corporate finance. This section reviews those regulatory reforms and presents aggregate-level and micro-level evidence on their impact on financing patterns.

The Japanese government's security-market regulations reduced both the supply and demand for corporate debt. First, on the supply side, the government required all domestically issued bonds to be fully secured against a firm's assets. It is widely believed that Japanese managers were reluctant to issue secured debt. The Nihon Keizai Shimbun-sha (1987) cites the administrative cost of establishing collateral as one of the most important reasons for the stagnant growth of domestic straight bond issues. There were no prohibitions against unsecured bank debt. According to Yoshihara (1987, p. 130), as of March 1981, less than 40% of all lending done by banks required collateral. These regulations therefore encourage bank financing.

A second supply-side regulation required firms to receive government permission to issue bonds in foreign markets. Unlike domestic bonds, these bonds could be unsecured. Nevertheless, foreign bonds were infrequently used because the government—for a complicated set of reasons—appears to have been reluctant to grant permission to issue these bonds.

Finally—and perhaps most important—there were interest-rate ceilings that reduced the demand for bonds. Holders of corporate bonds thus earned below-market yields. For example, Shimura (1978) reports that the difference between the subscribers' yield and the market yield of corporate bonds was as high as one percentage point in the late 1960s. While there were also interest-rate ceilings on bank debt, it is widely believed that banks were able to get around these restrictions by requiring firms to hold low-interest-bearing accounts at the bank (see, e.g., Aoki 1984, pp. 20–21).

The result, as one would expect, is that bank borrowing was the primary

source of external funds for most firms. Nasu (1987) reports that from 1976 to 1980, 80% of manufacturing firms' external funds came through borrowing from financial institutions.

The move toward deregulation was initiated in the government bond market. Until 1977, there was essentially no secondary market for government bonds. Instead, the Ministry of Finance put pressure on the banks to hold these low-yielding bonds. During a time in which government debt was quite low, this was acceptable to the banks. High growth helped sustain such practices because the Bank of Japan could (and actually did) monetize the bonds without fear of inflationary consequences. But as the government deficit grew and growth slowed after the first oil shock, this policy became more costly to the banks. They began to put pressure on the government to loosen its interest-rate restrictions. The government finally agreed to do so, and by June 1978 the Ministry of Finance began selling bonds through public auctions. Relaxation of interest-rate ceilings in the corporate bond market soon followed as it became apparent that the demand for corporate bonds would have been destroyed by the liberalization of the government bond market. As evidence of this change, the mean difference between the subscribers' yield and the market yield in the 1980–88 period was −54 basis points, whereas it was 32 basis points between 1973 and 1979. Interest-rate ceilings still exist, but they are adjusted frequently in line with market conditions.[3] In addition, the interest rates on convertible bonds are not regulated (Shinkai 1988, p. 288).

The government's second major reform was the loosening of its restrictions on foreign bond issues. Following the passage of the Foreign Exchange Law Reform of 1980, firms were no longer required to have government permission before issuing bonds on overseas markets; instead they were only required to notify the government that they intended to make such an issue.[4] According to the Ministry of Finance, by 1983 Japanese firms raised almost half their capital in overseas securities markets.

A third important reform was the government's legalization of warrant bonds in June 1981. These bonds come with an option to buy shares at a specified price during a certain period. This option was initially nondetachable, but it became detachable after December 1985. The Ministry of Finance reports that by 1986 over 20% of all new funds were raised using warrant bonds.

Finally, in January 1983 the government phased in new regulations allowing firms to issue unsecured bonds. Before then, only Toyota Motors and Matsushita Electric were permitted to issue unsecured bonds in domestic securities markets. In January 1983, an additional nine firms were permitted to issue unsecured straight debt and 23 more firms were allowed unsecured convertible bonds. In several stages over the subsequent four years, these privileges were gradually expanded; by February 1987, 180 firms could issue unsecured straight bonds, and 330 firms could issue unsecured domestic convertible bonds.

Together these reforms facilitated a pronounced shift in the aggregate financing patterns away from (indirect) bank borrowing and toward (direct) bond financing. Table 4.1 reproduces Nasu's (1987) statistics on financing patterns since 1971. As the table shows, between 1981 and 1985, the aggregate percentage of external funds raised by bank borrowing was 57%, which was down from 80% in the preceding five-year period. In contrast, the percentage due to bond financing rose from 2% between 1976 and 1980 to 22% between 1981 and 1985. The percentage of external funds raised through equity issues also increased slightly from 12% between 1976 and 1980 to 16% between 1981 and 1985.

The remainder of this section examines whether these general patterns also hold for a particular set of manufacturing firms. The firms in question represent a subset of the Japanese manufacturing firms that have been continuously listed on the Tokyo Stock Exchange since 1965. Since the data are described at length in Hoshi, Kashyap and Scharfstein (1990), we omit an extended description of the data.[5] This particular subset comprises 121 nonfinancial firms that we previously classified as having a close affiliation to a single bank in the 1972–82 period. The question we ask is: Have these firms that already had well-established banking relationships followed the general movement away from bank borrowing? In the next section, we examine whether any such moves have affected the firms' investment behavior.

To address this first question, we supplemented the balance sheet data that we have previously used with detailed data on borrowing patterns. These data are available from the publication *Keiretsu no Kenkyu*, which is also one of the original sources underlying the identification of these firms as having a strong bank relationship from 1972 to 1982.[6] Our strategy in collecting the data was to pick two years that would permit a comparison of the borrowing patterns before and after the reforms discussed above. We chose 1977 as the early year for two reasons: it is well before any of the important regulatory changes and it is the first year for which we had the stock price data needed to

Table 4.1 **Composition of External Funds Raised by Manufacturing Firms (%)**

	1971–75	1976–80	1981–85
Securities:	11.6	14.3	38.2
Stocks	7.0	12.1	15.5
Bonds	4.6	2.2	22.7
Borrowings from financial institutions:	84.0	80.3	56.6
Notes discounted	13.7	27.5	−.6
Short-term borrowings	31.8	47.0	49.6
Long-term borrowings	38.5	5.8	7.6
Other borrowings	4.4	5.4	5.2

Note: The data are taken from table 3-10 in Nasu (1987, p. 85).

compute Tobin's q (which we need later in analyzing investment). We compare the corporate financing patterns in 1977 to those in 1986, the most recent year for which data are available.[7] While post-1986 data would be helpful, it is not necessary; by then many of the key regulatory changes that have enabled firms to reduce their dependence on bank financing were already in place.

In collecting the data we found that 12 of the 121 firms either did not have complete data in *Keiretsu no Kenkyu* or had switched largest lenders by 1986. These firms no longer satisfy our definition of a firm with a close bank relationship. For the remaining 109 firms, table 4.2 compares data on some key variables in 1977 and 1986.

The first observation is that for these firms the 10 years between 1977 and 1986 have been ones of steady growth. The real capital stock increased by 50% over this period. Judging from the recent data, the growth of the capital stock appears to be continuing: in 1977, the median value of Tobin's q was 1.32, while the median rate of investment (relative to the capital stock) was .07; in 1986, these numbers were 1.68 and .19, respectively.[8] Thus, the period we are analyzing is one in which there was considerable investment, and financing needs were likely to have been important.

The change in the debt-equity ratio during this period is perhaps the most striking piece of evidence from table 4.2; in 1977, the ratio was 1.26; by 1986 it had fallen to .37. These numbers primarily reflect the steep rise in the Japanese stock market. During this 10-year period the aggregate equity value of these firms rose by more than fourfold, an annual growth rate of over 15%. While equity values have soared, there has been a much smaller increase in debt financing; the median nominal market value of debt rose only 3%, amounting to a real decline of about 11%.

The aggregate shift away from bank borrowing toward bond financing that was mentioned earlier is also evident for these firms. Table 4.2 shows that the book value of bank borrowing has fallen in real terms, with the median value falling by 24% and the mean falling by 11%. In addition, long-term bank borrowing was a much smaller fraction of all long-term liabilities, falling from 66% in 1977 to 31% in 1986.

One historically important source of bank financing are banks affiliated with a firm's *keiretsu* or industrial group. These groups are loose affiliations of firms (many of which have trading relationships with each other) centered around a core group of banks and other financial intermediaries. The 109 firms in our sample can all be considered members of one of the six largest industrial groups during the 1972–82 period. It is widely believed that for these firms group financing was the most important source of capital.[9]

There are a number of important differences between borrowing from a group bank and borrowing from other banks. First, group banks are likely to hold more debt in these firms than other banks and hence have stronger incentives to monitor them. In 1977, in our sample, group banks held, on average,

Table 4.2 **Group Firms Characteristics in 1977 and 1986: Summary Statistics for Selected Variables**

	Medians Only	
	1977	1986
Real capital stock—Depreciable assets (in millions of 1981 yen)	11,239	16,867
Tobin's q (for all assets)	1.32	1.68
(Investment)/(Capital)	.07	.19
(Market value of debt)/(Market value of equity)	1.26	.37
(Borrowing from group)/(Total bank borrowing)	.31	.29
(Total bank borrowing)/(Total debt)	.93	.88
(Borrowing from group)/(Total debt)	.28	.22
(Total bank borrowing)/(Capital)	1.75	1.01
(Borrowing from group)/(Capital)	.51	.30
	Medians (Means)	
	1977	1986
Nominal market value of total debt	18,819	19,404
	(64,988)	(77,399)
Nominal book value of bonds	950	3,580
	(6,947)	(16,703)
Nominal book value of bank borrowing	16,763	15,187
	(57,434)	(59,189)
Nominal book value of group borrowing	5,097	4,265
	(13,759)	(14,557)
	.66	.31
(All long-term borrowing)/(All long-term liabilities)	(.59)	(.38)
(Bonds)/(All long-term liabilities)	.09	.18
	(.11)	(.26)

Note. Capital and investment refer to real depreciable assets.

24% of all bank debt. In addition, group banks also tend to hold more equity in their client firms; this too gives them more powerful incentives to monitor. Moreover, group banks have in the past been active at helping member firms in financial distress; other banks often defer to the group banks, expecting them to take the lead in organizing any financial workouts for distressed firms (Sheard 1985). Finally, former bank executives are often placed in top managerial positions at these firms. This may facilitate the flow of information between the bank and its client firms.

Table 4.2 reveals that firms have become much less dependent on group financial institutions for their financing. The book value of borrowing from group financial institutions has dropped substantially, with the median falling 33% in real terms and the mean 4%. Interestingly, this change has mirrored changes in the amount of total bank borrowing. As the table shows, while the

overall level of group borrowing has fallen as a fraction of total bank borrowing, this form of borrowing has remained roughly constant.

So far we have focused on the changes in the level of bank and group borrowing. Of course, these changes could in principle reflect a decline in the financing needs of Japanese corporations. To give us a more meaningful measure of the change in the composition of financing, we control for the change in firms' financing needs by normalizing the borrowing numbers by the market value of the firms' debt and by the market value of their depreciable assets.[10]

These ratios reinforce the view that both bank and group borrowing have become less important funding sources. Relative to total debt, both types of borrowing show modest declines—by 5% in terms of all bank borrowing and by 21% in terms of group borrowing. However, these declines come on top of the previously mentioned downward trend in debt financing, so that they understate the movement away from bank financing. For this reason, the ratios that compare the borrowing numbers to the capital stock are better measures of these level effects; relative to the capital stock, both borrowing measures fell by over 40% from 1977 to 1986.

Table 4.2 also indicates that along with the shift away from bank financing there has been a move toward bond financing. The median book value of bond financing rose by over three-and-a-half times in real terms. As a fraction of long-term liabilities, bonds have risen twofold. A more detailed look at the bond patterns reveals that most of the increase in bond financing has come from the issue of convertible bonds. In 1977 the average amount of outstanding convertible bonds accounted for 30% of all bond financing. This percentage and the amount of outstanding convertible bonds were both roughly constant until the 1983 regulatory changes. Since then, convertible bonds have gained in use, so that by 1986 their face value was nearly five times the level in 1977. Even with the rise in straight bond financing, convertible bonds accounted for 60% of all bond financing in 1986.

A simple pattern emerges from table 4.2. The period of steady growth from 1977 to 1986 accompanied a marked decline in debt-equity ratios. In particular, the bank-borrowing component of debt, the traditional source of financing, became much less important. This is reflected in declines in borrowing from both group banks and other banks. The recent data suggest that when firms need outside financing, they are increasingly turning to the stock market and the newly developed bond market.

While this message is consistent with the aggregate evidence presented earlier, it is somewhat misleading; table 4.2 masks some interesting heterogeneity in the data. Not all of the firms have been so aggressive in cutting back on debt financing, nor have all the firms had such steady growth. In fact, the performance and general financing patterns of firms that have reduced their dependence on bank financing are quite different than firms that have maintained their banking relationships.

Table 4.3 **Characteristics Sorted by Movements in Group Borrowing to Total Debt Ratio**

	Medians Only			
	69 Firms Where GB/D Fell		40 Firms Where GB/D Rose	
	1977	1986	1977	1986
Real capital stock—Depreciable assets (in millions of 1981 yen)	10,877	20,674	15,123	16,115
Tobin's q (for all assets)	1.34	1.74	1.24	1.46
(Investment)/(Capital)	.07	.19	.04	.15
(Borrowing from group)/(Total debt)	.28	.17	.25	.31
(Borrowing from group)/(Capital)	.53	.17	.50	.53
	Medians (Means)			
Nominal market value of total debt	16,531 (63,378)	17,118 (81,061)	24,871 (67,766)	20,243 (71,080)
Nominal book value of bonds	1,166 (7,730)	7,162 (21,470)	286 (5,596)	0 (8,481)
Nominal book value of group borrowing	4,934 (14,265)	2,967 (13,527)	5,438 (12,890)	7,736 (16,308)

Note: Capital and investment refer to real depreciable assets. GB/D stands for the ratio of group borrowing to total debt.

Table 4.3 demonstrates this point by separately showing the relevant statistics from table 4.2 for two sets of firms: those for whom the ratio of group borrowing to total debt has decreased and those for whom it has increased. The same basic pattern would emerge if we classified these firms according to changes in the ratio of total bank borrowing to debt.

This table brings out two important points. First, the firms that have reduced their dependence on group financing (and bank financing, more generally) have had much higher growth than the firms that have increased their dependence on group financing. In 1986, the real capital stock of the median firm in the former set of firms is over twice its size in 1977—a real growth rate of over 6% a year. In contrast, the real capital stock of the median firm that has increased its group borrowing has risen by less than 1% per year.[11]

The second important difference between the two sets of firms is their changes in q. Despite the large increase of the capital stock for the firms that have become less dependent on group financing, their q's have risen appreciably. The increase in q for these firms is roughly twice as large as for the other firms.

These data suggest that decisions regarding the mix of debt financing are not arbitrary; Diamond (1989) presents a theory of this choice. This raises an important issue for our paper when we come to compare the investment be-

havior of the two sets of firms: Are the factors that determine firms' financing choices correlated in some way with their investment behavior? If so, our results will be biased. After discussing what we think determines firms' financing choices, we present evidence and argue that this issue probably does not explain our results.

4.3 Financing Patterns and Investment

4.3.1 Approach

The objective of this section is to investigate whether the documented changes in Japanese financing patterns have had an impact on corporate investment behavior. As discussed in Section 4.1, essentially all models that posit information problems in the capital market predict that more liquid firms undertake more investment. We have argued that close bank relationships are a means of mitigating information problems; banks with large debt and equity stakes in firms have strong incentives to monitor them. In contrast, firms without investors who have large financial stakes at risk are more likely to face information problems when it comes to raising capital.

In Hoshi, Kashyap, and Scharfstein (1990) we showed that during the period when these firms all had close banking relationships, 1977–82, liquidity was not a significant determinant of investment. The question we ask here is whether, for the set of firms that have loosened their ties to banks, liquidity is a more important determinant of investment. Moreover, does liquidity continue to be unimportant for firms that maintain close bank ties?

The main empirical obstacle in determining the importance of liquidity is the possibility that liquidity is correlated with other variables that affect investment. In particular, if the fundamental determinants of investment are unobservable, then the liquidity coefficient in an investment regression will be biased to extent that liquidity is correlated with the fundamentals. The standard claim is the such correlation exists: strong current performance as evidenced by high liquidity signals that future performance is likely to be good and hence that investment is worthwhile. Thus, a regression of investment on some measure of liquidity may simply be picking up the relationship between current and future performance, inducing an omitted variable bias.

Fazzari, Hubbard, and Petersen (1988) take two steps toward addressing this problem. First, they estimate an equation that contains both liquidity and an explicit proxy for the value of investment opportunities. They argue that since q is a forward-looking measure of profitability, it is useful in this regard. We believe that q is an imperfect measure of investment opportunities,[12] so that some component of liquidity still reflects these opportunities. Nevertheless, to the extent that q does reflect investment opportunities it will reduce the omitted variable bias of the liquidity coefficient.

The more innovative approach to this problem is to compare the effects of

liquidity across two sets of firms. Fazzari, Hubbard, and Petersen (1988) identify a set of firm that they believe on a priori grounds are likely to face information problems in the capital market and identify another set that are not likely to face such problems.[13] They then estimate the investment equations for these two sets of firms, comparing the estimated effects of liquidity. Under the null hypothesis of perfect capital markets there should be no difference in the estimated liquidity coefficients provided the omitted variable bias is the same for the two sets of firms. Thus, if one is to explain the finding that liquidity is more important for one set of firms under the null hypothesis, one has to argue that the omitted variable bias is greater for that set of firms: either that q is a particularly bad proxy for investment or that liquidity is particularly good proxy. Below, we discuss two arguments along these lines, but do not find compelling evidence for them. Absent such a compelling argument, the findings are consistent with the existence of liquidity constraints.

4.3.2 Regression Equations

The evidence we will present is obtained by regressing investment in depreciable assets (normalized by the stock of depreciable assets) on a set of yearly dummies, a tax-corrected version of q for depreciable assets, cash flow, lagged production, and the beginning of period stock of marketable securities. The last three variables were all normalized by the stock of depreciable assets and all the data were first differenced.

This regression equation is the same as the one estimated in our previous paper. Essentially all of the nonliquidity variables are included to reduce the possibility that the liquidity variables might be proxying for unobservable determinants of investment. We briefly discuss why these variables should reduce this possibility. The yearly dummies are included to filter out any common macroeconomic shocks.[14] Other firm or industry-specific shocks are eliminated by first differencing (at the cost of losing one year of data). Since this transformation induces a moving-average term into the residual, all the standard errors reported below are computed using a robust method that allows for first-order moving-average errors (see White 1984).

For the reasons given above we include q in the regressions. In fact, we actually use both beginning- and end-of-period q in all of our regressions. We include both measures because it is possible that cash received during the period contains information about investment opportunities not contained in the beginning-of-period q. Including the end-of-period q addresses this problem at the cost of obscuring the interpretation of the coefficients on q.[15] Since these regressions are not designed to test the q theory of investment, this trade-off is one we are willing to make. The results are not affected by the inclusion of end-of-period q.

We also include production over the previous year in our regressions. There are several reasons to include production. The most important is that the empirical investment literature has repeatedly shown the existence of an acceler-

ator effect in the data. Our previous paper confirms the importance of the effect for these firms. Blundell et al. (1987), Fazzari, Hubbard, and Peterson (1988) and Whited (1990) establish that the accelerator effect is important even in models with q for firms in Britain and the United States. If we were to drop production, it is possible that the liquidity variable would be proxying for accelerator effects since production and liquidity are typically correlated. The inclusion of both variables eliminates this problem. In addition, theoretical arguments based on the presence of monopolistic competition in the product market can also be used to justify the inclusion of a production term in the investment equation (see Schiantarelli and Georgoutsus 1987). We emphasize, however, that these results do not depend on the inclusion of production.

Finally, since the focus of the investigation is the sensitivity of investment to liquidity, we include two measures of liquidity. The first variable is current cash flow, which is defined as income after tax plus depreciation less dividend payments.[16] We also include the firms' holding of marketable securities as a proxy for the stock of a firm's liquid assets. These securities are identified by the firms as assets that can readily be converted into cash. In most years, the median firm's holdings of these cash equivalents is as large as the median amount of investment.

4.3.3 Findings

As a starting point for our discussion, we estimate the basic regression for the 109 firms over the 1978–82 period—specifically, from April 1978 to March 1983. The results are shown in the first column of table 4.4. As would be expected from our previous work, neither cash flow nor the stock of liquidity is a significant determinant of investment over this prederegulation period.

Table 4.4 **Investment and Internal Funds before and after Deregulation**

	All 109 Firms	All 109 Firms
Fiscal years	1978–82	1983–85
Average q (beginning of period)	−.002	.010
	(.005)	(.005)
Average q (end of period)	.002	−.009
	(.005)	(.006)
$\left(\frac{\text{Cash flow}}{K}\right)_t$	−.008	.161
	(.036)	(.149)
$\left(\frac{\text{Marketable securities}}{K}\right)_{t-1}$	.041	.037
	(.031)	(.040)
$\left(\frac{\text{Production}}{K}\right)_{t-1}$	.019	−.009
	(.002)	(.011)

Note: Dependent variable is I/K. All regressions include a set of yearly dummies and are done using first-differenced data. The standard errors are reported in parentheses below the coefficient estimates and they have been corrected for the moving average introduced by the first differencing.

The coefficients of both variables are precisely estimated and small, which suggests the interpretation that these variables are not important determinants of investment.

As the second column of table 4.4 shows, the results are less clear-cut over the 1983–86 period. The point estimate of the cash flow coefficient is much larger, but it is imprecisely estimated so that at conventional levels of significance it is indistinguishable from zero. The seemingly large standard errors suggest that there is substantial heterogeneity in the data. Below, we establish that this is the case.

It is worth pointing out that, as so much previous work has shown, q does not appear to be the key variable that determines investment. Also, production is no longer significant in the later period. Given the reduced-form nature of the regression, this change is hard to interpret.

We now consider the natural question raised by the results in table 4.4. Is the increased sensitivity of investment to cash flow in the later period related to the changes in financing patterns that occurred at the same time? To address this question, we separated the sample into two sets of firms, those that increased and those that decreased their reliance on bank financing. As a measure of the strength of a bank relationship we used the ratio of group borrowing to debt. We focus on group borrowing rather than total bank borrowing because, as discussed above, group borrowing is probably associated with more intensive monitoring. However, it is worth indicating that other measures of the dependence on bank financing yield similar results.

We ran the above regressions for the two sets of firms. The first two columns of table 4.5 show that for the pre-deregulation period, the sensitivity of investment to internal funds does not seem to depend on whether or not firms subsequently changed their group borrowing to total debt ratio. Put differently, splitting the sample in the 1978–82 period does not reveal a tendency for either class of firms to invest more when their liquidity is higher.

Since the two samples are independent, hypothesis tests comparing individual coefficients between the two sets of firms can be conducted without being concerned about covariances. As the table shows, the sampling variation is large enough so that none of the individual coefficients are statistically different for the two groups. In most cases, the coefficients are also precisely estimated so that such comparisons are meaningful. The only exception is for the marketable securities variable, where the coefficient is very difficult to pin down for the firms that have maintained strong ties to the groups. Overall, these findings support our previous work: during this period when all of these firms had close banking ties, liquidity does not drive investment.

The third column of table 4.5 demonstrates the first of the two main findings of the paper: firms that have loosened their ties to group banks exhibited a marked increase in the effect of liquidity on investment. The coefficient on cash flow for these firms increased by a factor of five from .082 to .479 between the pre- and postderegulation periods; the t-statistic on cash flow in-

Table 4.5 **Investment and Internal Funds before and after Deregulation (Controlling for Movements in Group Borrowing to Total Debt Ratio)**

	GB/D Down, 69 Firms	GB/D Up, 40 Firms	GB/D Down, 69 Firms	GB/D Up, 40 Firms
Fiscal years	1978–82	1978–82	1983–85	1983–85
Average q (beginning of period)	−.003	−.003	.005	.016
	(.006)	(.008)	(.008)	(.004)
Average q (end of period)	−.003	.016	−.007	−.008
	(.006)	(.008)	(.009)	(.005)
$\left(\frac{\text{Cash flow}}{K}\right)_t$	.082	−.064	.479	−.049
	(.100)	(.035)	(.140)	(.098)
$\left(\frac{\text{Marketable securities}}{K}\right)_{t-1}$	.044	.139	.049	−.187
	(.029)	(.130)	(.027)	(.102)
$\left(\frac{\text{Production}}{K}\right)_{t-1}$	.013	.020	−.020	.012
	(.007)	(.002)	(.013)	(.015)

Note: GB/D stands for the ratio of group borrowing to total debt. Dependent variable is I/K. All regressions include a set of yearly dummies and are done using first-differenced data. The standard errors are reported below the coefficient estimates and they have been corrected for the moving average introduced by the first differencing.

creased from .8 to 3.4. Using a one-sided test, the postderegulation coefficient is significantly larger than the prederegulation coefficient at the 5% level. The other coefficients for these firms are mostly unaffected; none are statistically different across the two periods.

The paper's second major result, shown in the last column of the table, is that for firms that have maintained their ties to group banks, liquidity continues to be unimportant even after deregulation. For these firms, both before and after the regulatory changes, cash flow is statistically insignificant with a coefficient that is tightly estimated and close to zero. The effect of holdings on marketable securities is hard to pin down in either period, but neither coefficient is significant. Individual comparisons of the other variables in the equation also suggest that there are no statistically significant differences across the two periods, although the standard errors on coefficients for beginning-of-period q are rather large.

The analysis suggests that bank relationships relax liquidity constraints. Before accepting this interpretation of the evidence, however, we explore an alternative explanation of our results. As we discussed above, the characteristics of firms that have loosened their bank ties differ substantially from those that do not. In particular, firms that reduced their dependence on banks had higher growth and higher q's. This suggests that there are some underlying economic forces that determine corporate borrowing patterns. Diamond (1989) analyzes models along this line. It is possible that the factors that determine this choice are correlated with firms' investment behavior.

One explanation for the result that liquidity is unimportant for firms that maintain their bank ties is based on the observation that these firms generally have low q. These firms would not be expected to invest heavily and their investment opportunities are probably poor. It might be argued that for these firms neither liquidity nor any other variable should forecast investment. In contrast, successful firms with high q tend to use the public capital markets. These firms have better investment opportunities and one might expect that other variables like liquidity would predict investment. Hence, in this view, the omitted variable bias is more severe for the firms that have loosened their bank ties, and it is not surprising that the estimated effects of liquidity are larger for these firms. By this reasoning, any selection mechanism that simultaneously partitions firms on the basis of q implicitly uncovers an investment-liquidity linkage that is driven by these consideration rather than the selection rule.

To address this alternative explanation, one must show that a selection rule that explicitly conditions on performance does not explain the observed differences in the relationship between investment and liquidity. Table 4.6 reports the estimated regression equations after sorting firms into low and high q groups. The partition is made on the basis of average q for all assets in 1977.[17] To save space, we only report results for the partition that separates the top one-third and bottom two-thirds of the firms: this amounts to separating firms with q above and below 1.5. Similar results would apply for a partition based on the median firm. It also does not matter whether we partition based on q in 1977 or in 1986.

Table 4.6 suggests that our main findings are not explained by the possibil-

Table 4.6 **Investment and Internal Funds before and after Deregulation (Separating High- and Low-q Firms)**

	34 Firms $q \geq 1.5$ in 1977	75 Firms $q < 1.5$ in 1977	34 Firms $q \geq 1.5$ in 1977	75 Firms $q < 1.5$ in 1977
Fiscal years	1978–82	1978–82	1983–85	1983–85
Average q (beginning of period)	−.001	−.007	.016	.005
	(.008)	(.008)	(.007)	(.008)
Average q (end of period)	−.002	.008	−.004	−.012
	(.008)	(.006)	(.007)	(.009)
$\left(\frac{\text{Cash flow}}{K}\right)_t$	−.048	.069	.097	.350
	(.047)	(.061)	(.158)	(.205)
$\left(\frac{\text{Marketable securities}}{K}\right)_{t-1}$	.038	.059	−.033	.064
	(.058)	(.038)	(.066)	(.038)
$\left(\frac{\text{Production}}{K}\right)_{t-1}$	.016	.018	−.003	−.007
	(.010)	(.002)	(.019)	(.013)

Note: Dependent variable is I/K. All regressions include a set of yearly dummies and are done using first-differenced data. The standard errors are reported below the coefficient estimates and they have been corrected for the moving average introduced by the first differencing.

ity that cash flow contains differential information for high and low q firms. The first two columns show that, for both sets of firms, liquidity was unimportant in the prederegulation period; both the flow and stock measures of liquidity are tightly estimated and insignificant. The last two columns show that similar—although somewhat ambiguous—results hold for the postderegulation period. Over this period, cash flow is harder to estimate precisely with relatively high standard errors. None of the coefficients is significant. The coefficients for the low and high q firms are not significantly different from each other, although the point estimate for the low q firms is higher. We also sorted simultaneously by both q and the ratio of group borrowing to debt. Both low and high q firms that reduced their group borrowing showed a strong sensitivity of investment to cash flow, whereas both types of firms that continued to rely on group banks showed much lower sensitivity of investment to cash flow.

To assess further the importance of this problem, we sorted the sample on the basis of whether investment in the postderegulation period was above or below average. In general, this selection rule will be problematic since it implicitly sorts on the basis of the residuals in investment equation. But in this case, it is perhaps the cleanest way to test whether performance or strength of affiliation is more important in determining the investment/cash flow linkages. We found that the high-investment firms that maintained their group ties showed no significant relation between investment and cash flow, while the high-investment firms that moved away showed a very strong and significant relation. The low-investment firms showed a similar pattern although here the strongly attached group firms actually had a significantly negative cash flow coefficient, while the firms that loosened their ties had a positive and significant coefficient. Hence, group attachment and not stock market indicators such as q or even realized investment rates seem to be the key determinant of whether cash flow helps to predict investment.

Of course, q and observed investment rates are imperfect measures of a firm's prospects. It is conceivable that a firm's financing patterns are in fact better indicators. For example, it may be that only firms with excellent investment opportunities reduce their bank ties so that for them liquidity is particularly informative about investment opportunities. Unfortunately, it is impossible to determine whether the financing behavior itself is a better measure of future performance. Thus, to accept our interpretation of the facts one must believe that q and investment rates themselves are reasonable measures of future performance.

4.4 Conclusion

This paper presents evidence on the role of banks in monitoring firms. We argued that bank monitoring mitigates information problems in the capital market. This is manifested in the investment behavior of firms with close bank

relationships; these firms do not appear to be liquidity constrained. We started with a sample of firms with close bank ties and showed that their investment was not sensitive to their liquidity. Regulatory reforms created new possibilities to raise money directly from the capital market. We found that the investment of firms that chose this new financing option and weakened their bank ties was much more sensitive to liquidity than firms that continued to borrow heavily from banks.

This analysis raises an obvious question: If indeed bank monitoring overcomes information problems and relaxes liquidity constraints, why did some firms weaken their bank ties? This question points to the need for a theory of the choice between bank debt and public debt. Except for Diamond's (1989) recent theoretical contribution, we know very little about this trade-off. Diamond argues that young firms, or older ones that have done poorly, will borrow mainly from banks and that older, more successful firms will use public debt. The idea is that successful firms have more "reputation capital" at stake and hence have more to lose by taking inefficient actions. These firms do not need to incur the monitoring costs associated with bank borrowing. By contrast, younger firms have not yet developed a reputation and older, less successful firms do not have a good reputation to lose. It is therefore efficient for these firms to incur the costs of bank monitoring.

The results presented here suggest that monitoring and other costs associated with bank financing must be large. Otherwise, firms would not have chosen to weaken their bank relationships until they had enough collateral (both tangible and intangible) to be able to get around liquidity constraints. Unfortunately, we can only conjecture what these costs might be. Beyond direct monitoring costs, three others come to mind. The first obvious cost stems from regulations requiring banks to hold a fraction of their assets in non-interest-bearing accounts. This reserve requirement means that the costs of funds to banks exceed those of individual investors; as a result, they will require a higher gross rate of return on their investments.[18] In addition, bank loans are generally less liquid than publicly traded debt. The difficulty that banks face in adjusting their loan portfolio may also mean that they will require a higher gross return.

Finally, a more subtle cost of bank financing may arise from the different objectives of banks, corporate managers, and shareholders. Since banks mainly hold debt claims, they receive little of the up side from unusually good firm performance (of course, to the extent that they own equity they will participate in some of the gains). Shareholders, in contrast, care only about maximizing the up side. This conflict may result in excessively conservative investment policies if banks control corporate investment decisions. It may therefore be efficient to reduce bank ties to avoid this problem at the expense of becoming more liquidity constrained. As firms generate more cash from ongoing operations, they may be more willing to make this transition. In addition, managers may prefer to have more control over operating decisions

than a bank is willing to allow. Managers may choose to weaken the firms' bank ties and incur greater financing costs because it gives them more control despite the fact that it is inefficient to do so. Again, as firms become more liquid, managers may be more willing to incur these costs.

We conclude by emphasizing that this empirical analysis (and that of MacKie-Mason, in this volume) as well as the theoretical work of Diamond (1989) suggests that there is more to financing decisions than the choice of a debt-equity ratio. A crucial decision that firms face is the actual source of financing regardless of whether it is in the form of debt or equity. The recent changes in Japanese financing arrangements were particularly useful in addressing this issue.

Obviously, Japan is not the only country in which this issue is important: firms operating in the context of other financial systems face the very same set of questions. And, Japan's is not the only financial system in the midst of rapid change. Along with the increase in leverage in the United States there have been dramatic changes in who holds corporate debt and equity. Firms are increasingly relying on private equity markets for their financing; for many firms much of the equity is held by management and large institutional investors. This movement away from passive shareholders with small equity stakes to larger, more active shareholders may have important consequences for the link between the financial and real sides of the firm. In addition, there have been striking changes in the structure of debt markets: junk bonds and the increased reliance on private placement are two recent phenomena. While firms in Japan have moved towards direct capital-market financing, in some ways the move in the United States has been in the opposite direction. Understanding the forces underlying these changes is one of the important challenges facing students of corporate finance.

Notes

1. The costs include administrative expenses in excess of underwriting fees, reserve requirements that raise the cost of funds to banks, and the illiquidity of bank loans.
2. See, e.g., Hamada and Horiuchi (1987), Royama (1982), Suzuki (1974).
3. According to Shinkai (1988) these rates are said to "'respect' the market rates."
4. The government can still intervene to block an issue, but such interventions are very unusual.
5. To simplify the calculations, we restricted the sample to firms with accounting years ending in March. After imposing this restriction and removing outliers, we are left with 337 firms. Most of the data on them comes from the Nikkei Financial Data Tapes.
6. In fact, we used Nakatani's (1984) refinement of *Keiretsu no Kenkyu*, which eliminates firms that switched their lender or merged.
7. The dates here refer to the end of a fiscal year, so that when we say 1977 it refers to March 1977.

8. Our measure of Tobin's q is the ratio of the market value of debt and equity (correcting for taxes) to the replacement cost (measured at market values) of all assets. The construction of q is discussed at length in Hoshi and Kashyap (1990). Throughout this section, we compare the median value for the firms at two points in time. Even though the median firm is generally different at each point, for ease of exposition we discuss the comparison as if the same firm is being studied.

9. See, e.g., Hodder and Tschoegl (1985).

10. In both these ratios, the denominators are nominal market-value numbers while the numerator is a nominal book-value number. Given that most bank borrowing is short term, the book-value numbers for borrowing should not be very different from the market-value numbers for borrowing. Hence these ratios should be straightforward to interpret.

11. Note that we use the debt normalization rather than the asset normalization. We do this because the asset-based measure is low for high-asset firms so that one would expect to observe these pattems by the very nature of the construction.

12. In calculating Tobin's q one must make numerous assumptions that no doubt introduce measurement error. For example, one must convert book-value measure of asset values into market-value measures, a very imprecise task.

13. They argue that firms with low divident payouts are more likely to face information problems since they seem to prefer retaining their earnings.

14. Since the length of the panel is so short, it is difficult to make any further corrections for possible serial correlation.

15. End-of-period q is endogenous since it includes the end-of-period replacement cost in its denominator, which in tum includes the replacement cost for investment made during the year. Accordingly, the coefficient associated with end-of-period q will be biased toward zero.

16. It is not clear if dividends are discretionary and whether they belong in a measure of liquidity; however, when we estimate our model including dividends in our liquidity measure, our results do not change.

17. The q's that appear in the regressions pertain only to depreciable assets, that it is they are constructed by subtracting the replacement cost of nondepreciable assets from the market value of the firm and dividing this difference by the replacement cost of depreciable assets. This measure of q and Tobin's q, which is based on all assets, are very highly correlated (see Hoshi and Kashyap 1990).

18. Fama (1985) and James (1987) document an interesting fact along these lines. They show that yields on bank certificates of deposite and bankers' acceptances are no different than the yield on comparable maturity govemment bonds and commercial paper. Thus, given reserve requirements and their greater costs of funds they must be losing money on these securities and earning profits on their other activities, perhaps corporate-lending activities. To be earning profits in this activity they must offer a differentiated product: borrowing from a bank must be different from borrowing directly from the capital market. Of course, this fact does not tell us in what way the two sources of funds are different.

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