



**Corporate Structure, Liquidity, and Investment: Evidence from Japanese Industrial Groups**

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CORPORATE STRUCTURE,  
LIQUIDITY, AND INVESTMENT:  
EVIDENCE FROM JAPANESE INDUSTRIAL GROUPS\*

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This paper presents evidence suggesting that information and incentive problems in the capital market affect investment. We come to this conclusion by examining two sets of Japanese firms. The first set has close financial ties to large Japanese banks that serve as their primary source of external finance and are likely to be well informed about the firm. The second set of firms has weaker links to a main bank and presumably faces greater problems raising capital. Investment is more sensitive to liquidity for the second set of firms than for the first set. The analysis also highlights the role of financial intermediaries in the investment process.

I. INTRODUCTION

This paper explores the empirical relationship between corporate financial structure and investment. Our analysis is based on the large body of theoretical work that shows that information problems in the capital market can have important effects on both financial structure and investment. We focus on a common theme of this work, namely that liquidity—the availability of internal funds—should be an important determinant of investment when there are information problems in the capital market. We find evidence to support this view.

This paper also presents evidence on the role of banks and other financial intermediaries in channeling funds into productive investment. Diamond [1984], among others, argues that banks serve as corporate monitors who bear the costs of becoming informed about their client firms and who ensure that they make

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efficient business decisions. The evidence presented here is consistent with the view that banks indeed play such a role.

The basis of our empirical investigation is a panel data set of Japanese manufacturing firms. We focus on Japanese firms because they operate in an environment that appears to mitigate information problems in the capital market. The key component of this environment is the *keiretsu* or industrial group. This institution coordinates the activities of member firms and—most interestingly from our perspective—finances much of their investment activity. Much of the financing comes from the large city banks that form the core of each of the large groups: they are both creditors and shareholders of group firms. We argue in the next section that this close bank relationship is likely to mitigate information problems that typically arise when debt and equity are diffusely held and no individual investor has an incentive to monitor the firm. By contrast, there is another set of Japanese firms that are not affiliated with an industrial group. In general, these independent firms have weaker banking ties. As a result, they are likely to face greater difficulty raising capital.

Thus, it is relatively easy to distinguish between firms that are likely to face information problems and those that are not. Our analysis then compares the investment behavior of these two sets of firms. The basis of comparison is the importance of liquidity as a determinant of corporate investment. We compare firms in this way because essentially all models that posit some sort of information problem in the capital market predict that more liquid firms should invest more. These models also predict that liquidity is irrelevant when there are no information problems. Thus, our strategy is to see whether liquidity is a more important determinant of investment for independent, unaffiliated firms than for group firms with close banking ties.

This empirical test is based on the predictions of many models. Two prominent examples are Jensen and Meckling [1976] and Myers and Majluf [1984]. Jensen and Meckling argue that incentive problems raise the cost of external finance. Outside financing dilutes management's ownership stake, thereby exacerbating incentive problems that arise when managers control the firm but do not own it. Myers and Majluf stress information problems rather than incentive problems, but reach a similar conclusion. If managers are better informed than investors about a firm's prospects, the firm's risky securities will sometimes be underpriced, thereby raising the cost of external finance. In both cases, managers find it more

attractive to finance investment with internal funds. Thus, for firms facing information and incentive problems, liquidity will be an important determinant of investment.

We are not the first to focus on the link between investment and liquidity. Meyer and Kuh [1957] is one early empirical study of liquidity effects; many other papers have built on their work. A standard criticism of these studies is that liquidity proxies for other unobservable determinants of investment, in particular the profitability of investment. High liquidity signals that the firm has done well and is likely to continue doing well. Thus, more liquid firms have better investment opportunities; it is not surprising that they tend to invest more.

One way around this problem is to control for the expected profitability of investment when determining the investment effects of liquidity. One can do this by using the forward-looking information in Tobin's  $q$ : the ratio of the market value of the firm to the replacement cost of its assets. The theory predicts that if liquidity constraints are unimportant, Tobin's  $q$  should be the only determinant of investment. Not surprisingly, liquidity matters despite the inclusion of  $q$ .<sup>1</sup> Yet, skeptics remain unconvinced about the importance of liquidity constraints: they rightly point out that Tobin's  $q$  is difficult to measure and that there are many other strong assumptions underlying the theory.

Fazzari, Hubbard, and Petersen [1988] suggest a more sophisticated approach to this problem. They divide firms according to their a priori beliefs about whether a firm faces information problems in the capital market and then test whether liquidity is more important for the firms where information problems are presumed to be severe. Their basis of comparison is corporate dividend policy, arguing that firms that retain more of their earnings are more likely to be liquidity constrained. Indeed, they find that investment is more sensitive to liquidity for firms that consistently retain a larger fraction of their earnings.<sup>2</sup>

As discussed above, we take a similar approach to this problem, dividing our sample into two sets of firms, independent firms for which we would expect liquidity to be important and

1. See, for example, Chirinko [1987].

2. Zeldes [1989] takes a similar approach to analyzing the effects of liquidity constraints on personal consumption by dividing his sample of individuals into a group with a low level of assets and one with a high level. As predicted, his structural Euler-equation approach detects liquidity constraints for the former group of individuals, but not the latter.

affiliated firms for which we would not. The advantage of this approach is that even though the individual estimates of the liquidity coefficients may be biased (say because Tobin's  $q$  is mismeasured), provided that the bias is to be the same for two sets of firms, the estimated difference in the coefficients will be an unbiased estimate of the true difference. Rejection of equality of the coefficient then indicates that the true effects of liquidity are more important for one set of firms. Indeed, the hypothesis of equality of the coefficients is easily rejected: liquidity is much more important for independent firms than for affiliated firms.

Much of the paper considers whether it is reasonable to assume that the biases in the liquidity coefficients are identical; it is conceivable that the estimates are more positively biased for independent firms than for affiliated firms. This would explain why investment appears to be much more sensitive to liquidity for independent firms. We explore three reasons why this may be so. We do not find support, however, for this hypothesis. Thus, we interpret our findings as evidence that group financing arrangements relax liquidity constraints.

Our work complements the large empirical literature that explores the interaction between capital structure and information problems. This work is relevant because many of the information-based models that predict the importance of liquidity also make predictions about capital structure. For example, Myers and Majluf predict that more liquid firms should invest more *and* that equity issues should be associated with a negative share price response. This is precisely what Asquith and Mullins [1986] find. Other studies find similar share-price movements to capital structure changes that are consistent with information-based models of capital structure and investment.<sup>3</sup>

By contrast, there is little empirical work on the role of banks in the corporate investment process. James [1987] is one exception, but his evidence is indirect. He documents a more positive share-price response for firms that announce that they have borrowed money from a bank than for firms that issue bonds. James interprets this finding as evidence that banks serve a monitoring function that public bondholders do not. Although this result is

3. In addition, there is a small literature that tries to explain capital-structure choices based on information problems in the capital market. See Auerbach [1985] and MacKie-Mason [1990].

consistent with our findings, there is clearly more work to be done on how banks affect firms' real business decisions.

The remainder of the paper is organized as follows. The next section describes the institutional features of Japanese corporate finance that enable us to analyze the effects of information problems on investment. Section III describes how we distinguish between independent and group firms and presents some sample statistics on the two sets of firms. In Section IV we discuss the rationale behind our approach, describe the data we use, and present the basic regression results. Section V considers alternative explanations of our results. We conclude in Section VI with a brief discussion of the implications of our work and speculation about some recent changes in Japanese capital markets.

## II. INSTITUTIONAL FEATURES OF JAPANESE CORPORATE FINANCE

The purpose of this section is to provide a brief description of the important features of industrial groups. The six largest industrial groups—Mitsubishi, Fuyo, Sumitomo, Dai-ichi Kangyo, and Sanwa—date back to the 1950s.<sup>4</sup> The first three emerged from the fragments of the prewar *zaibatsu* that were initially outlawed after the war. The second three were formed somewhat later and were initiated by the banks that now form the core of these groups. Most large companies in the 1950s developed some affiliation with an industrial group. Membership in these groups has been remarkably stable for over three decades.

The groups are both diversified and vertically integrated. For example, the Mitsubishi group has member firms in the automobile, beer, and chemical industries. By conservative estimates, 89 of the top 200 Japanese industrial firms have strong business connections to one of the six largest groups. These firms account for 40 to 55 percent of total sales in the natural resources, primary metal, industrial machinery, chemical, and cement industries.

In addition, affiliated firms do much of their buying and selling within their group. As an extreme example, Gerlach [1987] reports that Mitsubishi Aluminum sold 75 percent of its output to other group firms and bought all of its inputs from group firms. He also estimates that affiliated firms are three times as likely to do

4. There are numerous other smaller groups, but we focus on the six largest because the ties within these groups are strongest and the most financially oriented.

business with other firms in their group than with unaffiliated firms.

More interesting from our perspective, however, are the financial ties among group firms. The most important financial link is between group firms and the banks at the center of each of the six primary industrial groups. The banks in these six groups include the five largest in the world and nine of the top fourteen banks.<sup>5</sup>

Affiliated firms do a significant fraction of their borrowing from the banks in their group. This contrasts with unaffiliated, independent firms that are much more inclined to spread their borrowing around. It is also different from the borrowing patterns of large U. S. corporations that rely more heavily on the corporate bond market. In addition, until very recently, group banks (of which there are typically more than one) owned as much as 10 percent of the equity of member firms; often affiliated life insurance companies own large equity stakes as well.<sup>6</sup> Moreover, group banks often place their employees in key managerial positions of affiliated manufacturing firms, thereby easing the flow of information between banks and their client firms.

These close ties are likely to reduce the cost of capital of affiliated firms. Because banks own large equity stakes in member firms and lend considerable capital, they have strong incentives to get around the information and incentive problems typically associated with arm's-length capital-market transactions. This concentration of financial claims in the hands of a few banks reduces the free-rider problems that plague firms with diffusely held debt and equity.

Moreover, because affiliated banks are both shareholders and debtholders, firms have less incentive to take actions that benefit one class of investors at the expense of another.<sup>7</sup> The concentration of borrowing and the linkage of debt to equity also reduces the cost of financial distress because it reduces conflicts that arise among

5. These statistics come from the American Banker's 1989 survey, *The Top 500 Banks in the World*. For perspective, Citibank, the largest U. S. bank, was twenty-second in the world and less than half the size of the top four banks.

6. The Revised Anti-Monopoly Act of 1977 required banks to reduce their holdings of equity to no more than 5 percent by 1987. Note that in the United States the Glass-Steagall Act prohibits any equity ownership by banks.

7. Aoki [1984] makes this point. Interestingly, the capital structures of these Japanese firms resemble some U. S. firms that have used "strip financing" as part of a leveraged buyout: like Japanese banks, investors in these highly leveraged firms hold both its debt and equity.

investors when a firm is near default.<sup>8</sup> This reduction in the costs of financial distress enables firms to issue more debt. As a result, they receive the greater tax advantages of debt financing. They can also avoid the adverse-selection costs associated with equity financing.

There is some evidence that these factors, particularly the alleviation of conflicts among creditors are important. Suzuki and Wright [1985] have shown that in times of financial distress Japanese companies with strong bank ties are more likely to avoid bankruptcy proceedings than companies without close bank ties. One interpretation of this finding is that the concentration of debt and equity enables the bank to restructure the firm's liabilities without having to rely on the coordinating role of the bankruptcy courts.

There is also considerable anecdotal evidence to support this view. For example, Abegglen and Stalk [1985] cite the case of the automobile manufacturer, Mazda, which was in financial distress during the 1970s. As a member of the Sumitomo group, Mazda had close connections with the group's major bank. When the company got into financial trouble, one of the managing directors of Sumitomo's bank assumed the leadership of the firm and led it out of financial trouble. Indeed, according to Sheard [1985], a former head of the Sumitomo bank was quoted as saying, "We are always prepared to help out when a member firm is in trouble. We won't allow any group member companies to go into business failure." Sheard documents several other instances in which group banks bailed out affiliated firms.

In contrast, Sheard notes that weak banking relationships were an important factor behind the four largest Japanese postwar failures: Kojin, Eidai Sangyo, Osawa Shokai, and Rikkar. In each of these cases no bank was willing to step in and organize a workout. Indeed, in covering the Osawa Shokai bankruptcy, *Nihon Keizai Shimbun* (the Japanese financial daily paper) ran an article titled, "The weakness of not having a main bank" [Sheard, 1985].

In sum, close banking ties are beneficial for at least three reasons. First, because banks with large financial stakes in their client firms have the incentive to monitor these firms, information

8. See Bulow and Shoven [1978] and Gertner and Scharfstein [1990] for analyses of the conflicts that arise in situations of financial distress. In a recent paper [Hoshi, Kashyap, and Scharfstein, 1991] we document the importance of group relationships and close bank ties in mitigating the costs of financial distress.



and incentive problems are reduced. Second, conflicts among creditors are eased, particularly when a firm is in financial distress. This enables firms to take advantage of tax-favored debt financing. Finally, the placement of former bank employees in management positions at client firms can facilitate information flows between the bank and firm.

In many ways, the relationship between a group firm and its bank resembles the relationship between a division of a large firm and the central office: banks, like the central office, provide capital and managerial support, in exchange for which they get an ownership interest in the firm and some say in how it is run. Of course, the links in the group are considerably weaker,<sup>9</sup> and the firm still retains ultimate authority over its own operations. But those links are important. And unlike a conglomerate, where the divisions are not publicly traded, we can observe these links. Thus, our analysis may provide useful information about the structure of the firm that is otherwise difficult to observe.

### III. DISTINGUISHING BETWEEN INDEPENDENT AND GROUP FIRMS

The sample we analyze is a subset of the Japanese manufacturing firms that have been continuously listed on the Tokyo Stock Exchange between 1965 and 1986 and have fiscal years ending in March. We restricted the sample to firms with accounting years ending in March to simplify the construction of (tax-corrected) Tobin's average  $q$ , which we use in our regression analysis. We extracted most of the data from the Nikkei Financial Data tapes. The data construction is described in more detail in Hoshi and Kashyap [1990].<sup>10</sup>

Determining which firms are affiliated and which are independent is somewhat difficult. Several publications (*Keiretsu no Kenkyu*, *Industrial Groupings in Japan*, and *Nihon no Kigyo Shudan*) attempt to make this distinction. We chose *Keiretsu no Kenkyu's* classification scheme because it focuses on the strength of a firm's relationship to the financial institutions in the group: the propensity to borrow from group banks and insurance companies and the

9. We discuss this in more detail in subsection V.2 below.

10. These basic selection rules leave us with a sample of 353 firms. We drop 16 more firms for which the absolute value of  $q$  exceeded 50 in any accounting year.

percentage of shares held by other group firms.<sup>11</sup> We use Nakatani's [1984] refinement of *Keiretsu no Kenkyu*'s classification scheme which selects firms in the largest six groups and which eliminates firms that switched groups. The latter restriction ensures that we have a sample of firms with strong and stable group ties.

It is important to keep in mind that group "membership" is not clearly defined; there are no membership dues or cards. Instead, it is best to think of a group as a network of business and financial relationships of varying degrees and kinds. We have chosen to focus on the financial aspects of group affiliation: in particular, a firm's relationship with a major bank. It is best to think of this as a *type* of group affiliation, rather than as a *definition* of affiliation. Some firms in the sample do not fit *Keiretsu no Kenkyu*'s definition; nevertheless, they may have close business relationships with other nonfinancial firms in the group. And, firms that are not considered part of the group may have very strong ties to a main bank, although on average they are weaker.

The intersection of Nakatani's sample and ours leaves us with 121 group firms and 24 independent firms. According to *Keiretsu no Kenkyu*, as of 1981, only 83 of the 859 nonfinancial firms listed on the Tokyo Stock Exchange were completely independent of an industrial group. Thus, the small number of independent firms in our sample reflects the fact that there are few of them in the Japanese economy. The remaining 192 firms analyzed in Section V are hybrids of affiliated and independent firms.

Table I shows some relevant statistics for the two sets of firms. More precise definitions of the variables are given in subsection IV.2. All statistics are computed for the fiscal years 1977 to 1982. As the table shows, gross investment normalized by the beginning of period capital stock is about the same across the two classes. The independent firms tend to invest slightly more, and their investment is more volatile. A similar conclusion holds for liquidity and production. The liquidity-capital and production-capital ratios of the independent firms are both larger and more volatile. Tobin's  $q$  is slightly higher for independent firms. The most striking difference between the two sets of firms is that group firms tend to have

11. More specifically, *Keiretsu no Kenkyu* identifies a firm as being strongly affiliated with a group if it meets one of the following criteria: one of the group banks was the largest lender to the firm in three consecutive years and shareholdings in the group exceed 20 percent; the largest lender provided at least 40 percent of the firm's bank debt; there is a historical affiliation.

TABLE I  
SUMMARY STATISTICS COMPARING GROUP AND INDEPENDENT FIRMS\*

	Group firms	Indep. firms
Number of firms	121	24
Median $I/K$	0.130	0.148
Mean standard deviation $I/K$	0.110	0.138
Median cash flow/ $K$	0.240	0.291
Mean standard deviation cash flow/ $K$	0.106	0.120
Median production/ $K$	7.23	7.79
Mean standard deviation production/ $K$	1.15	1.48
Median Tobin's average $q$	1.04	1.23
Median debt/equity	0.97	0.66
Median $K$ (millions of 1982 yen)	13,037	13,388
Median sales growth	0.069	0.081
Median short-term securities/ $K$	0.145	0.116

\*Medians are calculated for all firms over all years. Standard deviations are calculated on a firm-by-firm basis and then averaged. Investment,  $I$  and capital  $K$  are for depreciable assets; other variables are defined in subsection IV.2 of the text.

much higher ratios of debt to equity. The higher debt-equity ratio is consistent with the view that a close bank relationship reduces the cost of debt financing. The last three lines of the table show that the two types of firms are similar in several other ways. Independent firms are slightly larger and tend to have slightly higher sales growth; both types of firms hold roughly similar percentages of short-term liquid securities.

One might be tempted to use these statistics to support or reject the hypothesis that independent firms are liquidity constrained. For example, the higher volatility of investment by independent firms would appear to be consistent with this hypothesis, while their higher level of investment is not. We caution against such comparisons: none of the differences in the means of the relevant variables are statistically significant, and the comparisons do not condition on the other characteristics of the firms.

#### IV. REGRESSION EVIDENCE

##### *IV.1. Estimation Strategy*

Numerous studies dating back at least to Meyer and Kuh [1957] document a pronounced positive correlation between liquidity and investment at both the firm level and aggregate level. At first glance, one might try to interpret this finding as evidence of

liquidity constraints. The now standard criticism of this interpretation is that liquidity proxies for an important omitted variable, namely the profitability of investment: when a firm's liquidity is high, it is likely to be doing well and so should have good investment opportunities. It is therefore not surprising that they invest more.

While there are many ways around this problem, the most popular approach is to use securities-market data to control for the value of investment opportunities.<sup>12</sup> Hayashi [1982] has derived conditions under which Tobin's average  $q$ , the ratio of the market value of the firm to the replacement cost of its assets, is sufficient to assess how much the firm should invest. These conditions are quite stringent: among other things, capital markets must be perfect; firms must use a constant returns-to-scale technology; and they must not have market power. Therefore, it should not be surprising that in investment regression equations that include liquidity and Tobin's  $q$ , both variables are significant. One interpretation is that liquidity constraints are important. However, it is also possible that Hayashi's conditions are not satisfied or that  $q$  is mismeasured (which is not unlikely given that the denominator is constructed using accounting numbers).

We are sensitive to the ambiguity in the interpretation of the significance of variables other than  $q$ , and most of the remainder of the paper tries to resolve this ambiguity. As discussed in the Introduction, we follow the basic approach of Fazzari, Hubbard, and Petersen [1988]. Instead of estimating the effect of liquidity on investment for all firms, we separate firms based on our a priori beliefs about how liquidity should affect their investment. Studying Japanese firms is useful in this regard because there is a straightforward way of isolating firms for which liquidity should be important: it should matter for independent firms and not for affiliated firms. We test to see whether this is indeed the case.

This approach is useful even if the estimated coefficients on liquidity are biased. This is because the *difference* in the estimated coefficients is an unbiased estimate of the true difference as long as the biases are the same for the two sets of firms. It is conceivable that in classifying the firms as independent or affiliated, we

12. Alternatively, one can use the investment Euler equation to assess whether a neoclassical, perfect capital-market model can explain investment. Recent work by Whited [1990], Hubbard and Kashyap [1990], and others finds that this model alone is not sufficient; however, when the authors incorporate borrowing restrictions, they are capable of explaining investment behavior. This approach is similar to Zeldes' [1989] strategy for analyzing consumption behavior.

implicitly sorted them according to the size of their bias. For example, it is possible that firms with a high correlation between liquidity and unobservable investment opportunities are largely independent firms. In this case, a larger coefficient of liquidity for independent firms may simply be uncovering this fact. After presenting the basic results establishing that the estimated liquidity effects do appear to be more important for independent firms, we explore three reasons why the estimates for independent firms may be more biased. We do not find evidence along these lines.

#### *IV.2. Regression Equations*

The regressions we ran include as regressors, one or more measures of liquidity, Tobin's  $q$ , and lagged production. To eliminate the effects of scale, we normalize the investment, production, and liquidity measures by the firm's capital stock in the beginning of the year. To remove firm-specific effects, we include a firm dummy; and to weed out macro shocks, we include a yearly dummy.

We use both flow and stock measures of liquidity. The cash flow measure is income after tax plus (accounting) depreciation less dividend payments.<sup>13</sup> This number records the net flow of cash into the firm during the period of investment. The stock of liquidity is more difficult to measure since we do not have precise data on firms' cash balances. We do, however, have data on firms' holdings of short-term securities. These are securities that the firm describes as readily convertible into cash. The vast majority of the firms in our sample hold these types of securities. We use the level of short-term securities at the beginning of the period to measure the stock of liquid assets the firm has when it decides on investment at the beginning of the period.

Our measure of Tobin's  $q$  is the ratio of the market value of depreciable assets (debt plus equity minus the market value of nondepreciable assets such as land) divided by an estimate of the replacement cost of depreciable capital.<sup>14</sup> Tobin's  $q$  is calculated at

13. It is not clear whether dividends are discretionary and thus whether they belong in a measure of liquidity. When we estimate our model including dividends, the results do not change. This is not surprising given the low and stable payout rates in Japan.

14. We briefly describe our procedure for calculating the data required to compute  $q$ . More details are contained in Hoshi and Kashyap [1990]. The market value of debt is estimated by dividing the reported interest paid by a market interest rate. The value of equity is straightforward to compute. Calculating the replacement cost of assets is more complex. In some cases the replacement cost is taken to

the beginning of the period. Gross investment is measured as the change in the stock of depreciable capital from the previous year plus capital depreciation during the year.

Finally, we include lagged production in the regressions, where production is defined as sales plus the change in final goods inventories. This “accelerator effect” is important in the empirical investment literature despite the lack of a compelling theory behind it.<sup>15</sup> One theoretical explanation for the inclusion of production is that liquidity effects are important; however, in this case it would be better to include lagged liquidity itself. Alternatively, Schiantarelli and Georgoutsos [1987] have shown that when firms have monopoly power lagged production should be related to current investment. We do not include production for these reasons, but instead do so as a practical matter. Since liquidity and production are correlated, if we were to exclude production, liquidity might proxy for accelerator effects that appear to have been important but that we do not fully understand. As we discuss below, however, the basic character of our findings does not depend on whether production is included.

The inclusion of  $q$  and production are imperfect attempts to control for effects that are difficult to observe. We caution against a structural interpretation of the coefficients and, instead, rest our conclusions on the estimated differences in the effects of liquidity.

### *IV.3. Regression Results*

We report our basic results in Table II. The first column contains the results for the pooled sample of independent and group firms. The results indicate that  $q$  alone does not adequately explain investment: the estimated effects of production and liquid-

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be the asset's book value. This is done for liquid securities (such as cash) and for assets like goodwill and patents where no other option was feasible. We used a recursion technique to calculate the replacement cost of inventories and physical capital. We equate the market value of an asset to its book value in an initial period (March 1965) and then sum subsequent inflation-corrected flows to derive stock values of inventories and physical capital. Finally, we estimated the value of land in two steps. First, we multiply the acreage owned by each firm in a base period (March 1974) by a price for that period. We then update this measure using a recursion similar to the one described above. The special procedure for treating land was adopted because the alternative approach (using a recursion after setting the market value equal to the book value in a base period) led to implausibly low estimates of land values.

15. See Jorgenson [1971], who writes, “Real output emerges as the single most important determinant of investment.”

TABLE II  
INVESTMENT REGRESSION EQUATIONS\*

	All firms	Group firms	Indep. firms	Group firms	Indep. firms
Cash flow	0.106 (0.032)	0.041 (0.033)	0.501 (0.084)	0.060 (0.035)	0.451 (0.083)
Short-term securities	0.096 (0.025)	0.061 (0.024)	0.512 (0.085)	0.081 (0.026)	0.441 (0.081)
Tobin's average $q$	0.006 (0.002)	0.007 (0.003)	0.007 (0.004)	0.011 (0.003)	0.003 (0.004)
Production	0.019 (0.003)	0.022 (0.003)	-0.022 (0.009)	----	----
$\bar{R}^2$	0.391	0.432	0.458	0.362	0.435
Number of firms	145	121	24	121	24

\*The dependent variable is investment in depreciable assets divided by the capital stock at the beginning of the period. Production and the liquidity measures are normalized by the capital stock. The regressions include yearly dummies and firm dummies and cover the fiscal years 1977-1982. Standard errors are reported below the coefficient estimates.

ity are statistically significant and positive. The estimated coefficient on  $q$  is statistically significant, but small.<sup>16</sup>

The second and third columns of Table II report the results when we condition on whether the firm is part of an industrial group or is independent. The second column establishes that the coefficient of cash flow is small and statistically insignificant for group firms. The short-term securities variable is statistically significant as are production and  $q$ . The third column shows that cash flow, short-term securities, and production are statistically significant, while Tobin's  $q$  is statistically insignificant.

The main result of the paper is that the estimated coefficients of both liquidity variables are much larger for the independent firms than for the group firms—eight to twelve times as large. The differences in the coefficients of cash flow and short-term securities are both statistically significant at the 1 percent confidence level.<sup>17</sup> We can easily reject the null hypothesis of equality of the liquidity coefficients.

Note that production appears to be much more important for

16. We do not give a structural interpretation to this coefficient, but if one wishes to, it can be viewed as implying implausibly large adjustment costs in investment. This is a common finding. See, for example, Summers [1981].

17. The  $t$ -statistic of the difference in the coefficients is 5.10 for cash flow and 5.11 for short-term securities. These are well above the cutoff point for the 1 percent confidence level.

group firms; the differences in the estimated coefficients are statistically significant. Given that we do not have a strong theoretical rationale for including production, this coefficient is difficult to interpret. To establish that the liquidity result is not driven by the inclusion of production, we drop it from the regression equation. The results are reported in the last two columns of Table II. These columns indicate that liquidity continues to be more important for independent firms despite the exclusion of production; the differences remain statistically significant at the 1 percent confidence level.

In our view, the regressions we report are the most sensible and straightforward. We did, however, estimate several other specifications to determine the robustness of our results. None of the conclusions was affected. In particular, we added more lags of liquidity and production to account for the possibility that it may take more than a year for investment to show up in the capital stock. We found no substantive difference in the results. We also included  $q$  at the end of the period because cash flow that comes in during the period might contain information about future investment opportunities not contained in  $q$  at the beginning of the period. The effect of this variable is small and insignificant, and it does not materially affect any of the other coefficients. In addition, we instrumented for cash flow using lagged values. The instrumental variables approach should wipe out the component of cash flow that is unpredictable given beginning-of-period  $q$ . This is another way of avoiding the problem that cash flow during the period contains information about investment opportunities not contained in beginning-of-period  $q$ . Again, none of the qualitative results were changed.<sup>18</sup>

We conclude this section by reporting the results for the remaining 192 firms in our sample, those that are neither independent nor affiliated. These firms can be classified into three subcategories. Two of the subcategories include firms that are hybrids of affiliated and independent firms. As one would expect, liquidity matters more for these firms than for affiliated firms, but less than for independent firms. The third set of firms are subsidiaries of group firms. Not surprisingly, their investment is not very sensitive to liquidity.

The first subcategory is comprised of 25 firms that have some

18. These results are reported in an earlier version of this paper issued as MIT Sloan Working Paper No. 2071-88.



connection to a major group, but may not have close financial ties with the group's banks. These firms are members of a group's President's Council which meets monthly to discuss broad business concerns facing the group. Membership is fairly prestigious and is generally restricted to firms with active business ties to other members of the group.

There are several reasons why President's Council firms may not have been included in Nakatani's list of group-affiliated firms. First, the firm may have joined the President's Council only recently or may have switched group affiliation. Alternatively, the firm may have been involved in some merger activity. Or, the firm may have a ceremonial appointment to the President's Council, but may not have any active affiliation with the group. Finally, it may have weak affiliation with the group's financial institutions.

Depending on the reason for exclusion, we have different beliefs about whether these firms have ready access to funds from group banks. Unfortunately, we do not know exactly why Nakatani excluded each firm from his list. Nevertheless, it is fair to assume that in general these firms have weaker ties to group banks. It is not clear, however, whether these firms also have weaker nonfinancial affiliations with other firms in the group.

The first column of Table III shows that the coefficient of cash flow is statistically significant for these firms while that of short-

TABLE III  
INVESTMENT REGRESSION EQUATIONS FOR FIRMS WITH MIXED STATUS

	President's Council/not group firms	Quasi- indep. firms	Subsidiary firms
Cash flow	0.406 (0.162)	0.245 (0.042)	-0.082 (0.049)
Short-term securities	0.110 (0.072)	0.082 (0.033)	0.105 (0.0131)
Tobin's average $q$	-0.002 (0.004)	-0.000 (0.004)	0.019 (0.008)
Production	0.032 (0.008)	0.012 (0.004)	0.022 (0.007)
$\bar{R}^2$	0.408	0.227	0.582
Number of firms	25	152	15

\*The dependent variable is investment in depreciable assets divided by the capital stock at the beginning of the period. Production and the liquidity measures are normalized by the capital stock. The regressions include yearly dummies and firm dummies and cover the fiscal years 1977-1982. Standard errors are reported below the coefficient estimates.

term securities is not. The difference between the coefficient of cash flow for President's Council firms and group firms is statistically significant at the 5 percent confidence level. The relatively large standard errors of the estimated liquidity coefficients suggest that there is considerable heterogeneity among these firms. It seems likely that for some of them liquidity is irrelevant while for others it is important. Given the various reasons these firms were not classified as affiliated, it is not surprising that we estimate this coefficient imprecisely. Nevertheless, the results are consistent with the idea that liquidity is more important for firms with weaker bank ties.

The second subcategory is comprised of 152 firms that are neither independent nor affiliated. Nakatani does not list these firms as strong group members, and none is a member of a group's President's Council; however, these firms are not sufficiently distanced from the six major groups to be called independent. It is also possible that some of these firms may be members of one of the minor industrial groups.

The second column of Table III shows that their investment patterns reflect this hybrid status. Liquidity is quite important for these firms; the estimated coefficients of the two liquidity measures are between the estimates for the group firms and the completely independent firms. The difference between this cash flow coefficient and those of independent and group firms is statistically significant at the 1 percent confidence level. The short-term securities coefficient is statistically significantly different from the coefficient for independent firms at the 1 percent level. There is no statistical significance in the difference of the coefficients for independent and quasi-independent firms. These findings suggest that the closer a firm moves to the group banks, the more easily a firm can attract funds to finance investment projects.

The final subcategory is comprised of the fifteen firms that Nakatani lists as subsidiaries of group firms. The third column of Table III shows that the coefficients of both liquidity measures are statistically insignificant. The difference between the cash-flow coefficients of the subsidiaries and independent firms, quasi-independent firms, and President's Council firms are all statistically significant at the 1 percent confidence level. The coefficient of short-term securities for this set of firms is statistically different from the coefficients for the independent firms, but not the others. Because these firms, at least through their parent companies, have

access to group banks, it is reassuring to see that their investment is not particularly sensitive to their liquidity.

## V. COMPETING EXPLANATIONS

Thus far, we are able to reject the hypothesis that the measured effect of liquidity is the same for independent and group firms. As long as the potential bias introduced by the omitted variable problem is the same for the two sets of firms, this amounts to rejecting the hypothesis of equality of the true liquidity coefficients. We interpreted this finding as evidence that independent firms face more binding liquidity constraints.

One might, however, explain our results by arguing that the estimated effects of liquidity are more positively biased for the independent firms than for the group firms. Thus, one can explain the observed pattern of coefficients even under the null hypothesis of no liquidity constraints. We begin this section by considering several reasons why the estimates may be more biased for independent firms and conclude by discussing the possibility that independent firms are overinvesting rather than underinvesting.

### *V.1. Industry Effects*

One possible explanation of our results is that independent firms may operate in high growth industries where current liquidity is likely to proxy well for the value of investment opportunities, whereas group firms may operate in low growth industries where liquidity is an uninformative proxy. This could induce a larger positive bias for independent firms than for group firms. We find no evidence to support this view.

Table IV shows the breakdown of firms by broad industrial classification. Given the small number of independent firms, comparison on a finer industry level is not informative. The distribution of firms across industry classes is roughly similar for independent and group firms. Thus, it appears that our classification scheme does not simultaneously sort firms by industry.

Even with this aggregated industry classification, regression analysis would be uninformative because there are too few independent firms. However, if we pool independent firms and quasi-independent firms—both of which showed a strong sensitivity of investment to cash flow—we can crudely gauge whether industry effects explain our results.

TABLE IV  
 DISTRIBUTION OF GROUP AND INDEPENDENT FIRMS BY BROAD  
 INDUSTRIAL CLASSIFICATION

Industries	Number of group firms (% of total group firms)	Number of indep. firms (% of total indep. firms)
Food, textiles, pulp and paper, clay, glass, and stone	25 (21%)	3 (13%)
Electric machinery and precision machinery	26 (21%)	6 (25%)
Oil, chemicals, rubber, and drugs	24 (20%)	6 (25%)
Steel and nonferrous metals	18 (15%)	3 (13%)
Autos and transportation durables	7 (6%)	1 (4%)
Machines	16 (13%)	5 (21%)
Miscellaneous and ship building	5 (9%)	0 (0%)
All Industries	121	24

To conserve space, we briefly summarize our results. For group firms, the coefficient of cash flow is statistically insignificant in each of the seven sets of industries. In five of the seven categories the coefficient is small and precisely estimated. The only large coefficient is in autos and transportation durables, where there are only seven firms. In the electric machinery and precision machinery industries, the effect of cash flow is moderately large, but also is imprecisely estimated. On balance, there is no evidence that pooling industries is responsible for our finding that cash flow is only a minor determinant of affiliated firms' investment.

Analysis of the pooled sample of independent and quasi-independent firms shows that pooling industries also does not account for our findings on independent firms; in each industry group, the estimated coefficient of cash flow is relatively large. In six of the seven broad industry categories, cash flow is significant. In the remaining category, which includes the food, textile, pulp and paper, and clay, glass and stone industries, cash flow is statistically insignificant but seven times the point estimates for group firms. In each industry except autos and transportation

durables, the point estimates are larger for the nonaffiliated firms. These differences are statistically significant in three industries.

Similar results hold for the coefficient of short-term securities. The point estimates are larger for independent firms in five of the seven industries. They are insignificant in each of the industries for group firms and significant in four of the seven industries for independent firms. The differences in the estimated coefficients are only significant in one of the industries. Thus, it seems that industry effects cannot explain our findings.

### *V.2. Measurement Error*

Another explanation of our findings is that the accounting measures of cash flow might be more polluted for group firms than for independent firms. This would be another situation in which observed liquidity provides less information about the value of investment opportunities for group firms than for independent firms. There are two reasons to believe that this might be the case. First, group firms' transactions with other group firms may not take place at market prices. Second, group firms may try to shuffle income across firms to reduce tax liabilities, smooth reported income, or fund investment where it is needed.

We find this class of explanations unconvincing for several reasons. First, the tax-reduction and income-smoothing explanation presumes a degree of strategic micro-management that is inconsistent with what we know about behavior within the group. There are undoubtedly enough product-market linkages among group firms to enable them to shuffle income. However, these firms are all publicly traded and independently managed. It is hard to believe that firms have an incentive to make themselves look bad to help other firms.

This explanation then depends on the existence of an institutional structure that would coordinate and enforce transfers among firms. Neither of the two obvious candidates, the President's Council nor the banks, appears to have undertaken this role. The President's Council meeting is described as a loosely organized gathering that does not deal with these types of details. Moreover, banks do not seem to engage in such aggressive management. As one Sumitomo executive put it [Gerlach, 1987], "We are a big company now, and cannot be run even from the President's office. How possibly could the President's Council or some other Sumitomo grouping do it?"

An explanation related to income shuffling is that the group is

liquidity constrained as a whole and the bank or President's Council simply allocates funds within the group to firms with the most valuable investments. Thus, the group is similar to a conglomerate that decides how available cash is allocated among the various divisions, but the bank does not add to the liquidity of the group as a whole. Although this result is consistent with our findings, we do not find it compelling because it overstates the observed coordinating role of the banks and President's Council and understates the autonomy of these publicly traded companies.

It is difficult to explore this idea empirically, but one point is worth noting. If the group actively managed the income of its members, one might expect to see a significantly lower volatility of cash flow for group firms than for independent firms. This would follow if the group took income from unusually cash-rich firms and gave it to unusually cash-poor firms, thus smoothing the time series of observed cash flow. As Table I indicates, there is a small difference in the standard deviations of group and independent firms, but this difference is far from statistically significant. Thus, there is little evidence in the data to support this idea.

### *V.3. Endogeneity of Group Membership*

Another possible problem with our interpretation of the results is that group membership is endogenous; factors that lead a firm to avoid group membership might be correlated with factors that would make liquidity more informative about investment opportunities. A similar criticism has been suggested by Blinder [1988] in his comments on Fazzari, Hubbard, and Petersen's [1988] finding that low-dividend-paying firms exhibited a greater sensitivity of investment to liquidity than high-dividend-paying firms. It is possible that firms which retain most of their earnings do so because they have good investment opportunities that may not be observable by the market.

One might make a similar argument regarding the endogeneity of group membership. For example, it is possible that firms that do not join a group are those with particularly profitable investment opportunities. Thus, investment is more sensitive to liquidity because it is a better proxy for investment opportunities. We find this argument unconvincing for two reasons. First, most firms have been affiliated with group banks for more than 25 years. During the time of our sample, group affiliation was essentially fixed and independent of short- and medium-term fluctuations in financing needs. Moreover, firms may have wanted to join a group,

but were prevented from doing so [Gerlach, 1987]. Second, there is no strong evidence that independent firms have performed significantly better during the sample period: investment, sales growth rates, and  $q$  were not statistically different. Thus, it is unlikely that sorting firms on the basis of affiliation implicitly sorts firms on the basis of their growth opportunities. Moreover, any potential bias along these lines is dealt with by the inclusion of a fixed firm effect since these opportunities are not likely to change over the time of our sample.

Finally, we note that some have argued that these financing arrangements were established to allocate funds during a time of capital scarcity and rationing. The firms that joined groups were the ones that were the most liquidity constrained. If this is true, then it biases the results against us: in the counterfactual circumstance in which the group-classified firms did not join a group, their investment would be extremely sensitive to liquidity.

#### *V. 4. Overinvestment or Underinvestment?*

As discussed in the Introduction, most models of financial structure and investment imply that information and incentive problems lead firms to underinvest. In contrast, Jensen [1986] and others have argued that if managers prefer growth over profitability, they may invest free-cash flow in negative net present value projects. In this view, the correlation between liquidity and investment is a symptom of overinvestment rather than of underinvestment. According to this theory, close bank relationships should mitigate this problem because banks can prevent their client firms from investing in unprofitable projects.

Lang and Litzenberger [1989] try to distinguish between the overinvestment and underinvestment theories by examining stock-price responses to dividend announcements of U. S. firms. According to both theories, stock prices should rise in response to unanticipated dividend increases. In models of asymmetric information that typically imply underinvestment, a dividend increase signals higher future cash flows; in the overinvestment theory the dividend distributions prevent managers from overinvesting. Lang and Litzenberger argue that if the overinvestment theory is correct, the share-price response should be larger for firms with poor investment prospects since these firms are more likely to be overinvesting. In contrast, asymmetric information models have no particular prediction concerning the relationship between a firm's investment prospects and the share-price response to its dividend increase. The authors find evidence consistent with the

overinvestment theory: firms with poor investment prospects, as indicated by a low value of Tobin's  $q$ , exhibit a more positive share price response to a large dividend increase than do firms with a high value of Tobin's  $q$ .<sup>19</sup>

Lang and Litzenger's finding suggests a way to distinguish between these two views for our sample of Japanese firms. Our results indicate that investment is highly sensitive to liquidity for independent and quasi-independent firms. The overinvestment theory predicts that the investment of firms with poor prospects should be more sensitive to their liquidity than the investment of firms with good prospects. Moreover, we would expect group firms with poor prospects to overinvest less because they are subject to bank monitoring. Thus, according to the overinvestment theory, the difference in the liquidity coefficients of the group and non-group firms should be larger for firms with poor investment prospects.

To explore these predictions, we divided the sample of firms into those with generally good investment prospects and those with poor investment prospects. As a proxy for a firm's investment prospects, we used average Tobin's  $q$  during the sample period 1977–1982. Firms with a value of average Tobin's  $q$  above (below) the sample median were considered those with good (poor) investment prospects.

The first column of Table V reports the regression results for the set of nongroup firms that includes both independent and quasi-independent firms. We pooled these firms because of the small number of independent firms (although this set of firms is now more heterogeneous in their estimated liquidity effects). In addition to the variables used in the previous regressions, we add two interaction terms: (1) cash flow times a dummy variable which equals one if  $q$  is above the sample median; and (2) short-term securities times the same dummy variable. The overinvestment hypothesis predicts a negative coefficient for both interaction terms: investment should be less sensitive to liquidity for high  $q$  firms.

The results indicate that the coefficients of the interaction terms are *positive*: the investment of high  $q$  firms is more, not less, sensitive to the two liquidity measures. (Note, however, that the

19. This finding is consistent with dividend increases being more of a surprise for low  $q$  firms. The authors attempt to distinguish between this explanation and the overinvestment explanation.



TABLE V  
INVESTMENT REGRESSION EQUATIONS IN WHICH LIQUIDITY EFFECTS VARY WITH  
TOBIN'S  $q^*$

	Nongroup firms	Group firms
Cash flow	0.137 (0.058)	0.102 (0.065)
Cash flow* High $Q$ dummy	0.205 (0.072)	-0.080 (0.075)
Short-term securities	0.084 (0.042)	0.084 (0.069)
Short-term securities* high $Q$ dummy	0.040 (0.058)	-0.025 (0.073)
Tobin's average $q$	0.001 (0.003)	0.008 (0.003)
Production	0.011 (0.004)	0.021 (0.003)
$\bar{R}^2$	0.243	0.431
Number of firms	176	121

\*The dependent variable is investment in depreciable assets divided by the capital stock at the beginning of the period. Production and the liquidity measures are normalized by the capital stock. The regressions include yearly dummies and firm dummies and cover the fiscal years 1977-1982. Standard errors are reported below the coefficient estimates.

effect is imprecisely estimated for short-term securities.) This finding is inconsistent with the overinvestment hypothesis.

The second column of Table V reports the regression results for the sample of group firms. The coefficients of both liquidity measures are larger for the low  $q$  firms, although the differences are not statistically significant. More importantly, the difference between the liquidity coefficients of the group firms and the nongroup firms appears to be larger for the *high*  $q$  firms. The largest (and the only statistically significant) difference is in the cash flow coefficients of high  $q$  firms: the total effect is 0.342 for nongroup firms and 0.022 for group firms. This finding conflicts with the prediction of the overinvestment theory that the differences should be larger for low  $q$  firms. Thus, on balance, we find no evidence to support the overinvestment hypothesis, and if anything our findings tend to reject it.

## VI. CONCLUDING REMARKS

In this paper we have presented evidence consistent with the view that information and incentive problems in the capital market have important effects on corporate investment. This evidence

comes from the fact that investment by firms with a close relationship to a bank—those firms that we a priori believe can minimize these problems—is much less sensitive to their liquidity than firms raising their capital through more arms-length transactions.

Our results lend support to the view recently put forward by Greenwald, Stiglitz, and Weiss [1984] and Bernanke and Gertler [1989] that capital-market imperfections contribute to excessive output fluctuations. In this view, high current profits increase current liquidity, thereby generating investment and increasing future output and profitability. The results also suggest that a related transmission mechanism may operate through the banking sector: a reduction in bank liquidity makes it difficult for firms to raise capital from informed lenders, thus raising their cost of capital. As Bernanke [1983] has shown, the large fall in bank liquidity may help to explain the depth and persistence of the Great Depression.

The results may also suggest that the institutional arrangements in Japan offer Japanese firms an important competitive advantage. While international cost-of-capital comparisons are generally quite difficult to make, the evidence here documents that Japanese institutions may enable firms to mitigate capital-market imperfections. To the extent that the U. S. capital market has no analogous institutional arrangement, U. S. firms may operate at a disadvantage.

We advise caution in jumping to this conclusion. If the Japanese system is indeed more efficient, why do not U. S. firms rely more heavily on concentrated bank borrowing? One reason may be that the Glass-Steagall Act prohibits banks from owning equity in U. S. corporations. It may then be inefficient for a bank to exercise control over the firm without an equity stake since their objectives (presumably ensuring that their loan is paid back) will be very different from shareholders'. This line of reasoning suggests that Glass-Steagall has real efficiency costs.

An alternative view is that the Japanese system itself evolved out of a restrictive regulatory environment. It is widely believed that capital was scarce at least through the mid-1970s. This was exacerbated by government regulations that imposed interest-rate ceilings and limited the ability of firms to raise money abroad. In this environment of capital rationing it was very important for firms to form close relationships to banks, which were at the time the only source of capital. Thus, the firms that were able to form

close ties to a bank were less liquidity constrained, although the economy as a whole may have been liquidity constrained.<sup>20</sup>

Interestingly, the Japanese government has been loosening its capital-market restrictions. Interest-rate ceilings have been raised to reflect market conditions; restrictions on corporate issues of debt and other securities have been relaxed; and firms can more easily raise foreign capital and issue domestic bonds. The result has been that firms have begun to loosen their ties to banks and now borrow much more from the corporate bond markets. In an environment where it is easier to raise capital directly from securities markets, there are less compelling reasons to have close ties to a bank. Our more recent work [Hoshi, Kashyap, and Scharfstein 1990] documents and tries to explain the move by some firms away from banks as their primary source of capital.<sup>21</sup>

This suggests that there are costs and benefits associated with close banking relationships. This paper is about the benefits; the costs are less clear. Of course, there are reserve requirements that raise the costs of funds to banks. And, if banks are to monitor firms, these monitoring costs will raise the costs of bank financing relative to directly placed debt. Finally, and perhaps most important, the control that banks exercise over firms may be unpalatable to corporate managers. Once alternative financing arrangements become available, managers may prefer to raise capital from more anonymous sources who will not exercise such control. While this may be in managers' interest, it may hamper firms' ability to raise capital. These issues are the focus of our current research.

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#### REFERENCES

Abegglen, James, and G. Stalk, *Kaisha, The Japanese Corporation* (New York, NY: Basic Books, Inc., 1985).

20. Johnson [1989] documents a similar phenomenon in Germany during the hyperinflation of the 1920s. Bank deposits dried up because individuals kept most of their wealth in goods rather than in cash. Thus, capital was scarce, and preference was given to large firms with long-standing relationships to the banks. Smaller firms were therefore unable to get bank credit. Many of them went public during this period or were acquired by large firms.

21. See Diamond [1989] for an interesting model of the choice between bank debt and directly placed debt.

- American Banker, *The Top 500 Banks in the World*, 1988.
- Aoki, Masahiko, "Shareholders' Non-anonymity on Investment Financing: Banks vs. Individual Investors," M. Aoki, ed., *The Economic Analysis of the Japanese Firm* (Amsterdam: North-Holland, 1984).
- Asquith, Paul, and D. Mullins, "Equity Issues and Offering Dilution," *Journal of Financial Economics*, XV (1986), 61–89.
- Auerbach, Alan, "Real Determinants of Corporate Leverage," in B. Friedman, ed., *Corporate Capital Structures in the United States* (Chicago, IL: University of Chicago Press, 1985).
- Bernanke, Ben, "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression," *American Economic Review*, LXXIII (1983), 257–76.
- , and M. Gertler, "Agency Costs, Net Worth and Business Fluctuations," *American Economic Review*, LXXIX (1989), 14–31.
- Blinder, Alan, Comment on "Investment and Finance Reconsidered," *Brookings Papers on Economic Activity* (1988), 196–200.
- Bulow, Jeremy, and J. Shoven, "The Bankruptcy Decision," *Bell Journal of Economics*, IX (1979), 437–56.
- Chirinko, Robert, "Tobin's  $Q$  and Financial Policy," *Journal of Monetary Economics*, XIX (1987), 69–87.
- Corporate Statistics Quarterly* (Tokyo: Ministry of Finance).
- Diamond, Douglas, "Financial Intermediation and Delegated Monitoring," *Review of Economic Studies*, LI (1984), 393–414.
- , "Monitoring and Reputation: The Choice Between Bank Loans and Directly Placed Debt," unpublished paper, University of Chicago, 1989.
- Fazzari, Steven, R. G. Hubbard, and B. Petersen, "Investment and Finance Reconsidered," *Brookings Papers on Economic Activity* (1988), 141–95.
- Gerlach, Michael, "Alliances and the Social Organization of Japanese Business," Ph.D. thesis, Yale University, 1987.
- Gertner, Robert, and D. Scharfstein, "A Theory of Workouts and the Effects of Reorganization Law," unpublished paper, University of Chicago, 1990.
- Greenwald, Bruce, J. Stiglitz, and A. Weiss, "Informational Imperfections and Macroeconomic Fluctuations," *American Economic Review Papers and Proceedings*, LXXIV (1984), 194–99.
- Hayashi, Fumio, "Tobin's Marginal  $q$  and Average  $q$ : A Neoclassical Interpretation," *Econometrica*, L (1982), 213–24.
- Hoshi, Takeo, and A. Kashyap, "Evidence on  $q$  and Investment for Japanese Firms," *Journal of the Japanese and International Economics* IV (1990), forthcoming.
- , —, and D. Scharfstein, "Bank Monitoring and Investment: Evidence from the Changing Structure of Japanese Corporate Banking Relationships," in R. Glenn Hubbard, ed., *Asymmetric Information, Corporate Finance, and Investment* (Chicago, IL: University of Chicago, 1990), pp. 105–26.
- , —, and —, "The Role of Banks in Reducing the Costs of Financial Distress in Japan," *Journal of Financial Economics* (1991), forthcoming.
- Hubbard, R. Glenn, and A. Kashyap, "Internal Net Worth and the Investment Process: An Application to U. S. Agriculture," NBER Working Paper, No. 3339, 1990.
- Industrial Groupings in Japan* (Tokyo: Dodwell Marketing Consultants, biannual publication).
- James, Christopher, "Some Evidence on the Uniqueness of Bank Loans," *Journal of Financial Economics*, XVI (1987), 217–36.
- Jensen, Michael, "Agency Costs of Free-Cash Flow, Corporate Finance, and Takeovers," *American Economic Review Papers and Proceedings*, LXXVI (1986), 323–29.
- , and W. Meckling, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics*, V (1976), 305–60.
- Johnson, Simon, "Inflation, Disintermediation, and Economic Activity," Ph.D. thesis, MIT, 1989.
- Jorgenson, Dale, "Econometric Studies of Investment Behavior: A Review," *Journal of Economic Literature*, IX (1971), 1111–47.
- Keiretsu no Kenkyu* (Research on Industrial Groups) (Tokyo: Keizai Chosa Kyokai, annual publication).

- Lang, Larry, and R. Litzenger, "Dividend Announcements: Cash Flow Signaling vs. Free Cash Flow Hypothesis," *Journal of Financial Economics*, XXIV (1989), 181-91.
- MacKie-Mason, Jeffrey, "Do Firms Care Who Provides Their Financing?" in R. Glenn Hubbard, ed., *Asymmetric Information, Corporate Finance, and Investment* (Chicago, IL: University of Chicago, 1990), pp. 63-103.
- Meyer, John, and E. Kuh, *The Investment Decision* (Cambridge, MA: Harvard University Press, 1957).
- Myers, Stewart, and N. Majluf, "Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have," *Journal of Financial Economics*, XIII (1984), 187-221.
- Nakatani, Iwao, "The Economic Role of Financial Corporate Grouping," in M. Aoki, ed., *The Economic Analysis of the Japanese Firm* (Amsterdam: North-Holland, 1984).
- Nihon no Kigyo Shudan* (Japanese Enterprise Groups) (Tokyo: Sangyo Doko Chosa-Kai, annual publication).
- Schiantarelli, Fabio, and D. Georgoutsos, "Monopolistic Competition and the Q Theory of Investment," Working Paper 87/11, Institute for Fiscal Studies, United Kingdom, 1987.
- Sheard, Paul, "Main Banks and Structural Adjustment," Australia-Japan Research Centre, Research Paper 129, 1985.
- Summers, Lawrence, "Taxation and Corporate Investment: A  $q$ -Theory Approach," *Brookings Papers on Economic Activity* (1981), 67-127.
- Suzuki, Sadahiko, and R. Wright, "Financial Structure and Bankruptcy Risk in Japanese Companies," *Journal of International Business Studies*, (1985), 97-110.
- Whited, Toni, "Debt, Liquidity Constraints, and Corporate Investment: Evidence from Panel Data," Federal Reserve Board, FEDS Working Paper 113, 1990.
- Zeldes, Stephen, "Consumption and Liquidity Constraints: An Empirical Investigation," *Journal of Political Economy*, XCVII (1989), 305-46.