Bank Power and Cash Holdings: Evidence from Japan

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Abstract

Using industrial firms from the United States, Germany and Japan, we examine the effect of bank power on cash holdings. We show that Japanese firms hold more cash than U.S. or German firms. We also document that Japanese cash balances are affected by the monopoly power of banks. During periods with powerful banks, firms' high cash holdings are consistent with banks extracting rents. When banks weakened, Japanese cash levels became more like U.S. firms. We conclude that strong Japanese banks persuade firms to hold large cash balances. This is contrary to widely held beliefs about the Japanese governance system.

1. Introduction

Rajan and Zingales (1995) show that in 1991 Japanese industrial firms held, on average, nearly twice the cash to assets of firms from any other G7 country. The obvious question is why do Japanese industrial firms hold so much cash?

The primary difference in corporate governance between the U.S. and Japan is that in the U.S., capital markets are the main monitor, while in Japan, the main bank is the primary monitor and disciplinarian of the firm. A criticism of the U.S. system is that with atomistic shareholders and bondholders there may not be optimal monitoring of managers, giving rise to many forms of agency costs.[1] Conversely, in the Japanese system where a main bank acts as monitor and firms are members of large industrial groups (*keiretsu*) with coordinated cross holdings, these conflicts should be mitigated. A reduction in agency costs is predicted because the main bank relation should decrease both asymmetric information and wasteful behavior by management. These benefits should result in lower cash holdings in Japanese versus U.S. firms, because there is less need to hold cash for precautionary reasons.[2] Likewise, close monitoring by the main bank should lead to an elimination of cash hoarding for the benefit of management. However, an analysis of cash holdings of Japanese and U.S. firms leads to the striking result that industrial firms in Japan hold significantly higher levels of cash. This paper evaluates possible explanations for this result. We examine whether a system in which banks wield significant influence as the primary monitor and provider of financing leads to higher cash holdings than a system in which the capital markets perform these roles.

Our initial examination of the cash holdings of Japanese and U.S. firms affirms the results of Rajan and Zingales (1995). Japanese firms hold significantly higher levels of cash than firms from the United States. Japanese firms also exhibit greater persistence in cash holdings than U.S. firms. When we include

a sample of German firms, we find that cash holdings in Germany are similar to those in the U.S. This is even more interesting since the German system is also characterized as being bank-centered. These findings are inconsistent with arguments of the efficiencies of the Japanese main bank monitoring system. What then explains the high cash holdings of Japanese firms?

One explanation lies in the power of the main bank. If there is no explicit or implicit monitor of the main bank, then the bank can take actions to increase its own wealth at the expense of the non-bank firm. This may take the form of the main bank encouraging the firms in which it acts as principal monitor to hold relatively high levels of cash, predominately to benefit the bank.[3] The idea that Japanese main banks may appropriate rents from industrial firms is addressed in Weinstein and Yafeh (1998) who show that, during a period of powerful banks, wealth gains of industrial firms with main bank relations were expropriated by the main bank. Their paper shows that the performance of industrial firms with main bank relations, trailed that of firms with no main bank ties. They argue that this poor performance partly results from rent extraction by the main bank which served as the bank's payment for the financing services described above. The mechanisms for this rent extraction are mainly through interest rates as well as inducing firms to use large quantities of bank financed capital inputs.

We explore the rent extraction hypothesis through a detailed evaluation of Japanese firms' cash holdings across time. Banks in Japan had effective monopoly power during the period after the second world war through the 1970s, but became weaker following a series of changes in bank regulations and an adverse shock to the financial sector in the late 1980s and into the 1990s. Consistent with the bank power arguments, Japanese firms held significantly more cash during the 1970s than during the late 80s and 90s. Cash holdings in the later years are still relatively high, but closer to U.S. levels. More interesting,

debt levels are also significantly lower in the later period which supports the idea that when powerful, Japanese banks preferred firms to hoard cash rather than use it to pay down their debt. These results support our argument that during the 70s, Japanese firms held cash to generate rents for the main banks, reduce the banks' monitoring costs, or both. The results are more pronounced when we evaluate the level of bank debt held by the firms, which exhibits a significant decrease from the earlier to the later period. This is consistent with the findings in Hoshi and Kashyap (1999) which shows that non-bank firms able to access the public markets significantly reduced bank financing starting in the late 1980s. The implication is that there appears to be agency costs of a bank-centered system when there are no other monitoring forces, such as large, non-bank blockholders or well-developed capital markets.

The rest of the paper is organized as follows. In Section 2, we present a theoretical discussion of the predictions of the various governance systems as it pertains to a firm's cash balance. Also, we present our hypotheses that explain cash holdings in Japan. In Section 3, the data are described along with our methodology, while the determinants of cash holdings across the three countries are presented in Section 4. In Section 5, we take a closer look at the Japanese system and the changes in cash holdings across time. Section 6 offers conclusions.

2. Corporate Governance and Cash Holdings: Theory and Prediction

Access to capital is a major concern for firms in any country. A firm which requires external financing can rely on either debt or equity, but both have an asymmetric information problem which may prevent financing from being obtained.[4] In the case of debt financing, the higher the level of informational asymmetry between the firm and the lender, the more difficult it will be for the lender to ascertain the firm's

credit quality. In some cases, identifying a firm's quality may be so difficult that the lender may simply ration credit (see Stiglitz and Weiss (1981)). Because of this asymmetry in lending and the possibility of credit rationing by banks, firms may decide to hold high levels of cash so they can take advantage of positive NPV projects even when credit is tight.

Unlike a system with diffusely held debt and equity like the U.S., in Japan, where banks are closely connected with the operations of the firms to which they lend, the cost of determining credit quality will be lower (Hoshi, Kashyap and Scharfstein (1991)). Since bank officials are often members of the firm's board and perhaps its management team, they can assess credit quality prior to a financing need. Therefore, the Japanese system of governance differs from the U.S. in several ways which should impact the problems associated with informational asymmetries.

Along with asymmetric information, lenders must also be concerned with the risk of asset substitution when they provide debt to a firm. Typically in the U.S., restrictive debt covenants preclude shareholders from undertaking a higher risk program. As Jensen and Meckling (1976) argue, another way to resolve this potential agency conflict is to have stockholders own proportionate shares of debt and equity, essentially strip financing. However, since U.S. banks are very limited in their ability to hold equity, this resolution is unavailable. This is not the case in Japan, though, where the banks not only can, but do hold equity in the firms to which they lend.[5]

In sum, U.S. lenders not only face the problem of assessing credit quality, but they are also subject to asset substitution.[6] Thus, U.S. firms should hold proportionately more cash for precautionary reasons. Conversely, in Japan, the active participation of the main bank and the web of cross ownership should lead to much lower agency costs. Thus we expect Japanese non-bank firms to hold very little cash relative to

similar firms in the United States.

The preceding arguments are based on the assumption that firms hold cash as a result of, or to overcome, agency problems or informational asymmetries. If we assume a transaction motive for holding cash based on the money demand literature (see for example, Mulligan (1997)), then the analysis may change. Mulligan (1997) argues that the main determinants of a firm's cash holdings are its activity, technological sophistication, and opportunity costs of holding cash. His study finds that there are economies of scale in cash holdings. Because Japanese firms are larger, on average, than U.S. firms, the transaction motive also implies that Japanese firms will hold less cash than U.S. firms.

2.1. Why might Japanese firms hold high levels of cash?

Given the discussion in the previous sub-section, it is easy to conclude that cash holdings in Japan should be lower than those in the U.S. Additionally, the cash holdings of Japanese and German firms should not be substantially different because both systems are bank-centered. This would be true unless we consider that with bank monitoring, we must be concerned with the incentives of banks if they possess monopoly power.

Weinstein and Yafeh (1998) show that bank-centered monitoring may lead to wealth redistribution from the manufacturing sector to the banking sector, and that firms without bank ties outperform firms connected to a main bank. If the bank was interested in redistributing wealth or extracting rents, might this be facilitated through a firm's cash holdings? It can if firms hold large reserves of cash rather than paying it out as dividends. For instance, suppose the bank owns 5% of a firm's equity. If the firm paid out its excess cash as a dividend, the bank would receive only 5% of the cash.[7] In this case, the bank would have

5% of the cash to use to make loans to other firms, less any reserve requirements. However, if the firm pays no dividend and holds the cash on deposit at the bank, the bank has access to 100% of the cash, which it could lend to other firms. If the bank is required to pay taxes on its dividend distribution, this would give further incentive to the bank to pursue such action. Additionally, a bank with monopoly power might pay below market interest rates on deposits. Thus, each dollar deposited provides an added subsidy to the bank and another reason to encourage large cash holdings by firms.

However, if a firm holds cash, it should not need as much bank financing as it otherwise would. Thus, the bank may incur a cost by encouraging cash holdings, namely the loss of potential loans to those firms. Japanese banks seem to face a tradeoff between encouraging its firms to hold cash versus paying the cash out as dividends. The ideal situation for the bank is if the firm hoards cash and uses bank financing for its positive NPV projects. This situation can only occur if banks have monopoly power and can induce such behavior from the non-bank firm.

Rent extraction by banks with monopoly power is similar to the argument presented in Petersen and Rajan (1995). Petersen and Rajan (1995) show that the rents banks can extract tend to be directly related to how competitive the market for financing is in the city where a firm is located. This argument is particularly applicable to the bank-centered system in Japan where, due to the *keiretsu* and the regulatory environment, competition among banks is almost nonexistent. Therefore, if the Japanese system provides main banks with monopoly power, banks may persuade firms to hold higher levels of cash than would be expected based on U.S. agency cost considerations.

There exists another reason that banks may encourage firms to which they lend to hold large amounts of cash. Although equity ownership decreases the risk of asset substitution, Japanese banks

typically hold more of a firm's debt than its equity. By keeping a large reserve of cash on hand, the firm reduces its risk of default and thus increases the value of the debt (see Macey and Miller (1997) for a discussion). Additionally, in the main bank system of Japan, the bank is expected to support the firm if it encounters financial difficulty.[8] Therefore, a reduction in the probability of default reduces the costs of the firm's financial distress to the bank.

Hoshi, Kashyap and Sharfstein (1990) show that firms with strong main bank ties tend to invest and sell more than firms without these ties when they face financial distress. They conclude that a main bank relationship either overcomes the free-rider problem and allows efficient renegotiation or that the main bank simply refuses to allow one of its group to fail due to a reputation issue. Kaplan and Minton (1994) show that the main bank performs a monitoring and disciplinary role by placing members of the bank on the firm's board or actively managing the firm during times of distress and contraction. These papers argue that the cost of financial distress is relatively low for Japanese firms. Here we argue that, due to the role of the main bank in the Japanese system, the financial distress costs may be transferred to the banks.

At times, main banks have paid the liabilities of its borrowers to outside entities. This implies that a firm's default may be more costly for a Japanese bank than a U.S. bank since the Japanese main bank stands to lose not only the loans it made to the firm, but may also face implicit costs associated with loss of reputation, or explicit costs associated with honoring the firm's liabilities. With default being a more costly state, we would expect to see Japanese banks take precautions to avoid it, which may include requiring large cash holdings of the firm. Many of the predictions for cash holdings for the cost reduction in financial distress versus the rent extraction hypothesis will be the same. But, regardless of the motives, this behavior may be detrimental to shareholders.

2.2. What factors impact bank behavior and firm cash holdings?

Interesting questions that arise out of the previous discussion are whether this situation exists in other developed markets with bank-centered systems, such as Germany. Additionally, since the power of banks in Japan decreased starting in the 1970s, did this affect firms' cash holdings?

On the surface, it's not apparent that there should be significant differences in cash holdings of German and Japanese firms. In fact, Japanese banks own less stock than their German counterparts and, due to voting rules, have far less voting control. These factors suggest a similar or greater monopoly power in Germany. However, in Germany, there are forces that counteract the power of banks. First, the German system provides for a two-tiered board in which employees as well as stockholders hold seats on the supervisory board. Additionally, although there are cross holdings in Germany, there is not an equivalent keiretsu structure as is found in Japan. More importantly, often there exist large active non-bank shareholders who may act to mitigate the power of banks, leading to relatively lower cash holdings.

During the growth era in Japan from the 1950s to mid 1970s, banks dominated the financial system because bond markets were repressed and firms rarely issued equity. During the 1970s and 1980s, the Japanese system underwent changes that made it easier for firms to issue public debt and equity. Firms were able to issue bonds more freely on the domestic and international markets, including unsecured straight and convertible bonds. During the 1980s, the number of firms allowed to issue public non-convertible debt grew from two to over 500. Also, regulatory changes made it easier for firms to list on exchanges. Additionally, other regulatory changes reduced the power of banks by lowering the maximum percentage of shares banks could own in a particular firm. With financing alternatives expanding for many firms, their dependence on banks decreased.

Investors were given more alternatives than the artificially low rates paid on bank deposits, further eroding the power of banks in Japan. Markets opened up for both government and corporate debt, as well as equity. Also, interest rates were slowly deregulated starting in the mid 1980s, ending by 1993. Finally, as a result of the increase in alternatives available to firms and investors, by the early 1990s the health of the Japanese banking system came into question. With the weakening power of the main banks and the ability to more easily access external financing, we should see Japanese firms moving towards similar levels of cash as we observe in the U.S.[9]

3. Data and Methodology

We use the PACAP files which include data about Japanese firms from 1974-1995 for our analysis. For German data, we use COMPUSTAT's Global Vantage database from 1984-1994, while the U.S. firm data are from COMPUSTAT for 1971-1994. In this paper, for the U.S. and Germany, cash refers to cash and marketable securities. However, in Japan, due to significant cross holdings of shares of other firms, cash refers only to cash on hand as reported in the PACAP database. This should bias our results toward finding that Japanese firms have lower cash holdings than firms in the U.S. or Germany. Since we are trying to examine the effect of cash, we deflate all variables by assets minus cash which we refer to as net assets following Opler, et. al. (1999).

We use the year end Japanese consumer price index (including imputed rent) to deflate total assets to 1994 Yen. To calculate total assets in 1994 dollars, we use the average monthly exchange rate for the dollar to the yen during 1994. Size is the natural logarithm of total assets, thus real size is the value of the logarithm of total assets based on 1994 U.S. dollars. The German data are adjusted similarly using the CPI

from West Germany, obtained from CITIBASE.

Since we are concerned with free cash flow as well as potential under-investment, we also examine a firm's investment policy. For the U.S. data, we rely on the flow of funds statements, however, we do not have access to these data for Japanese and German firms. Hence, as a proxy for capital expenditures, we use the annual change in net fixed assets to which we add back depreciation charges. Roughly four (18) percent of the Japanese (German) firm years have negative capital expenditures using this proxy.

We use the market to book ratio as a measure of a firm's growth opportunities since the value of growth options are not included in a firm's book value, but should be reflected in its market value (see for instance Smith and Watts (1992)). Market to book is defined as (book value of assets - book value of equity + market value of equity) / total assets. We define a firm's cash flow as income from operations + depreciation charges - interest and discount charges - income taxes - cash dividends, while total leverage is defined as long-term debt + short-term debt divided by total assets. Since we need to control for alternative sources of liquidity, we also examine net working capital, which we define as current assets - current liabilities - cash. Thus, net working capital is examined without the impact of cash. To control for outliers which may impact our results, all raw variables are winsorized at the 1 percent tails.

4. Cash Holdings: A Cross Country Analysis

Table 1 shows summary statistics for Japan, Germany and the United States. Panel A shows Japanese firm years from 1974-1995, Panel B includes German firm years from 1984-1994, and Panel C contains U.S. firm years from 1971-1994. The first thing to notice is that Japanese firms hold a greater percentage of their assets in cash. On average, they hold 18.5 percent of net assets in cash, which is slightly

greater than the U.S., but remember that for the U.S., cash includes marketable securities while in Japan it does not. Japan is also 50 percent greater than the mean for Germany's cash and marketable securities. The results are more striking when we compare the medians. The median Japanese firm holds roughly two and one half times the amount of cash that the median German or U.S. firm does. The high cash levels in Japan are consistent with the findings in Rajan and Zingales (1995). We also notice that when we examine the quartiles of cash, Germany and the U.S. seem relatively similar, while Japanese firms hold more cash at each quartile.

We find that Japanese and German firms in our sample are larger than the U.S. firms with regard to assets and sales. Opler, et. al. (1999) find that larger firms hold less cash with respect to asset base and Mulligan (1997) finds economies of scale in cash with regard to sales. This makes the higher cash holdings of Japanese firms even more surprising since smaller firms are more likely to hold higher levels of cash. Therefore, any bias our sample creates would tend to be towards the U.S. cash holdings being overstated. Market to book ratios appear to be similar across countries, while net working capital is dramatically different. German firms tend to have high levels of net working capital to assets while Japanese firms have very low levels, with more than half of the firm years characterized by negative net working capital. This may simply reflect the fact that Japanese firms are well known for not holding large stocks of inventory.[10]

Pertaining to leverage, Japanese firms are not very different from U.S. firms although they are slightly more levered, while German firms seem to carry relatively little debt. Another interesting observation is that although Japanese firms seem best able to pay cash dividends, they pay the least, with the average German firm paying out 80 times the level of the average Japanese firm. This is consistent with the idea that the large non-bank blockholders in Germany push for higher dividends since, unlike banks,

they do not benefit from large cash holdings. U.S. firms tend to fall in the middle.

One possible reason a firm may hold cash is to smooth out the fluctuations of internally generated cash flow. Industry sigma is the mean of the standard deviation of cash flow to assets for 20 (10) years for Japanese and U.S. (German) firms for each year in each industry. Industry is defined as 2 digit SIC code for Germany and the U.S. and 2 digit industry code (INDID) from PACAP for Japan. This variable accounts for the volatility of cash flows and shows that there are dramatic differences among the countries. Although Japan and Germany have similar levels of cash flow volatility, U.S. firms experience a much higher degree of volatility. On average, U.S. firms face a cash flow volatility about 4 times as large as its foreign counterparts.[11] Clearly, for precautionary reasons, it seems as though U.S. firms have the incentive to hold larger amounts of liquid assets. Additionally, the larger volatility in the U.S. should create incentive for banks to require larger cash balances since the risk of default is higher. Strangely, we do not see this; however, debt covenants may be taking the place of large cash balances.

Since membership in a keiretsu in Japan may play a significant role in the cash holdings of firms, we examine whether firms are members.[12] In our sample 49% of Japanese firms are part of a keiretsu. When we conduct tests for the difference in means and medians, we find that almost all of the variables are statistically different from each other at the 1% level.[13]

In order to properly evaluate the rent extraction hypothesis, we need a measure of the bank debt that is held by the firm. Kang and Stulz (1997) reports that loans in the PACAP database is a good proxy for bank debt, while notes and debentures are used for the non-bank debt. We use loans to evaluate the ratio of the firm's debt that is bank debt. We see that the mean (median) percentage of bank debt to total debt is almost 90% (100%) for the full sample. Thus, even though the total leverage of the U.S. and Japan

are comparable, Japanese firms' debt is almost entirely from banks. Since we do not have this information for the U.S. or Germany, we cannot make a comparison, though we do not expect the bank debt level to be as high in the U.S.

Finally, to determine the existence of excess cash holdings in Japan and Germany, we use the regression in Table 2 to predict the level of cash holdings for a firm assuming that it is a U.S. firm. We then do a univariate analysis of the residual. We find convincing evidence of the relatively high cash levels in Japan relative to the U.S. and Germany. The mean level of excess cash in Japan is almost twice that of Germany and around 50% higher than that of the United States. The results are even more striking if we evaluate the medians. The median level of excess cash in Japan is more than ten times that of Germany and around 20 times that of the U.S. The excess cash for Germany is similar to that of the U.S.

Clearly, the level of cash holdings in Japan is higher than that of the U.S. or Germany. This is surprising given what we would expect from the Japanese monitoring system.

4.1 Determinants of cash holdings

Among the three countries, there are considerable differences in the governance systems, hence we might expect firms in each country to have distinctive determinants of cash holdings. Panel regressions of the cash holdings across the full sample and on a country specific level are shown in Table 2. Since Opler et. al. (1999) find persistence in cash holdings, we use the Fama-MacBeth (1973) methodology. Each year, we run cross-sectional regressions and use the time series of the regression coefficients to make our inferences. The independent variables are as described in the previous section. There are some interesting findings which are inconsistent with what one may predict based on the assumptions developed

in previous studies.

For the full sample of all countries, we find that the cash level of firms is increasing with market to book, cash flow/net assets and R&D/sales, which is consistent with the results from the U.S. Net working capital/assets, firm size, and the dividend dummy are all negative which is again consistent with the U.S. findings. However, in the full sample, U.S. firms make up most of the data, thus similarities are to be expected. The regression in column 1 shows that there is a significant country specific component to the cash holdings of these firms. Consistent with the univariate results, the Japan dummy variable is highly significant indicating that Japanese firms hold more cash even after controlling for fundamental factors. What is intriguing is that the German dummy is also significantly positive. In order to use all available information, we run a pooled time-series cross-section regression for all countries (column 2). To control for any macroeconomic events we include unreported yearly dummies. The inferences do not change greatly with this specification.

Since there are significant differences in the cash holdings across countries, we run individual regressions for each of the three countries. We include, but do not report, annual dummy variables to account for macroeconomic effects. We use the residuals of these specifications to determine levels of excess cash. The regressions are shown in columns 3-6 of the same table, and yield some interesting results. In Germany the evidence shows that larger firms hold more cash, while the opposite is true for Japan and the U.S. Also, for German firms, net working capital is insignificant, whereas in the other countries it is significantly negative.

Even though cash flow is significant for both the U.S. and Japan, it is of opposite signs, with the U.S. increasing and Japan decreasing with cash holdings. A possible explanation for this difference is that

due to the keiretsu relationships, high cash flow firms may be funded by the high cash but low cash flow firms within the keiretsu. This difference is also supported by the results on capital expenditures, in which the U.S. and German firms both show a significant increase in cash as capital expenditures increase, while the Japanese firms have a significantly negative relation. Although this result seems inconsistent with the market to book result which indicates that firms with good investment opportunities hold more cash in order to take advantage of them, it is not necessarily inconsistent if the high growth firms are being funded by the banks within the keiretsu.

To test the impact of keiretsu membership on the cash holdings of the firms, we include a dummy variable for keiretsu membership. We find that firms which are members of a keiretsu hold less cash than non-member firms, which is consistent with Hoshi, Kashyap and Sharfstein (1991) who show that keiretsu firms are less liquidity constrained than non-group firms.

Contrary to the results from the U.S., Japanese and German firms that pay dividends tend to have higher levels of cash. This might signify that dividends, in the U.S., are a mechanism firms use to avoid building up free cash flow, as Jensen (1986) argues, while dividends in Japan and Germany are used to return cash to shareholders in the event of unusually profitable years. This is consistent with the findings of Dewenter and Warther (1998) who show that dividends are less sticky in Japan than they are in the U.S. Clearly, for all three countries, firms with higher leverage hold less cash which is again consistent with Jensen's argument. In column 4, we run a Fama-MacBeth specification for Japan in order to address the econometric issues mentioned previously. The inferences are unchanged.

We have established that firms in Japan have cash holdings that are inconsistent with previous work regarding the motives that account for cash holdings in the U.S. In addition, the Japanese main bank

system provides for bank powers that are beyond those in other industrialized countries. We thus evaluate whether the cash holdings of Japanese firms persist longer than cash holdings of U.S. and German firms. If there is greater persistence, this may be evidence that Japanese banks prefer non-bank firms to hoard cash. On the other hand, if we find less persistence in Japan, it would be supportive of the idea that banks play a key role in forcing firms to disgorge excess cash. An investigation reveals that Japanese firms have greater persistence in excess cash than firms from the U.S. or Germany.[14] This seems to indicate that powerful banks did little to influence firms' payout policy regarding excess cash. The remainder of this paper more closely examines the cash holdings of Japanese firms and how they are affected by changes in bank power.

5 Japanese Firms and Cash

We have argued that cash holdings in Japan may be affected by the power of the main bank. To evaluate this hypothesis more clearly, we focus on two sub-samples. The early period, 1976 - 1982[15], which was characterized by significant bank power, and 1989-1995 which saw a considerable weakening of the financial system. In the early period, we assume that the main bank had significant influence over the non-bank firms. This seems reasonable since banks could hold up to 10% of a firm's equity and the capital markets were not developed. Also, firms were effectively prohibited from issuing debt, thus if firms needed financing, banks were their only option. The law restricting bank ownership to 5% of a firm was passed in 1977, but because firms had ten years to fully implement these laws, it was not binding until 1987. Also, investors had few alternatives for their savings and relied extensively on the artificially low rates paid on bank deposits.

In the later period, 1989-1995, a relaxation of rules governing the capital markets made it easier for firms to issue debt and equity. Regulations weakening the power of banks along with the expansion of the public sale of government bonds and the opening of the securities markets gave investors more alternatives for their investments. As argued by Hoshi and Kashyap (1999), these developments along with the delayed implementation of laws giving banks other alternatives for increasing earnings were main contributors to the weakening of the banking system beginning in the early 1990s. The middle years from 1983-1988 are assumed to be a transition period and are eliminated from our tests.

Regressions of the full sample and sub-periods are shown in Table 3.[16] In columns 1, 3 and 5, we include annual dummies to incorporate any macroeconomic effects that may impact the results. The regressions show that there are differences in the determinants of cash across the periods. Specifically, leverage is insignificant during the first sub-period, but is significantly negative in the latter. This is particularly interesting. With powerful banks, firms' cash holdings and leverage may have been dictated by the banks, thus we might not expect to see any relation between them, which is what we observe in the early period. However, if firms were allowed to select their leverage and cash holdings, as with the U.S., we would expect to find an inverse relationship. This is precisely what we observe in the later period.

We find that market to book, R&D / sales, and industry sigma are not significant during the first period, but they are significant in the second. This result is also consistent with firms' investment and riskiness not impacting cash holdings during the first period. The coefficient on capital expenditures is significantly negative during the early sub-period but insignificant during the later period. These differences seem to indicate that firms with greater investment opportunities held higher levels of cash in the second period than they did from 1976-1982.

Consistent with the findings in Hoshi, Kashyap and Sharfstein (1991), keiretsu membership lowers the necessity to hold cash, but only during the last sub-period. If banks were extracting rents during the first period, then the liquidity benefits of the keiretsu would be less important, which is consistent with our results.

Finally, if banks extracted rents from firms, then we should see cash increasing as firms increased their bank borrowing. This is exactly what we find when we incorporate the effect of bank debt to total debt for the first sub-period. We find a positive and significant relation between cash holdings and bank debt / total debt. However, during the second period, we see a strong negative relation between bank debt / total debt and cash holdings, which is what we would expect if firms use debt and cash as substitutes.

If banks were forcing firms to hold high levels of cash in order to extract rents, we should see firms moving towards more optimal levels of cash as bank power diminished. The last specification attempts to directly test this by looking at both sub-periods simultaneously. We define a dummy variable Early which equals one during the period of high bank power and zero otherwise. Consistent with our arguments, we find that the coefficient on Early is positive and highly significant. Thus, controlling for fundamental factors, Japanese firms held considerably higher levels of cash when banks were strong.

The regression results indicate that the sub-periods we define do seem to be substantively different. However, some may argue that the level of bank power was not homogenous across industrial firms. For instance, firms which could access the capital markets via convertible debt may have faced less control from banks than those which were unable to issue convertibles. Thus, for robustness, we examine how the ability to issue public debt affected corporate cash holdings. Table 4 shows the results of these tests.

We measure ability to access the capital markets by examining the first time that a Japanese firm

issued convertible debt. The dummy variable Access is constructed which equals one in the first year of issue and for all subsequent years. Since the firms initially issue at different points in time, we allow for bank power to be heterogenous across firms in any given year. The remaining control variables are identical to those used in Table 3.

The first regression in Table 4 includes both firm specific and annual dummies in addition to the reported variables. Hence, the coefficient on Access measures the change in a firm's cash holdings during the year that they first accessed the capital markets. The significant negative coefficient indicates that when firms became less reliant on banks, they held lower levels of cash than they did previously. This result is particularly puzzling since an issue of convertible debt provides for a large cash inflow to the firm and thus we should expect a positive sign on the coefficient. Thus, despite the fact that the firm was raising capital in that year, they held significantly lower levels of cash than they did when the banks had monopoly power over them.

The remaining specifications in Table 4 confirm that firms held significantly less cash after they had access to the capital markets. The negative coefficients on Access indicate that from the time that the firms first issued public debt, they held less cash than they had previously. The results hold using OLS as well as the method of Fama and MacBeth (1973). The results in Table 4 corroborate the evidence presented in Table 3 and indicate that our use of sub-periods as a proxy for bank power is valid. Together, both tables provide strong evidence that powerful banks may have been able to coerce firms to hold large amounts of cash in order to expropriate rents.

5.1 Robustness and further tests

We have demonstrated that cash holdings of Japanese industrial firms appear to be higher in the early period because main banks demand higher cash balances to expropriate rents. However, another possibility exists. In the early period, interest rates were regulated in Japan leading to the frequent use of compensating balances. In the later period, deregulation allowed banks to charge market interest rates, eliminating the need for the compensating balances. It is possible our results simply reflect the demise of this practice, because we should observe higher cash and leverage when such balances were used.

Without compensating balances, we should see lower debt levels. However, the composition of the debt should not change. Presumably, bank lending is the cheapest source of financing for Japanese firms, thus firms should not raise external debt, even when available. Hence, we examine the proportion of total debt comprised of bank debt. If compensating balances explain our results, we should not see any difference in this proportion from the early to the later period.

We find that the mean amount of a firm's debt which is from the bank is 94.5% in the early period, while in the later period the proportion is only 74.2%. The difference is highly significant, both statistically and economically. We observe similar inferences using the median which decreases from 100% to 85.3%. The fact that firms are moving away from bank financing even though it should be less costly indicates that there must have been some cost imposed by the banks in excess of the compensating balances. This indicates our results are driven by bank power and not the regulatory environment.

We also perform several tests to examine the robustness of our results and the strength of our interpretations. We have relied mainly on the assumption that firms hold cash to overcome informational asymmetries. However, many researchers examine cash holdings using traditional money demand

equations. Mulligan (1997) performs such tests and concludes that there are economies of scale in cash holdings. We examine whether our results are an artifact of our assumption by performing similar regressions. First, we repeat all our analysis deflating our variables by sales rather than assets. Second, we examine our results using the specification that Mulligan (1997) uses. In both cases, we find that our main results are unchanged.[17] Hence, the assumption of why firms hold cash does not affect our inferences.

If Japanese banks were exerting monopoly power over the industrial firms, we should see this influence waning over time as firms increase access to outside financing. Thus, we examine the coefficients on the annual dummies from the Japanese regression in Table 2. The coefficients from 1977-1989 range from 0.77 to 0.63 and never fall below 0.56. However, the coefficient for 1990 is 0.49 and then monotonically declines to 0.20 for 1994 indicating that firms were systematically reducing their cash holdings each year when bank power weakened. This is even more relevant since the financial crisis in Japan began around the 1990 time period.

We have shown in Table 4 that firms which had access to the capital markets in the form of convertible debt held significantly lower levels of cash than the firms which were dependent on the banks. However, when bank power was weak, the difference between firms which could access the capital markets and those that could not should be lessened. We empirically test this in Table 5. The table shows cash regressions similar to those in Tables 3 and 4, except that in addition to each of the variables, we include interaction variables. The first two specifications show regressions where we interact the dummy variable Access with each independent variable. The coefficients on the interaction terms provide a measure of whether the factors that impact cash holdings differ between firms which were dependent on banks and those that were not. Interaction variables that are significant are shown in bold. We see that in

the early period, six of the eleven interaction variables are significant indicating that the reasons for cash holdings differed greatly between bank dependent and bank independent firms. When we examine the later period, we find that none of the interaction variables is significant. This is strong evidence that banks exerted their power to influence the firm's cash holdings.

For robustness, we perform similar tests with a different measure of capital market access. The dummy variable Free Bank is set to one if the firm has less than 100% of its debt in the form of bank debt and zero otherwise. We find that four of the ten interactions are significant in the early period while only one is significant in the latter.[18]

Finally, if Japanese firms held more cash than U.S. firms because of bank pressure, we might expect to find that Japanese firms which were not bank dependent would be more similar to U.S. firms than those that were. We examine this in Table 6 by looking at the excess cash of Japanese firms assuming that they were U.S. firms. We predict a level of cash holdings using the coefficients from the U.S. regression in Table 2 and measure excess cash as the difference between the actual cash holdings and the predicted level.

Examining Panel A, we see that in the early period, Japanese firms had a mean level of excess cash of 13.12% of net assets, assuming they were U.S. firms. However, in the later period, they decreased their holdings to 12.33%. Although the decrease is statistically significant, it doesn't seem economically important until we examine it alongside the U.S. firms' cash holdings. For the U.S. firms, the average was 4.55% in the early period while it dramatically increased to 11.28% in the 1989-1995 period.[19] Thus, the typical Japanese firm had nearly 3 times the excess cash of an average U.S. firm in the early period, but only 1.1 times the level in the later period. It seems that when bank power decreased, Japanese firms

shifted their cash holdings towards that of U.S. firms. This finding is consistent with the arguments of Hoshi and Kashyap (1999) regarding the future of the overall Japanese capital markets and firm financing following the Big Bang reforms.

In Panel B, we segment the excess cash holdings of the Japanese firms in the early period by whether they were bank dependent. Again we separate our firms on the basis of convertible debt (Access) and the proportion of bank debt to total debt (Free bank). We see that firms which were dependent on the banks held roughly 1.25 to 1.5 times the excess cash than firms which had other financing sources. The differences at the mean and median are highly significant and indicate that powerful banks encouraged firms to hold more cash than they otherwise would have.

6. Conclusion

This paper examines the existence of surprisingly high levels of cash held by Japanese firms, which is contrary to what one might expect from a bank-centered monitoring system. In such a system, one expects lower agency costs from asymmetric information and asset substitution. Hence, with the reduction of the cost differential between internally and externally generated funds, we should find lower cash holdings than those observed in the United States. However, the results of this paper show that the level of cash holdings is higher in Japan than it is in the U.S. or Germany. Since the Japanese system is characterized by large banks having monopoly power, especially during the early years of our sample, this finding is consistent with banks extracting rents from firms or banks lowering their costs of monitoring by encouraging firms to maintain large cash balances.

We show that the amount of power banks wield over their borrowers is an important factor in

determining cash holdings. When we separate the Japanese firms into sub-periods based on the degree of bank power, we find several interesting results. Japanese firms held significantly more cash when bank power was high, providing strong evidence in support of cash holdings being the mechanism by which banks extract rents from firms. We also find that firms which had access to non-bank financing held significantly less cash than those which were bank dependent. Our results are robust to several specifications and are not simply measuring the use and demise of compensating balances. Overall, our results support the idea that there may be difficulties with a bank-centered governance system if no other monitoring forces exist, such as large non-bank blockholders or an active market for corporate control. This result has important implications for corporate governance, especially in emerging market economies undergoing capital market reforms.

Endnotes

1. This is based on arguments put forth in Berle and Means (1932).

2. Opler, Pinkowitz, Stulz and Williamson (1999) discuss different motives for firms to hold cash. We use their definition of the precautionary motive which is holding cash to enable investment when cash flow is poor. This is analogous to the value of liquidity in Myers and Majluf (1984). Opler, et al. (1999) find evidence which is consistent with U.S. firms holding cash for precautionary reasons.

3. See Macey and Miller (1997) for a discussion of banks' incentives in the U.S., Japan, and Germany and why they might not coincide with those of shareholders.

4. Issues and implications pertaining to asymmetric information are covered extensively in the financial economics literature. Seminal papers on the subject include Myers and Majluf (1984), Leland and Pyle (1977), Diamond (1984) and Jensen (1986).

5. There are limits on the amount of equity a bank can hold in a firm in Japan, but this is not binding since there is a complex web of cross holdings across firms and banks. Through these cross holdings, a bank can effectively have control over a higher percentage of shares than is formally allowed by law.

6. Although we discuss the problems that U.S. banks face, the discussion generalizes to other creditors. Bondholders have to assess the risk of default when deciding whether or not to purchase bonds and they are at risk of asset substitution, thus the fact that U.S. firms do not have to rely solely on banks does not materially affect our argument. Although bondholders can hold equity, wealth constraints are likely to make strip financing difficult.

7. In Japan banks could hold up to 10% of a firm's shares until 1987 when it dropped to 5%. Even though banks are limited to 5% of the equity, due to the keiretsu arrangement and the fact that the main bank influences a number of smaller banks, the effective control over equity could be much larger.

8. Aoki, Patrick and Sheard (1994) discuss the Japanese main bank system and the responsibilities of the main bank.

9. Many of the facts concerning the Japanese financial system are taken from Hoshi and Kashyap (1999). A more detailed description of the Japanese banking system and its future can be found in their work.

10. The negative levels of net working capital may also be driven by the fact that many Japanese firms factor their notes receivable for cash. The factored notes remain on the balance sheet as a contra asset which would lower current assets. Since we remove cash from the calculation of net working capital, we may in essence be removing both cash and notes receivable from the calculation. When net working capital is calculated including cash, the mean is 18.11% while the median is 14.48%.

11. This is consistent with Macey and Miller (1997) who argue that bank-centered governance can lead to less risk taking.

12. We thank Jun-Koo Kang for providing us with the sample of Japanese keiretsu firms.

13. Median cash and market to book are insignificantly different between Germany and the U.S. In addition, mean and median sales are not different between Japan and Germany. Results are available upon request.

14. Results are not shown but are available from the authors.

15. Although the Japanese data starts in 1974, due to requirements for calculating cash flow volatility, we are unable to measure excess cash for the first two years.

16. The number of observations is smaller in the later period because short term debt is missing for many firms. However, when we rerun the tests setting short term debt equal to zero when it is missing, the results are similar.

17. The results are available upon request. The Mulligan specifications show that although there are economies of scale in Japan, the coefficient is significantly greater than that in the U.S. (0.84 vs 0.71). Interestingly, we find that the coefficient in Germany is 1.07 which is significantly greater than 1 indicating that economies of scale in cash holdings do not exist in German firms. The fact that the coefficients differ significantly across countries suggests that cash holdings may be driven more by agency costs and informational asymmetries than by traditional money demand.

18. Bank debt to total debt is dropped from the right hand side of the second specification since the Free Bank dummy variable is based on the amount of bank debt to total debt.

19. The increase in excess cash holdings in the U.S. is interesting in its own right, but an explanation is beyond the scope of this paper and left for future research.

References

Aoki, Masahiko, Hugh Patrick, and Paul Sheard, 1994, "The Japanese main bank system: An introductory view." in Masahiko Aoki and Hugh Patrick (eds.), *The Japanese main bank system: Its relevance for transforming economies*, Oxford University Press, Oxford.

Berle, Adolph A. and Gardiner C. Means , 1932, *The Modern Corporation and Private Property*, Macmillan, New York.

Dewenter, Kathryn L. and Vincent A. Warther, 1998, "Dividends, asymmetric information, and agency conflicts: Evidence from a comparison of the dividend policies of Japanese and U.S. firms," *Journal of Finance*, 53, 879-904.

Diamond, Douglas W., 1984, "Financial intermediation and delegated monitoring," *Review of Economic Studies*, 51, 393-414.

Fama, Eugene F. and James D. MacBeth, 1973, "Risk, return, and equilibrium: Empirical tests," *Journal of Political Economy*, 81, 607-636.

Hoshi, Takeo, Anil Kashyap and David Scharfstein, 1990, "The role of banks in reducing the costs of financial distress in Japan," *Journal of Financial Economics*, 27, 67-88.

Hoshi, Takeo, Anil Kashyap and David Scharfstein, 1991, "Corporate structure, liquidity and investment: Evidence from Japanese industrial groups," *Quarterly Journal of Economics*, 106, 33-60.

Hoshi, Takeo and Anil Kashyap, 1999, "The Japanese banking crisis: Where did it come from and how will it end?," forthcoming in *NBER Macroeconomics Annual* 1999.

Jensen, Michael, 1986, "Agency costs of free cash flow, corporate finance and takeovers," *American Economic Review*, 76, 323-329

Jensen, Michael C., and William H. Meckling, 1976, "Theory of the firm: Managerial behavior, agency costs and ownership structure," *Journal of Financial Economics*, 3, 305-360.

Kang, Jun-Koo and René Stulz, 1997, "Is bank centered corporate governance worth it? A cross-sectional analysis of the performance of Japanese firms during the asset price deflation," Working Paper WP 97-6, The Ohio State University.

Kaplan, Steven N. and Bernadette Minton, 1994, "Appointments of outsiders to Japanese boards: Determinants and implications for managers," *Journal of Financial Economics*, 36, 225-258.

Leland, Hayne E. and David H. Pyle, 1977, "Informational asymmetries, financial structure, and financial intermediation," *Journal of Finance*, 32, 371-387.

Macey, Johnathan R. and Geoffrey P. Miller, 1997, "Universal banks are not the answer to America's corporate governance 'problem': A look at Germany, Japan, and the U.S.," *Journal of Applied Corporate Finance*, 9, 57-73.

Mulligan, Casey B., 1997, "Scale economies, the value of time, and the demand for money: Longitudinal evidence from firms," *Journal of Political Economics*, 105, 1061-1079.

Myers, Stewart and Nicholas Majluf, 1984, "Corporate financing and investment decisions when firms have information that investors do not have," *Journal of Financial Economics*, 13, 187-221.

Opler, Tim, Lee Pinkowitz, René Stulz and Rohan Williamson, 1999, "The determinants and implications of corporate cash holdings," *Journal of Financial Economics*, 52, 3-46.

Petersen, Mitchell A. and Raghuram G. Rajan, 1995, "The effect of credit market competition on lending relationships," *Quarterly Journal of Economics*, 110, 407-443.

Rajan, Raghuram and Luigi Zingales, 1995, "What do we know about capital structure? Some evidence from international data," *Journal of Finance*, 50, 1421-1460.

Sheard, Paul, 1989, "The main bank system and corporate monitoring and control in Japan," *Journal of Economic Behavior and Organization*, 11, 399-422.

Smith, Clifford W. and Ross L. Watts, 1992, "The investment opportunity set and corporate financing, dividend and compensation policies," *Journal of Financial Economics*, 32, 263-292.

Stiglitz, Joseph and Andrew Weiss, 1981, "Credit rationing in markets with imperfect information," *American Economic Review*, 71, 393-410.

Weinstein, David E. and Yishay Yafeh, 1998, "On the costs of a bank centered financial system: Evidence from the changing main bank relations in Japan," *Journal of Finance*, 53, 635-672.

White, Halbert, 1980, "A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity," *Econometrica*, 48, 817-838.

Table 1

Summary Statistics

Denominator of assets is really net assets (assets-cash). Cash in the U.S. and Germany is defined as cash on hand plus marketable securities. In Japan, cash is defined solely as cash on hand. Real Size (Sales) is the logarithm of real total assets (net sales). Market to Book is defined as (book value of assets - book value of equity + market value of equity) / total assets. Cash Flow is defined as EBITDA - interest expense - taxes - common dividends. Net working capital is defined as current assets - current liabilities - cash. Total leverage is defined as long-term plus short-term debt / total assets. For Japan and Germany, capital expenditures are defined as the change in net fixed assets plus depreciation, for the U.S., capital expenditures are from the flow of funds statement. Capital expenditures are negative for about 4% (17%) of Japanese (German) firm years. Industry sigma is the standard deviation of cash flow to assets for a firm's industry based on the previous 20 (10) years for the U.S. and Japan (Germany). Industry is defined as 2 digit SIC code for Germany and the U.S. and 2 digit industry code INDID from PACAP for Japan. When R&D is listed as missing it is set to zero. Keiretsu is a dummy variable which equals one if the firm belongs to any type of keiretsu and zero otherwise. Excess cash is defined as actual cash to assets minus that predicted from a regression with log cash to assets as the dependent variable. Excess cash if U.S. firm is a measure which uses the coefficients from the U.S. regression.

Panel A: Japan 1974-1995

Variable	Mean	First Quartile	Median	Third Quartile	Sample Size
Cash / Assets	18.52%	9.89%	15.74%	23.48%	31,199
Real Size (1994 Yen)	10.97	10.02	10.82	11.80	30,308
Real Size (1994 $)	6.35	5.40	6.20	7.18	30,308
Real Sales (1994 Yen)	11.02	10.60	10.92	11.86	30,050
Real Sales (1994 $)	6.40	5.44	6.30	7.24	30,050
Market-to-Book	1.54	1.15	1.35	1.71	29,063
Cash Flow/Assets	3.68%	0.90%	3.67%	6.42%	28,864
Net Working Capital/Assets	-0.82%	-13.98%	-1.93%	11.88%	31,199
Cash Dividends/Assets	0.021%	0.000%	0.008%	0.025%	31,199
Total Leverage	29.25%	14.76%	27.89%	42.28%	31,200
Capital Expenditures/Assets	4.95%	1.69%	3.88%	6.99%	27,570
Industry Sigma	2.74%	2.39%	3.11%	3.17%	29,279
R&D / Sales	0.088%	0.000%	0.000%	0.000%	31,201
Keiretsu	48.84%				30,281
Short term bank debt / assets	18.73%	10.16%	17.16%	25.50%	13,384
Long term bank debt / assets	10.31%	2.12%	6.86%	15.31%	26,206
Bank debt / total debt	88.40%	85.33%	100.00%	100.00%	13,211
Excess cash if U.S. firm	12.62%	4.54%	10.26%	17.53%	25,375
Excess cash	3.18%	-4.37%	0.60%	7.34%	25,216

Panel B: Germany 1984-1994

Variable	Mean	First Quartile	Median	Third Quartile	Sample Size
Cash / Assets	12.17%	2.21%	6.63%	16.50%	2,177
Real Size (1994 DM)	6.60	5.29	6.50	7.79	2,177
Real Size (1994 $)	6.12	4.81	6.03	7.32	2,177
Real Size (1994 DM)	6.87	5.53	6.90	8.22	2,141
Real Size (1994 $)	6.39	5.05	6.42	7.74	2,141
Market-to-Book	1.42	0.98	1.20	1.59	2,009
Cash Flow/Assets	2.14%	-0.72%	2.22%	5.09%	2,137
Net Working Capital/Assets	19.66%	6.35%	21.94%	34.24%	2,177
Cash Dividends/Assets	1.59%	0.00%	1.15%	2.15%	2,176
Total Leverage	20.48%	6.59%	17.04%	31.85%	2,177
Capital Expenditures/Assets	7.45%	1.43%	5.74%	11.55%	1,350
Industry Sigma	3.10%	2.03%	3.11%	3.96%	2,613
R&D / Sales	0.45%	0.00%	0.00%	0.00%	2,141
Excess Cash if U.S. firm	6.73%	-1.29%	1.75%	9.76%	1,224
Excess Cash	5.24%	-2.15%	0.96%	7.36%	1,224

Panel C: United States 1971-1994 (See also Opler et al. (1999) Table 2)

Variable	Mean	First Quartile	Median	Third Quartile	Sample Size
Cash / Assets	18.03%	2.16%	6.05%	17.22%	127,284
Real Size (1994 $)	4.19	2.68	4.13	5.60	126,131
Real Sales (1994 $)	4.23	2.72	4.35	5.87	128,749
Market-to-Book	1.59	0.93	1.18	1.74	97,801
Cash Flow/Assets	0.74%	0.76%	6.37%	10.91%	125,532
Net Working Capital/Assets	13.36%	-0.95%	15.51%	32.30%	122,511
Cash Dividends/Assets	1.04%	0.00%	0.00%	1.54%	125,151
Total Leverage	27.96%	10.05%	24.94%	40.49%	127,165
Capital Expenditures/Assets	8.87%	2.93%	6.10%	11.49%	127,063
Industry Sigma	12.26%	5.59%	8.80%	16.90%	126,067
R&D / Sales	2.96%	0.00%	0.00%	1.50%	127,462
Excess cash	8.55%	-2.69%	0.59%	9.02%	87,117

Table 2

Cash Regression Results

The dependent variable in all regressions is the natural logarithm of cash/net assets. Cash in the U.S. and Germany is defined as cash on hand plus marketable securities. In Japan, cash is defined solely as cash on hand. Net assets is defined as total assets less cash. Market to Book is defined as (book value of assets - book value of equity + market value of equity) / total assets. Real Size is the natural logarithm of total assets deflated to 1994 U.S. dollars. Cash flow is defined as EBITDA - interest expense - taxes - common dividends. NWC is current assets - cash - current liabilities. Capex is capital expenditures. For the United States, capital expenditures come from the flow of funds statement while for Germany and Japan it is the change in net fixed assets, plus depreciation. Leverage is defined as short term plus long term debt divided by total assets. Industry sigma is the standard deviation of cash flow to assets for a firm's industry based on the previous 20 (10) years for the U.S. (Japan and Germany). Industry is defined as 2 digit SIC code for Germany and the U.S. and 2 digit industry code INDID from PACAP for Japan. R&D is research and development expense. When R&D is missing, we set it equal to zero. Sales is net sales. Dividend Dummy is equal to 1 if the firm paid a dividend in that year and zero otherwise. Keiretsu is a dummy variable which equals one if the firm belongs to any type of keiretsu and zero otherwise. Japan (Germany) Dummy equals 1 if the firm is Japanese (German) and zero otherwise. The United States data run from 1971-1994. The Japanese data are from 1974-1995 and the German data are from 1984-1994. All pooled regressions are run including dummy variables for each year (not reported) to eliminate any global macroeconomic factors. The omitted dummy variable is for 1994. White's (1980) correction for heteroscedasticity is used to calculate the t-statistics. FM indicates that the regression coefficients are determined from the time series of cross-sectional regression coefficients.

Variable	FM - All Countries	All Countries	Germany	FM Japan	Japan	United States
Market to Book	0.1430 (16.09)	0.1445 (30.46)	0.2416 (4.28)	0.1032 (4.39)	0.0571 (5.93)	0.1423 (27.63)
Real Size (1994 U.S. $)	-0.0422 (-6.80)	-0.0368 (-14.53)	0.1802 (7.83)	-0.0568 (-4.52)	-0.0562 (-15.72)	-0.0403 (-13.39)
Cash Flow / Net Assets	0.6860 (4.01)	0.1723 (4.82)	-2.3425 (-2.82)	-0.3957 (-2.63)	-0.6610 (-4.94)	0.1599 (4.39)
NWC / Net Assets	-0.9325 (-11.14)	-0.7960 (-36.18)	0.0944 (0.36)	-0.5945 (-6.09)	-0.5964 (-20.56)	-0.8097 (-31.23)
Capex / Net Assets	-0.1555 (-0.72)	0.3135 (5.27)	0.9616 (2.79)	-1.3319 (-5.33)	-1.2560 (-10.65)	0.4798 (7.31)
Leverage	-2.3893 (-27.15)	-2.5920 (-105.24)	-2.5531 (-8.61)	-0.6981 (-5.23)	-0.7419 (-24.04)	-3.0251 (-101.72)
Industry Sigma	0.1744 (0.29)	1.2599 (17.59)	10.0194 (3.03)	-0.7856 (-0.69)	0.3502 (0.52)	1.1653 (14.94)
R&D / Sales	2.0869 (3.14)	1.7821 (20.99)	1.9043 (1.31)	5.8022 (3.09)	8.7103 (6.25)	1.6589 (19.80)
Dividend Dummy	-0.0799 (-2.55)	-0.1105 (-11.80)	0.5552 (5.00)	0.1160 (5.31)	0.1107 (9.18)	-0.1279 (-11.38)
Keiretsu				-0.1280 (-8.98)	-0.1309 (-14.84)	
Japan Dummy	0.8106 (8.33)	1.1032 (95.72)				
Germany Dummy	0.0570 (2.10)	0.1666 (3.71)				
N	25	113,716	1,224	20	25,215	87,117
Adjusted R^2	24.57%	24.26%	21.84%	14.72%	16.14%	21.86%
Annual Dummies	No	Yes	Yes	No	Yes	Yes

Table 3

Japan Cash Regression Results

The dependent variable in all regressions is the natural logarithm of cash/net assets. Cash in Japan is defined solely as cash on hand. Net assets is defined as total assets less cash. Market to Book is defined as (book value of assets - book value of equity + market value of equity) / total assets. Real Size is the natural logarithm of total assets deflated to 1994 U.S. dollars. Cash flow is defined as EBITDA - interest expense - taxes - common dividends. NWC is current assets - cash - current liabilities. Capex is capital expenditures, defined as the yearly change in net fixed assets, plus depreciation. Leverage is defined as short term plus long term debt divided by total assets. Industry sigma is the standard deviation of cash flow to assets for a firm's industry based on the previous 10 years. Industry is defined as 2 digit industry code INDID from PACAP. R&D is research and development expense. When R&D is missing, we set it equal to zero. Sales is net sales. Keiretsu is a dummy variable which equals one if the firm belongs to any type of keiretsu and zero otherwise. Dividend Dummy is equal to 1 if the firm paid a dividend in that year and zero otherwise. Early is a dummy variable equal to one if the period is from 1974-1982 and zero otherwise. Two regressions are run including dummy variables for each year (columns 2 and 4) to eliminate any macroeconomic factors. The omitted dummy variable is for 1994. White's (1980) correction for heteroscedasticity is used to calculate the t-statistics.

Variable	1976-1995	1976-1982	1976-1982	1989-1995	1989-1995	Both Periods
Early						0.5910 (27.83)
Market to Book	0.0174 (1.06)	0.0004 (0.01)	-0.0034 (-0.13)	0.2530 (8.02)	0.1129 (3.08)	0.1321 (6.53)
Real Size (1994 U.S. $)	-0.1361 (-27.57)	-0.1245 (-24.25)	-0.1238 (-24.07)	-0.1528 (-9.05)	-0.1608 (-9.68)	-0.1379 (-24.97)
Cash Flow / Net Assets	-0.7319 (-4.19)	-0.2807 (-1.51)	-0.3471 (-1.85)	-1.4500 (-2.72)	-0.8750 (-1.65)	-0.9588 (-4.96)
NWC / Net Assets	-0.8729 (-20.71)	-0.9796 (-21.17)	-0.9765 (-20.93)	-0.4780 (-3.78)	-0.5202 (-4.22)	-0.9169 (-18.98)
Capex / Net Assets	-1.5843 (-10.62)	-1.8965 (-11.73)	-1.8112 (-11.21)	0.9598 (2.46)	-0.1690 (-0.41)	-1.0879 (-6.43)
Leverage	-0.2421 (-5.74)	-0.0345 (-0.76)	-0.0574 (-1.26)	-0.8771 (-6.68)	-0.8875 (-6.89)	-0.2422 (-5.08)
Industry Sigma	-0.0989 (-0.11)	0.7023 (0.79)	1.5811 (1.73)	-6.4789 (-1.96)	-6.4259 (-1.97)	-1.5808 (-1.61)
R&D / Sales	2.2191 (1.31)	1.1645 (0.66)	0.3411 (0.19)	8.8771 (1.87)	8.1984 (1.72)	3.2673 (1.73)
Dividend Dummy	0.1286 (8.71)	0.2008 (13.28)	0.2008 (13.28)	0.0690 (1.62)	-0.0007 (-0.02)	0.1672 (9.87)
Keiretsu	-0.0451 (-4.01)	-0.0118 (-1.02)	-0.0125 (-1.08)	-0.1494 (-4.42)	-0.1528 (-4.61)	-0.0390 (-3.02)
Bank debt / total debt	-0.5198 (-12.76)	0.1149 (1.99)	0.0995 (1.73)	-0.8217 (-11.69)	-0.8238 (-11.89)	-0.5503 (-10.90)
N	9,923	5,810	5,810	2,211	2,211	8,021
Adjusted R^2	26.54%	23.86%	24.45%	15.14%	17.82%	26.25%
Annual Dummies	Yes	No	Yes	No	Yes	No

Table 4

Japan Cash Regression Results

The dependent variable in all regressions is the natural logarithm of cash/net assets. Cash in Japan is defined solely as cash on hand. Net assets is defined as total assets less cash. Market to Book is defined as (book value of assets - book value of equity + market value of equity) / total assets. Real Size is the natural logarithm of total assets deflated to 1994 U.S. dollars. Cash flow is defined as EBITDA - interest expense - taxes - common dividends. NWC is current assets - cash - current liabilities. Capex is capital expenditures, defined as the yearly change in net fixed assets, plus depreciation. Leverage is defined as short term plus long term debt divided by total assets. Industry sigma is the standard deviation of cash flow to assets for a firm's industry based on the previous 10 years. Industry is defined as 2 digit industry code INDID from PACAP. R&D is research and development expense. When R&D is missing, we set it equal to zero. Sales is net sales. Keiretsu is a dummy variable which equals one if the firm belongs to any type of keiretsu and zero otherwise. Dividend Dummy is equal to 1 if the firm paid a dividend in that year and zero otherwise. Access is a dummy variable equal to one if the firm had access to the capital markets and zero otherwise. A firm is said to have Access if it currently has or has at some point issued convertible debt. The fixed effects regression includes dummy variables for each firm as well as annual dummies. The Fama-MacBeth regressions indicate that each year a cross-sectional regression is run and the time series of coefficients are used for the inferences. When annual dummies are indicated it means that dummy variables for each year are included in the regression to account for macro-economic factors. The omitted dummy variable is for 1994. White's (1980) correction for heteroscedasticity is used to calculate the t-statistics for the OLS regressions.

Variable	Fixed Effects	Fama-MacBeth	OLS	OLS
Access	-0.0506 (-2.81)	-0.0377 (-2.12)	-0.0851 (-5.09)	-0.1909 (-10.46)
Market to Book	0.0472 (3.58)	0.0568 (1.67)	0.0151 (0.92)	-0.0075 (-0.53)
Real Size (1994 U.S. $)	0.1037 (5.36)	-0.1273 (-21.75)	-0.1240 (-22.21)	-0.1088 (-18.41)
Cash Flow / Net Assets	0.3632 (2.48)	-0.6913 (-3.24)	-0.7619 (-4.37)	-0.6197 (-3.56)
NWC / Net Assets	-1.3118 (-26.42)	-0.7440 (-11.48)	-0.8522 (-20.13)	-0.9446 (-22.09)
Capex / Net Assets	-0.5804 (-5.13)	-1.3539 (-5.79)	-1.5784 (-10.57)	-1.3428 (-8.68)
Leverage	-0.1563 (-2.79)	-0.3615 (-3.48)	-0.2359 (-5.59)	-0.2309 (-5.28)
Industry Sigma	1.9028 (0.70)	-1.5115 (-0.90)	0.1540 (0.17)	-1.9765 (-2.10)
R&D / Sales	-0.0539 (-0.03)	2.1183 (1.00)	2.3146 (1.36)	6.2653 (3.38)
Dividend Dummy		0.0871 (2.56)	0.1326 (8.99)	0.1925 (11.99)
Keiretsu		-0.0715 (-3.97)	-0.0425 (-3.79)	-0.0143 (-1.17)
Bank debt / total debt	-0.6223 (-19.18)	-0.4368 (-4.61)	-0.5859 (-13.32)	-0.3251 (-7.24)
N	9,969	20	9,922	9,922
Adjusted R^2	70.66%	16.20%	26.75%	14.42%
Annual Dummies	Yes	No	Yes	No

Table 5

Impact of Capital Market Access on Japanese Cash Holdings

The dependent variable in all regressions is the natural logarithm of cash/net assets. Cash in Japan is defined solely as cash on hand. Net assets is defined as total assets less cash. Market to Book is defined as (book value of assets - book value of equity + market value of equity) / total assets. Real Size is the natural logarithm of total assets deflated to 1994 U.S. dollars. Cash flow is defined as EBITDA - interest expense - taxes - common dividends. NWC is current assets - cash - current liabilities. Capex is capital expenditures defined as the yearly change in net fixed assets, plus depreciation. Leverage is defined as short term plus long term debt divided by total assets. Industry sigma is the standard deviation of cash flow to assets for a firm's industry based on the previous 10 years. Industry is defined as 2 digit industry code INDID from PACAP. R&D is research and development expense. When R&D is missing, we set it equal to zero. Sales is net sales. Keiretsu is a dummy variable which equals one if the firm belongs to any type of keiretsu and zero otherwise. Dividend Dummy is equal to 1 if the firm paid a dividend in that year and zero otherwise. Early is the period from 1974-1982 and late is the period from 1989-1995. Access is a dummy variable equal to one if the firm had access to the capital markets and zero otherwise. A firm is said to have Access if it currently has or has at some point issued convertible debt. Free bank is a dummy variable measuring capital market access by assigning a value of 1 to any firm which has less than 100% of its debt in the form of bank debt, and zero otherwise. Regressions include dummy variables for each year to eliminate any macroeconomic factors. The omitted dummy variable is for 1994. White's (1980) correction for heteroscedasticity is used to calculate the t-statistics.

Dummy Variable	Access		Free Bank	
	Early	Late	Early	Late
Market to Book	-0.0207	0.1423	-0.0324	0.1445
	(-0.77)	(3.03)	(-1.16)	(2.92)
Dummy * Mkt to book	**0.1428**	-0.0722	**0.1119**	-0.0545
	(2.58)	(-1.23)	**(2.23)**	(-0.88)
Real Size (1994 U.S. $)	-0.1002	-0.1659	-0.0918	-0.1729
	(-15.78)	(-7.20)	(-11.88)	(-7.50)
Dummy * Real Size	**-0.0866**	0.0315	**-0.0633**	**0.0632**
	(-8.28)	(1.26)	**(-6.94)**	**(2.62)**
Cash Flow / Net Assets	-0.1899	-0.5424	-0.2571	-1.1194
	(-0.93)	(-0.74)	(-1.17)	(-1.45)
Dummy * Cash Flow	**-1.2632**	-0.5929	-0.1600	0.7954
	(-2.60)	(-0.56)	(-0.39)	(0.75)
NWC / Net Assets	-1.0297	-0.6730	-1.0286	-0.4108
	(-18.80)	(-3.79)	(-17.46)	(-2.00)
Dummy * NWC	**0.3129**	0.2934	**0.1913**	0.3105
	(3.14)	(1.18)	**(2.10)**	(1.20)
Capex / Net Assets	-1.8627	-0.0543	-1.8184	-0.4037
	(-10.40)	(-0.09)	(-9.00)	(-0.64)
Dummy * Capex	0.4493	-0.2272	0.1089	0.7768
	(1.15)	(-0.29)	(0.34)	(0.97)
Leverage	-0.1053	-0.8565	-0.1273	-0.8861
	(-2.02)	(-4.54)	(-2.19)	(-4.27)
Dummy * Leverage	**0.2784**	-0.1530	**0.3267**	-0.2028
	(2.58)	(-0.60)	**(3.48)**	(-0.79)
Industry Sigma	1.6094	-7.5100	1.4437	-8.0598
	(1.56)	(-1.57)	(1.27)	(-1.68)
Dummy * Industry Sigma	1.5639	1.5033	2.7836	-0.5434
	(0.85)	(0.28)	(1.77)	(-0.11)
R&D / Sales	-1.3642	-1.5980	-1.2078	13.3048
	(-0.67)	(-0.21)	(-0.55)	(2.01)
Dummy * R&D / Sales	**11.1022**	17.7812	6.0580	-1.2826
	(2.70)	(1.84)	(1.73)	(-0.14)
Dividend Dummy	0.1857	-0.0198	0.1818	-0.0214
	(11.58)	(-0.32)	(10.54)	(-0.34)
Dummy * Dividend Dummy	0.0534	0.0541	0.0480	0.0655
	(1.13)	(0.66)	(1.37)	(0.79)
Keiretsu	-0.0125	-0.1167	-0.0065	-0.1713
	(-0.95)	(-2.30)	(-0.43)	(-3.16)
Dummy * Keiretsu	0.0132	-0.0598	-0.0186	-0.0192
	(0.49)	(-0.89)	(-0.81)	(-0.28)
Bank to Total	-0.0963	-0.7103		
	(-1.26)	(-5.40)		
Dummy * Bank to Total	0.2142	-0.1521		
	(1.95)	(-1.04)		

N	5,810	2,211	5,810	2,211
Adjusted R^2	25.96%	18.99%	25.63%	15.90%
Annual Dums	Yes	Yes	Yes	Yes

Table 6

Excess Cash Holdings of Japanese Firms if they were U.S. Firms

Excess cash for Japanese firms is calculated assuming they are U.S. firms. Means and medians [in brackets] are shown. The number of observations appears in braces. The coefficient values from the U.S. regression in Table 2 are used to predict the level of cash Japanese firms should hold. The difference between the actual level and the predicted level is the measure of excess cash. Early is the period from 1974-1982 and late is the period from 1989-1995. Access is a dummy variable equal to one if the firm had access to the capital markets and zero otherwise. A firm is said to have Access if it currently has or has at some point issued convertible debt. Free bank is a dummy variable measuring capital market access by assigning a value of one to any firm which has less than 100% of its debt in the form of bank debt, and zero otherwise. p-values are shown from difference of means (t-test) and medians (wilcoxon Z-test) [in brackets].

Panel A:	Early	Late	p-values
Japan	0.1312 [0.1190] {7301}	0.1233 [0.0838] {10384}	0.0001 [0.0001]
U.S.	0.0455 [0.0030] {34114}	0.1128 [0.0093] {28266}	0.0001 [0.0001]
p-values	0.0001 [0.0001]	0.0001 [0.0001]	

Panel B: Early period	Mean	Median		Mean	Median	t-test p-value	Z-test p-value
U.S.	0.0455	0.0030	U.S.	0.0455	0.0030	---	---
Japan Access	0.0966 {1725}	0.0911	Japan No Access	0.1419 {5576}	0.1306	20.84 0.0001	-17.20 0.0001
Difference p-value	26.77 0.0001	38.25 0.0001	Difference p-value	55.80 0.0001	74.67 0.0001		
U.S.	0.0455	0.0030	U.S.	0.0455	0.0030	---	---
Japan Freebank	0.1202 {1870}	0.1102	Japan No freebank	0.1520 {3119}	0.1411	12.82 0.0001	-12.36 0.0001
Difference p-value	37.13 0.0001	45.89 0.0001	Difference p-value	53.18 0.0001	62.96 0.0001		