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Capital Markets and the Banking Sector: The Efficiency of
Japanese Banks in Reducing Agency Costs

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I. INTRODUCTION

The capital market comprising stocks and other securities markets is supposed to play two roles: one is to provide investors and other agents with opportunities for risk-sharing, and the other is to discipline corporate managers with the goal of efficient management. In Japan, as the tremendous increase in trading volume in the stock exchange since the mid-1980s exemplifies, the capital market has developed the capability to fulfill the first role. But this is just a recent phenomenon. Until the beginning of the 1980s, secondary markets were at best stagnant. Primary markets were much less important, although as Chart 1 shows, the increase in the relative importance of equity-financing was remarkable in Japan's financial system in the latter half of the 1980s. The amount of funds raised by Japanese companies in securities markets remained at a very low level during the 1960s and 1970s.

Concerning the disciplining of corporate managers, it is a stated principle that the board of directors and the system of auditing accounts are important as they are assumed to fill an informational gap between shareholders and managers. In reality, however, they are not so effective as this principle purports. Individual investors could exert some influence on managers by actively trading shares. But they do not seem to have much incentive to closely monitor specific companies' management because monitoring is costly, and because they hold a well-diversified portfolio of stocks to lower the degree of risk.[1]

Managers who have expertise in business management are considered to be more reliable as auditors of individual corporations than investors in general. These expert managers can accurately assess whether there is any discrepancy between the potential and the actual performance of a specific company. If a discrepancy is discerned, they may attempt to take the firm over. Taking over and rearranging the management of a firm will increase its market value, bringing forth capital gains to those who succeed in such takeovers. A takeover, especially a hostile one, implies competition for the rights to manage corporate resources. Thus, the possibility of being taken over would discipline incumbent managers to pursue efficient management, resulting in a maximization of their firms' values.

But Japan is reminded of the role of takeovers only when there is a surge of hostile takeovers in the United States. In Japan, hostile takeovers are almost nonexistent, even though the number of mergers and acquisitions (M&A) has been increasing since around 1980. Since 1986, the annual total of Japanese companies' M&A whose targets were Japanese firms has numbered over 200.[2] For example, the number of M&A in 1988 was 220.

A rough classification of M&A is as follows: (1) takeovers of firms in trouble, which implies a program to rescue those firms; (2) mutual shareholdings in order to strengthen cooperative relationships; (3) friendly mergers; and (4) buying up shares of Japanese and foreign joint enterprises by the Japanese partner. At any rate, all of them are clearly not hostile takeovers. However, Minebea, the world's largest miniature bearing maker, atempted to take over Sankyo Seiki, which produces electronic parts and music boxes, in a rare hostile takeover. It was started in 1984 and ended in failure in 1988.[3]

The reorganization through takeovers, however, may not work so efficiently in disciplining corporate managers as many people expect. As Grossman and Hart(1980) claim, there is a free-rider problem about the process of takeovers in the sense that some stockholders (or bondholders) would decline a tender offer while hoping that a sufficient number of their fellow shareholders would accept it and make the bid successful.[4] Some scholars emphasize the danger of the destructive impact associated with hostile takeovers. According to their argument, the hostile takeover tends to destroy specific (quite often invisible or intangible) capital assets accumulated by the target firm.[5] Therefore, they want more suitable methods of disciplining corporate managers other than the possibility of a hostile takeover.

Of course, the banking sector can be to some extent substitutable for the capital market. Particularly, the banking sector seems to have played quite an important role in postwar Japan as a medium of both providing wide opportunities of risk-sharing and disciplining corporate management. Some people go so far as to say that the 'miraculous' achievement of the

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Japanese economy was essentially based on the financial structure in which banks played dominant roles as financial intermediaries.

The purpose of this paper is to review some arguments about the workings of the banking sector in the Japanese economy and to provide an empirical test concerning its efficiency. Specifically, in Section 2 as follows, we will provide an overview of various arguments concerning bank efficiency, in particular, the main bank relationship to reduce agency costs associated with external fund raising by companies. In Section 3, we test an important hypothesis that the main bank relationship, which is defined as a lasting financial transaction between a bank and a specific firm, is useful in reducing the agency costs of external funds. While there are a few predecessors of our empirical analysis, there remain a great many issues to be investigated. In this paper, our particular consideration is the problem of how to quantify the main bank relationship, and the importance of shareholding by the main bank in reducing agency costs. Finally, in Section 4, we will summarize the results of our investigation to date, and present some remaining issues.

2. THE WORKINGS OF THE BANKING SECTOR IN JAPAN'S CORPORATE FINANCE

In place of the securities market, the banking system can play the role of providing opportunities for risk-sharing and that of disciplining corporate management. Particularly, many scholars argue that the Japanese banking system has successfully played the part for the capital market. Their arguments vary in focus and scope, but we will provide an overview of them in the following.

Economies of scale in banking: As is well known, due to economies of scale in financial intermediation, banks can provide investors with highly safe stores of values in the form of bank deposits. At the same time, Japanese banks form a sort of syndicated loan system, to specific companies, thereby avoiding extreme concentration of their loans on a small number of big borrowers. We can suppose that the main bank of a company is an effective coordinator of their syndicated loans. It is a conspicuous feature of Japanese banking that an individual firm borrows from many banks at the same time. This feature reflects a scheme of risk-sharing between banks that the main bank informally mediates. [6]

Banks have also been an important producer of information concerning borrowing companies. They examine investment projects proposed by companies--sometimes based inside information. Banks can monitor management of borrowing companies particularly through long-term relationships with borrowers. The main bank is regarded as accumulating specific information on individual companies, and the specific nature of this information leads to the long-term relationship between the main bank

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and individual firms. This monitoring mechanism is a noteworthy merit of the main bank relationship, which effectively prevents managers' opportunistic actions.[7]

Personnel connections with firms: There are many firms whose executive boards contain some members sent from their main banks. These personnel connections are regarded as useful for the main bank to examine the quality of managerial resources of borrowers as well as to monitor their management. Moreover, when a firm faces financial distress, the main bank is able to discern the temporary 'liquidity crisis' from the 'solvency crisis', and gives financial support to the troubled firm under 'liquidity crisis' thereby preventing unnecessary bankruptcy. This financial support by the main bank contributes to reducing 'the bankruptcy costs' accompanied with corporate debts. The main bank can also do this because it can accumulate relevant specific information about borrowers through long-term relationshisp with individual borrowing firms.[8]

Importance of equity positions taken by banks: Some emphasize the importance of Japan's banks as shareholders of big companies. It is well known that banks, especially big city banks, have been most important players in the framework of 'mutual shareholdings' in Japan.[9] Particularly, the main bank is more often than not one of the largest shareholders of borrowing companies. Thus, Japanese banks, by taking large positions in the debt and equity of the same firm, can repress incentives of managers to transfer wealth from debtholders to both themselves and shareholders. This is the financial unification that some scholars believe

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effectively mitigates the agency problem associated with external fund-raising by the firm.[10]

Under the system of mutual shareholding, banks seem to play very delicate roles. On the one hand, mutual shareholding has been developed as a tool for incumbent managers to ward off hostile takeovers by outsiders. Actually, we have observed many cases in which banks respond to requirements from incumbent corporate managers threatened by hostile takeovers by increasing their equity positions in those firms to support the managers. In this sense, those banks involved in the system of mutual shareholding may contribute to weakening the capital market discipline enforced on corporate management and to strengthening the discretionary power of managers.[11] Therefore, there exists the danger that incumbent managers will waste corporate resources by inefficient management or by consumption of perks.

However, the fact that corporate managers can remain immune from disciplinary pressure from the capital market does not necessarily mean that they can enjoy perk consumption in such a way as described by Jensen and Meckling(1976). As has been explained above, banks are supposed to closely monitor managerial behavior from the viewpoint of not only major lenders but also major shareholders. In this sense, we could regard the agency problem related to corporate governance as being resolved in Japan not by the capital market mechanism but by the workings of the banking sector. Some economists consider that bank involvement in corporate activities through equity positions in other firms is much more efficient as a measure of corporate control than capital market discipline through hostile takeovers, because it is probable that hostile takeovers undermine

contractual relations between investors, managers and employees and consequently prevent their firm-specific investments such as expenditures in R&D projects that would increase productivity in the long run.[12]

In reality, it has not yet been determined whether mutual shareholding involving banks is an efficient means of disciplining corporate management, or a form of conspiracy among incumbent managers to defend their positions and to enjoy the perks. The remarkable achievement by the Japanese corporate sector during the 'high growth era' of the 1960s and 1970s seems to indicate the efficiency of this system. On the other hand, the experience in the late 1980s, when many firms were engaged in speculative investment in stocks and other financial assets (called 'zai-tech' in Japanese) to eventually incur heavy capital losses due to sharp decreases in stock prices since 1990, seems to suggest that corporate managers indulged in wasteful activities as Jensen's (1986) 'free cash flow' hypothesis describes.

Necessity of empirical investigation: We have roughly explained some hypotheses about the role of the banking sector in solving the agency problem in corporate finance. A variety of anecdotes have been provided to support and in some cases to refute those hypotheses. But the full-scale analysis of those hypotheses has just been undertaken by Hoshi, Kashyap and Scharfstein(1991), Prowse(1990) and others. Unfortunately, we cannot tackle them all here. In Section 3, we will concentrate on the specific problem of how the main bank relationship reduces the agency costs associated with external finance in Japan. It is widely acknowledged that the Japanese banking sector is characterized by the main bank relationship.

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Thus, most of the efficient workings of the banking sector assumed in our arguments explained in this section should have close relationships to the workings of the main bank. The empirical analysis of some features of the main bank relationship in Section 3 will shed some light on those arguments.

3. AN EMPIRICAL ANALYSIS OF CORPORATE INVESTMENT AND THE MAIN BANK
RELATIONSHIP

In this section we focus our investigation on the effectiveness of the main bank relationship in reducing the agency cost associated with external fund raising. A variety of empirical research has indicated a positive relationship between the availability of either internal funds or the amount of liquid assets and investment expenditures by the firm.[13] We could interpret these results as a consequence of the difference in capital cost for various methods of fund-raising. Internal funds are the least expensive for firms because they are immune from the agency costs that external fund-raising, such as borrowing, would incur under incomplete information. Thus, the firm tends to finance its investment expenditures primarily by internal funds, and therefore, the availability of internal funds is one of the most important determinants of investment by the firm. More specifically, greater availability of internal funds makes the cost of capital lower and, all other things being equal, induces the firm to increase investment expenditures.[14]

However, as the previous section has suggested, in the context of Japan's financial system, it is widely believed that the lasting relationships between the main banks and their borrowers are effective in reducing the agency costs of debt. If this is true, either internal funds are less important in determining corporate investment in Japan, or those firms having the strongest relationship to their main banks (assuming these relationships vary) are less constrainted by internal funds relative to those with weak main bank relationships.

3.1: The main bank relationship and investment expenditure

The basis of the following analysis is the hypothesis proposed by Fazzari, Hubbard, and Petersen(1988), and Hoshi, Kashyap and Scharfstein(1991) that the cost of capital for individual firms decreases as the amount of the internal funds increases, and that the internal fund is less important as the relationship between the firm and its main bank is strengthened.

Particularly, Hoshi, Kashyap and Scharfstein(1991) have investigated Japanese firms' investment by making use of the 'Tobin's Q' theory of corporate investment with a view to testing the hypothesis concerning the roles of the main bank, as discussed above. They divide the sample of firms into two sets: one consists of the 'affiliated' firms belonging to the keiretsu groups, and another is a set of 'independent' firms not affiliated with the keiretsu. Their statistical investigation shows that the amount of internal funds has a greater influence on the investment behavior of the 'independent' firms than on the of 'affiliated' ones. Under the assumption that the 'affiliated' firms have stronger relationships with their main banks than the 'independent' ones, we can interpret their result as implying that the main bank relationships contribute to a reduction in agency costs and make internal funds less important in the investment function of the 'affiliated' firms.

Although their investigation is relevant and their conclusion seems to be convincing, we should be careful not to regard the main bank relationship in the same light as the keiretsu group. The main bank relationship is more universal than the keiretsu group in the sense that most Japanese firms have their own main bank regardless as to whether or

not they belong to any <u>keiretsu</u> group. On the one hand, there may be some independent firms which have very strong relationships with their main banks. On the other hand, the relationships between some 'affiliated firms' and their main banks are not as intimate as is generally believed. Thus, we need to differentiate the main bank relationship from the <u>keiretsu</u> grouping.

It has been conventional to assume that the strength of the main bank relationship between a bank and a firm can be measured by the relative share of the main bank's loan in the total amount of borrowing by the specific firm.[15] But, it is not necessarily clear why there is a definite relationship between the main bank's essential role of information production and the relative importance of its loan. At present, we have not yet established a theory that clarifies what variables are appropriate in quantifying the effectiveness of the main bank relationship.[16]

In arguments explained in the previous section, banks are supposed to get specific information and control managers' behavior through both shareholding and personnel connections with firms. Therefore, we should pay enough attention to these factors to be able to evaluate the activities of the main bank. Although how to measure the effectiveness (or strength) of the main bank relationship remains to be settled, we have attempted to quantify the main bank relationship not only in terms of the relative importance of main banks' loan, but also in terms of main banks' share-holding and/or personnel connections.

3.2: A Simple Model of Corporate Investment

Before proceeding to estimation, we must derive an investment function with agency costs which provides a basis of the following empirical investigation. Particularly, we will discuss how agency costs influence the cost of capital for investing firms.

The value of the firm under agency costs: In the following we will derive the relationship between investment expenditure and the availability of internal funds under the assumption of the agency costs of debt. But in order to simplify our discussion as much as possible, we consider the case in which the firm is in a stationary state and will decide its investment expenditure once and for all. The essence of our argument will not change by the introduction of more sophisticated dynamic elements. [17]

When perfect arbitrage is possible in financial markets, the stockholders of a firm must bear the agency costs completely. We assume that the agency costs of debt will rise as the debt increases:

$$A_t = A(B_t); \quad A_B > 0, \quad A_{BB} > 0, \tag{1}$$

where A_t is the agency costs during the period t and B_t is the stock of debt at the beginning of period t. The current net revenue X_t of the firm is dependent on the capital stock K_t at the beginning of period t; i.e., $X_t = X(K_t)$. We assume that the marginal efficiency of capital is positive but decreasing; i.e., $X_K(K_t) > 0$, $X_{KK}(K_t) \leqq 0$. By assuming the constant interest rate r on the borrowing, we can present the profit after interest payments at period t as follows:

$$X_t - A_t - r \cdot B_t = X(K_t) - A(B_t) - r \cdot B_t.$$

If the firm does not invest at period t, its financial and real

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structure are preserved at the levels achieved before period t. In this case, the total market value of the firm's stock $S_{\Box t}$ is presented by (2), where $u_{\Box t}$ is the cost of capital for the firm without investment expenditure.

$$S_{\Box t} = [X(K_t) - A(B_t)] + [X(K_t) - A(B_t)] \diagup (1 + u_{\Box t})$$

$$+ [X(K_t) + A(B_t)] \diagup (1 + u_{\Box t})^2 + \cdots - B_t$$

$$= [X(K_t) - A(B_t)](1 + u_{\Box t}) \diagup u_{\Box t} - B_t \qquad (2)$$

Consider the case in which the firm decides investment expenditure Z_t financed by both internal fund F_t and additional borrowing V_t. The internal fund F_t is defined as the amount of profit after dividend D_t has been paid out to share-holders. Thus,

$$Z_t = F_t + V_t \qquad (3)$$

$$F_t = X(K_t) - A(B_t) - r \cdot B_t - D_t \qquad (4)$$

where the internal fund F_t and dividend D_t cannot be negative; i.e.,

$$F_t, \ D_t \geqq 0 \qquad (5)$$

The dividend policy of the firm is a very intricate problem. The level of dividend may be a signal of presenting the firm's value under the asymmetric information.[18] But in the following discussion we assume for simplicity that the dividend does not play any meaningful role and therefore the optimum level of the dividend is zero.

The increment of capital stock I_t ($= K_{t+1} - K_t$) realized by the investment expenditure Z_t is dependent on the adjustment costs C_t of the investment. In other words, the increment of capital stock is presented by deducting adjustment costs from the investment expenditure: i.e.,

$$Z_t = I_t + C_t. \qquad (6)$$

Following the formulation by Uzawa(1969), we assume that the adjustment

costs can be presented by the following function:

$$C_t = C(I_t, K_t); \quad C(0, K_t) = 0, \quad C_I \geqq 0$$

$$C_I(0, K_t) = 0, \quad C_{II} > 0, \quad C_{IK} < 0. \quad (7)$$

From (6) and (7), we can derive a function for investment expenditure as follows.

$$Z_t = Z(I_t, K_t); \quad Z(0, K_t) = 0, \quad Z_I > 0$$

$$Z_I(0, K_t) = 1, \quad Z_{II} > 0, \quad Z_{IK} < 0 \quad (8)$$

The investment at period t increases the capital stock at the beginning of period $t + 1$ from K_t to K_{t+1}. In period $t + 1$ the profit after interest payments will be

$$X(K_{t+1}) - A(B_t + V_t) - r \cdot (B_t + V_t).$$

But after period t, the firm is assumed to stay at the stationary state. Thus, in this case, the stock value of the firm S_{1t} at the beginning of period t can be presented by the following (9), where u_t is the cost of capital when the firm decides the investment expenditure.

$$S_{1t} = [X(K_t) - A(B_t) - F_t] + [X(K_{t+1}) - A(B_t + V_t)] \diagup (1 + u_t)$$

$$+ [X(K_{t+1}) - A(B_t + V_t)] \diagup (1 + u_t)^2 + \cdots - (B_t + V_t)$$

$$= [X(K_t) - A(B_t) - F_t] + [X(K_{t+1}) - A(B_t + V_t)] \diagup u_t$$

$$- (B_t + V_t) \quad (9)$$

The optimum conditions for investment and borrowing: The investment Z_t in the period t is expected to give net gain $S_{1t} - S_{0t}$ to the present stockholders. By making use of the above equations, we can present the net gain to stockholders as follows;

$$S_{1t} - S_{0t} = [X(K_{t+1}) - A(B_t + V_t)] \diagup u_t - [X(K_t) - A(B_t)] \diagup u_{0t}$$

$$- (F_t + V_t) \quad (10)$$

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The managers of the firm are assumed to decide the levels of investment expenditure Z_t (or capital increment I_t) and additional debt V_t so as to maximize this net gain (10) subject to constraints (3) - (5).

The first order conditions for the optimum decision are summarized by the following (11-1), (11-2), and (11-3):

$$q_t^* = Z_I(I_t^*, K_t) \qquad\qquad (11\text{-}1)$$

$$Z(I_t^*, K_t) = F_t^* + V_t^* \qquad\qquad (11\text{-}2)$$

$$D_t^* = 0, \qquad\qquad (11\text{-}3)$$

where

$$q_t^* = X_K(K_t + I_t^*) \diagup [u_t + A_B(B_t + V_t^*)] \qquad (12\text{-}1)$$

$$F_t^* = X(K_t) - A(B_t) - r \cdot B_t. \qquad (12\text{-}2)$$

The starred are the optimum levels for respective variables. F_t^* in (12-2) is the amount of internal funds predetermined in period t, and q_t^* in (12-1) is the marginal Tobin's Q that takes the agency costs of debt into consideration. [19]

Equation (11-1) presents a relationship between the increment of capital I_t and the marginal Tobin's Q. This relationship is depicted by the positively sloped Z-curve in Figure 1. This curve is positively sloped because we assume the marginal adjustment cost is increasing ($Z_{II}(I_t, K_t)$ > 0). We can also derive another relationship between investment and the marginal Tobin's Q from (12-1). An increase in I_t decreases the marginal efficiency of capital $X_K(K_t+I_t)$ because of the assumption of decreasing marginal efficiency of capital ($X_{KK}(K_t) \leqq 0$). On the other hand, the increase in I_t needs an increase in the investment expenditure Z_t. Since the amount of internal funds F_t^* is predetermined in period t, the increase in investment expenditure leads to the increase in debt outstanding at the

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beginning of period t+1, which incurs additional agency costs. Let us assume for simplicity that the marginal efficiency of capital X_K depends on only the capital stock K_t. Thus, an increase in I_t will reduce q_t, i.e., the marginal Tobin's Q. The q-curve in Figure 1 indicates the relationship between the increment of capital I_t and q_t. When the investment expenditure Z_t is equal to the internal funds F_t^*, the stock of borrowing does not increase (i.e., $V_t = 0$) and, therefore, the marginal Tobin's Q is $X_K \diagup [u_t + A_B(B_t)]$. Point P on the q curve presents the increment of capital stock I_t and q_t when the investment expenditure is entirely financed by internal funds.

The intersection of the q-curve and the Z-curve in Figure 1 gives the optimum levels of I_t and q_t. We can intuitively understand how both optimum investment I_t and marginal Tobin's Q q_t would be influenced by changes in exogenous variables by observing Figure 1:

(1) An increase in the marginal efficiency of capital X_K (for the sake of simplicity, we will assume it to be a constant e_t hereafter) shifts q-curve upwards, and increase the optimum levels of both investment I_t and marginal Tobin's Q q_t. Similarly, a increase in cost of capital u_t and an increase in outstanding debt B_t respectively shift the q-curve downwards, leading to a decrease in investment.

(2) The increase in the amount of internal funds F_t^* shifts the q-curve to the right by a smaller distance than the increment in F_t^*.[20] Therefore, it increases the investment I_t, but less than the increment in F_t^*.

(3) The increase in capital stock K_t shifts the Z-curve downwards and the q-curve upwards respectively. The optimum level of investment I_t obviously

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increases as K_t increases.

We can summarize these results in the following investment function (13-1) and the function of marginal Tobin's Q (13-2) corresponding to the optimum investment. To avoid complicated notations, we will delete the star indicating optimum levels of respective variables.

$$I_t = f(K_t, B_t, F_t, u_t, e_t);$$

$$f_K > 0, \ f_B < 0, \ f_F > 0, \ f_u < 0, \ f_e > 0 \qquad (13\text{-}1)$$

$$q_t = g(K_t, B_t, F_t, u_t, e_t);$$

$$g_K > 0, \ g_B < 0, \ g_F > 0, \ g_u < 0, \ g_e > 0^{(21)} \qquad (13\text{-}2)$$

The influence of the main bank relationship: From the above discussion, we conclude that an increase in debt raises the agency cost $(A_B(B_t + V_t) > 0 \ )$, suppressing investment expenditure by individual firms. The larger the amount of internal funds available to the firm, the smaller the need for additional borrowing to finance capital expansion, so that the larger amount of internal funds will, ceteris paribus, lead to the larger investment expenditure. In this sense, the availability of internal funds restrains the firm's investment.

However, if the intimate relationship between the main bank and its borrowing firm diminishes the agency cost of debt, how does it change the influence of the internal fund on the firm's investment? In order to answer this question, we will modify the function of the agency costs $A(B_t)$ to explicitly consider the main bank's role of reducing them. Specifically, we will assume the agency costs of debt to be represented by the following function (14):

$$A_t = m \cdot A(B_t), \qquad (14)$$

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where m is a parameter to measure the impact of the main bank relationship. We assume that m becomes smaller as the relationship between the main bank and the firm becomes more intimate.

It is intuitively obvious that the q-curve in Figure 1 slopes more gently as the parameter m becomes smaller, because the more intimate main bank relationship is supposed to lessen the extent to which an increase in investment incurs additional agency costs. Thus, the same rightward shift of the q-curve caused by an increase in F_t will increase the investment I_t to a lesser degree in the case of smaller m (i.e., in the case of the more intimate main bank relationship) than in the case of larger m (i.e., in the case of a less intimate main bank relationship).

Thus, the main bank relationship will reduce the influence of internal funds on the firm's investment expenditure. For simplicity's sake we have not focused on it, but the main bank relationship also influences investment responses to changes in other exogenous variables. Similarly, the response of marginal Q to changes in the internal fund availability will be less significant as m becomes smaller. In the following empirical investigation, however, we will focus on the main bank relationship's influence on individual firm capital investment.

3.3: An Empirical Analysis of Main Bank Variables

In this section, we empirically investigate the relationship between investment by individual firms and their internal funds, and the influence of main bank variables on this relationship. The sample of the empirical analysis is a group of 38 companies belonging to the electric equipment industry. We have confined our analysis to those 38 companies, mainly

because we have had easy access to the necessary data of those companies during the period of 1972 - 1988(fiscal year). We will give a detailed explanation about the data in the Appendix.

The estimation of the basic investment function: The purpose of our analysis is to find out how main bank variables influence investment expenditure based on an estimation of the investment function (13-1). We will transform (13-1) into the following log-linear function;

$$\log I_t = a_0 + a_1 \cdot \log K_t + a_2 \cdot \log B_t + a_3 \cdot \log F_t$$
$$+ a_4 \cdot u_t + a_5 \cdot e_t + v_t, \qquad (15)$$

where u_t and e_t are proxies for the cost of capital and the marginal efficiency of capital respectively, and v_t is a term for disturbance. We approximate the cost of capital u_t by the weighted average of the call rate and the discount bill rate, and the marginal efficiency of capital by the rate of increase in operating profits.

Under the assumption that the debt is associated with the agency cost, the coefficients of equation (15) are expected to satisfy the following inequalities:

$$a_1 > 0, \ a_2 < 0, \ a_3 > 0, \ a_4 < 0, \ a_5 > 0 \qquad (16)$$

Table 1 presents the result of estimating the investment function (15) based on panel data of the 38 companies. We utilized the PANEL command of the RATS by assuming the random effects model.[22] All coefficients satisfy theoretically expected conditions presented by (16), although a_5 is not significant at all. Particularly, the internal fund has a significantly positive coefficient a_3, suggesting the importance of agency costs of debt. This is consistent with the result Hoshi, et al.(1991)

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obtained in their empirical study based on more comprehensive data.

Main bank variables: It is conventional to assume that the fraction of all bank borrowing that comes from the firm's main bank represents the strength of the relationship between the firm and its main bank.[23] We call this fraction 'the ratio of the main bank loan'. But, as has already been explained, whether or not the ratio of the main bank loan truly indicates the strength of the main bank relationship remains uncertain. In addition to the ratio of the main bank loan, we will introduce the fraction of the firm's outstanding shares held by the main bank ('the ratio of main bank share holding') and the fraction of all members of the firm's executive board that come from the main bank ('the ratio of main bank officers') to measure the strength of the main bank relationship. The ratio of main bank share-holding is particularly important because, as has been explained in the previous section, some scholars have emphasized the importance of shareholding by banks as a measure of reducing agency costs. Table 2 summarizes the statistical characteristics of those main bank variables the ratio of the main bank loan M_L, the ratio of main bank share holding M_S, and the ratio of main bank officials M_O calculated for each of sampled firms. According to this table, these variables do not highly correlate with each other except for M_S and M_O.

Impact of the main bank variables: In this section, we will estimate the investment function with agency costs discussed. If any one of the main bank variables M_L, M_S, M_O is a relevant proxy of the strength of the main bank relationship, and if the main bank relationship is effective in

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reducing the firm's agency costs of borrowing, we expect that the amount of internal funds will be less important for firm that have larger main bank variables. Specifically, we will test the following investment function which is a modified version of the basic investment function (15):

$$\log I_t = a_0 + a_1 \cdot \log K_t + a_2 \cdot \log B_t + (a_3 + a_{31} \cdot M_{Lt} + a_{32} \cdot M_{St}$$

$$+ a_{33} \cdot M_{Ot}) \cdot \log F_t + a_4 \cdot u_t + a_5 \cdot e_t + v_t. \qquad (17)$$

We are interested in whether or not the coefficient a_3 for the internal funds F_t is positive, and whether we can find any significantly negative coefficient among a_{31}, a_{32}, and a_{33} in the estimated investment function (17).

Table 3 presents the estimated result of the investment function (17) based on the same panel data as was utilized in estimating (15). The result of this estimation supports the hypothesis that the amount of internal funds F_t positively influences the firm's investment ($a_3 > 0$). This is what estimation (15) has already confirmed.

Table 3 also suggests that the main bank relationship measured by the ratio of main bank loans M_L is effective in reducing the restrictive influence of internal funds, because the coefficient a_{31} of M_L is negative at a 10% significance level. The other main variables M_S and M_O are not as effective as the theory anticipates, because their coefficient a_{32} and a_{33} are positive though they are statistically insignificant. We may say that both of M_S and M_O are meaningless in reducing the agency costs of debt.[24]

From the result presented in Table 3, we can conclude that the main bank relationship measured by the relative importance of the main bank loan M_L contributes to mitigating the constraint of availability of internal funds on the firm's investment. On the other hand, both the shareholding

by the main bank and the number of officials sent from the main bank are not significant in reducing internal funds constraint. Particularly, it is noteworthy that the equity positions taken by main banks are not so powerful in mitigating agency problems as some have thought. This may not be surprising, because the equity position would scarcely provide meaningful information about borrowing firms additional to that which it has accumulated through long-term loan transactions with the firm.[25] At any rate, this result suggests that we need to carefully reconsider the hypothesis that the equity position taken by banks is an efficient measure of resolving the agency problems of external fund-raising.

We should pay some attention to the magnitude of the contribution by the main bank variables to reduce agency costs. The absolute value of the coefficient of M_L is 0.0008 (Table 3), and the average value of M_L for the sampled firms is around 20% (Table 2). Therefore, it can be said that, on the average, the main bank relationship of the sampled firm has reduced the restrictiveness of internal funds by 0.016, which is just 3% of the constraint (0.4955) when the firm would not have the main bank relationship with a bank. Thus, our test suggests that the magnitude of effectiveness of the main bank relationship is very small. One reason for this result may be that the sample of our test contains only leading Blue Chip firms on the Tokyo Stock Exchange. These firms may have accumulated such great 'financial power' that they have been able to avoid the serious agency costs of external fund-raising without substantial support from their main banks.

In order to confirm the general validity of our empirical result, future study should extend our sample by including small-scale firms that

would be supposed to require substantial support from the main bank. We should also extend the sample period from 1972-88 to the 1960s during which the bank appeared to play much more important roles than the period after mid-1970s.

4. CONCLUDING REMARKS

In Section 2 of this paper we explained various role of the banking sector in reducing the agency costs associated with external financing by focusing on the workings of the Japanese financial system. Then we tested the hypothesis that the main bank relationship reduces the agency costs of external fund, thereby mitigating the restrictiveness of the internal funds for investment expenditure determined by individual firms. The basic formulation of our test is similar to that adopted by Hoshi, Kashyap and Scharfstein(1991). We have been careful of quantifying the strength of the main bank relationship.

Our empirical test in Section 3 brought forth the following results:

(1) Availability of internal funds exerts a substantial influence on individual firms' investment behavior. This suggests the existence of the agency costs with external fund-raising.

(2) The main bank relationship --the strength of which is measured in terms of the relative share of the main bank loan in the total borrowing-- contributes to mitigating the restrictive influence from the internal funds, although the magnitude of the contribution is very small.

(3) Shareholding by the main bank does not contribute to reduction of agency costs.

Chart 1 presents changes in composition of fund raising by major Japanese companies (around 600 top companies belonging to various industries) since 1960. According to this chart, a drastic change occurred in Japanese corporate finance during the 1980s. Major companies reduced their reliance on borrowed funds, and instead increased the relative share

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of internal funds since the early 1980s. In spite of this structual change, our investigation still affirms the role of main banks in reducing the agency cost of debt. This result is worth of emphasis. But we must acknowledge the tentative nature of our research. First, we should extend the scope of our sampled firms. Particularly, it is interesting and important to include small-scale firms into our sample, because they suffer from the difficulty of incomplete information to a greater extent than leading firms. Therefore, the main bank relationship would be more important for the former type of firm than for latter.

Secondly, we need to investigate the validity of our basic assumption that the main bank relationship is an exogenous factor in explaining the investment behavior of firms. We must explain why some firms have relatively close relations with their main banks while others do not. In other words, if the main bank relastionship is effective in reducing agency costs, why is it that some firms seem not to depend on the main bank relationship? In order to answer this question, we need a theoretical framework to explain the choice of the main bank relationship both on the part of borrowing firms and on the part of banks. This is problem that remains to be solved.

Lastly, we should say a word about the drastic change in Japan's corporate finance structure during the latter half of 1980s, which we can note in Chart 1. This phenomenon can be interpreted as owing to the fact that those companies did not need to borrow heavily during this period because the growth rate of capital accumulation of these companies significantly declined. They tended to decrease the relative importance of external fund-raising associated with agency costs.

At the same time, however, we should note that the ratio of funds raised by issuing stocks has substantially increased since the mid-1980s. Therefore, Japanese companies appeared to aggressively exchange their capital structure from debt to equity. Does this signify any fundamental change in corporate governance in Japan? More specifically, did the Japanese corporate sector choose to sever traditional connections with the banking sector? And if so, will the discipline presumed to be exerted on corporate management through bank relationships become less effective? These are very important questions remaining to be answered.

Chart 1: Compositions of Fund Raising
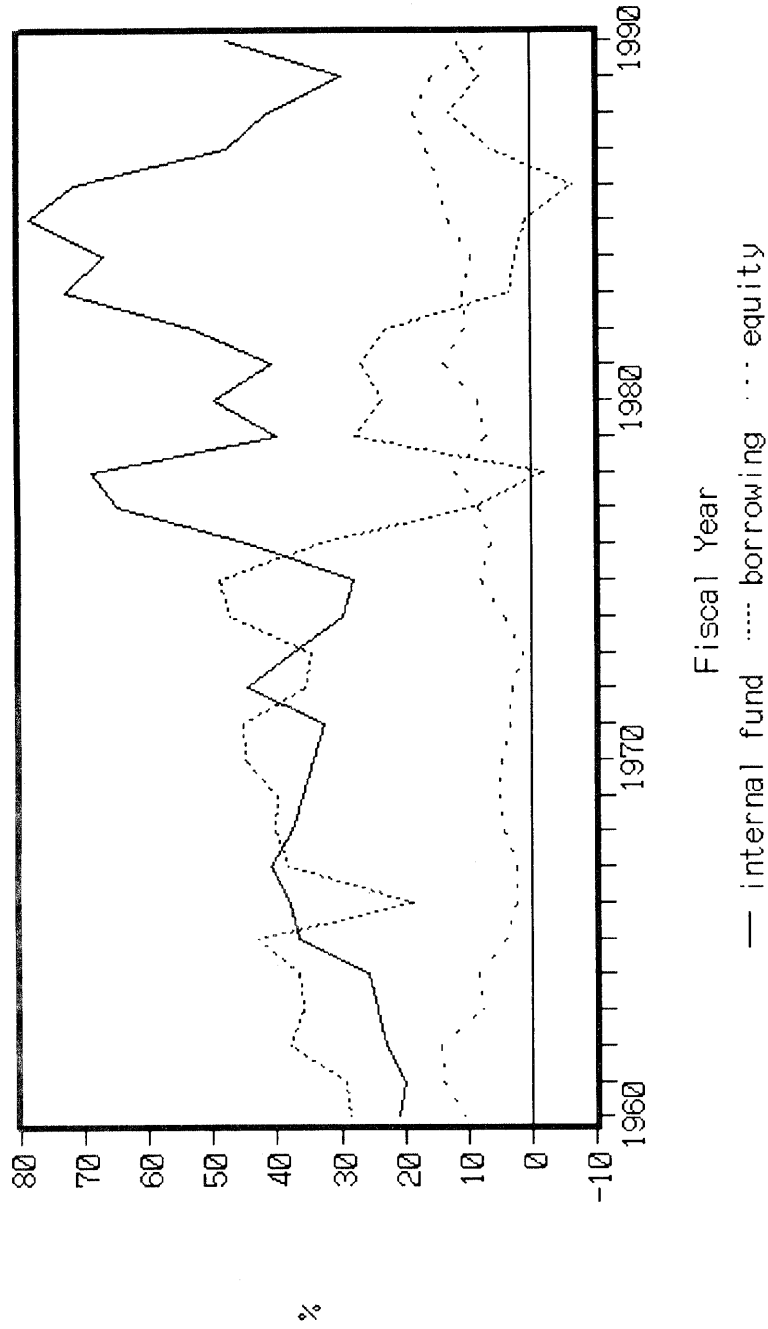of Major Companies in All Industries

Fiscal Year
— internal fund ···· borrowing ··· equity

Figure 1: Investment I_t and q_t

q_t

$$q_t = e_t/[u_t + A_B(B_t + V_t^*)]$$
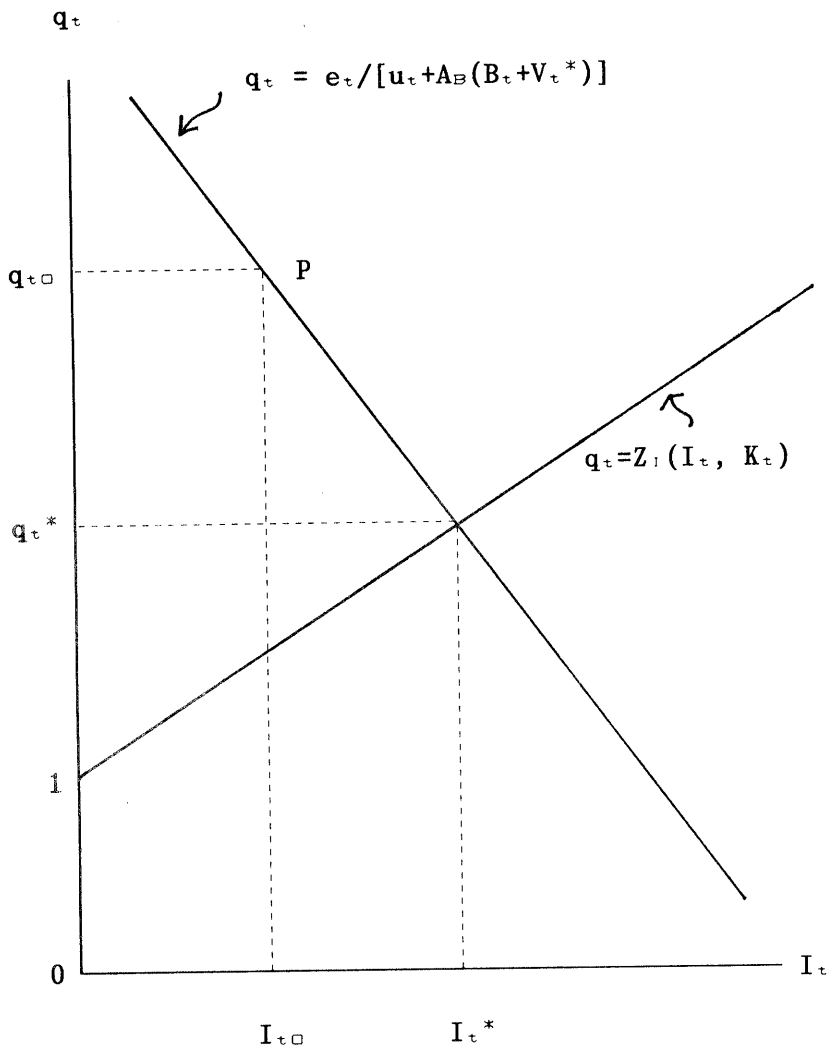
P

q_{t0}

$$q_t = Z_1(I_t, K_t)$$

q_t^*

1

0   I_t

I_{t0} I_t^*

[Note: I_{t0} is obtained from the following equation:

$$Z(I_{t0}, K_t) = F_t^*. \qquad]$$

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Table 1: The result of a basic estimation

a_0	-1.0631	(-2.32)
a_1	0.6021	(4.27)
a_2	-0.0492	(-1.37)
a_3	0.4292	(3.69)
a_4	-0.0740	(-2.09)
a_5	0.0129	(0.42)
R^2	0.62	
DW	1.80	

(Note) The parentheses present t values.

Table 2: Characteristics of main bank variables (the average, the standard deviation and the coefficient of correlation: 1972 - 88)

		M_L	M_S	N_O
average		19.9	4.0	4.1
standard deviation		12.1	2.5	3.6
coefficient of	M_L	1.000	0.026	0.118
correlation	M_S	0.026	1.000	0.455
	M_O	0.118	0.455	1.000

(Source) Toyokeizai-shimposha, Kigyo Keiretsu Soran.

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Table 3: Estimation of the investment function

$$\log I_t = a_0 + a_1 \cdot \log K_t + a_2 \cdot \log B_t + (a_3 + a_{31} \cdot M_{Lt} + a_{32} \cdot M_{St}$$
$$+ a_{33} \cdot M_{Ot}) \cdot \log F_t + a_4 \cdot u_t + a_5 \cdot e_t + v_t$$

a_1	0.5465	(3.39)	+
a_2	-0.0581	(-1.54)	-
a_3	0.4955	(3.62)	+
a_{31}	-0.0008	(-1.53)	-
a_{32}	0.0008	(0.26)	-
a_{33}	0.0016	(0.64)	-
a_4	-0.0727	(-2.04)	-
a_5	0.0065	(0.22)	+
R^2	0.63		
DW	1.81		

Appendix: An Explanation of the Data

(1) Sampled firms, the sample period, and data sources

The sampled firms in this paper are 38 companies in the electric equipment industry -- the financial data of which are available from Mitsubishi Research Institution's Analyses of Corporate Management continuously from 1971 to 1988 (fiscal year). The financial data (i.e., capital investments, tangible fixed assets, and internal funds) are based on Analyses of Corporate Management and Nikkei NEEDS/COMPANY, and the data source of the main bank variables (M_L, M_S, and M_O) are from Toyokeizai-shimposha's Kigyo Keiretsu Soran and Nihonkeizai-shinbunsha's Kaisha Nenkan (Yearbook on Corporations).

(2) Definition of variables

The main bank: In principle, we define the main bank of a firm as the bank that supplies the largest amount of loans to the firm. If there are more than two banks that supply the largest loans, we define the main bank as that which holds the largest share of the firm's stock. If there still remain two or more banks as the main bank, we take personnel connections into account to define the main bank for individual firms.

Capital investment (I_t): The increment of tangible fixed assets during the current fiscal year t.

Stock of capital (K_t): The tangible fixed assets outstanding at the end of previous fiscal year t-1.

Stock of debt (B_t): The total of debt outstanding at the end of the previous fiscal year t-1.

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The internal funds (F_t): The 'net income after tax' plus 'business depreciation minus 'dividend payout' during the previous fiscal year t-1.

The cost of capital (u_t): The weighted average of the call rate and the discount bill rate during the previous fiscal year t-1. Although long-term interest rates would be more desirable than short-term interest rates, we have no reliable long-term interest that can be traced back to 1972 in Japan.

The marginal efficiency of capital (e_t): the growth rate of operating income from period t-2 to period t-1.

The ratio of the main bank loan (M_L): The percentage of the main bank loan out of the total amount of borrowing of the firm.

The ratio of main bank stockholding (M_S): The percentage of the stock held by the main bank out of the total number of stock issued by the firm.

The ratio of main bank officials (M_O): The percentage of executive officials coming from the main bank out of the total members of the executive board. The concurrent case is included.

FOOTNOTES:

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(1) Many authors emphasize this difficulty. See, for example, Jensen and Meckling(1976) and Fama(1980).

(2) See Ubukata(1988). This is not unique to the Japanese capital market. For example, "[i]n France and Germany there have until very recently been no reported cases of hostile acquisitions"(Fank and Mayer(1990:p.198)).

(3) Isaacs and Ejiri(1990: pp.109-110) concisely explain how Minebea failed to take over Sankyo Seiki.

(4) See also Barnea, Haugen and Senbet(1985:pp.69-71).

(5) See Shleifer and Summers(1988) and Frank and Mayer(1990).

(6) Horiuchi, Kato, and Packer(1991) developed a model to explain the main bank's coordinating role in a sort of syndicated loan. See also Sheard(1991).

(7) As for the role of main bank relationships in Japan, see Sheard(1985), Horiuchi, Packer and Fukuda(1988). Greenbaum, Kanatas, and Venezia (1989) and Shape (1990) investigate how the specific nature of information on borrowers will bring forth a long-term relationship between banks and firms.

(8) See Sheard(1985) and Hoshi, Kashyap and Scharfstein(1990).

(9) The Antitrust Law forbids banks from holding more than 5% of shares issued by each corporation. But a small percenage of shareholding will sufficiently make a bank one of the biggest shareholders of a large public corporation in Japan.

(10) Barnea, Haugen and Senbet(1985: pp.63-65) explain the effectiveness of financial unification in mitigating agency problems. See also an interesting empirical study by Prowse(1990), who argues that the agency problem is mitigated to a great degree in Japan by this financial unification.

(11) After the 'Zaibatsu-resolution' immediately follwing the end of World War II, some large companies that had belonged to the Zaibatsu groups in prewar times wanted to preserve their intimate relationship with each other through mutual shareholding. Therefore, mutual shareholding in itself is not a recent phenomenon in the Japanese capital market. But it became prevalent after the mid-1960s because of corporate policies of 'stabilizing shareholding (kabunushi antei-ka kousaku)' stimulated by the liberalization of capital movements which began around 1965. Most Japanese were concerned about the danger of capital liberalization giving foreign investors a greater chance to dominate Japanese business by acquiring stocks in the capital market. The Japanese managers of that period were eager to strengthen barriers against the intrusion of 'foreign capital' into Japan's corporate sector, expected to occur in the process of the liberalization of capital movements.

(12) See Shleifer and Summers(1988) and Frank and Mayer(1990). According to Jensen(1989), the golden age of the active investor was destroyed in the

United States by government edict in the Glass-Steagall Act of 1934 that prevented banks from taking equity positions in other companies. He claims that hostile takeovers were a response to those regulatory restrictions on corporate control.

(13) For example, see Meyer and Kuh(1957), Fazzari, Hubbard and Petersen(1988), Gertler and Hubbard(1988), and Hubbard and Kashyap(1989) for empirical studies on the United States data, and Hayashi and Inoue(1990) and Asako, Kuninori and Murase(1991) for the Japanese data.

(14) See the seminal works by Jensen and Meckling(1976) and Myers(1977) concerning agency costs in corporate finance.

(15) For example, Hoshi, Kashyap, Scharfstein(1990) propose this measure in their empirical study about the role of the main bank during periods of financial distress for the borrowing firm.

(16) Leland and Pyle(1977) and Campbell and Kracaw(1980) emphasize the rationality of financial intermediaries in charge of producing information on a specific firm committing some amount of funds to the firm. According to their argument, the relative share of the main bank loan to the total borrowing by the firm is effective in signaling the quality of the firm to other investors.

(17) For example, see Chirinko(1987) for a dynamic analysis of firm investment.

(18) See Easterbrock(1984) and related literature.

(19) If there is no agency cost accompanied by debt, $A_B(B_t + V_t) = 0$, so that the marginal Tobin's Q is $q_t^* = X_K/u_t$, which would be represented by horizontal q-curve in Figure 1. In this case, the optimum level of investment I_t^* does not depend on both outstanding debt B_t and internal

funds F_t^*.

(20)   The increment dF_t^* of the internal funds shifts the q-curve rightwards by $(1/Z_t)dF_t$, which is smaller than dF_t because Z_1 is larger than unity by the assumption (8).

(21)   An increase in debt stock B_t increases I_t, since we assume that the marginal agency cost associated with debt is increasing (i.e., $A_{BB} > 0$).

(22) The same method of estimation is used in Table 3. See Hsiao(1986) for the random effect model.

(23) See, for example, Hoshi, Kashyap and Scharfstein(1990).

(24) Hoshi, Kashyap and Scharfstein(1990) adopt a method similar to that taken in this paper to investigate the investment behavior of financially distressed firms. They conclude that those firms belonging to the keiretsu groups can maintain higher levels of investment than those that are independent and that the main bank relationship measured by the relative importance of the main bank loan (the ratio of the main bank loan in this paper) appears to help financially distressed firms maintain the level of investment outlay, and that the firm's relative share of stocks held by the main bank does not statistically influence the firms' investment. Their conclusions seem to be consistent with our empirical results summarized in Table 3.

(25)   Even if the equity position does not particularly increase informational efficiency, there remains an incentive for the main bank to take equity positions of firms. As has been suggested in the previous section, a main objective of mutual shareholding may be to give wide latitude to incumbent managers by reducing the possibility of hostile takeovers from outsiders. If this is the case, we cannot regard

shareholding by the banking sector as an efficient method of reducing agency costs in corporate finance.

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