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Influence of the Japan Development Bank Loans on Corporate Investment Behavior

by

Akiyoshi Horiuchi
Qing-yuan Sui

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I Introduction

A number of hypotheses have been proposed concerning the roles of government financial institutions in the framework of post-World War II industrial policies. The Japan Development Bank (JDB) has particularly attracted a great deal of attention as a policy tool of promoting industrial development. It has been be widely believed that the JDB was an effective instrument by which the Japanese government financially stimulated industrial development after World War II. Some people have even gone so far as to say that the JDB can be a good model for governments of many of today's developing countries.

But in what ways has the JDB been effective in stimulating industrial development? The JDB has usually supplied long-term credit to target industries at special interest rates substantially lower than market rates. In this sense, the government was able to utilize JDB loans as an instrument to distribute subsidies to various industries. However, if the government had only wanted to distribute subsidies, it need not have set up a financial intermediary like the JDB – the government could have simply

provided important industries subsidies by means of a tax-cum-subsidy scheme.

Another noteworthy point is that the amount of JDB loans supplied to the industries that showed remarkable growth and became internationally competitive was relatively small. Those industries did not receive a large amount of loan subsidies from the JDB. As has been pointed out by many scholars, JDB loans tended to be concentrated in declining or stagnant industries such as coal mining and marine shipping during Japan's era of high growth. Therefore, we are rather sceptical about the effectiveness of the JDB subsidy in promoting Japan's industrial development.

This paper emphasizes that the most essential function of the JDB was not to distribute long-term credit to important industrial sectors, but to intermediate exchanges of information between policy makers such as the Ministry of International Trade and Industry (MITI) and industrial companies, as well as to monitor the managerial behavior of borrowing companies from various angles. We argue that the JDB functioned in the Japanese financial system as an information producer which efficiently reduced agency costs for the borrowing firms. As we explain in this paper, many scholars have argued for this hypothesis, but nobody has yet empirically tested its validity. The main purpose of this paper is to narrow the discrepancy existing between the theoretical hypotheses about the workings of the JDB, and the empirical studies testing their validity.

This paper also investigates the extent to which the JDB competed with private banks as a financial intermediary. It is needless to say that private banks play an important role by monitoring firms, and thereby reduce the agency costs associated with external fund raising. If the

function of the JDB had been essentially that of a financial intermediary, the JDB very likely would have competed with private banks in the financial system. In other words, the JDB loans might be more effective in promoting those firms private banks have not sufficiently monitored, but not so effective for those firms that private banks have sufficiently monitored. We can ascertain whether the JDB loans actually inefficiently duplicate the role of private banks by dividing the sampled firms into two groups: (1) firms that have been closely monitored by private banks; and (2) firms that have not been closely monitored by private banks. This paper thus investigates both the effectiveness and the limitation of the JDB loans from the perspective of agency problems, mainly based on estimation of the investment and borrowing functions of individual firms.

The structure of this paper is as follows. Section II briefly explains the historical background of the Japan Development Bank and investigates the roles of the JDB in the framework of the so-called industrial policies that were started in the late 1950s. In particular, we explain the role of the JDB as an information-producing agent in the context of industrial development. We then proceed to an empirical analysis of the effectiveness of the JDB loan in inducing borrowing firms to increase their investment expenditure in Section III. We devise a method of testing the existence of promotive effects from the JDB loans, and then examine whether the role of the JDB has been redundant for those firms that have maintained stable long-term relationships with private banks. Section IV summarizes our arguments in this paper and their implications.

II Industrial Policies and the Japan Development Bank

If the government desires rapid industrial development, it will be confronted with the problem of how to efficiently allocate long-term credit to the industries regarded as indispensable to economic development. The Reconstruction Financing Bank (RFB: *Fukko Kinyu Kinko*), which actively supplied long-term loans to "key industries", such as electric power, from January 1947 to early 1949, can be regarded as an important instrument the Japanese government used to deal with reconstruction immediately after World War II. After the RFB stopped its activities in 1949 because of its inflation-prone tendencies, the Japan Development Bank (JDB) was started in 1951 as its successor, although the JDB was given greater political autonomy than its predecessor.[*1] During its early stages, the JDB concentrated long-term credit on the very same "key industries" which constituted electric power, marine shipping, iron and steel, and coal. During the period from 1951 to 1960, around 77% of the total amount of the JDB loans was directed to these four industries (Table I).[*2]

II.1 The JDB loans as an instrument of the industrial policy

In the late 1950s, the government started an industrial policy of strengthening industries "constitutionally", and/or stimulating firms to develop new production technology. Under this industrial policy, the government, in most cases, introduced a specific law which authorized the policy maker to intervene in the affairs of specific industries and give financial support to the industries through the JDB's loans. For example, MITI introduced the Extraordinary Measures Law for the Promotion of the

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Machine Industry (*Kikai-kogyo Sinko Rinji Sochi Hou*) introduced in 1956 to stimulate the machine-tool industry to make its production processes more efficient thereby strengthening its international competitiveness.[3]

Subsidies associated with the JDB loans: The JDB supplies credit using two types of interest rates. One is the standard interest rate (*Kijun Kinri*) and another is the special interest rate (*Tokubetu Kinri*) which has been substantially lower than the former.[4] From May 1951 when the JDB started its business to February 1961, the standard interest rate was set at a level slightly below the long-term prime interest rates required of borrowing firms by private banks. Since February 1961, however, the standard interest rate of the JDB loans and the private long-term prime rate remained at the same level.

The JDB supplied long-term credit at the special interest rate, which was lower than the market long-term prime rate, to those firms whose projects were regarded as important in pursuing the goals specified by the industrial policy. Obviously, the existence of such loans at the special interest rate imply subsidies to borrowing firms. Thus, since the start of the industrial policy aimed at various industries other than the four "key industries," the number of firms which enjoyed the subsidies associated with the JDB loans increased.

We should be careful, however, not to exaggerate the importance of the JDB subsidy. Except for a few industries such as coal mining, marine shipping and electric power, the amount of credit supplied by the JDB to individual industries was very small compared with the total amount of funds they raised from private banks. Table II presents the JDB loans to

various industries as a proportion of the total equipment funds raised by those industries. This table shows that the JDB loans were overwhelmingly important for coal mining and marine shipping, which were declining or stagnant industries. On the other hand, the JDB loans were minuscule for steel and machinery which were important promoters of Japan's economic growth during the 1960s.

Generally speaking, the amount of credit supplied by the JDB was a very small part of the corporate finance structure of Japan. According to Table III, which shows the components of external fund raising by the Japanese corporate sector, the share of the JDB loans was 3.5% in the first half of the 1950s, but later declined to less than 2.0%, and stayed at that level since the latter half of the 1950s. On the other hand, the loans supplied by private financial institutions continued to occupy the highest share of the corporate finance. It is not an exaggeration to say that the rapid economic growth in postwar Japan was achieved by indirect finance from private banks. Moreover, if the JDB was important because of its function of distributing subsidies, one could argue that Japan needed no special financial intermediaries controlled by the government like the JDB, but only an organization providing target industries with subsidies.

II.2 Intermediation and information production by the JDB

Many scholars and practical persons have pointed out the importance of the intermediary role of the JDB in the framework of Japan's industrial policy. In addition, some scholars proposed that the JDB mediated between policy makers, such as MITI and private companies, helping to smooth communication between them. In the following section, we discuss this

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intermediary role hypothesis.

The process of the JDB's decision making: The allocation of the JDB loans to an individual industry was based upon schemes decided either by special laws such as the Extraordinary Measures Law for the Promotion of the Machine Industry, or by councils such as the Machine Industry Council who were authorized by special laws. In principle, however, the JDB decides the specific patterns of credit allocation independently from the government. The JDB examines investment projects proposed by potential borrowers, and as a rule supplies its loans in the form of syndicated loans with private banks. According to the JDB(1963: p.141), the JDB loans accounted for only 27% of the total amount of funds raised by the firms (excluding those in electric power and marine shipping industries) for the specific projects supported by the JDB. The remaining amount was financed either by private bank loans (44%) or by retention (29%). The JDB also regularly monitors the performance of borrowers during the loan commitment by requiring regular business operation reports from them.[*5]

MITI actively recommended individual firms to the JDB as loan candidates regarded as suitable vis-a-vis industrial policies. Before providing a recommendation, the MITI closely investigated the individual firms' potential, and exchanged relevant information with the JDB. The information from the MITI was important when the JDB decided whether a specific firm could be permitted to become a borrower.

But the JDB was not always a passive credit supplier in the framework of industrial policy. Rather, the JDB was quite active in providing the

MITI with information about future industrial development possibilities, and helping the MITI to design specific plans for industrial development policies. Additionally, individual firms could ask the JDB for advice in order to develop investment plans which would be recognized as appropriate to become a JDB credit.

The JDB thus played a rather complicated and interesting intermediary role between the policy makers such as MITI and business firms throughout the industrial policy process. Its role was complicated because the JDB could be regarded as an effective insider from the viewpoint of both policy makers and individual firms, which were target of specific industrial policy. This JDB's unique role enabled it to be useful in ensuring smooth communication between the policy makers and business, and helped the JDB obtain valuable information that would be unavailable for private banks. In such cases, the JDB loans gave private banks a meaningful signal indicating which firms have high probability of achieving good performance in the near future.

The "information effects": Japan's industrial policy is characterized not as a means of direct intervention by the government into industrial activities, but as a means of inducing private firms to an objective which was considered socially desirable. Many scholars argue that the unique and delicate role assigned to the JDB was suitable for this sort of indicative planning. For example, after pointing out that the amount of the JDB credit was a very small share of the total amount of funds raised by private business, Ueno(1978: p.33) argued that JDB credit was important because it announced the names of specific firms which would be prosperous

under the industrial policy. According to Ueno, once a firm obtained credit from the JDB, private banks and financial institutions competed with each other to supply loans to the firm "virtually without credit examinations."

Similarly, according to Sato(1990: p.637), "if the Japan Development Bank decides to make a loan to an industry, private banks interpret it as an indication that the government considers that industry as a growth industry worthy of being financed by public funds, and is willing to back up the industry if it falls into financial difficulties. Knowing this stance of the government, private banks are induced to extend credit to that industry." Their arguments are similar to the "cowbell effect hypothesis" proposed by Higano(1986) who emphasized the importance of JDB's examination and monitoring of borrowing firms. According to his hypothesis, the credibility of the JDB's efficient monitoring has helped private banks to economize the costs of producing information about individual firms to which the JDB supplied loans. Thus, the pattern of allocation of the JDB loans has been an influential determinant of credit allocation given by private banks. Itoh, et al.(1988: pp.80-84) also presented the hypothesis that the JDB loans could indicate a desirable direction of credit expansion to private banks. Based on the concept of "a focal point" in the game theory, they argue that this indication mechanism by the JDB can help private institutions to choose a better equilibrium.

These arguments emphasized the JDB loans "information effects" of helping firms to raise external funds and stimulating their investment expenditure. They, however, leave out two central aspects: (a) why information production by the JDB is necessary? As has been emphasized by

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Diamond(1984) and other authors, the most important role of private banks is their information production by screening and monitoring. The JDB information production seems to be redundant; (b) why other form of information revelation was not used? There appears to have been much easier ways to declare government's policy, for example to make and announcement in newspapers.

It may be argued that there is an insufficiency of information production by private banks. In a typical case, a firm borrows from many private bands with one of them, often called the main bank, playing a central role. Other banks are usually users of information provided by the main bank. In this case information production would be lower than the socially optimal level, because of the existence of free-riders. Another example is that it takes long time for related parties to construct bank ties. There may be potentially good firms without main banks just because they have only short history. The JDB can extend information production level, because its special relationship with the government and also because its decision making is not led by profit-maximization. On the other hand, as there is no way to check whether the revelation is truthful, it would not be credible unless the government pays some costs if it lies. Information revelation in the form of JDB loans would be important because of the reliability problem.

III An Empirical Analysis of the Influence of the JDB Loans

According to the "information effects" hypothesis, the fact that a

firm begins borrowing from the JDB reduces the agency costs associated with borrowing external funds and thereby, other things being equal, promote the firm's investment and external borrowing. In this section, we test this hypothesis based on statistical investigations.

III.1 The sample for empirical analyses

We focus on the activity of the firms that were listed in the Second Section of Tokyo Exchange in 1965 when the industrial policy was well under way in Japan, and investigate whether their activity, particularly equipment investment, was significantly influenced by the JDB loans during the period from 1965 to 1988. The firms listed in the Second Section are not big companies, rather they are of medium size. These firms however, are felt to be most relevant for study as industrial policy was aimed at stimulating investment by medium size companies.[6] Moreover, we expect that these firms faced more serious information problems in financial markets than large firms.

The number of firms listed in the Second Section of the Tokyo Exchange was 587 as of 1965. After excluding those who went bankrupt, went private for some reason, or were merged or absorbed into another entity during the sample period, we obtained 476 sample firms based on NEEDS-TS(COMPANY). During this period, some firms moved up into the First Section of Tokyo Exchange.[7] While a number of new firms were listed in the Second Section, the former, but not the latter, are included in our sample firms.

Simple statistical observations: First of all, we divide the sample firms into two groups: (1) those that borrowed from the JDB during

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1965-1988; and (2) those that did not borrow from the JDB during 1965-1988. We call the former "JDB firms", and the latter "Non-JDB firms." Out of 476 sample firms, the number of the "JDB firms" is 226 and the remaining 250 are belonging to the group of the "Non-JDB firms." These two groups are statistically compared for three selected periods: "high growth era" (1968-1974); "latter half of the 1970s" (1975-1980); and "1980s" (1981-1988). Table IV summarizes the comparison.

According to Table IV, the "JDB firms" have larger values of average equipment investment per total assets (INVA) than the "Non-JDB firms" in each of the three periods. Thus the JDB loans appear to have led to higher level of borrowers' investment expenditure. During the "high growth era" the "JDB firms" borrowed larger amounts per total assets (LONA) than "Non-JDB firms." While both groups have sharply decreased their borrowing relative to total assets since the latter half of the 1970s, on average the "JDB firms" had slightly smaller LONA than the "Non-JDB firms" had during both the latter half of 1970s and the 1980s. This seems to suggest that the JDB loans somehow helped firms to reduce their reliance on borrowing from the banking sector.

As far as profit rates are concerned, we cannot find significant differences between these two groups. Both groups recorded almost same average operating profits per total assets (OPR) and current profits per total assets (CPR). However, it is noteworthy that the interest expense per total debts (COC) was larger for the "JDB firms" than for the "Non-JDB firms" in every period. This means that on average the firms which borrowed from the JDB could not significantly reduce interest expense.

In sum, Table IV suggests that the JDB loans led to greater equipment

investment expenditure, but did not lead to smaller interest expense for the borrowing firms. This observation seems to cast doubt on the hypothesis that the subsidy associated with the JDB loans was important in stimulating borrowing firms' equipment investment. The analysis based on Table IV is, however, too simple to derive any definite conclusion. More sophisticated methods are necessary to be conclusive on these points.

III.2 The performance of borrowing firms preceding and following the JDB loans

In order to test the hypothesis about the "information effect" of the JDB loans, we proceed to an event study about borrowing firms' performance. Specifically, we select from our sample firms those that started borrowing from the JDB during the period from 1966 to 1988, and compare their various performance relative to their peers before and after the beginning of the JDB loans. We call those firms as the "event firms", and there are 78 event firms in our original sample.[8]

A simple "event study": Table V shows the performance of our event firms both prior to, and subsequent to their first borrowing from the JDB. The numbers shown measure the average performance of 78 event firms relative to their industries calculated year by year. For each event firm, data from the year of the beginning of the JDB loans is called "year zero" data. Events firms are followed from year "-5" (five years before the loan) to year "+7" (seven years after the start of the loan). For example, the first entry in the second column (SPC) says that in the five years prior to the JDB loans, the rates of annual increase in stock prices of

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event firms are on average 6.10 percentage point lower than the average of contemporary industry stock price increases. Its t-value presented in the parenthesis (0.52), however, is so low that we can reject the hypothesis that the average investment rate of the event firms is higher than their industry average in the year "-5."

The column LJDB in Table V shows the JDB loans (the increment of JDB loans from the previous year) per total assets of the event firms. The average of the JDB loan ratios is 3.54% in the year when the event firms started borrowing from the JDB. The JDB loan ratios are, on average, scarcely higher than zero for the two years subsequent to the starts, and then tend to be negative from the year "+3." This suggests that, on average, the borrowing firm tended to gradually switch from the JDB loans to loans from private banks around three years after the start of the JDB loans.

Responses of stock prices: In efficient capital markets, the market value of a firm precisely reflects all influences related to the market evaluation of the borrowing firm. If the JDB loans actually improve the evaluation by the financial market of the borrowing firms, and reduced the effective costs of the external funds, the JDB loans would increase the market prices of their stocks. Thus, we could measure the promoting effects of the JDB loans by observing the relationship between the stock prices of the firm and the JDB loans supplied to it.

SPC in Table V indicates the rate of changes of event firms' stock prices compared with their peers in the same industries. Although we observe the increase rate of the stock price of the "event firm" was, on

average, nearly 14 percentage point higher than its industry average in year "0", it is statistically not significant. We cannot say that the stock price of the event firm remarkably increased immediately before and immediately after the firm started borrowing from the JDB. Thus, as a whole, Table V seems to reject the hypothesis that the JDB loans were effective in improving the market evaluation of the borrowing firms through "information effects."

But we do not take these results at face value for the following two reasons. First, in order to obtain any definite results through this approach, we need to control for influences on stock prices of various factors other than the JDB loans. Mainly because of limitation on statistical data concerning stock prices, we abandoned this sophisticated approach.[9] Secondly, the assumption of a perfectly efficient stock market seems to be irrelevant particularly to the Japanese financial system during the high growth era. It may not be an exaggeration to say that the banking system, including the JDB loans, efficiently mediated information transfer between related agents in place of the stock market. Instead of the approach in terms of stock prices, we adopt a simple "event study" and then estimate the investment and borrowing functions of individual firms to test the hypothesis about the "information effect" of the JDB loans.

The Impact on INVA: The column of INVA in Table VI shows that the JDB loans had a significant impact on the event firms' investment. The average investment rate is more than 7 percentage points higher than that of their industries in the first year (year "0"), which is significant at a one percent confidence level.

Although the average of JDB loan rates was not significantly positive in the year after the start of the loan (year "+1"), the averages of both total borrowing (LONA) and long-term borrowing (LONB), both of which are divided by total assets, of the event firms are significantly positive at a 5 percent confidence level; consequently making the average investment rates of those firms significantly positive. This suggests that the granting of JDB credit induced private banks to extend their loans to these firms and promoted the firms' investment expenditure. It is noteworthy, however, that the JDB loan impact did not last for long. According to the INVA line on Table V, the event firms investment rate averages are not significantly higher than their industry average from year "+2" on.

That the investment rate of an event firm is, on average, 1.82 percentage points higher than its peers one year prior to receiving the JDB loans (significant at a one percent confidence level). Since neither the total borrowing (LONA), nor long term borrowing (LONB), of the event firms are significantly higher than the averages of their peer firms, these higher investment rates do not seem to have been supported by borrowing from private banks which had anticipated the receipt of JDB credit one year later. We interpret this as suggesting that the event firms prepared for borrowing the JDB loans by actively increasing equipment investment expenditure mainly through the utilization of internal funds.

The impact on the total borrowing: The LONA line on Table VI shows that the amount of total borrowing by the event firms is 6.82 (an amount is almost equivalent to investment expenditure INVA), and 3.3 percentage points higher than the JDB loans in year "0" when the event firms began

borrowing from the JDB. This tendency continued in the second year ("+1" year), when the JDB loans to the event firms were slightly positive. We have the same result with respect to the event firms' long-term borrowing (LONB line on Table VI). This suggests that the JDB loans did not "crowd out" private banks' loans in the first and second years, but rather stimulated the firms to increase their investment expenditure.

The impact on interest expenses: The COC line on Table VI presents the relative performance of the interest expenses of the event firms. The interest rate expenses per total amount of debt for the event firms tended to be higher than that of their industries after they started borrowing from the JDB.[10] Although not presented due to space limitation, the current profit averages per total assets were lower for the event firms after the start of the JDB loans than for their peers. Higher interest expenses were likely responsible for the event firms' lower profit rates. In short, the JDB loans contributed neither to reducing interest rate expenses for borrowing firms, nor to increasing their profits.

Main bank relationships and the effectiveness of JDB loans: As has already been explained in the previous section, one part of the JDB's activities of producing an "information effect" seems to duplicate those of private banks, particularly main banks. Main banks are believed to examine and monitor their client firms to such an extent that other banks and financial institutions delegate monitoring to the main banks.[11] In such a market, the information effect of a JDB loan would be weaker when it is supplied to a firm with a relatively strong long-term relationship with

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its main bank, than when it is supplied to a firm whose long-term relationships with its main bank is unstable or who has no main bank relationship at all.

In order to investigate this difference in the information effects of the JDB loans, we divide the "event firms" into two groups. One is a group of the firms with stable main bank relationships and another is a group of the firms that have no stable relationships with their main banks. We call the former "MB firms" and the latter "other firms" in the following analysis. We identify a main bank for each of our sample firms by employing the definition given by *A Study on the Keiretsu* published annually by the Nihon Keizai Chosa-kai. An "MB firm" is defined as one that did not change its main bank at all during the period from 1965 to 1988.[12] The fact that the relationship between the firm and its main bank did not change implies that the specific capital associated with the long-term relationship is large enough to prevent an alteration of the relationship. We assume that the specific capital contributes to the bank's precise monitoring of its client firm.

We identified 27 "MB firms" from our sample of 80 event firms. The remaining 51 firms were classified into the "other firms" group. We examined the performance of firms from both groups preceding and following the start of the JDB loans the same way we did in Table V. The results are presented in Table VI, which shows significant differences between the two groups impact of the JDB loans on the firms' investment and borrowing.

We can observe the following results from Table VI : (1) The investment expenditures of both the "MB firms" and the "other firms" significantly increased in year "0" when the JDB loan began. The magnitude, however, of

increase is larger for the "other firms." While the average investment expenditure by "MB firms" is only slightly larger than the industrial average from year "+1" on, the average for "other firms" is larger than the industry averages at a 5% significance level for years "+1" and "+2." (2) Neither total borrowing (LONA) nor long-term borrowing (LONB) was significantly greater than the industry average for "MB firms" after the year "+1". For "other firms", however, both LONA and LONB were larger than the industrial averages from year "0" to year "+2" at a 5% significance level.

Observations (1) and (2) suggest that the effects of JDB loans on investment and borrowing were less pronounced for the firms that maintained stable long-term relationships with their main banks than for those that did not. This result in turn supports the hypothesis that the JDB's essential role is the production of information, a role which is highly substitutable for that which private banks have played in the framework of main bank relationships.

III.3 Estimating investment and borrowing functions

The above "event study" was not satisfactory because it did not control for influences on investment expenditure and borrowing of various important variables. In the following, we evaluate the impact of the JDB loans by estimating individual firms' investment and borrowing functions.

Specification of investment and borrowing functions: The starting point of our estimation is the Tobin's Q type investment function with a constraint on internal funds. The constraint on internal funds is

interpreted as indicating additional agency costs incurred because of an "imperfection" in capital markets when the firm borrows external funds. Theoretically, the amount of internal funds (INTA(t)) is expected to be positively related with investment expenditure (INVA(t)). Many scholars have already estimated this specification of investment function with modest success.[13]

Since it was not easy to obtain reasonable measurements of Tobin's Q, we abandoned it and instead introduced proxies (i) for the cost of capital (COC(t)), estimated based on interest expense of individual firms; and (ii) for the marginal efficiency of investment (MEI(t)), estimated based on the past operating profits of individual firms. Here we define MEI(t) as the average of operating profits per total assets over past three years. Tobin's Q could be regarded as integrating these two variables, but we disintegrated components of Q into two parts COC(t) and MEI(t). It is expected that COC(t) is positively, and MEI(t) negatively correlated with INVA(t). We also added the amount of JDB loans per total assets to the investment function to evaluate the magnitude of direct impact from the JDB loans.

Actually we wanted to ascertain the JDB loan "information effect". So we estimated the investment function by adding dummy variables that indicate the number of years that have passed since first borrowing from the JDB for each "event firm." For example, TIME(0) represents the very year when the "event firm" began borrowing from the JDB, TIME(1) represents the following year, and TIME(2) represents the year after. We take the dummy variables out 2 years because after three years the dummy variables were found to have absolutely no explanatory power. We assume these dummy

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variables measure the extent to which the JDB loans influence the borrowing firms' performance at, and after the loans begin.

We also took into consideration the possibility that the equipment investment by a firm may have a form of autocorrelation. This is because an increase in investment expenditure is often followed by autonomous increases in investment and borrowing for several years because of the indivisibility of the equipment investment. Therefore, the increase in investment expenditure due to the start of the JDB loans most likely induces increases in investment and borrowing in year "+1", year "+2" and so on. This kind of autocorrelation has nothing to do with the JDB loan "information effect" that many authors have emphasized. In order to precisely measure the magnitude of the information effect, we must exclude autocorrelation influences from our estimation. With a view to excluding the influences, we introduced two lag years $INVA(t-1)$ and $INVA(t-2)$ in estimating the investment function.[14]

Thus, we specify the investment function as follows:

$$(1) \quad INVA(t) = a_0 + a_1 \cdot INTA(t) + a_2 \cdot COC(t) + a_3 \cdot MEI(t) + a_4 \cdot LJDB(t)$$
$$+ a_{51} \cdot INVA(t-1) + a_{52} \cdot INVA(t-2)$$
$$+ a_{60} \cdot TIME(0) + a_{61} \cdot TIME(1) + a_{62} \cdot TIME(2)$$
$$+ u(t),$$

where $INVA(t)$, $INTA(t)$, $COC(t)$, $MEI(t)$ and $LJDB(t)$ are the equipment investment, the internal funds, the cost of capital, the marginal efficiency of investment, and the JDB loans respectively, and $u(t)$ is a disturbance term. The coefficient parameters are expected to satisfy following conditions:

$$(2) \quad a_1 > 0, \ a_2 < 0, \ a_3 > 0, \ a_4 > 0, \ a_{5i} > 0 \ (i = 1,2).$$

If the fact that the JDB starts lending to a specific firm actually promotes its investment expenditure, at least one of a_{6i} (i=0,1,2) is expected to be positive.

Since the firm determines its investment expenditure and borrowing simultaneously, the reduced form of its borrowing demand takes the same form as the investment function (1). Thus,

$$(3) \quad BOR(t) = b_0 + b_1 \cdot INTA(t) + b_2 \cdot COC(t) + b_3 \cdot MEI(t) + b_4 \cdot JDB(t)$$
$$+ b_{51} \cdot INVA(t-1) + b_{52} \cdot INVA(t-2)$$
$$+ b_{60} \cdot TIME(0) + b_{61} \cdot TIME(1) + b_{62} \cdot TIME(2)$$
$$+ v(t),$$

where BOR(t) is defined the total amount of borrowing minus the JDB loans, and parameters are expected to satisfy the following conditions:

$$(4) \quad b_1 < 0, \ b_2 < 0, \ b_3 > 0, \ b_4 > 0, \ b_{5i} > 0 \ (i = 1,2).$$

As has been explained in the previous section, the JDB loans are usually provided in the form of a syndicated loan with private bank credit. Therefore, it may be thought of as obvious that the JDB loans induced increases in the amount of borrowing by the firm from private banks. We should note, however, the possibility that the JDB loans crowded out private bank loans in the sense that the firm substitutes the JDB loans for loans from private banks. In this case, the increase in LJDB(t) is associated with a decrease in the private banks loans BOR(t), and we could not find a positive b_4 in the estimated borrowing function. On the other hand, as has already been explained, the JDB loan "information effect" would make it easy for the firm to borrow from private banks, and thus stimulate BOR(t):i.e., at least one of b_{6i} (i = 0,1,2) would be positive.

Results of the estimation: Specifically, we estimated the two functions (1) and (3) by pooling 78 "event firms" with 250 "Non-JDB firms" that have never borrowed from the JDB for the time period of 1967-1988. As has already explained, the group of "event firms" consists of 27 "MB firms" and 51 "other firms." Table VII provides the summary statistics of each group of the sample firms. On average, the investment expenditure per total assets (INVA) is smaller for the "Non-JDB firms" than for both groups of "event firms." The average of total borrowing (BOR) is also smaller for the "Non-JDB firms" than for the "event firms." As for the "event firms," the averages of both INVA and BOR are larger for the "other firms" than for the "MB firms". It should also be noted that the average of JDB loans (LJDB) is larger for the "other firms" than for the "MB firms." In the following, we argue this may have an important implication about the efficiency of the credit allocation through the JDB.

In order to control for influences specific to individual industries, we also introduced the dummy variables of double-digit industries for individual firms.[15] At the same time, we assumed the constant term for each of investment and borrowing functions is variable over time, and thus add the dummy variables indicating each year. The estimated investment and borrowing functions are presented in Table VIII. The results are summarized below, deleting estimated coefficients of both industrial dummy variables and year dummy variables in order to save space.

Table VIII shows that investment expenditure shows a strong positive autocorrelation. Even after excluding this influence, however, we may still conclude that the JDB loans positively influenced both investment expenditure and borrowing immediately after they began. For example, the

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"event firms" investment function significantly shifted in the JDB loan start year ("year 0") and the next year ("year +1"), and the sum of the shift is around 8.0 percentage points (Equation IX -1). The borrowing function shows similar shifts both in "year 0" and "year +1" (Equation VIII -2).

The estimated investment function (Equation VIII -1) in Table VIII shows that the amount of JDB loans JDB(t) is statistically significant at the 10 percent confidence level. But, as Table V shows, the average of JDB(t) did not exceed 3.54. Therefore, the magnitude of the shift caused by the amount of the JDB loans can be estimated to have been at most 0.52 of a percentage point (0.146x3.54) which is substantially smaller than the magnitude of shifts of the investment function caused by the start of the JDB loans independently from the amount of the loans. This suggests that not the amount of the JDB loans, but the fact of the JDB loans and their timing are essential to the borrowing firm's investment.

Main bank relationships and the "information effect": According to Table VIII, there are significant shifts of the investment functions of both the "MB firms" (Equation VIII -2) and the "other firms" (Equation VIII -3) one year after the JDB loans started (TIME(1)). But the extent of the shift is larger for the "other firms" (7.75) than for the "MB firms" (3.85). Moreover, the shift of the second year (TIME(2)) is significantly positive at a 5% confidence level for the "other firms" while it is slightly negative and insignificant for the "MB firms." The sum of the coefficients for TIME(0), TIME(1) and TIME(2) is around 4.9 for the "MB firms", less than half of the 10.9 for "other firms."

We find even more remarkable differences between the two groups by observing shifts in their borrowing functions ("MB firms" - Equation VIII -5; "other firms" - Equation VIII -6). The borrowing function shows a major shift in the year when the JDB loans started. However, it is significant at a 5 percent confidence level for the "other firms," the shift is statistically insignificant for the "MB firms." Furthermore, the shift of the borrowing function in the second year after the start of the JDB loans is positively significant (at a 10 percent confidence level) for the "other firms", but insignificant for the "MB firms." These results clearly show that the "other firms" have a tendency to increase borrowing from private banks immediately after the start of the JDB loans, but that the "MB firms" do not have this tendency.

By estimating investment and borrowing functions, we were thus able to obtain results consistent with those from the previous event study shown in Table V and VI. We may summarize the results by stating that JDB loans obviously promoted investment for the borrowing firms, but the effectiveness of these loans was more significant for those borrowers who did not possess stable long-term relationship with their main banks. For the borrowers who had stable main bank relationships, the enhancing effects of the JDB loans are somewhat unclear. In summary, it can be proposed that the function of the JDB was at least partially competitive with that of private banks in providing the financial system with various monitoring services.

III.4 Summary of the empirical analyses

In this section, we empirically investigated the influence of JDB loans on borrowing firms' investment expenditure and borrowing behavior. The estimated investment and borrowing functions seem to confirm the JDB loan "information effect," because they show that not the amount of JDB loans, but their timing has significantly positive impact on borrowers' behavior.

When we divide the sampled firms into two groups (those that have maintained stable main bank relationships and those that do not), we find a clear enhancing effect from the JDB loans for the latter group, but not such a clear effect for the former group. This difference in the effect from the JDB loans seems to support the hypothesis that the JDB has competed with private banks in the sense that some of essential roles of the JDB are related to those examining and monitoring services which private banks provide. Thus, at least a part of the "information effects" comes from monitoring activities provided by the JDB.[16]

IV Concluding Remarks

In the late 1950s, the Japanese government started industrial policies for the purpose of stimulating target industries to develop their productive capacities and to introduce new technology. The JDB loans were utilized as a means of implementing industrial policy measures. The amounts of JDB loans distributed to those industries which became internationally competitive afterward, however, were relatively small.

Rather stagnant or declining industries enjoyed a great amount of long-term credit supplied by the JDB. Therefore, the JDB does not appear to have been an active promoter of Japanese industrial development.

Many observers argue that the importance of the JDB derives from its activities of producing information. Some argue that the JDB loans provide the financial system with reliable signals of policy makers' intentions. Others believe that examination and monitoring by the JDB effectively reduces the agency costs for borrowing firms. According to those arguments, the amount of the JDB loans does not matter. The fact that a specific firm could borrow from the JDB gives an important signal to private banks and thereby promotes the firm's investment expenditure. We called this effect of the JDB loans the "information effect."

As far as we know, however, there are few full scale empirical analyses to test the validity of the hypothesis of the "information effect." This paper tried to fill this vacancy. We chose medium size firms as our sample, and tested whether the JDB loans had the "information effect" on individual firms' investment expenditure mainly by an "event study." Our analysis supports the hypothesis that the JDB loans positively influenced the borrowers investment expenditure through the "information effect."

We thus showed that the JDB actually stimulated its borrowers to expand their investment expenditure. This is not direct evidence, however, that the JDB was indispensable for Japanese economic development. We found that the "information effect" of the JDB loans was more significant when the borrowers had no stable main bank relationships than when they had preserved stable main bank relationships with private banks. This result

suggests that the JDB role partly duplicated that of private banks in the sense that the private banks could produce the same "information effect" through the main bank relationships with their client firms. Therefore, it can be said that as the banking sector becomes more efficient in the process of economic development, the less important the JDB has become as a promoter of industrial development. It might be a good policy for the JDB to concentrate its credit on small and medium size firms that have not yet established long-term relationships with private banks and, in that sense, tended to suffer from serious agency problems associated with external financing.

It should also be pointed out that the positive effect of the JDB loans does not necessarily mean the overall success of the Japanese government in promoting industrial growth. In practice, it was a very complex issue for the government to foster industries through allocation of government funds. There are some cases in which the government could not respond to financial requests from various important industries at crucial early stages of their development.[17]

1) From the first quarter of 1947 to the first quarter of 1949 when the
RFB stopped supplying loans, the cumulative amount of RFB's loans was ¥130
billion, which was equal to 40% of the total amount loans supplied by
private banks during the same period. The RFB raised funds by issuing
long-term bonds, most of which were bought by the Bank of Japan. The RFB
issued ¥109 billion of its bonds during the two year period from January
1947 to March 1949. The Bank of Japan directly underwrote 70% of the
bonds, which translated into a 38% increase in bank notes during the same
period (Bank of Japan(1986: p.103)). The activities of the RFB were, thus,
supported by increases in money supply, putting inflationary pressure on
the economy.

2) We briefly explain here the JDB's role of mediating Japanese firms'
borrowing from abroad immediately after World War II. At that time, it was
almost impossible for Japanese firms to borrow from abroad mainly because

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foreigners had no precise information about Japanese borrowers. The JDB mediated Japanese firms' borrowing in two ways. First, the JDB re-lent the funds it borrowed from the World Bank to Japanese firms. In this case, the government gave guarantees for the JDB loans. Secondly, the JDB itself gave guarantees for private firms' direct borrowing from abroad. The JDB's intermediation was thus important because of the serious information discrepancy between Japanese private sectors borrowers and foreign lenders. We did not, however, discuss this role of the JDB in this paper.

3) We should note that the legislature made collusion among firms in the machine-tool industry legitimate despite the Anti-trust Law. It was a usual practice to permit that target industry firms to form a cartel to strengthen their status in the market. As Johnson(1982:236-237) argues, industrial policy as a rule was a package of various measures such as permission to borrow capital and technology from abroad, preferential treatment with respect to taxes and subsidies, and permission to form cartels, etc. The JDB loan was therefore just one component of a package of industrial policies.

4) The margin between the standard and the special interest rates was from 2.5% to 3.5% during the 1950's. But it became narrower as the Japanese economy grew. As of October 1992, it was only from 0.6% to 0.05%. See the JDB(1976: pp.54-81).

5) The JDB sometimes consults the main bank of a borrowing company to obtain inside information about the borrower, because the main bank may be better informed than the JDB. We investigated whether the existence of a reliable main bank influenced the effectiveness of the JDB intermediation in our empirical analyses in this paper.

6) The JDB(1963: pp.140-141) points out that major targets of the JDB loans were shifted from big companies to medium size ones from the latter half of the 1950s.

7) Of 477 sample firms, 208 had moved upwardly to the First Section by 1988.

8) The number of firms that borrowed from the JDB during the sample period of 1965-1988 is 226. Of these 226, 146 firms started borrowing from the JDB before 1966. In other words, since those 146 firms had already borrowed JDB loans at the start of our sample period, we could not determine the informational impact that the JDB loans would give rise to just after the start of the loans.

9) The stock price data compiled by NEED-TS(COMPANY) is incomplete in the sense that it does not contain the data before 1966, and lacks data of some companies before the 1970s. Because of this limitation, the number of "event firms" considered in Table V is only 42.

10) As has already been explained, the event firms' long-term borrowing (LONB) is significantly larger than the industrial average for years "0" and "1." This means that the event firms tend to owe long-term debt more heavily than their peers after the start of JDB loans. Since, interest expenses are higher for long-term debt than for short-term debt, this tendency accounts for the event firms' higher COC for year "+1" and after.

11) See Horiuchi et al. (1988), and Sheard (1992).

12) *A Study on the Keiretsu* adopts the definition of the main bank based on not only the amount of loans supplied by banks, but also personnel exchanges, mutual shareholdings and other historical circumstances.

13) For example, see Fazzari, et al.(1988), and Hoshi, et al.(1991).

14) Omitting those lagged variable INVA(t-1) and INVA(t-2) did not essentially change the estimation results we explain in the following.

15) The *NEEDS-TS(COMPANY)* classifies individual companies into thirty six double-digit industries from foods(01) to services(71). We introduce dummy variables to identify which industry each company belongs to. We also tried to estimate the same investment and borrowing functions without the industrial dummy variables. But it did not alter the essential results discussed below.

16) Table VII shows that the JDB provided more credit for "other firms" than for "MB firms." This indicates that the JDB perceived this difference in the information effect of its loans between firms with stable main bank relationships and other firms, and strengthened the enhancing effects by heavily distributing its credit to those firm who had not established stable main bank relationships.

17) See Calder(1992). He explains this as follows:

> MITI likewise short-sightedly rejected financial requests from autos (Toyota) and consumer electronics (SONY) at crucial early stages of their development. Even in steel, a self-declared priority sector for MITI, industrial-credit policy was remarkably rigid and hesitant in dealing with creative overtures from dynamic new firms. MITI meekly accepted the bankruptcy of the creative early oxygen-furnace producer Amagasaki Steel in 1954 and only reactively backed Kawasaki Steel's Chiba Works (1950-54) after it had become a fait accompli. (p.393)

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Table I : Composition of JDB loans from 1951 to 1974
(average over periods: ¥ billion (%))

Fiscal year	1951-1955	1956-1960	1961-1965	1966-1970	1971-1974
Electric power (1)	117 (42.8)	118 (39.0)	112 (16.6)	101 (7.4)	136 (6.6)
Marine shipping (2)	64 (23.4)	83 (27.3)	202 (30.0)	483 (35.4)	426 (20.7)
Iron and steel (3)	14 (5.2)	8 (2.6)	4 (0.6)	5 (0.4)	0 (0.0)
Coal mining (4)	17 (6.0)	26 (8.4)	57 (8.5)	47 (3.4)	6 (0.3)
Subtotals (1 - 4)	212 (77.4)	234 (77.3)	376 (55.8)	635 (46.6)	569 (27.6)
Promotion of industrial technology(a)	1 (0.4)	14 (4.6)	56 (8.4)	147 (10.8)	227 (11.0)
Other industries	58 (21.2)	38 (12.4)	87 (13.0)	198 (14.5)	226 (10.9)
Social development(b)	3 (1.0)	17 (5.6)	154 (22.9)	383 (28.1)	1,040 (50.5)
Total	274 (100.0)	303 (100.0)	673 (100.0)	1,363 (100.0)	2,061 (100.0)

(a) Including promotion of computer, electronic, machine tool, and new technology industries, and development of heavy machinery production.
(b) Including rehabilitation of big cities, modernization of distrition, development of provincial areas, improvement of living standard.

Source: The JDB(1976: pp.32-33)

Table II : JDB loans as a proportion of the total equipment funds
(average)

Industries	1954-1960*	1961-1967*
Coal mining	31.2%	45.3%
Steel	2.5	1.0
Machine	2.6	3.1
Chemical	3.4	3.8
Textile	2.1	2.2
Agriculture	0.5	0.4
Electric power	13.1	8.3
Marine shipping	29.5	39.0
Transportation	0.7	2.2
All industries	6.8%	4.3%

Source: Horiuchi and Ohtaki(1987:pp.123-148))

Note: * Fiscal year.

Table Ⅲ : Components of external fund raising by the corporate sector

Period	Stock	Bonds	Loans by pvt. fin. insti.	JDB	RFB	others	total(¥ bil.)
1946-50	13.1	3.5	72.4		5.5	5.5	1,635(100.0)
1951-55	14.1	3.8	71.9	3.5	-0.3	7.0	4,230(100.0)
1956-60	14.2	4.7	73.0	1.7		6.4	9,878(100.0)
1961-65	13.9	4.4	74.7	1.6		5.4	24,168(100.0)
1966-70	6.8	3.1	81.2	1.8		7.1	43,030(100.0)
1971-75	5.6	3.9	81.8	1.7		7.0	95,405(100.0)

Source: The Bank of Japan, *Economic Statistics Annual.*

Table IV : Comparison of performance between "JDB firms" and "non JDB firms"

(All industries)

| | 1968-1974 | | 1975-1980 | | 1981-1988 | |
	JDB firms	Non JDB	JDB firms	Non JDB	JDB firms	Non JDB
INVA (%)	10.02 (0.26)	7.54 (0.20)	5.85 (0.25)	3.99 (0.14)	6.92 (0.31)	4.53 (0.11)
LONA (%)	8.85 (0.36)	7.63 (0.38)	0.43 (0.32)	0.26 (0.21)	1.19 (0.33)	1.82 (0.41)
INTA (%)	2.90 (0.17)	3.29 (0.21)	1.70 (0.23)	1.59 (0.25)	2.90 (0.23)	2.63 (0.17)
CPR (%)	26.11 (1.40)	31.58 (2.18)	12.54 (5.01)	17.23 (1.67)	14.36 (1.38)	12.50 (2.15)
OPR (%)	10.29 (0.18)	10.09 (0.20)	6.90 (0.21)	7.04 (0.20)	5.60 (0.20)	5.65 (0.14)
COC (%)	4.77 (0.04)	4.32 (0.04)	5.27 (0.06)	4.62 (0.05)	4.27 (0.06)	3.49 (0.04)
AASS (¥bil)	9.11 (0.41)	8.99 (0.32)	25.60 (1.59)	20.39 (0.78)	51.76 (3.63)	32.02 (0.95)

Note: INVA: equipment investment per total assets in the previous year(%), LONA: borrowing per total assets in the previous year(%), INTA: internal funds per total assets in the previous year(%), CPR: current profits per total assets in the previous year(%), OPR: operating profits per total assets in the previous year(%), COC: interest expenses per total debts(%), AASS: total assets(¥ billion). Figures in parentheses indicate standard errors.
Source: Nihonkeizai-Simbunsha, *NEEDS-TS(COMPANY)*.

Table V : Performance of firms before and after the JDB loans

Year	SPC	INVA	LONA	LONB	COC	LJDB
-5	-6.10(0.52)	0.64(0.68)	-0.39(0.38)	0.31(0.45)	0.00(0.00)	----
-4	2.76(0.30)	-0.27(0.31)	-0.61(0.64)	0.43(0.66)	0.14(0.82)	----
-3	8.17(1.03)	-1.08(2.16)	-0.68(0.73)	-0.87(1.67)	-0.00(0.00)	----
-2	2.05(0.39)	-0.01(0.02)	-0.65(0.74)	-0.85(1.44)	0.12(0.67)	----
-1	-2.53(0.44)	1.82(2.49)	1.12(1.15)	0.51(0.82)	0.09(0.56)	----
0	13.99(1.30)	7.06(3.19)	6.82(3.55)	4.70(2.78)	-0.07(0.47)	3.54(5.61)
+1	-7.31(1.10)	4.40(1.90)	4.27(3.05)	3.42(2.61)	0.24(1.60)	0.64(1.45)
+2	-3.45(0.76)	-1.14(1.75)	1.95(1.08)	1.94(1.28)	0.35(2.50)	0.10(0.77)
+3	-13.46(2.88)	-0.62(1.11)	0.33(0.38)	0.34(0.62)	0.35(2.06)	-0.22(1.57)
+4	-0.82(0.15)	-1.22(1.58)	-1.78(2.51)	-1.65(3.11)	0.44(2.75)	-0.26(1.44)
+5	-0.78(0.15)	-0.42(0.71)	-0.81(1.07)	-0.68(1.33)	0.42(2.47)	-0.26(3.71)
+6	7.24(1.09)	-0.41(0.72)	0.38(0.56)	-0.59(1.34)	0.30(1.67)	-0.16(2.67)
+7	2.23(0.39)	0.40(0.54)	0.22(0.19)	0.62(1.11)	0.19(1.06)	-0.07(0.88)

Note: SPC: annual rates of stock price changes from the end of previous fiscal year
         to the end of the current fiscal year;
       INVA: investment expenditure per total assets;
       LONA: total borrowing per total assets;
       LONB: long-term borrowing per total assets;
        COC: interest expenses per total assets;
        JDB: JDB loans per total assets.
       Figures in parentheses indicate absolute t values.

Table VI : Performance of firms before and after the JDB loans

The MB firms (27 firms)

Year	INVA	LONA	LONB	COC	LJDB
-5	0.51(0.28)	0.63(0.43)	-0.06(0.07)	0.17(0.63)	---
-4	-0.85(0.79)	-0.41(0.37)	0.37(0.28)	0.09(0.31)	---
-3	-1.33(1.64)	0.21(0.11)	0.29(0.29)	-0.21(0.81)	---
-2	0.38(0.54)	0.16(0.10)	0.03(0.03)	-0.12(0.44)	---
-1	2.66(2.06)	0.74(0.43)	1.47(1.28)	0.05(0.18)	---
0	4.49(2.40)	6.59(3.79)	4.34(2.70)	-0.31(0.19)	2.05(4.27)
+1	0.13(0.13)	1.87(1.43)	1.55(1.55)	0.55(2.50)	0.28(1.75)
+2	-0.68(0.88)	0.85(0.48)	0.48(0.44)	0.54(2.35)	0.16(0.50)
+3	-0.31(0.28)	0.30(0.21)	-0.52(0.63)	0.26(1.08)	-0.03(0.30)
+4	-0.42(0.40)	-0.31(0.28)	-1.15(1.98)	0.47(1.81)	-0.30(0.41)
+5	0.10(0.13)	-0.97(0.66)	0.44(0.48)	0.79(2.82)	-0.11(1.22)
+6	0.23(0.27)	0.79(0.71)	-0.61(0.75)	0.42(1.62)	-0.14(3.50)
+7	1.13(1.04)	-0.86(0.31)	1.60(1.29)	0.26(1.00)	0.11(0.61)

The Non-MB firms (51 firms)

Year	INVA	LONA	LONB	COC	LJDB
-5	0.72(0.67)	-0.88(0.66)	0.48(0.51)	-0.08(0.35)	---
-4	0.05(0.04)	-0.71(0.53)	0.46(0.62)	0.16(0.80)	---
-3	-0.92(1.46)	-1.12(1.06)	-1.44(2.48)	0.10(0.38)	---
-2	-0.06(0.07)	-1.03(0.96)	-1.26(1.73)	0.25(1.04)	---
-1	1.32(1.52)	1.31(1.09)	0.01(0.01)	0.11(0.55)	---
0	7.97(2.55)	6.93(2.50)	4.88(2.01)	-0.03(0.16)	4.29(4.77)
+1	6.59(1.92)	5.49(2.75)	4.38(2.31)	0.08(0.42)	0.82(1.24)
+2	1.53(1.70)	2.51(1.93)	2.17(2.09)	0.25(1.39)	0.07(0.58)
+3	-0.87(1.36)	0.34(0.32)	0.77(1.08)	0.39(1.77)	-0.32(1.52)
+4	-1.59(1.54)	-2.53(2.81)	-1.90(2.53)	0.42(2.00)	-0.24(0.89)
+5	-0.52(0.65)	-0.72(0.83)	-1.26(2.10)	0.22(1.05)	-0.34(3.78)
+6	-0.52(0.69)	0.16(0.18)	-0.57(1.08)	0.24(1.04)	-0.18(2.00)
+7	0.54(0.66)	0.16(0.18)	0.10(0.19)	0.16(0.67)	-0.17(0.94)

Note: See Table V.

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Table VII : Descriptive Statistics

	The "Non-JDB firms" (N = 250)	The "MB firms" (N = 27)	The "other firms" (N = 51)
INVA(t)	5.308 (0.09)	6.380 (0.29)	7.469 (0.32)
BOR(t)	3.572 (0.21)	4.181 (0.45)	4.537 (1.16)
INTA(t)	2.395 (0.13)	2.209 (0.25)	2.970 (1.84)
COC(t)	4.171 (0.03)	4.542 (0.07)	4.665 (0.05)
MEI(t)	5.115 (0.09)	4.386 (0.16)	4.786 (0.14)
LJDB(t)	---- (----)	0.102 (0.05)	0.247 (0.08)

Notes: Means and standard errors (in parentheses) of respective groups of sample firms.

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Table VIII : Estimated investment functions

	All firms* (VIII-1)			The MB firms (VIII-2)			The other firms (VIII-3)		
INTA	0.060	(4.89	)**	0.042	(4.24	)**	0.050	(4.91	)**
COC	-0.241	(-5.18	)**	-0.255	(-5.34	)**	-0.238	(-4.97	)**
MEI	0.015	(1.06	)	0.008	(0.55	)	0.008	(0.55	)
LJDB	0.184	(2.06	)*	0.206	(0.91	)	0.192	(1.96	)*
INVA(-1)	0.244	(20.08	)**	0.265	(20.12	)**	0.243	(19.14	)**
INVA(-2)	0.147	(12.38	)**	0.164	(12.63	)**	0.148	(11.94	)**
TIME(0)	1.638	(1.82	)*	2.457	(1.74	)*	1.194	(0.56	)
TIME(1)	6.443	(8.08	)**	3.980	(3.07	)**	7.768	(7.92	)**
TIME(2)	0.502	(0.65	)	-1.579	(-1.25	)	1.566	(1.85	)*
F-Value	56.85			52.09			51.23		
Adjust.R²	0.196			0.209			0.194		

Table VIII (continued): Estimated borrowing functions

	All firms* (VIII-4)			The MB firms (VIII-5)			The other firms (VIII-6)		
INTA	0.002	(0.34	)	-0.004	(-0.15	)	-0.004	(-0.17	)
COC	-0.340	(-3.24	)**	-0.353	(-3.01	)**	-0.305	(-2.75	)**
MEI	-0.124	(-3.80	)**	-0.135	(-3.82	)**	-0.117	(-3.42	)**
LJDB	0.412	(2.04	)*	0.362	(0.65	)	0.410	(1.82	)*
INVA(-1)	0.112	(4.10	)**	0.120	(3.71	)**	0.107	(3.64	)**
INVA(-2)	-0.009	(-0.34	)	-0.010	(-0.33	)	-0.013	(-0.45	)
TIME(0)	5.212	(2.56	)**	4.466	(1.39	)	5.731	(2.19	)*
TIME(1)	3.212	(1.79	)*	4.518	(1.42	)	2.559	(1.73	)*
TIME(2)	0.105	(0.06	)	2.136	(0.69	)	-0.846	(-0.38	)
F-Value	15.91			12.02			12.96		
Adjust.R²	0.061			0.054			0.054		

(Notes) Firms consists of 80 "event" firms and 251 "Non-JDB firms."
The constant terms are assumed to be variable overtime. Figures in
parentheses indicate t values. * is significance at a 5% confidence level
and ** is significance at a 1% confidence level. The estimated parameters
of the industrial dummy and year dummy variables were deleted to save space.