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Abstract

This paper demonstrates the possibility that a lender's risk incentive renders it difficult to conduct efficient debt renegotiation. When a lending bank has a risk incentive, the bank is not likely to make a debt concession, even though such a concession could resolve inefficiencies caused by a borrower's risk incentive. If the debt renegotiation is refrained, then the borrowing firm chooses a value-decreasing risky project so that the collection of the loan becomes to be risky one, resulting in increase in the wealth of the lending bank's shareholders. The lender's risk incentive thus accelerates borrower's risk incentive.

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1. Introduction

Debt renegotiation is often desirable for a borrowing firm in financial distress because it resolves inefficiencies caused by suboptimal decisions made by the firm or its stakeholders. However, several studies have pointed out that ex-post debt renegotiation is difficult. For example, Giammarino (1989) and Henikel and Zechner (1993) show that informational asymmetry between the borrowing firm and outside creditors is a hindrance to efficient debt restructuring. Gertner and Scharfstein (1991), James (1995), and Detragiache and Garella (1996) point out that debt renegotiation often can not be agreed upon due to conflicts among multiple creditors when the borrowing firm has a number of different creditors.

This paper provides an alternative explanation for the difficulty of debt renegotiation, i.e., a lender's risk incentive. Let us consider a typical risk incentive problem of a levered firm in financial distress, which borrows from only one bank.[1] It is well-known as risk incentive problem that shareholders of the levered firm are likely to prefer a risky investment to a safe one, even though a risky project is less valuable than a safe one. The risk incentive of the borrowing firm decreases the value of a bank loan as well. By forgiving debt, the risk incentive problem of the borrowing firm can be resolved, and then the borrowing firm undertakes a value-increasing safer project. As a result, both the total value of the firm itself and the expected amount of money that the lending bank can collect increase.

From the viewpoint of the lending bank, while debt forgiveness enhances the value of the loan to the firm, it may decrease its shareholders' wealth. Along the same lines in the case of the borrowing firm, shareholders of the lending bank may prefer a risky

[1] For a discussion of a risk incentive problem, see Jensen and Meckling (1976), Gavish and Kalay (1983), Green (1984), and Green and Talmor (1986).

collection of the loan to a stable collection, even though the risky collection is less valuable than the stable one. In particular, when the financial condition of the lending bank is unhealthy, shareholders of the bank have a risk incentive, as do the shareholders of the borrowing firm.[2] If the bank management pursues the shareholders' wealth at the cost of the creditors (e.g., the depositors), then debt forgiveness does not occur. Thus, the model presented in this paper shows that the risk incentive at a lending bank renders efficient debt renegotiation impossible, even if neither informational asymmetry nor conflicts among creditors exist.

The model has implications with regard to the stock price behavior of lending banks in response to debt forgiveness. Suppose that management of a lending bank acts not in the interest of the shareholders' wealth but rather in its own interests. For example, if the management wants to avoid default, then it prefers stable to risky loan collection.[3] In such situations, the bank has an incentive to forgive debt, after which the borrowing firm undertakes a safer project, such that the bank can achieve stable collection of the loan. Since debt forgiveness is not desirable in terms of the bank shareholders' wealth, the stock price of a lending bank goes down in response to debt forgiveness.

Recently, some Japanese non-financial firms and their main banks made large debt

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[2] Saunders, Strock, and Travlos (1990) and Demsetz and Strahan (1997) empirically found a positive relationship between managerial shareholdings and bank risk-taking (market risk measure) in the U.S. Anderson and Fraser (2000) also reported that managerial shareholdings were positively related to both total risk and firm-specific risk in the late 1980s, when the U.S. banking industry was under unhealthy financial conditions. John, John, and Senbet (1991) and Goldberg and Harikumar (1991) theoretically argued the relationship between bank risk-taking incentives and the design of deposit insurance.

[3] For a discussion of default costs on management, see footnote 7.

forgiveness agreements. In response to the announcements of debt forgiveness, the stock prices of all of these main banks decreased.[4] Since management is separated from ownership in major Japanese banks, one might conclude that the management of major Japanese banks does not always act in pursuit of its shareholders' wealth. In particular, the Japanese banking industry has been under unhealthy financial conditions since the late of 1990s. Thus, it seems plausible that managers of Japanese major banks have worried about defaults, in which deadweight costs, such as reputation losses or salary cuts, were incurred.

The rest of the paper is organized as follows. In Section 2, a simple model is provided in which bank debt concession resolves a typical risk incentive problem of a borrowing firm. In Section 3, it is shown how the risk incentive of a lending bank hinders debt forgiveness. In Section 4, a numerical example of the model is given. In Section 5, the negative effect of debt forgiveness on the stock price of a lending bank is discussed. In Section 6, the discussion is summarized and concluded.

2. A Model of a Borrower's Risk Incentive

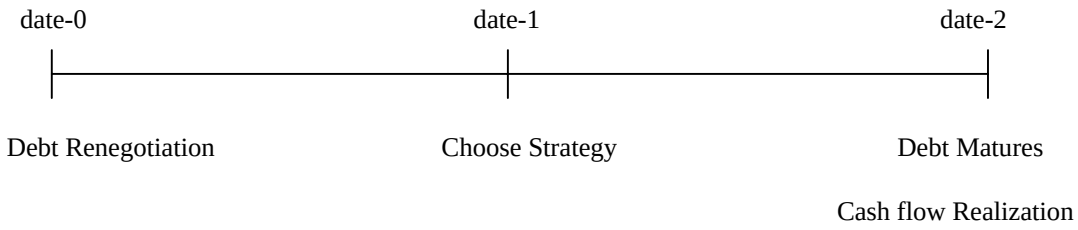

Figure 1: Sequence of Events

[4] To my knowledge, there is no empirical study that shows the negative announcement effect on main lending banks in response to debt concession. Dahiya, Saunders and Srinivasan (2003) reported that a significant negative stock price reaction of a leading bank occurred when a large corporate borrower announced default.

There are three dates in the model. At the initial date, date-0, a firm has bank debt with a face value of D. It is assumed that the firm borrows from only one bank. In the model, neither holdout problem, as pointed out by Gertner and Scharfstein (1991), James (1995), Detragiache and Garella (1996), nor the asymmetric information problem, as pointed out by Giammarino (1989) and Henikel and Zechner (1993), exist. At date-1, the firm chooses between two mutually exclusive strategies: strategy S and strategy R. Strategy S generates a certain cash flow of Y at the terminal date, date-2. On the other hand, strategy R generates a stochastic cash flow, i.e., a high cash flow of X with probability p and a low cash flow of zero with probability 1-p at date-2. For the sake of simplicity, it is assumed that all agents are risk-neutral and the risk-free interest rate is zero.

The following parameters are assumed in this model.

$$0 < pX < Y < D < X . \tag{1}$$

Assumption (1) implies three things. First, $pX<Y$ means that strategy S generates a higher expected cash flow than does strategy R, that is, strategy S is more valuable than strategy R. Second, $Y<D$ means that the expected value of the firm is lower than the face value of the outstanding debt. In this sense, the firm is in financial distress. If the firm chooses strategy S, then all of the cash flow generated at date-2 is paid to the bank. Third, $D<X$ means that shareholders of the borrowing firm can obtain a positive cash flow, X-D, if the firm succeeds with strategy R.

Under the current setting, the firm has a risk-taking incentive. Let $V_F(D, j)$ denote the value of the equity of the firm, which is affected by both the face value of the bank debt, D, and the strategy $j \in \{R, S\}$ chosen at date-1. Since $V_F(D, R)=p(X-D)>0$ and $V_F(D, S)=\max\{Y-D, 0\}=0$ hold under assumption (1), the firm chooses strategy R in order to maximize its shareholders' wealth. The decision of the firm is inefficient in the sense

that strategy R is less valuable than strategy S.

Furthermore, the risk-taking incentive of the borrowing firm decreases the value of the loan of the lending bank. Let $V_D(D, j)$ denote the value of the loan with a face value of D, under the condition that strategy $j \in \{R, S\}$ is undertaken. It is easy to show that, according to assumption (1), $V_D(D, R)=pD$ and $V_D(D, S)=Y$. Since $pD<pX<Y$, $V_D(D, R)<V_D(D, S)$ holds true. Thus, the risk-taking incentive of the borrowing firm may not desirable for the lending bank.

In order to resolve the borrower's risk incentive problem and to increase the value of the loan, the bank has an incentive to forgive the debt. Suppose that both the firm and the bank agree upon debt forgiveness and subsequently, the debt face value decreases to D^* from D. In order to forgive debt, the new face value of the debt, D^*, has to satisfy two requirements.

First, it is required that the act of debt forgiveness induces the firm to undertake strategy S. In other words, the firm chooses strategy S under the new face value of D^*. Let $V_F(D^*, j)$ denote the value of the firm equity just after debt forgiveness is agreed upon, which depends upon strategy $j \in \{R, S\}$ chosen at date-1. Since $V_F(D^*, S)=\max\{Y-D^*, 0\}$ and $V_F(D^*, R)=p(X-D^*)$, this requirement is given by

$$V_F(D^*, S) \geq V_F(D^*, R) \Leftrightarrow (Y - pX)/(1-p) \geq D^*. \qquad (2)$$

Note that condition (2) implicitly requires that $D^*<Y$. If condition (2) is not satisfied, then the firm will undertake strategy R in order to pursue the shareholders' interests.

Second, it is required that debt forgiveness never decreases the value of the bank loan. In this section, it is assumed that the bank does not make a debt concession, if such a concession were to decrease the value of the loan. Given that the firm chooses strategy S, the value of the loan with a new face value, which is represented as $V_D(D^*, S)$, is $\min\{Y, D^*\}=D^*$. Then, the second requirement is given by

$$V_D(D^*, S) \geq V_D(D, R) \Leftrightarrow D^* \geq pD. \quad (3)$$

Thus, based on (2) and (3), it follows that the risk incentive of the borrowing firm can be resolved through debt forgiveness, provided the new face value of the bank debt, D^*, satisfies the following equation:

$$pD \leq D^* \leq \frac{Y - pX}{1 - p}. \quad (4)$$

Note that equation (4) requires that

$$pD \leq \frac{Y - pX}{1 - p}. \quad (5)$$

I thereby arrive at the following proposition.

Proposition 1. Suppose that both (1) and (5) are satisfied. Under the original debt contract with a face value of *D*, the borrowing firm has a risk incentive, such that the risky strategy R is undertaken at date-1. This risk incentive problem can be eliminated through debt concession, after which the face value of the bank debt decreases to D^* from *D*. Under the new face value, D^*, which satisfies equation (4), the firm undertakes the more valuable and safer strategy S. Both the value of the borrower's equity and the value of the lender's loan increase in response to such debt forgiveness.

Proposition 1 shows that ex-post debt renegotiation, which is referred to here as efficient debt forgiveness, can resolve the borrower's suboptimal investment. It should be stressed that Proposition 1 is derived from the assumption that the lending bank acts to maximize the value of the loan, or equivalently, acts to maximize the total value of the bank itself. The next section examines whether or not efficient debt forgiveness will be agreed upon when the bank manager acts in the interest of the current shareholders' wealth, rather than in terms of the value of the loan.

3. Lender's Risk Incentive and Debt Forgiveness

For the sake of analytical simplicity, suppose that the lending bank has two kinds of assets at date-0; one of these assets is risk-free (e.g., Treasury bills or portfolios of risk-free loans) and the other type of asset is a risky loan to the borrowing firm, as discussed in the previous section. The value of the risk-free asset is represented by A. As mentioned above, the original face value of the risky loan is represented by D. The bank has deposits with promised payments of B, which matures at date-2. In this setting, the equity value of the bank, represented by $V_B(D)$, is affected only by the face value of the risky loan.

First, consider the case in which $A \geq B$ holds. In this case, all deposits can be met, regardless of the amount of the collection on the risky loan. Therefore, the equity value of the bank increases monotonically with an increase in the value of the risky loan. Since debt reduction increases the value of the loan, as shown in Proposition 1, the lending bank makes a debt concession. The borrower's risk incentive can be resolved, and the more valuable strategy S is undertaken.

Next, consider the case in which the bank has a risky liability at date 0, i.e., $A<B$ holds. In other words, under the current status of the assets, the bank cannot meet its liability with certainty. In this case, the equity value of the lending bank does not always increase with an increase in the value of the loan. To better conceptualize this point, suppose that the bank does forgive debt, as shown in Proposition 1, such that the value of the loan increases. Since the firm chooses strategy S under the new face value of D^*, the bank will collect D^* with certainty. Then, the total cash flow of the bank is $A+D^*$, and its equity value, denoted by $V_B(D^*)$, is given by

$$V_B(D^*) = \max\{A + D^* - B, 0\}. \tag{6}$$

On the other hand, if the bank does not forgive the debt, then the borrowing firm chooses strategy R. Since the total cash flow of the bank is A with probability p, and $A+D$ with probability $1-p$, the value of bank equity is given by

$$V_B(D) = p\max\{A + D - B, 0\}. \tag{7}$$

It should be noted that $V_B(D^*)$ is not always larger than $V_B(D)$. The bank manager, who is assumed to acts in the interest of the current shareholders' wealth, will decide to reduce the principal of the loan only when $V_B(D^*) \geq V_B(D)$ is satisfied.[5] Otherwise, (i.e., when $V_B(D^*) < V_B(D)$ holds), the bank manager does not forgive the debt, even though debt forgiveness increases the value of the loan.

It follows from (6) and (7) that the value of the bank equity is always equal to zero when $D \leq B-A$ holds. Therefore, in the following analysis, I will examine the case in which $0 < B-A < D$ holds. The next proposition, Proposition 2, shows that under some circumstances, the lender's risk incentive renders efficient debt forgiveness impossible.

Proposition 2. Suppose that $0 < B-A < D$ and

$$\frac{Y - pX}{1 - p} < pD + (1 - p)(B - A). \tag{8}$$

Then, the equity value of the lending bank decreases after efficient debt forgiveness is agreed upon.

***Proof of Proposition 2* :** Under condition (8),

$$D^* < pD + (1 - p)(B - A)$$

is satisfied for any D^* satisfying (4). Then,

[5] It is assumed that debt forgiveness is agreed upon when $V_B(D^*) = V_B(D)$ holds.

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\begin{aligned}
& V_B(D) - V_B(D^*) \\
& \geq V_B(D) - (D^* + A - B) \\
& = p(D + A - B) - (D^* + A - B) \\
& > 0
\end{aligned}
$$

holds true for any D satisfying $0<B-A<D$. Conversely, when condition (8) does not hold, there exists a D^* that satisfy the following equation:

$$pD < pD + (1-p)(B-A) \leq D^* \leq \frac{Y - pX}{1-p}.$$

It follows from $0<B-A<D$ and from the second inequality given above that

$$0 < p\{D - (B-A)\} \leq D^* - (B-A) \; 0 < p\{D - (B-A)\} \leq D^* - (B-A).$$

Since $V_B(D^*)=D^*-(B-A)$ for such D^*, debt forgiveness increases the equity value of the bank. □

Condition (8) is satisfied when either D or $B-A$ is large. It follows from (7) that the equity value of the bank under the original loan, $V_B(D)$, increases with an increase in the residual profit of the bank, $D-(B-A)$. Since $D-(B-A)$ is increasing with D, shareholders of the bank prefer the original debt contract to debt renegotiation, when the original principal of the loan, D, is large. On the other hand, it follows from (6) that the equity value of the bank under the new principal of the loan, $V_B(D^*)$, decreases with $B-A$. Then, when $B-A$ is large, efficient debt forgiveness is disadvantageous to the original debt contract for shareholders of the bank. Thus, under condition (8), the equity value of the bank decreases if the bank forgives the debt. As long as the bank manager acts to maximize the current shareholders' wealth, she will not agree to debt renegotiation.

As shown in the previous section, if there is no debt forgiveness, then the borrowing firm is induced to undertake risky strategy R, resulting in a riskier collection of the loan. When a bank prefers a risky cash flow to a stable cash flow, then the bank can be said to

have a risk incentive. Proposition 2 implies that when the lending bank has a risk incentive, then efficient debt renegotiation may not be agreed upon, such that the borrowing firm undertakes a risky strategy. The lender's risk incentive induces the borrower to choose value-decreasing risky projects.

Proposition 2 also shows that efficient debt forgiveness is agreed upon when neither $0<B-A<D$ nor (8) holds. Thus, as long as the lending bank has a risk incentive, achieving successful and efficient debt renegotiation will depend upon the asset-liability conditions of the lending bank.

4. Numerical Example

The following numerical example illustrates Proposition 2. Suppose that p=0.5, Y=80, D=90, X=100, and $B-A$=50. It is a simple matter to check that $0<B-A<D$, and conditions (1), (5), and (8) are all satisfied.

First, identify the risk incentive of the borrowing firm. Under the original principal of the loan, D=90, the equity value of the firm is zero if the firm undertakes strategy S. On the other hand, the equity value is 0.5(100-90)=5 if the firm undertakes strategy R. Clearly, the firm undertakes strategy R to enhance the shareholders' wealth. The value of the original bank loan is 0.5×90=45, on the condition that strategy R is undertaken.

In order to avoid the borrower's risk incentive, the bank will make a debt concession. The new principal, D^*, has to satisfy (4). It is assumed that the bank makes the minimum debt concession, that is, $D^*=(Y-pX)/(1-p)=60$. Under this new face value of the bank debt, the equity value of the firm is 20, regardless of a strategy undertaken at date-1. Then, the firm has no incentive to choose a risky strategy. After the bank forgives the debt, the value of the loan is 60, which is larger than 45. In this case, forgiving the debt increases the value of the bank loan.

As shown in Proposition 2, however, the bank does not forgive the debt, due to its

own risk incentive. To better comprehend this point, note that the equity value of the bank is 0.5(90-50)=20 under the original loan, which induces the firm to undertake strategy R. On the other hand, the equity value of the bank is 10 after the firm undertakes strategy S in response to the debt having been forgiven. Therefore, under the current setting, forgiving the debt decreases the equity value of the lending bank. If the manager of the bank acts in the interest of the shareholders' wealth, then the bank does not forgive the debt.

It should be pointed out that the bank goes into default with a positive probability of 0.5 if it does not forgive the debt. No default occurs if it forgives the debt. If the manager of the lending bank wants to avoid default rather than to increase the shareholders' wealth, then the bank will forgive the debt; this choice will in turn decrease the equity value of the lending bank.

5. Stock Price Decline of the Lending Bank in Response to Debt Forgiveness

Thus far, it has been assumed that the management of the lending bank acts in the interest of the shareholders' wealth. Then, as implied by Proposition 2, efficient debt forgiveness is agreed upon only when the stock price of the lending bank increases in response to having forgiven the debt. The management of the bank never forgives the debt if debt forgiveness decreases the stock price of the bank. In the real world, however, the stock price of the lending bank often falls just following an announcement of debt forgiveness.

Table 1 represents three cases of agreements to forgive large debts; these cases involved Japanese non-financial firms and their main banks in 2002. Daiei is one of the largest chain stores in Japan, the operating performance of which underwent decline in the 1990s. Both Daikyo and Towa Real Estate are real estate companies listed on the Tokyo Stock Exchange 1st Section; the operating performance of both of these

companies also declined during the 1990s.

On February 26, 2002, the morning edition of the *Nihon Keizai Shimbum*, which is the most popular economic press in Japan, reported that Daiei and its three main banks, UFJ, Sumitomo Mitsui, and Mizuho, agreed upon a debt forgiveness of 170 billion Yen (approximately $ 1.5 billion). As shown in Table 1, the stock price of these main banks dropped in response to the announcement. Comparing with the Bank Industry Index provided by the Tokyo Stock Exchange, the abnormal return of UFJ was -3.6%, that of Sumitomo Mitsui was -1.28%, and that of Mizuho was -2.62%. Comparing with TOPIX, which is the most commonly used stock price index of the Japanese stock markets, the abnormal return of UFJ was -4.88%, that of Sumitomo Mitsui was -2.55%, and that of Mizuho was -3.89%.

Similar to the case of Daiei, a main bank, UFJ, experienced a relatively larger stock price decline compared to both the Bank Industry Index and TOPIX, when the bank forgave the Daikyo and Towa Real Estate loans.

The question is why the lending bank agreed to the concession of the loan, which in turn decreased its stock price. The last paragraph in Section 4 provides a useful argument for answering this question. Suppose that the management of the lending bank is subject to the deadweight costs of default or financial distress. As emphasized by Gilson (1989) and Gilson and Vetsuypens (1993), default is costly for corporate managers.[6] In order to avoid default, the bank management may prefer a stable

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[6] Gilson (1989) found that managers were not subsequently employed by another firm for several years after being replaced in default. Gilson and Vetsuypens (1993) reported that almost one-third of COEs were replaced in a given year for reasons relating to default, and those who retained their positions often took substantial cuts in their salary and bonus. Several theoretical studies regarding corporate finance, such as those of Grossman and Hart (1982) and Zwiebel (1996), have assumed that corporate managers

collection of the loan to a risky collection. Note that, in the current setting, the lending bank can avoid default as long as the new principal of the loan, D^*, satisfies $B\text{-}A \leq D^*$. The bank goes into default with a positive probability of 1-p under the original principal, D.

Since $B\text{-}A < pD + (1\text{-}p)(B\text{-}A)$ holds under $B\text{-}A < D$, there exists a D^* satisfying the following condition:

$$B\text{-}A \leq \max\{pD, B-A\} \leq D^* \leq \frac{Y-pX}{1-p} < pD + (1-p)(B-A). \quad (9)$$

Note that both (4) and (8) are satisfied under condition (9). Then, the lending bank never goes into default after efficient debt forgiveness is agreed upon ($B\text{-}A < D^*$), whereas debt forgiveness decreases the equity value of the bank (Proposition 2). This scenario accounts for the situation in which the stock price of the lending bank declines in response to an announcement of debt forgiveness.[7]

The above explanation depends on two crucial assumptions. One of these assumptions is that the lending bank does not have a risk incentive. Rather, it is assumed that the management of the bank fears default. The other assumption is that the financial condition of the lending bank is not healthy in the sense that it has a risky liability ($A < B$). These two assumptions appear to be appropriate for the current major Japanese banks for the following reasons. First, managerial shareholdings have been traditionally

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incur deadweight costs in cases involving bankruptcy.

[7] In the current model, as shown in Section 2, debt forgiveness is not disadvantageous in terms of the stock price of the borrowing firm, as long as the management of the firm acts in the interest of its shareholders' wealth. In the three cases of debt forgiveness represented in Table 1, the announcement had a positive effect on the stock prices of Daiei and Daikyo, whereas in the case of Towa Real Estate, the announcement had a negative effect on stock price.

very small in major Japanese banks. Since the risk incentive of a bank is likely to be positively correlated with managerial ownership, it may be concluded that major Japanese banks have little risk incentive.[8] Second, as pointed out by Cargill (2000) and Ueda (2000), the financial conditions of Japanese banks steadily worsened during the 1990s. In 1998 and 1999, the Japanese Government helped many Japanese banks by injecting public funds into private banks. Under such unhealthy financial conditions, it is not unreasonable to assume that the management of major Japanese banks is oversensitive to default.

6. Conclusion

This paper suggests the possibility that a lender's risk incentive hinders the efficient debt renegotiation of debt. When both a lending bank and a borrowing firm have a risk incentive, the bank prefers a risky collection to stable collection of a loan. Although debt forgiveness reduces the risk incentive of the borrowing firm, the bank does not forgive the loan because it aims to enhance its shareholders' wealth. As a result, the borrowing firm chooses a value-decreasing risky project, such that the bank can collect a risky loan. The lender's risk incentive induces the borrower to also have a risk incentive.

This paper also demonstrates the possibility that the stock price of the lending bank will fall in response to efficient debt forgiveness. For example, when the lending bank is under unhealthy financial conditions, such that the management of the bank fears default, the bank forgives the loan. In such situations, efficient debt forgiveness increases the value of the borrowing firm, the value of the loan, and the total value of the lending bank, but decreases the equity value of the lending bank.

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[8] See footnote 2.

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Date	Forgiveness Amount (Billion Yen)	Borrower	Main Banks	Bank Stock Return (%)	Industry Index (%)	Industry Adjusted Return (%)	TOPIX (%)	Market Adjusted Return (%)
2/26/2002	170	Daiei	UFJ Sumitomo Mitsui Mizuho	▲ 5.21 ▲ 2.88 ▲ 4.22	▲ 1.60	▲ 3.61 ▲ 1.28 ▲ 2.62	▲ 0.33	▲ 4.88 ▲ 2.55 ▲ 3.89
5/14/2002	410	Daikyo	UFJ	▲ 3.48	▲ 0.96	▲ 2.52	▲ 0.27	▲ 3.21
11/8/2002	200	Towa Real Estate	UFJ	▲ 8.72	▲ 2.28	▲ 6.44	▲ 2.05	▲ 6.67

Table 1: Recent Debt Forgiveness and Bank Stock Price Reaction in Japan.

Discussion Paper

No.	Author	Title		Date
2002・1	Nobuyuki Isagawa	Cross Holding of Shares, Unwinding Cross Holding of Shares, and Managerial Entrenchment	(in Japanese)	1／ 2002
2002・2	Nobuyuki Isagawa	A Theory of Stock Price Behavior following Repurchase Announcements	(in Japanese)	1／ 2002
2002・3	Mahito Okura	An Equilibrium Analysis of the Insurance Market with Vertical Differentiation		2／2002
2002・4	Elmer Sterken Ichiro Tokutsu	What are the determinants of the number of bank relations of Japanese firms?		3／2002
2002・5	Mahito Okura	Review Article：Adverse Selection in Insurance Market	(in Japanese)	3／2002
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