Mutual Shareholding and Unwinding of Mutual Shareholding

as Stockpile for Business Recovery

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[Abstract]

Mutual Shareholding has long been a prominent future of Japanese corporate finance. Since the 1990s, many Japanese firms have been unwinding mutual shareholdings during the restructuring process. This paper provides a simple model in which firms decide to practice mutual shareholding in consideration of the possibility that in the future, they will unwind mutual shareholding. Mutual shareholding is a means of fund stockpiling in the sense that firms agree on the unwinding of mutual shareholding when they need to raise additional funds for recovering business. In particular, mutual shareholding is an effective means of a stockpile for business recovery in the case of firms whose returns have low correlations. The present model provides several implications with regard to mutual shareholding and the unwinding of mutual shareholding.

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1. Introduction

One of the most prominent features of Japanese corporate finance is the mutual shareholdings among large listed companies. Kuroki (2001) reports that mutual shareholdings observed among listed companies were about 17% of the total market capitalization at the end of the fiscal year 1990. Several studies have focused on explanations for why corporations choose to have mutual shareholdings. Traditionally, it has been commonly accepted that mutual shareholdings insulate corporate managers from interference by outside shareholders, in cases such as hostile takeovers [Sheard (1994) and Corbett (1994)]. In addition, it has been pointed out that mutual shareholdings are of benefit for risk sharing or diversification [Nakatani (1984) and Sheard (1989)]. Berglof and Perotti (1994) have shown that mutual shareholding is an effective mechanism of mutual control among member companies. Moreover, Osano (1996) has shown that mutual commitment caused by mutual shareholdings plays an important role in avoiding corporate managers' inefficient myopic investments.

During the 1990s mutual shareholdings among Japanese companies have steadily declined. Kuroki (2001) reported that the proportion of mutual shareholdings in the overall market declined to about 10% at the end of the fiscal year 2000. Ang and Constand (2002) also reported that the proportion of shares held by corporations and financial institutions tended to decrease during the 1990s in Japan. In contrast to the large amount of attention paid to the rationale of mutual shareholding, there has been relatively little focus on the unwinding of mutual shareholding. Given the recent decline in mutual shareholdings, a model of mutual shareholding in which mutual shareholdings are rationally unwound may provide further insight into the motivations for mutual shareholding. This paper is an initial effort in this regard.

In this paper, a fund stockpiling motivation of mutual shareholding is proposed, such that firms have mutual shareholdings as well as unwind mutual shareholdings.

Strategies for the fund stockpiling of two firms are considered. Each of the two firms stockpiles funds by choosing one of two optional financial strategies, namely, cash-holding and mutual shareholding. If each of the two firms chooses cash-holding, then the firm issues a certain number of shares on the market and can thereby hold cash until the firm needs to invest it. If both firms choose mutual shareholding, then each firm issues a certain number of shares to the other firm and retains mutual shareholding until either firm needs additional funds.[1]

In the present model, it is assumed that the firms are required to invest additional funds for recovering business, or for restructuring under unfavorable conditions that create problems for the business. It is known to be difficult for firms facing business troubles to raise capital by issuing new securities. Firms must use internal funds or must sell marketable assets to invest additional funds back into their declining business. It appears to be plausible that firms raise funds by unwinding mutual shareholdings for the recovery of business. It is well known that, during the 1990s, many traditional Japanese companies restructured their operations as well as accelerated the process of the unwinding of mutual shareholdings. It has often been claimed in the business media that firms chose to unwind mutual shareholdings in order to raise funds for the restructuring process. Sheard (1994) also has pointed out that the sale of securities has been a common response of large Japanese companies facing business difficulties.

Within this framework, the present study examines the means used by firms undergoing difficulty to stockpile the additional funds, i.e., it is considered whether mutual shareholding or cash-holding is more beneficial. When only one firm faces bad business conditions (a bad firm) and the other firm faces good business conditions (a

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[1] I do not consider equity finance at a time when a firm needs additional cash, because this financial strategy is dominated by cash-holding in the model. For detail, see Section 5.1.

good firm), only the bad firm needs additional funds in order to recover. The bad firm can raise more funds compared to its fundamental value under conditions of mutual shareholding, because it can sell shares of the good firm. This effect is called the "diversification effect of mutual shareholding". Similarly, cash-holding provides the bad firm with a relatively large amount of funds compared to its fundamental value. Since a firm issues new shares before the business condition is realized, it can sell shares at a price that reflects the possibility of the occurrence of favorable conditions. This effect is called the "self-diversification effect of cash-holding". Assuming reasonable conditions, it can be shown that the diversification effect of mutual shareholding is larger than that of cash-holding. In the present case, mutual shareholding provides more funds to the bad firm than does cash-holding.

When both of the two firms face bad conditions simultaneously, mutual shareholding provides fewer funds to the bad firm than does cash-holding. In this case, the diversification effect of mutual shareholding disappears because each bad firm has the other bad firm's shares. In contrast, the self-diversification effect of cash-holding remains because it does not depend on the business conditions a firm actually experiences. Finally, when both firms face favorable conditions simultaneously, neither of the firms needs to invest additional funds for the recovery of the business. In this case, mutual shareholding and cash-holding are indifferent.

Given this trade-off between mutual shareholding and cash-holding, the more desirable means of stockpiling funds is dependent on the distribution of business conditions that the two firms will experience. If the probability of events by which only one firm will experience bad conditions is sufficiently larger than the probability of events by which both firms will experience bad conditions, then mutual shareholding is a more desirable means of stockpiling funds than is cash-holding. Both firms agree on mutual shareholding and retain this strategy as long as neither firm experiences bad business conditions. However, when either firm experiences bad conditions, the bad

firm is required to unwind mutual shareholding in order to raise cash and recover business. The good firm agrees on the unwinding of mutual shareholding, because the recovery of the bad firm has the effect of increasing the value of the shares held by the good firm, resulting in an increase in the good firm's value. When both firms experience bad conditions under mutual shareholding, each bad firm sells the other firm's shares and invests the funds raised in this manner into its own faltering business. Thus, in the present model, firms choose mutual shareholding while considering the possibility of the unwinding of mutual shareholding.

The diversification effect of mutual shareholding discussed in this paper is somewhat different from the traditional diversification effect pointed out by Nakatani (1984). Traditionally, the diversification effect has been conceived within a framework assuming that mutual shareholding plays a role in stabilizing the returns of member firms, such that it is a desirable option for risk-averse investors who cannot easily diversify their portfolios due to market frictions. The diversification effect discussed in this paper indicates the possibility that firms facing difficulty can raise large amount of funds for recovery by the unwinding of mutual shareholding. In this model, a risk-averse economy is not assumed, and the diversification effect described in this paper is not dependent on risk-aversion. Instead, the diversification effect depends on the idea that firms can recover or improve their faltering business by investing additional funds into the business, and mutual shareholding may provide more funds than other financial instruments such as cash-holding. Sheard (1994, ch.7) informally points out that mutual shareholding provides member firms with a form of insurance against financial failure. The present model explicitly shows that mutual shareholding actually plays an important role in fund stockpiling; by these means, firms can then invest more funds into their faltering business than could utilizing other financial instruments.

The remainder of this paper is organized as follows. In Section 2, a model of

stockpiling funds for business recovery is presented. In Section 3, the value of stockpile for business recovery is examined, considering both mutual shareholding and cash-holding. In Section 4, the value of mutual shareholding and that of cash-holding are compared. Then, the issue is addressed regarding the conditions under which mutual shareholding is a more desirable means of stockpile for business recovery than is cash-holding. In Section 5, various remaining points and implications of the model are considered. Section 6 provides concluding remarks.
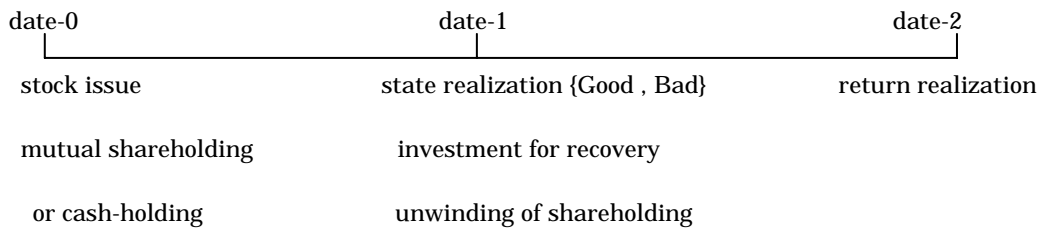
2. A Model of Stockpile for Business Recovery

In this model, there are two firms, firm a and firm b. At the beginning, each of the two firms issues one share outstanding, and has one existing asset. All participants are risk-neutral, and the interest rate is zero.

The asset-in-place of each firm generates stochastic return. If the external condition of a firm is good (state G), then the asset-in-place generates a high return, X. If the external condition is bad (state B), then the asset-in-place generates a low return, Y, where $Y<X$. In state B, however, the firm has the opportunity for recovery. That is, if the firm facing state B were in a position to quickly invest additional funds, C, into its business, then the total return generated from the asset-in-place would increase to $Y+(1+r)C$, where $r>0$ is the recovery rate. It can be interpreted that C is the funds invested into the firm's faltering business to recover the business. Thus, in the current model, a firm can recover its performance by investing new funds into the business in a timely fashion in response to the crisis. With regard to the recovery rate, it is assumed that $0<r<1$. In addition, the return in state B never exceeds the return in state G.

There are two means for firms to prepare funds for business recovery. Each firm can issue n shares to the market in advance and keep raised cash in hand; this is refereed to as "cash-holding". Alternatively, each firm can issue n shares to the other firm in

advance, that is, "mutual shareholding". Whether or not a firm prefers mutual shareholding to cash-holding is dependent on the amount of funds the firm can utilize when in crisis. Here, equity finance just following the realization of state B is not taken into account, because of the requirement of a swift investment of cash into the business. Since the execution of equity finances requires several weeks in the real world, the firm may lose an investment opportunity which requires the swift investment of cash. In addition, as will be addressed later, the equity finance conditional for the realization of state B is dominated by cash-holding in the current setting.

date-0	date-1	date-2
stock issue	state realization {Good , Bad}	return realization
mutual shareholding	investment for recovery	
or cash-holding	unwinding of shareholding	

Figure 1. Sequence of Events and Decisions

The formal sequence of events and decisions, described in Figure 1, is as follows. At date-0, each firm chooses cash-holding or mutual shareholding. If the two firms agree on mutual shareholding, then they exchange n shares with each other and maintain the other firm's shares until date-1. Let us define $\alpha = n/(1+n)$. In the case of mutual shareholding, each firm holds α fraction of the other firm's equity. It is assumed that $0 < \alpha < 1/2$. On the other hand, if both firms choose cash-holding, each firm issues n shares to the market and keep raised funds in hand.

At date-1, the true state is publicly realized. For both firms, the prior probability of state G is 1/2, and that of state B is 1/2. The date-0 values of both firms are identical, so that it is natural to assume that the two firms exchange the same fraction of equity from each other. However, it should be noted that it is not required that both firms always

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experience the same state at date-1. It is possible that each firm faces a different state. Hereafter, event (G, B) is referred to as the date-1 situation, in which firm a faces state G and firm b faces state B. Event (B, G), event (G, G), and event (B, B) indicate similar situations. Let us indicate the probability of event (G, G) by θ_{GG}, the probability of event (G, B) by θ_{GB}, the probability of event (B, G) by θ_{BG}, and the probability of event (B, B) by θ_{BB}. Since $\theta_{GG}+\theta_{GB}=1/2$, $\theta_{BG}+\theta_{BB}=1/2$, $\theta_{GG}+\theta_{BG}=1/2$, and $\theta_{GB}+\theta_{BB}=1/2$, then $\theta_{GG}=\theta_{BB}$ and $\theta_{GB}=\theta_{BG}$ hold in the current setting.

As mentioned earlier, a firm experiencing state B must invest new funds into the business in order to recover. If mutual shareholding was chosen at date-0, a firm experiencing state B can raise funds swiftly by selling the other firm's shares to the market. This is the case of involving the unwinding of mutual shareholding, which is agreed upon because the recovery of the bad firm's business increases the value of bad firm's shares held by the other firm, resulting in an increase in the total value of the other firm. If cash-holding was chosen at date-0, then a firm experiencing state B can use the funds raised at date-0.

Then, at date-2, the total returns of the two firms are realized. Since there is no informational asymmetry, in the case of mutual shareholding, the total return of a firm experiencing state G is not dependent on whether or not it sells the other firm's shares.

3. The Value of Business Recovery

3.1. The Value of Mutual Shareholding

In this subsection, the issue addressed is the amount of funds that a firm can invest into its faltering business when the two firms choose mutual shareholding at date-0. First, consider a situation in which firm a faces state B and firm b faces state G (event (B, G)). In this event, only firm a needs to invest additional funds into its faltering

business in order to recover the business. Let P_j^1 denote the date-1 stock price of the firm $j \in (a, b)$. Since firm a injects nP_b^1 into its business, the total value of assets of firm a is given by $Y+nP_b^1(1+r)$. On the other hand, the value of total assets of firm b is given by $X+nP_a^1$. Therefore,

$$P_a^1 = \frac{Y + nP_b^1(1+r)}{1+n}, \tag{1}$$

$$P_b^1 = \frac{X + nP_a^1}{1+n}. \tag{2}$$

By using $\alpha = n/(1+n)$ and solving these two equations, the following equations are obtained:

$$P_a^1(B,G;mh) = \frac{(1-\alpha)[Y+\alpha(1+r)X]}{1-(1+r)\alpha^2}, \tag{3}$$

$$P_b^1(B,G;mh) = \frac{(1-\alpha)[X+\alpha Y]}{1-(1+r)\alpha^2}, \tag{4}$$

where $P_j^1(B, G; mh)$ represents the date-1 stock price of firm $j \in (a, b)$ under mutual shareholding in event (B, G). In this case, firm a can invest $nP_b^1(B, G; mh)$ into its business, and creates the value of $rnP_b^1(B, G; mh)$. This is the value of business recovery under the condition of mutual shareholding. Note that the denominator of (3) and (4), $1-(1+r)\alpha^2$, is positive because $r<1$ and $\alpha<1/2$.

By calculating the difference between Y and (4), the following equation is obtained:

$$\frac{(1-\alpha)[X+\alpha Y]}{1-(1+r)\alpha^2} - Y = \frac{(1-\alpha)(X-Y)+r\alpha^2 Y}{1-(1+r)\alpha^2} > 0. \tag{5}$$

The numerator consists of two positive components. The first positive component, $(1-\alpha)(X-Y)$, is derived from the fact that a bad firm possesses shares of the other firm facing a good state. This effect is the diversification effect. The second component, $r\alpha^2 Y$, comes from the fact that a firm can recover business. This effect is the recovery effect.

When one firm faces a bad state and the other firm faces a good state, both the diversification effect and the recovery effect increase the amount of funds that a firm facing a bad state can invest into its business, resulting in an increase in the value of the firm.

The above argument can be applied when event (G, B) occurs. In this event, the date-1 stock price of firm a is given by the right hand of equation (4), and that of firm b is given by the right hand of equation (3). The value of mutual shareholding as stockpile for business recovery, given by $rnP_a^1(G, B; mh)$, is equal to $rnP_b^1(B, G; mh)$.

Next, consider the situation in which both of the two firms face state B (event (B, B)). In this event, both firms must invest additional funds into their business by unwinding mutual shareholding. Then,

$$P_a^1 = \frac{Y + nP_b^1(1+r)}{1+n}, \tag{6}$$

$$P_b^1 = \frac{Y + nP_a^1(1+r)}{1+n}. \tag{7}$$

It follows from (6) and (7) that the date-1 stock price of firm $j \in (a, b)$ under conditions of mutual shareholding in event (B, B), denoted by $P_j^1(B, B; mh)$, is given by

$$P_a^1(B, B; mh) = P_b^1(B, B; mh) = \frac{(1-\alpha)Y}{1-\alpha-\alpha r}. \tag{8}$$

Since both firm a and firm b face bad states, no diversification effect exists in (8). On the other hand, there exists a recovery effect, by which the amount of raised funds exceeds Y. In this case, the value of mutual shareholding is given by $rnP_a^1(B, B; mh)+rnP_b^1(B, B; mh)$, because both of the two firms attempt to recover business.

Finally, when both of the two firms face state G (event (G, G)), neither firm has to invest additional funds into its business. In this case, it is easy to demonstrate that the stock price of firm j is equal to X under mutual shareholding conditions.

3.2. The Value of Cash-Holding

The two firms can choose cash-holding to stockpile funds instead of mutual shareholding. In the case of cash-holding, a firm issues n shares at date-0, and maintain the raised cash for the recovery of business at date-2. The date-0 stock price of firm $j \in \{a, b\}$ under cash-holding is represented by $P_j^0(ch)$. The total amount of funds that firm j can use for recovery is then $nP_j^0(ch)$. Since the value of the assets of firm j in state G is $X + nP_j^0(ch)$, that in state B is $Y + (1+r)nP_j^0(ch)$, and each state is realized with a probability of 1/2,

$$P_j^0(ch) = \frac{(1/2)[X + nP_j^0(ch) + Y + (1+r)nP_j^0(ch)]}{1+n} .$$ (9)

By solving (9) with respect to $P_j^0(ch)$,

$$P_j^0(ch) = \frac{(1-\alpha)(1/2)(X+Y)}{1-\alpha-(rn/2)} = \frac{(1-\alpha)(X+Y)}{2-2\alpha-\alpha r} .$$ (10)

The denominator is positive because $r<1$ and $\alpha<1/2$.

As in the case of mutual shareholding, the value of (10) is larger than Y, that is,

$$P_j^0(ch) - Y = \frac{(1-\alpha)(X-Y)+r\alpha Y}{2-2\alpha-\alpha r} > 0 .$$ (11)

The first positive term in the numerator can be interpreted as a kind of diversification effect. Since issuance of new shares precedes the state realization, the value of a share of the firm includes the possibility of a high return, X. For the firm actually facing a bad state, cash-holding provides more funds than its fundamental value, Y; this is the self-diversification effect. The second positive term is derived from the recovery effect.

When only one of two firms faces state B, the firm invest $nP_j^0(ch)$ into its faltering business and creates the value of $rnP_j^0(ch)$, which is the value of cash-holding. On the

other hand, when both of the two firms face state B, the value of cash-holding is given by $2rnP_j^0(ch)$.

Recall that it is assumed that a return in state B never exceeds a return in state G. This assumption is formalized as

$$X + nP_j^0(ch) > Y + (1+r)nP_j^0(ch). \tag{12}$$

By plugging (10) into (12) and solving the equation,

$$(1-\alpha-\alpha r)X > (1-\alpha)Y \tag{13}$$

is obtained. Therefore, the recovery rate, r, must satisfy the requirement that $0<r<\min\{1, (1-\alpha)(X-Y)/\alpha X\}$.

4. Mutual Shareholding versus Cash-holding

In this section, mutual shareholding and cash-holding are compared from the perspective of stockpile for business recovery. First, event (B, G) is compared. Under mutual shareholding conditions, firm a can invest $nP_b^1(B, G; mh)$ into its faltering business for recovery. On the other hand, under cash-holding conditions, firm a can invest $nP_j^0(ch)$ into its business. Let us define $\Delta_{BG}=nP_b^1(B, G; mh)-nP_j^0(ch)$. If Δ_{BG} is positive (negative), then firm a can stockpile more (less) funds by mutual shareholding than it can by cash-holding. It follows from (4) and (10) that

$$\Delta_{BG} = \frac{(1-\alpha)[(1-\alpha-\alpha r)X - (1-\alpha)Y]}{(1-\alpha^2 - \alpha^2 r)(2-2\alpha-\alpha r)}. \tag{14}$$

From the assumption of (13), it can be concluded that Δ_{BG} is positive. That is, in event (B, G), firm a can invest more funds into its business by choosing mutual shareholding than by choosing cash-holding. The reason for this can be explained as follows. Since $\alpha<1/2$ and $r<1$, the coefficient of X is positive. This implies that the

diversification effect of mutual shareholding is larger than the self-diversification effect of cash-holding; this result is derived from the fact that, under mutual shareholding, a bad firm can sell shares of the other good firm. With regard to the recovery effect, the following is obtained:

$$\frac{\partial \Delta_{BG}}{\partial r} = \frac{-\alpha^2 (1-\alpha) f(X,Y,\alpha,r)}{(1-\alpha^2 - \alpha^2 r)^2 (2-2\alpha - \alpha r)^2} < 0 , \tag{15}$$

where

$$f(X,Y,\alpha,r) = X((1-\alpha)^3 + 2\alpha^2 r - 2\alpha^3 r - \alpha^3 r^2) + Y(1-\alpha)(1+2\alpha - 3\alpha^2 - 2\alpha^2 r) > 0 .$$

The inequality follows from $\alpha < 1/2$ and $r<1$. Since Δ_{BG} decreases with r, the recovery effect of mutual shareholding is smaller than that of cash-holding.[2] Under the assumption of (13), the diversification effect is more important than the recovery effect, because the recovery rate is restricted to be small.

The same result holds in event (G, B). That is, $\Delta_{GB}=nP_b^1(G, B; mh)-nP_j^0(ch)$, which is equal to Δ_{BG}, is positive.

Next, consider in event (B, B). The arguments in the previous section maintain that firm $j \in \{a, b\}$ can invest $nP_j^1(B, B; mh)$ into its faltering business under mutual shareholding conditions, whereas it can invest $nP_j^0(ch)$ into its business under cash-holding conditions. Let us define $\Delta_{BB}=nP_j^1(B, B; mh)-nP_j^0(ch)$. It follows from (8)

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[2] The intuition for this is as follows. Since the probability of the occurrence of state B is 1/2, the sensitivity of the ex-ante stock price to an increase in the recovery rate is also approximately 1/2. On the other hand, since each of the two firms has α fraction of the other firm's equity under mutual shareholding, the sensitivity of the good firm's stock price to an increase in the recovery rate is approximately $\alpha < 1/2$. Thus, the amount of cash that a bad firm can raise under cash-holding is more (positively) sensitive to an increase in the recovery rate than is the amount it can raise by mutual shareholding.

and (10) that

$$\Delta_{BB} = \frac{-\alpha[(1-\alpha-\alpha r)X - (1-\alpha)Y]}{(1-\alpha-\alpha r)(2-2\alpha-\alpha r)}. \qquad (16)$$

The condition (13) ensures that Δ_{BB} is negative. The negative coefficient of X means that the diversification effect of mutual shareholding is smaller than the self-diversification effect of cash-holding. This result is due to the fact that the diversification effect of mutual shareholding disappears in such an event.

The results of $\Delta_{GB}=\Delta_{BG}>0$ and $\Delta_{BB}<0$ state that there is a trade-off between mutual shareholding and cash-holding. Although mutual shareholding is more beneficial than cash-holding when each firm faces a different state, cash-holding outperforms mutual shareholding when both firms face the same state B. Which is more beneficial, mutual shareholding or cash-holding, depends on the distribution of the occurrence of event. In order to examine which strategy is preferable for stockpiling cash, the ex-ante efficiency of mutual shareholding, denoted by E_{mh}, and that of cash-holding, denoted by E_{ch}, are defined below.

$$E_{mh} = \theta_{GB} r n P_b^{-1}(B,G;mh) + \theta_{BG} r n P_a^{-1}(G,B;mh) + \theta_{BB} r n \{P_a^{-1}(B,B;mh) + P_b^{-1}(B,B;mh)\},$$

$$E_{ch} = \theta_{GB} r n P_a^{-0}(ch) + \theta_{BG} r n P_b^{-0}(ch) + \theta_{BB} r n \{P_a^{-0}(ch) + P_b^{-0}(ch)\}.$$

The ex-ante efficiency of mutual shareholding, E_{mh}, is given by the expected value of recovery when both firms agree on mutual shareholding at date-0. Similarly, the ex-ante efficiency of cash-holding, E_{ch}, is given by the expected value of recovery under cash-holding conditions. Taking into consideration that $\theta_{GG}=\theta_{BB}$, $\theta_{GB}=\theta_{BG}$, $P_a^{-1}(G, B; mh)=P_b^{-1}(B, G; mh)$, $P_a^{-1}(B, B; mh)=P_b^{-1}(B, B; mh)$, and $P_a^{-0}(ch)=P_b^{-0}(ch)$, the following is obtained:

$$E_{mh} = 2r[\theta_{BG} n P_b^{-1}(B,G;mh) + \theta_{BB} n P_b^{-1}(B,B;mh)], \qquad (17)$$

$$E_{ch} = 2r[\theta_{BG}nP_a^{\ 0}(ch) + \theta_{BB}nP_a^{\ 0}(ch)]. \tag{18}$$

Therefore,

$$E_{mh} - E_{ch} = 2r(\theta_{BG}\Delta_{BG} - \theta_{BB}\Delta_{BB}). \tag{19}$$

Mutual shareholding is agreed upon at date-0 when $E_{mh} > E_{ch}$ holds. It follows from (14) and (16) that

$$E_{mh} > E_{ch} \Leftrightarrow \frac{\theta_{BG}}{\theta_{BB}} > \frac{1 - \alpha^2 - \alpha^2 r}{(1-\alpha)(1-\alpha-\alpha r)}. \tag{20}$$

On the other hand, cash-holding is chosen at date-0 when

$$E_{mh} < E_{ch} \Leftrightarrow \frac{\theta_{BG}}{\theta_{BB}} < \frac{1 - \alpha^2 - \alpha^2 r}{(1-\alpha)(1-\alpha-\alpha r)}. \tag{21}$$

When $E_{mh} = E_{ch}$, mutual shareholding and cash-holding are indifferent. Now, the following proposition can be obtained.

Proposition 1. The two firms agree upon mutual shareholding when (20) holds, whereas the two firms choose cash-holdings when (21) holds.

Note that $(1-\alpha^2-\alpha^2 r)/(1-\alpha)(1-\alpha-\alpha r) > 1$. Thus, condition (20) requires that $\theta_{BG} > \theta_{BB}$. That is, mutual shareholding is agreed upon only when the probability of event (B, G) is relatively large compared to the probability of event (B, B). Intuitively, in such a situation, the diversification effect of mutual shareholding works well to stockpile cash. On the other hand, when (21) holds, the diversification effect of cash-holding functions well.[3]

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[3] Note that in event (B, B), mutual shareholding has no diversification effect while cash-holding does have a diversification effect.

5. Discussion and Implications

5.1. Equity Finance in the Bad State

So far, equity finance conditional on state B being realized (hereafter, "equity finance") has not been considered for two reasons. First, since the execution of equity finance frequently requires several weeks, a bad firm may lose its opportunity to recovery. Second, in the current setting, equity finance is dominated by cash-holding. That is, the total amount funds raised by equity finance just following the state realization (equity finance) is less than that raised by equity finance prior to the state realization (cash-holding). A formal argument follows regarding this point.

Suppose that a firm $j \in \{a, b\}$ issues n shares and raises cash after it experienced state B. The date-1 stock price of firm j experiencing state B can be denoted by $P_j^1(ef)$. Since the total rerun of the firm is $Y + nP_j^1(ef)(1+r)$ and the total number of shares is $1+n$, $P_j^1(ef)$ has to satisfy

$$P_j^1(ef) = \frac{Y + nP_j^1(ef)(1+r)}{1+n} . \tag{22}$$

By comparing (22) with (5) (or (6)), $P_j^1(ef)$ is equal to $P_j^1(B, B; mh)$. That is,

$$P_j^1(ef) = \frac{(1-\alpha)Y}{1-\alpha-\alpha r} . \tag{23}$$

Furthermore, $\Delta_{BB} < 0$ implies that $P_j^1(ef) < P_j^0(ch)$. Thus, the amount of funds raised by equity finance is always less than that raised by cash-holding. Therefore, neither firm chooses equity finance just following the state realization.

Proposition 2. In the current setting, equity finance conditional on state B being

realized is dominated by cash-holding.

5.2. Diversification Effect of Mutual Shareholding

As introduced in Section 1, it has been traditionally pointed out that one advantage of mutual shareholding is to stabilize member firms' returns though asset diversification. Some empirical studies, such as those of Nakatani (1984) and Douthett and Jung (2001), have reported that *Keiretsu* firms experience more stable returns than do non-*Keiretsu* firms. Since mutual shareholdings among *Keiretsu* firms are tighter than non-*Keiretsu* firms, mutual shareholding is an instrument of diversification.

However, it should be noted that in a situation in which investors can diversify their portfolios by themselves, the traditional diversification effect of mutual shareholding is not important *per se*. In other words, the diversification effect alone is not a motivation for mutual shareholding in a risk-neutral economy. In contrast, the diversification effect discussed in this paper plays an important role for cash stockpiling even in a risk-neutral setting, because both the diversification effect and the recovery effect are considered together.

Under mutual shareholding conditions, it is possible for a firm facing bad business conditions (a bad firm) to sell shares of the other firm. In particular, when the other firm faces good business conditions (a good firm), the value of a good firm is higher than that of the bad firm. In such an event, the bad firm can raise more funds for recovery by mutual shareholding than by cash-holding. In the current model, the diversification effect of mutual shareholding is economically important because it affects the magnitude of business recovery. As shown in the previous section, the more likely each of the two firms are to experience a different state, the better the diversification effect of mutual shareholding will work. Mutual shareholding is desirable among firms whose returns have low correlation. The present model suggests that the lower the correlation

is between the returns of member firms, the more effective the diversification effect of mutual shareholding will be for business recovery.

Sheard (1994, ch.7) maintains that the advantage of mutual shareholding does not appear to be to stabilize the returns of member firms, but rather to provide the member firms with a form of insurance against financial failure. By incorporating the recovery effect into the diversification effect, the present model formally demonstrates this point.

5.3. Unwinding of Mutual Shareholding for Business Recovery

One of contributions of this paper is to explicitly analyze the unwinding of mutual shareholding. In this model, mutual shareholding is unwound when at least one of two firms experiences bad business conditions. For such a firm, the unwinding of mutual shareholding is an effective financial instrument for raising funds required to recover or restructure the business.

As reported by Kuroki (2001) and Ang and Constand (2002), mutual shareholdings among Japanese firms have been declining since the 1990s. It is well known that Japanese firms have been progressively restructuring since the 1990s. The business press has often indicated that Japanese firms unwound mutual shareholdings in order to raise capital for restructuring; it has also been suggested that Japanese banks intended to unwind mutual shareholdings in order to raise capital in preparation for bad debt. In addition, Sheard (1994) has pointed out that the sale of securities has been a common response of large Japanese companies facing difficulties. Thus, although there have been few empirical studies focusing on the reason why mutual shareholdings among Japanese firms have declined, it is be possible to argue that firms abandoned mutual shareholding when they faced more profitable investment opportunities; in particular, the unwinding of mutual shareholdings provided firms the additional funds for recovery

or restructuring when the firms were experiencing difficulty.[4]

In the present model, mutual shareholding is unwound when at least one firm faces difficulty and therefore requires additional funds for recovery. There is no conflict between member firms with regard to the unwinding of mutual shareholding. When both of the two firms are confronted with bad business conditions, each firm sells the other firm's shares and invests the raised funds into more profitable options than mutual shareholding, that is, they focus on business recovery. When only one of the two firms experiences bad business conditions, this bad firm has to unwind mutual shareholding in order to raise funds for recovery. The other good firm agrees to unwind mutual shareholding, because the recovery of the bad firm will increase the value of the bad firm's shares held by the good firm, resulting in an increase in the value of the good firm. Thus, in the present model, firms rationally choose to unwind mutual shareholding in order to achieve recovery, and they choose to engage in mutual shareholding while considering the possibility of the unwinding of mutual shareholding.

5.4. Market Response to Unwinding of Mutual Shareholding

Next, stock price behavior following the unwinding of mutual shareholding is examined. It is assumed that informational asymmetry exists between firms and the stock market with regard to the firms' external conditions. That is, the firms are aware of their true business conditions, but the market is not. In addition, it is assumed that

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[4] To the best of my knowledge, the Fuji Research Institute Corporation (1993) is the only comprehensive empirical research center that has focuses on what Japanese corporate managers thought about mutual shareholdings; a questionnaire was used to analyze their options. It was in fact reported that about 2/3 of the firms in the sample (n=1175) worried about low returns from shares held as mutual shareholdings.

firms do not have access to any other means of raising funds for recovery. In such a situation, the unwinding of mutual shareholding is a signal that the external conditions of the firm are unfavorable.

Consider a situation in which condition (20) is satisfied such that the two firms agree upon mutual shareholding at date-0. Suppose that both firm a and firm b face bad business conditions. Since both firms wish to recover business, both firms agree on the unwinding of mutual shareholding and they sell their holding shares of the other firm; this type of unwinding of mutual shareholding can be referred to as "bilateral unwinding". Both firms have no incentive to continue shareholding, because they lose profitable investment opportunities by doing so. In order to maximize the long-term shareholders' wealth, both firms relinquish mutual shareholding, even though their stock prices will decline in the short-term. Stock price declines, dependent upon mutual shareholdings being unwound, are ensured by the assumption that returns under bad conditions will be smaller than returns under good conditions.

Next, suppose that firm a faces bad business conditions, but firm b faces good business conditions. In this case, firm a sells its holding shares of firm b in order to raise funds required to recover business. For the same reason as that given above, firm a has no incentive not to sell shares of firm b. On the other hand, firm b has no incentive to sell its holding shares of firm a. The explanation for this phenomenon is as follows. If firm b sells its holding shares of firm a, then the market realizes that both firms face bad business conditions. Since the stock price of firm b is undervalued compared to its fair value, the total amount of cash that firm a is able to raise decreases, resulting in a decrease in the total value of firm b. In order to avoid this risk, firm b will retain its shares of firm a or it will postpone selling them. This can be interpreted as a "unilateral unwinding" of mutual shareholding, or as "one-sided shareholding". Thus, a model with asymmetric information provides insights regarding the timing of the unwinding of mutual shareholding. When both firms face good business conditions, neither firm has

an incentive to unwind mutual shareholdings.

The following proposition summarizes the arguments discussed above.

Proposition 3. There exists a signaling equilibrium at which the bilateral unwinding of mutual shareholding indicates that both firms face bad business conditions simultaneously, and the unilateral unwinding of mutual shareholding indicates that only one firm faces bad business conditions. Although in both cases, stock prices decline following the unwinding of mutual shareholding, the magnitude of the stock price decline that occurs after the bilateral unwinding is larger than that following the unilateral unwinding.

Financial market practitioners often argue that the unwinding of mutual shareholdings will lead to a decline in the stock price due to an excess supply of shares. Although the present model also predicts that an unwinding of mutual shareholding will lead to a stock price decline, the reason for this decline is not excess supply. In the present model, the unwinding of mutual shareholding is a signal that the business conditions of the respective firms are unfavorable, so that the firms are forced to raise additional cash for recovery. The unwinding of mutual shareholding is desirable for long-term shareholders.

6. Conclusions

Mutual shareholding has long been a prominent strategy in Japanese corporate finance. However, since the 1990s, mutual shareholdings among Japanese firms have been unwound. In this paper, a simple model is outlined in which firms choose mutual shareholding while considering the possibility that they will at some point in the future unwind mutual shareholdings. In the model, mutual shareholding is a means of

stockpiling funds in the sense that when firms face bad business conditions, they can raise the funds required for recovery by selling the holding shares (unwinding mutual shareholding). This model reflects the well-known fact that many Japanese firms restructured their operations during the 1990s, and that they accelerated the unwinding of mutual shareholdings during that period.

The present study compared mutual shareholding and cash-holding (holding cash raised by equity finance) from the perspective of stockpile for business recovery, and demonstrated that mutual shareholding is superior to cash-holding when the correlation between the returns of the firms is low. In such cases, firms appear to agree on mutual shareholding, and they continue with mutual shareholding as long as their businesses are healthy. However, when at least one of the member firms experiences difficulty, the mutual shareholdings are unwound. Thus, in the present model, firms dynamically have mutual shareholdings, and then unwind such shareholdings in response to particular unfavorable business conditions.

The present model has several implications regarding mutual shareholding and the unwinding of mutual shareholding. First, in this model, the diversification effect of mutual shareholding functions well, even in a risk-neutral economy. When one firm faces bad business conditions (a bad firm), but the other firm faces good business conditions (a good firm), the bad firm can sell its holding shares of the good firm. Then, the bad firm can raise additional funds in an amount that exceeds its fundamental value in order to recover. The diversification effect of the mutual shareholding plays an important role in business recovery in this model.

Second, the present model suggests that the unwinding of mutual shareholding is agreed upon, even when only one firm faces bad business conditions. In such a situation, the bad firm has to discontinue with mutual shareholding in order to raise funds required to recover its business. The other good firm that does not require funds agrees to an unwinding of mutual shareholdings, because the recovery of the bad firm will

increase the value of the bad firm's shares that are still held by the good firm, resulting in an increase in the value of the good firm.

Third, by incorporating asymmetric information, the present model predicts that an unwinding of mutual shareholding will decrease the prices of member firms stocks, because unwinding of this sort is a signal that at least one member firm is undergoing difficulty. Although the unwinding of mutual shareholding will decrease the stock prices of member firms, the recovery of the bad firm following the unwinding of mutual shareholding is desirable for the long-term shareholders in member firms. The present model also provides new insight into the timing of the unwinding of mutual shareholding.

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