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1 Introduction

The Ministry of Finance (the MOF), with its strong influence over the government budget and financial industry, constantly sends its retiring officials to various organisations including financial institutions. One of the remarkable features of the Japanese economy is the relationship between the government and the private sector through *amakudari*. The term *amakudari* literally means "descent from heaven". In the context of business and politics in Japan, *amakudari* can have two meanings. It can be referred to either the practice of retiring bureaucrats obtaining senior positions in private firms, public corporations and government affiliated special associations, or the retired government officials per se in these high ranked positions. *Amakudri* approximately corresponds to the term "revolving door" in the United States.[1]

The functions and roles of *amakudari* in the government-business relationship have been mainly studied by foreign researchers, in an attempt to identify the secrets of Japan's high growth period. The *amakudari* practice is sometimes understood as a direct and effective tool for implementing regulation. It is also viewed as an informal communication mechanism between the government and business sector, which helps in the exchange of views on business and regulation policies.

The rise of the *Jusen* problem, however, has cast doubt over the *amakudari* practice in the financial industry. *Jusen* is a class of financial institutions, originally specialising in housing loans, which were set up by city banks in the early 1970s. Faced by a slowdown in lending to blue chip firms in the 1980s, city banks themselves started providing housing loans at lower mortgage rates than *Jusen* companies. Consequently, *Jusen* companies gradually shifted their business to supply funds to risky industries, for example, the real estate industry. The bad loans in *Jusen* companies reached unmanageable amounts by the mid 1990s due to the burst of the asset-price bubble at the beginning of 1990. The MOF desperately attempted to rescue the *Jusen* companies. At first, the MOF secretly sought for a solution to the problem with the assistance of city banks, but eventually ended up injecting taxpayers' money into the rescue plan. An embarrassing fact emerged during the discussion over the rescue plan in the Diet: with only one exception, all of the presidents of the *Jusen* companies were retired Ministry of Finance bureaucrats. Moreover, *amakudari* officials from the MOF occupied a considerable number of managerial positions.[2]

The objective of this paper is to examine the *amakudari* practice and its implication in the Japanese banking system under a game theoretic framework. Our paper is the first attempt to analyse the *amakudari* practice within a game theoretic framework, where all the economic literature regarding the *amakudari* practice has been purely empirical (Horiuchi and Shimizu, 2001, Suzuki, 2001, van Rixtel, 2002,

[1] However, *amakudari* is slightly different from "revolving door". In the *amakudari* practice, post retirement jobs are arranged by the secretariat of ministries. The *amakudari* practice is usually a long-term relationship between ministries and firms that accept *amakudari* officials.

[2] See Nikkei Shimbunsha (2000) for more details of the *Jusen* problem.

and Yamori, 1998). We consider a game in which there is asymmetric information between depositors and banks where the riskiness of each bank is private information. That is, riskiness is observable for individual banks but not observable to depositors. Banks with different degrees of risk can use *amakudari* officials as a signal of their riskiness. Our model predicts various equilibria depending upon (1) productivity of officials, (2) depositor's risk aversion, and (3) the riskiness of banks. Some interesting equilibria include ones where *amakudari* officials are hired even when they are unproductive for banks. We discuss the veracity of equilibria in view of the Japanese economy during the bubble and its preceding periods (1977-1990). Our discussion suggests that, in contrast to what the existing empirical literature has found, (1) the existence of the *amakudari* practice might have weakened the MOF's general prudential regulation in the banking industry, and (2) the *amakudari* practice as an incentive scheme for the MOF officials could be important.

The rest of the paper is organised as follows. Section 2 overviews the *amakudari* practice, discusses its functions, and reviews the previous literature. Section 3 develops our model and discusses various equilibria and their veracity, particularly in relation to the existing empirical literature. Section 4 concludes.

2 The *amakudari* practice and its functions

As with many other distinct features of the modern Japanese political and economic system, the *amakudari* practice appeared after the World War II. Two primary regulations have controlled the practice. First, The National Public Service Law (*Kokka Komuin Ho*) prohibits retiring bureaucrats from having a job in a company that they used to regulate for at least two years after their retirement. If bureaucrats want to be employed by a private company during this two-year period, approval must be obtained from the National Personnel Authority (*Jinji In*). Second, retiring bureaucrats themselves must not go out and seek these job opportunities. Instead, the National Personnel Authority is legally responsible for post-retirement personnel administration. However, in the actual process of *amakudari* for a retiring bureaucrat, the secretary of each ministry (*Kanbocho*) negotiates with firms and other organisations in order to arrange the position.

This is also true for the MOF. Jobs arranged by the secretariat are usually ranked in accordance with a bureaucrat's last position in the MOF. Some posts are called "*shiteiseki*" (reserved seats), specially provided for retired vice ministers. These are usually the heads of public corporations including the governor of the Bank of Japan. In the business sector, retired bureaucrats have been taking senior positions in regional and trust banks. For example, the Bank of Yokohama has accepted MOF officials as its president three times in a row. Smaller banks also regularly take retired officials. The *Jusen* related documents, which had been revealed in the Diet, showed that 138 former MOF officials occupied the positions as presidents or members of the board in 96 banks — approximately 60 per cent of all banks (Mukaidani *et al.*,

1994). Every year from 1977 to 1990 (the bubble and its preceding periods hereafter), more than 100 *amakudari* officials obtained their jobs in 125 regional banks in Japan (Horiuchi and Shimizu, 2001).

Three possible major roles of the *amakudari* practice have been identified in previous studies.[3] First, the *amakudari* practice is regarded as a mechanism that enables the government to implement effective industrial policies and prudential regulations. van Rixtel (2002) calls this "ex-post monitoring" since the MOF *amakudari* officials are located in the troubled banks as "watchdogs" who monitors their prudential behaviour. Second, it may be a lifelong incentive scheme for bureaucrats, in which the expectation of senior positions with a high salary in private firms after retirement motivates bureaucrats to work hard while they are employed by ministries for a relatively low salary. Third, the *amakudari* practice can be working to equalising competitiveness amongst different companies in their business scales, location, profitability, *etc.* This type of *amakudari* is called "buying influence" by van Rixtel (2002) because banks are effectively buying influence on the MOF — the former MOF officials can potentially bend the rules by pursuading the MOF, and banks can increase risky but profitable lending.

The functions of the *amakudari* practice have been an attractive topic to political scientists, foreign scholars in particular. Many studies have been actively conducted by foreign political scientists in this field. Economists, however, were not so much concerned with the role of the *amakudari* practice as political scientists were. Only a small set of literature deals with *amakudari* problems within the framework of economics, and hence it is not surprising that there are only very limited economic studies focusing on the relationship between the MOF and regulated banks. Within this small set of literature, Horiuchi and Shimizu (2001), Suzuki (2001), van Rixtel (2002), and Yamori (1998) are major contributors to the economic analysis of *amakudari* officials from the MOF. Their studies are empirical within the framework of economics, and show negative implications of the *amakudari* practice for disciplining banks' behaviour.

van Rixtel (2002) has conducted empirical analysis and has concluded that the *amakudari* practice based on "buying influence" is important in the Japanese banking industry. He has shown that banks' profitability has a negative effect on the inflow of *amakudari* officials, which implies that banks demand *amakudari* officials when they are troubled and try bending the rules using these officials who have connection with the MOF. Meanwhile, in the same empirical work, van Rixtel (2002) rejects two other roles of the *amakudari* practice. His estimation shows that the appointment of *amakudari* officials have effects on banks' various performance variables such as profitability, implying that the *amakudari* practice is not merely a reward system or an incentive scheme for the MOF officials. He finds that profitability of banks that accepted *amakudari* officials have improved in subsequent periods, but also finds that

[3] See Shaede (1995) and van Rixtel (2001). Che (1995) and Salant (1995) show that the practice of the "revolving door" can be socially useful.

those banks have increased lending to risky industries, hence rejecting his "ex-post monitoring" hypothesis.

This last empirical finding by van Rixtel (2001), which says that accepting *amakudari* officials leads to banks' non-prudential behaviour, has also been pointed out by a few other empirical studies . Horiuchi and Shimizu (2001) discuss that the *amakudari* practice is a form of collusion between a regulator and regulated banks and enables them to pursue their own benefits at the expense of taxpayers' welfare. In other words, the *amakudari* practice has a negative effect on the MOF's role as a regulator on behalf of the public. Their empirical analysis where they tested the banks who accepted *amakudari* officials from the MOF tended to engage in greater risk-taking than banks who did not accept *amakudari* MOF officials during the bubble and its preceding periods. Banks that accepted *amakudari* officials tended to have a higher bad-loan ratio than the banks that did not. An empirical study by Suzuki (2001) extends their analysis to the post-bubble period, and has also found a negative relationship between the inflow of *amakudari* officials and banks' prudential behaviour.

Yamori (1998) also studies the effect of the *amakudari* practice in the Japanese banking industry, using the theoretical framework of the expense preference behaviours of financial institutions. He relates the *amakudari* practice to the expense-preference hypothesis and tests this relationship based on the data of *Shinkin* banks — a kind of mutual funds. He finds that the financial institutions with *amakudari* officials had more employees than those without. This finding is consistent with his hypothesis that the *amakudari* practice has a negative effect on corporate governance by creating a cozy relation between the regulator and regulated banks.

Whilst the existing empirical literature has commonly pointed out that accepting *amakudari* officials leads to banks' non-prudential behaviour, there appears to be no common agreement as to whether *amakudari* officials are productive for private banks. Aside from van Rixtel (2002), no economic research has been conducted regarding *amakudari* officials productivity on private banks. As explained earlier, van Rixtel (2002) finds a positive effect of *amakudari* officials on banks' profitability in subsequent periods. However, this finding does not appear to be robust because (1) the majority of the estimates are statistically significant at only 10 per cent, and (2) the economic effects appear to be trivial. The change in profitability (net return on equity) ranges from -14 per cent to 7.8 per cent, whereas accepting an *amakudari* official affects a bank's profitability by no more than 0.4 percentage points, which appears to be economically insignificant. In our signalling model, therefore, we will investigate cases where *amakudari* officials are productive and unproductive for private banks. Equilibria that emerge differ according to productivity of *amakudari* officials and we discuss the veracity of those equilibria in view of findings in the previous empirical literature.

3 The Model

This section starts with setting up a signalling model in which a bank is the sender of signals and a depositor is the receiver of the signals. We consider two types of a bank, safe and risky. We consider cases where *amakudari* officials are productive for both banks, only for a safe bank, only for a risky bank, and for neither banks. We rank expected payoffs for a depositor and a bank for these four cases in order to discuss possible equilibria under each setting. Then we choose 4 interesting scenarios and discuss the veracity of those in relation to the previous empirical literature.

3.1 The Setup

There are two players: a risk-neutral bank and a risk-averse depositor. A depositor is endowed with one unit of term-deposit in a bank on the promise that the bank pays out $G > 1$ at the end of the period. However, she does not know the riskiness of the bank where she deposits her money. The depositor can take two actions: keeping the deposit in the bank until maturity or withdrawing before maturity. The timing of the game is as follows: (1) Nature chooses whether a bank is a safe bank or a risky bank. A bank can safe (S) with probablility s and risky (R) with probability $1 - s$ and the probability distribution over bank types is common knowledge; (2) Knowing its own type as private information, the bank decides whether to accept *amakudari* officials, which costs the bank C.; (3) After a depositor observes the bank's choice, she decides whether to keep her deposit in the bank until maturity.; (4) If the depositor withdraws her deposit before maturity, the bank must liquidate its project. If a bank faces liquidation before maturity, a depositor can recover a total of $L < 1$. Otherwise, the bank completes the project. If a bank accepts *amakudari* officials from the regulatory authority and if a depositor decides to withdraw her money before maturity, regardless of a bank's type, a bank's return is zero and a depositor's return is $L - C$. Since a bank has the limited liability, the cost of *amakudari* officials C has to be paid from the liquidation value L. On the other hand, if a bank does not accept *amakudari* officials and if a depositor decides to withdraw her money before maturity, regardless of a bank's type, a depositor's return is L and a bank's return is zero.

In the case where a depositor keeps her money in a bank until maturity, the project will be completed. A safe bank invests in a safe project, which pays out $Y \geq G$ at the end of the period with certainty, if it does not accept *amakudari* officials. If it does, the return becomes $Y_A \geq G$. We assume that it costs a bank C to accept *amakudari* officials. Then, it is always profitable for a safe bank to hire *amakudari* officials when $Y_A - C > Y$, as long as strategic interactions are not concerned. We define the productivity of *amakudari* officials for the safe bank as follows:

Definition 1 *Amakudari officials are productive for a safe bank if* $Y_A - C > Y$.

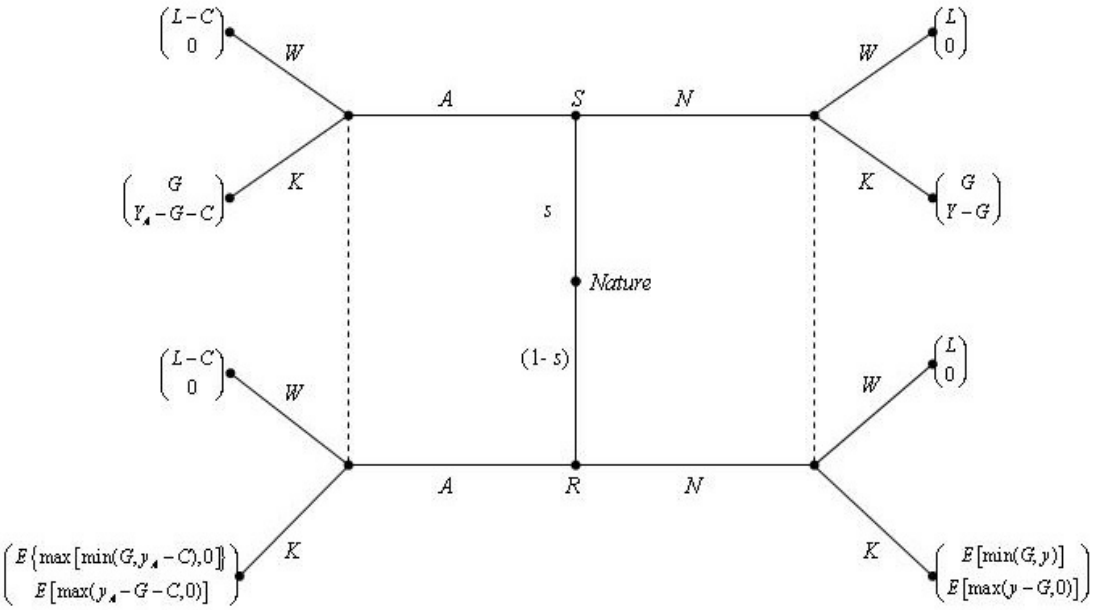

Figure 1: A game tree with the expected returns

A safe bank's return is $Y_A - G - C$ if *amakudari* officials are accepted, or $Y - G$ otherwise. For a depositor, if her deposit is in a safe bank, regardless of whether the bank accepts *amakudari* officials, her return is G.

In turn, a risky bank invests in a risky project in which the return at maturity $y \geq 0$ is a random variable. It is subject to a probability distribution with mean $\overline{y}$ if it does not hire *amakudari* officials, but we assume that the probability distribution shifts positively by a certain amount if it hires *amakudari* officials and that the mean becomes $\overline{y_A}$. Since a bank is risk neutral, it is more profitable for it to hire *amakudari* officials when $\overline{y_A} - C > \overline{y}$, as long as strategic interactions are not concerned. Hence the following definition:

Definition 2 *Amakudari officials are productive for a risky bank if* $\overline{y_A} - C > \overline{y}$.

Since the return on a risky project is random, the return for depositing in a risky bank is also random. For a risky bank, the expected return is $\max(y_A - G - C, 0)$ if *amakudari* officials are accepted, or $\max(y - G, 0)$ otherwise. The return for the depositor may be less than G if the realisation value of y_A or y is not high enough, since a bank has limited liability. More specifically, if her deposit is in a risky bank, her expected return is $\max[\min(G, y_A - C), 0]$ if the bank accepts *amakudari* officials, or $\min(G, y)$ otherwise. We summarise the above information in a game tree of the expected returns as in Figure 1.

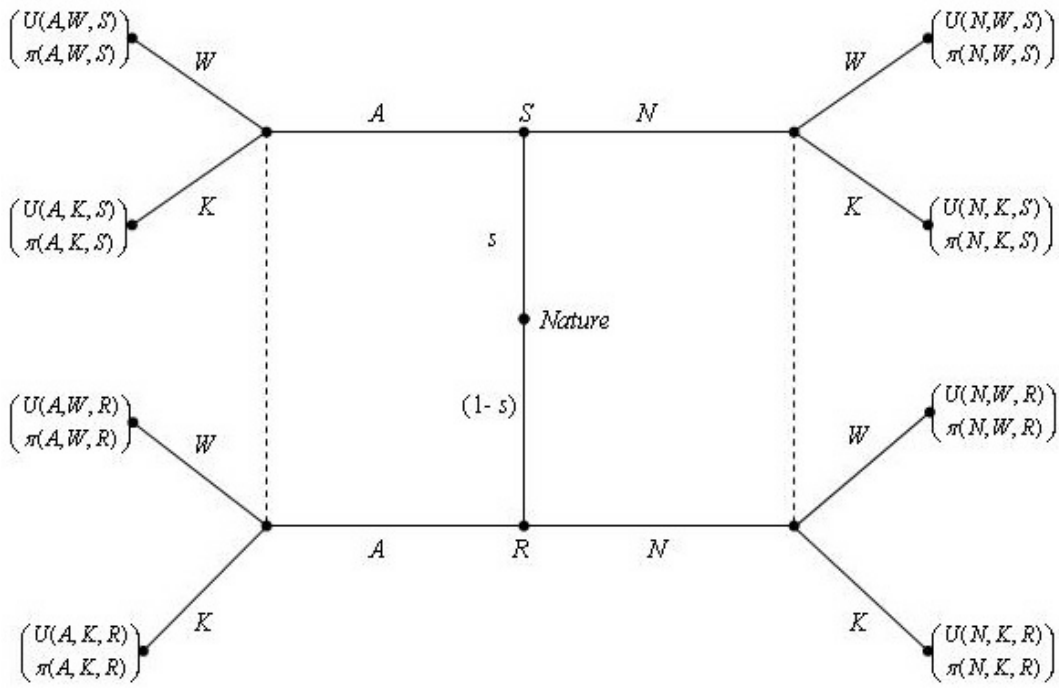

Figure 2: A game tree with the expected payoffs

3.2 Ranking of expected payoffs

The expected returns on the game tree in Figure 1 can be read as the expected payoffs only if both a bank and a depositor are risk-neutral, which is not the case. We need to take into accout the risk-aversion of a depositor and rank expected payoffs for a bank and a depositor. We denote the expected profits for a bank by $\pi(a_1, a_2, t)$. a_1 is the bank's action whether to accept (A) or not to accept (N) *amakudari* officials, hence $a_1 \in \{A, N\}$. a_2 is the depositor's action whether to keep (K) or withdraw (W) her deposits, hence $a_2 \in \{K, W\}$. t is the type of the bank, hence $t \in \{S, R\}$. Likewise, we denote the expected utility of a depositor by $U(a_1, a_2, t)$. Hence, the game tree of the expected payoffs is as in Figure 2. Now we rank the payoffs according to the productivity of *amakudari* officials.

3.2.1 Case I: When *amakudari* officials are productive for both banks

As for the profits, we only need to rank the top and the bottom halves separately, because once the nature chooses the type, these banks are different. For a safe bank, when a depositor keeps her depositor, by definition $\pi(A, K, S) > \pi(N, K, S)$. When a depositor withdraws, the project is not completed, and the bank with its limited liability will get nothing regardless of its hiring action. Hence, $\pi(A, K, S) > \pi(N, K, S) > \pi(A, W, S) = \pi(N, W, S)$. Likewise, for a risky bank, when a depositor keeps her

depositor, by definition $\pi(A, K, R) > \pi(N, K, R)$, and these are preferred to the case where a depositor withdraws. Hence, $\pi(A, K, R) > \pi(N, K, R) > \pi(A, W, R) = \pi(N, W, R)$. We assign numbers 3 (best), 2, and 1 (worst), respectively, to them, without loss of generality.

As for the depositor's expected utility levels, we need to compare 8 different ones. In the case where *amakudari* officials are productive for both banks, we naturally have three restrictions on the levels of expected utility. First, $U(A, K, S) = U(N, K, S)$ is the greatest because there is no risk and the depositor is guaranteed the return of G as promised. Second, $U(N, W, S) = U(N, W, R) > U(A, W, S) = U(A, W, R)$, because in case of withdrawal, a depositor ends up getting L with certainty if the bank's action is N, but $L - C$ with certainty if its action is A. Finally, since the probability distribution of the return for the risky project shifts by hiring *amakudari* officials, when they are productive, $U(A, K, R) > U(N, K, R)$ holds.[4]

There are 6 possible combinations of ranking of depositor's expected utility. We assign numbers 5 (best) to 1 (worst) to these expected utility levels. Table 1 summarises all the possible cases.

Scenarios	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**
$U(A, K, S)$	5	5	5	5	5	5
$U(N, K, S)$	5	5	5	5	5	5
$U(N, W, S)$	3	2	3	4	4	4
$U(N, W, R)$	3	2	3	4	4	4
$U(A, W, S)$	2	1	1	2	1	3
$U(A, W, R)$	2	1	1	2	1	3
$U(A, K, R)$	4	4	4	3	3	2
$U(N, K, R)$	1	3	2	1	2	1

Table 1: Depositor's Payoff Ranking: Cases I and III

3.2.2 Case II: When *amakudari* officials are unproductive for both banks

We again start with a bank. For a safe bank, when a depositor keeps her deposit, by definition $\pi(A, K, S) < \pi(N, K, S)$. When a depositor withdraws, the project is not completed, and the bank with its limited liability will get nothing regardless of its hiring action. Hence, $\pi(N, K, S) > \pi(A, K, S) > \pi(A, W, S) = \pi(N, W, S)$. Likewise, for a risky bank, when a depositor keeps her depositor, by definition $\pi(A, K, R) < \pi(N, K, R)$, and these are preferred to the case where a depositor withdraws. Hence, $\pi(N, K, R) > \pi(A, K, R) > \pi(A, W, R) = \pi(N, W, R)$. We assign numbers 3 (best), 2, and 1 (worst), respectively, to them, without loss of generality.

[4] It means that the probability distribution of return for the risky project with *amakudari* officials first-order stochastically dominates that without.

As for the depositor's expected utility levels, we again need to compare 8 different ones. The natural restrictions we have on the levels of expected utility are the following. First, again $U(A, K, S) = U(N, K, S)$, is the greatest because there is no risk and the depositor is guaranteed the return of G.[5] Second, $U(N, W, S) = U(N, W, R) > U(A, W, S) = U(A, W, R)$ again should hold, because in case of withdrawal, a depositor ends up getting L with certainty if the bank's action is N, but $L - C$ with certainty if its action is A. Finally, as we did in Case I, we have a restriction regarding expected utilitly levels of the risky project with and without *amakudari* officials, $U(A, K, R) < U(N, K, R)$. The inequality is reversed from Case I because officials are unproductive in Case II.

As in Case I, there are 6 possible combinations of ranking of depositor's expected utility. We assign numbers 5 (best) to 1 (worst) to these expected utility levels, which are summarised in Table 2.

Scenarios	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**
$U(A, K, S)$	5	5	5	5	5	5
$U(N, K, S)$	5	5	5	5	5	5
$U(N, W, S)$	4	2	4	4	3	3
$U(N, W, R)$	4	2	4	4	3	3
$U(A, W, S)$	3	1	2	1	1	2
$U(A, W, R)$	3	1	2	1	1	2
$U(A, K, R)$	1	3	1	2	2	1
$U(N, K, R)$	2	4	3	3	4	4

Table 2: Depositor's Payoff Ranking for Cases II and IV

3.2.3 Case III: When *amakudari* officials are productive only for a risky bank

For a safe bank, when a depositor keeps her deposit, by definition $\pi(A, K, S) > \pi(N, K, S)$. When a depositor withdraws, the project is not completed, and the bank with its limited liability will get nothing regardless of its hiring action. Hence, $\pi(A, K, S) > \pi(N, K, S) > \pi(A, W, S) = \pi(N, W, S)$. Likewise, for a risky bank, when a depositor keeps her depositor, by definition $\pi(A, K, R) < \pi(N, K, R)$, and these are preferred to the case where a depositor withdraws. Hence, $\pi(N, K, R) > \pi(A, K, R) > \pi(A, W, R) = \pi(N, W, R)$. We assign numbers 3 (best), 2, and 1 (worst), respectively, to them, without loss of generality.

As for the depositor's expected utility levels, ranking should be the same as in Case I, so Table 1 is relevant.

[5] We assume that $Y_A - C > G$ holds.

3.2.4 Case IV: When *amakudari* officials are productive only for a safe bank

For a safe bank, when a depositor keeps her depositor, by definition $\pi(A, K, S) > \pi(N, K, S)$. When a depositor withdraws, the project is not completed, and the bank with its limited liability will get nothing regardless of its hiring action. Hence, $\pi(A, K, S) > \pi(N, K, S) > \pi(A, W, S) = \pi(N, W, S)$. Likewise, for a risky bank, when a depositor keeps her depositor, by definition $\pi(A, K, R) < \pi(N, K, R)$, and these are preferred to the case where a depositor withdraws. Hence, $\pi(N, K, R) > \pi(A, K, R) > \pi(A, W, R) = \pi(N, W, R)$. We assign numbers 3 (best), 2, and 1 (worst), respectively, to them, without loss of generality. As for the depositor's expected utility levels, ranking should be the same as in Case II, so Table 2 is relevant.

Before delving into analysing equilibria, let us point out the similarity of Cases III and IV to the job-market signalling model by Spence (1973). In Spence (1973), a low productive worker finds signalling (obtaining education) more costly than a high productive worker does. Cases III (IV) corresponds to the case where a safe (risky) bank finds signalling, *i.e.*, accepting *amakudari* officials, more costly than a risky (safe) bank does.

3.3 Equilibria

Because examining all 24 scenarios is a little tedious, we shall only discuss ones that we think are interesting and important. For scenarios which will not be discussed in the text, the list of possible equilibria will be provided in Appendix. Throughout the analysis, we use the following notations. Regarding banks' strategy, we denote it by a combination of two actions, for example, (A, N), where the first argument corresponds to the safe bank's action. Regarding the depositor's strategy, we denote it by a combination of two actions as well, for instance, (K, N). The first argument K corresponds to the sequentially rational action at the information set following the bank's action A, and the second argument N corresponds to the sequentially rational action at the information set following the bank's action N. As for the depositor's belief, we use notations such as (0,1), which means that the depositor assigns the probability zero for a bank to be safe, and assigns one for a bank to be risky.

3.3.1 Scenario 1

The scenario we investigate first is where *amakudari* officials are productive for both banks. It turns out that as long as $U(A, K, R) > U(A, W, S) = U(A, W, R)$, we have an (A, A) pooling equilibrium. This inequality requires a depositor to be not too risk averse and/or the risky project to be not too risky, since either way it works to increase $U(A, K, R)$, expected utility for the depositor from keeping her deposit in a risky bank when it accepts *amakudari* officials. Let us look at Scenario (c) of Case I where we have the following game tree.

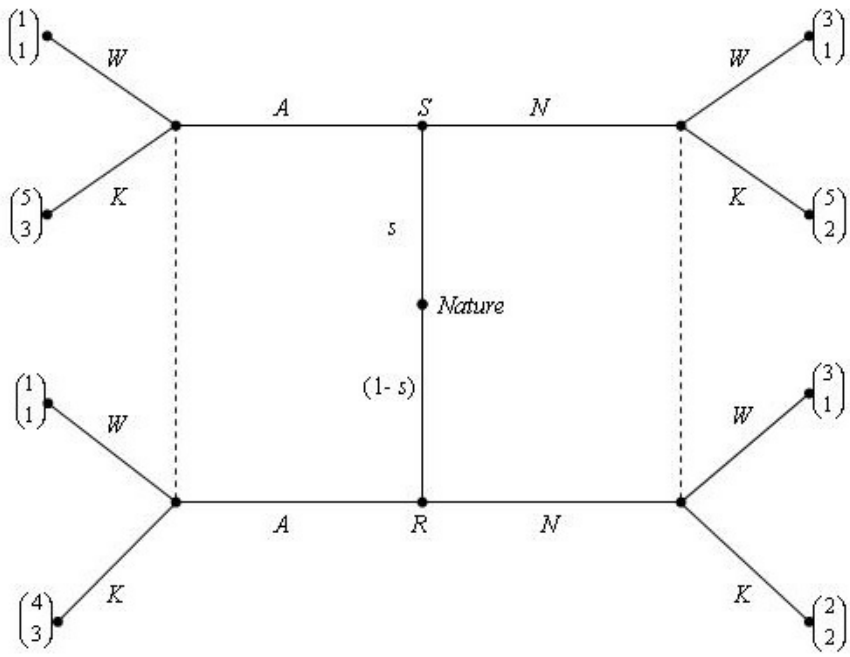

Figure 3: When *amakudari* officials are productive for both banks

We can tell that no separating equilibrium exists. When (A, N), then (K, W) is the sequentially rational strategy for a depositor. But then, a risky bank will mimic a safe bank and the equilibrium collapses. Likewise, when (N, A), then (K, K) is the sequentially rational strategy for a depositor, in which case, a safe bank will mimic a risky bank As for a pooling equilibrium, (N, N) cannot be an equilibrium for the following reason. Whatever the value s takes, W must be the strategy for the depositor at the information set that follows the bank's strategy A. Otherwise, banks have an incentive to deviate from the strategy N. However, at that information set, K is the dominant strategy, and hence the equilibrium collapses. (A, A) remains to be the only possible equilibrium, and in fact, it is supported by whatever belief a depositor has at the other information set. This is because the equilibrium payoff of the bank is 3 regardless of the depositor's action, which strictly dominates bank's payoff when it's strategy is N regardless of the depositor's action.

3.3.2 Scenario 2

Let us compare this (A, A) equilibrium with the (A, A) equilibrium where *amakudari* officials are unproductive for both banks. It turns out the condition for an (A, A) pooling equilibrium for this case is $U(N, W, S) = U(N, W, R) > U(N, K, R)$. In plain words, it means that a depositor is reasonably risk averse and/or the risky project is very risky — hence the condition is opposite to Scenario 1. We look at Scenario (c) of Case II where we have the following game tree:

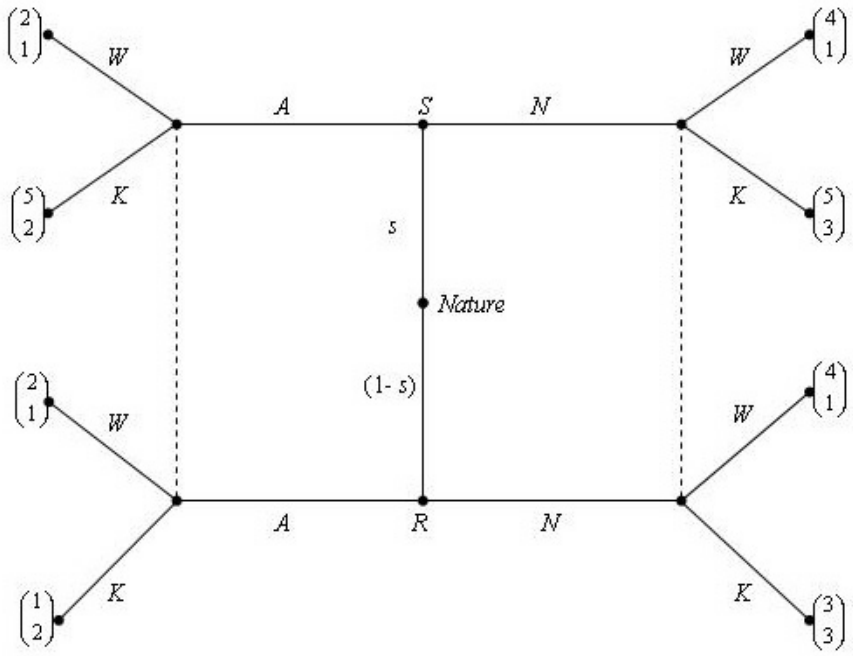

Figure 4: When *amakudari* officials are unproductive for both banks

The similar argument holds in showing the non-existence of a separating equilibrium. When (A, N), then (K, W) is the sequentially rational strategy for a depositor. But then, a risky bank will mimic a safe bank and the equilibrium collapses. Likewise, when (N, A), then (K, W) is the sequentially rational strategy for a depositor, in which case, again a risky bank mimics a safe bank As for a pooling equilibrium, both (N, N) and (A, A) exist. In the (N, N) equilibrium, for high enough s, K is the sequentially rational strategy for the depositor. Whatever belief in the other information set supports this equilibrium, hence (W, K) or (K, K) are possible strategies for the depositor. For low enough s, W becomes sequentially rational for the depositor, in which case, W must be sequentially rational for the depositor at the other information set, too. Belief such as (0,1) supports this equilibrium, and it survives the Intuitive Criterion. As for the (A, A) equilibrium, by the same token we can conclude that for low enough s, there exists belief that supports the depositor's strategy (W,W), and for high enough s, there exists belief such that (K, W) is supported.

3.3.3 Scenario 3

Let us now look at two scenarios under which a separating equilibrium emerges. We look at Scenario (a) of Case III where we have the following game tree:

It turns out that as long as $U(A, K, R) > U(A, W, S) = U(A, W, R)$, we have an (N, A) separating equilibrium, where a safe bank always does not accept *amakudari*

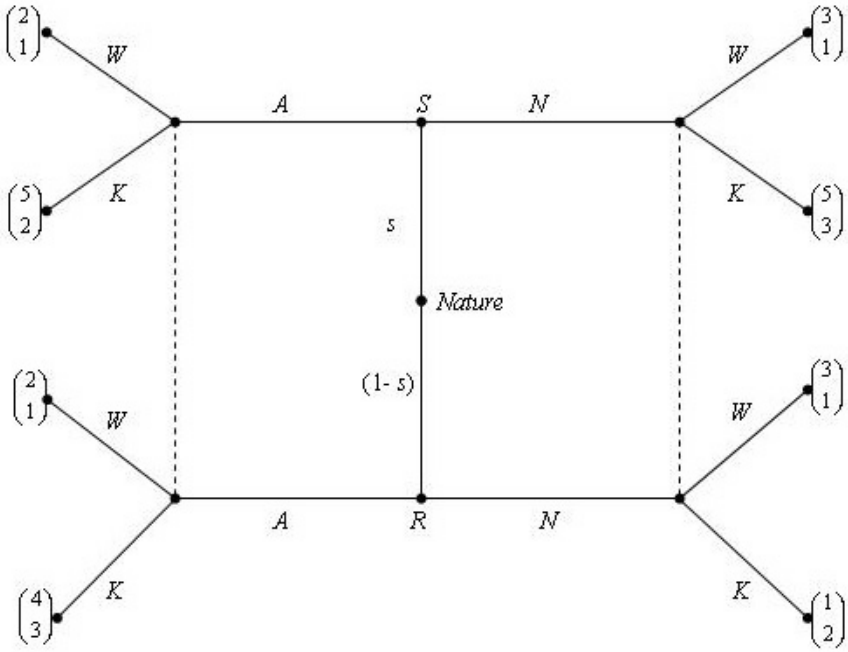

Figure 5: When *amakudari* officials are productive only for a risky bank

officials whilst a risky bank always does. This condition is the same as one for an (A, A) pooling equilibrium when officials are productive for both banks, and it requires a depositor to be not too risk averse and/or the risky project to be not too risky, since either way it works to increase $U(A, K, R)$, expected utility for the depositor from keeping her deposit in a risky bank when it accepts *amakudari* officials. If this does not hold (but only in one scenario) we end up with having unrealistic pooling equilibria, where neither of a bank accepts officials. We can tell that another separating equilibrium, (A, N), does not exist. When (A, N), then (K, W) is the sequentially rational strategy for a depositor. But then, a risky bank will mimic a safe bank and so the equilibrium collapses. A pooling equilibrium, (N, N), cannot be sustained for the following reason. Depending on the value of s, either K or W will be the sequentially rational strategy at the information set on equilibrium. Regardless of this strategy, W must be sequentially rational for the depositor at the other information set, in order for both banks not to deviate. However, this is impossible since K is the dominant strategy at that information set. In plain words, a risky bank deviates since it prefers not to mimic a safe bank. The other pooling equilibrium, (A, A), cannot be sustained for a different reason. At the information set on equilibrium, K is the dominant strategy for the depositor, so W has to be sequentially rational for the depositor at the other information set, in order for both banks not to deviate. Some belief such as (0,1) will support this strategy. However, this equilibrium is not natural. The belief (0,1) at the information set off-equilibrium implies that if the depositor sees a bank that does not accept officials, she regards it

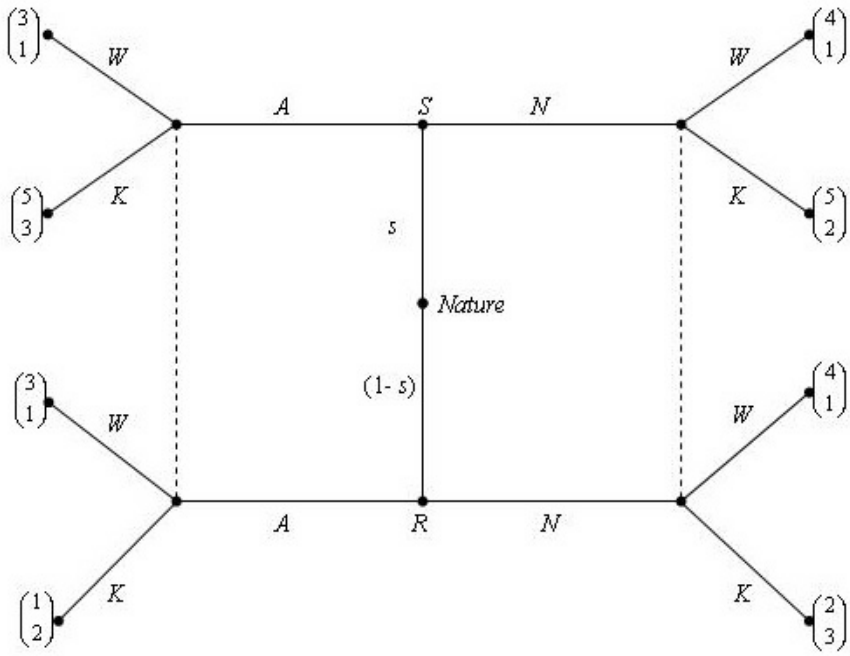

Figure 6: When *amakudari* officials are productive only for a safe bank

is a risky bank. However, the risky bank cannot make its equilibrium payoff better by deviating, whereas the safe bank can do so if a depositor believes that a bank that deviates is actually a safe bank. Hence, assigning the belief (1,0) is the natural choice in this case, in which case the (A, A) equilibrium collapses. Put it shortly, the Intuitive Criterion eliminates the (A, A) equilibrium. Hence we are left with an (N, A) separating equilibrium, and (K, K) is the only sequentially rational strategy for the depositor.

3.3.4 Scenario 4

The other separating equilibrium (A, N) can be seen in Case IV. Under three scenarios in Case IV we have a unique separating equilibrium (A, N) with the depositor's strategy (K, K). It turns out the condition for the (A, N) separating equilibrium in Case IV is $U(N, K, R) > U(N, W, S) = U(N, W, R)$, which is opposite to the condition under Scenario 2. So let us investigate what happens if this condition is violated and so the same conditions to Scenario 2 holds. We look at Scenario (a) in particular. Figure 6 describes the game tree.

First, both separating equilibria are eliminated. When (A, N), then (K, W) is the sequentially rational strategy for a depositor. But then, a risky bank will mimic a safe bank and the equilibrium collapses. Likewise, when (N, A), then (K, W) is the sequentially rational strategy for a depositor, in which case, again a risky

bank mimics a safe bank Second, a pooling equilibrium, (N, N) with the depositor's strategy (W, W), exists. In the (N, N) equilibrium, for high enough s, K is the sequentially rational strategy for the depositor. W must be sequentially rational for the depositor at the other information set, and belief such as (0,1) supports this equilibrium. However, it does not survive the Intuitive Criterion. For low enough s, W becomes sequentially rational for the depositor on equilibrium, in which case, W must be sequentially rational for the depositor at the other information set. Belief such as (0,1) supports this equilibrium, and in this case, it survives the Intuitive Criterion. Lastly, the (A, A) equilibrium with depositor's strategy (K, W) or (W, W), exists. For low enough s, there exists belief that supports the depositor's strategy (W,W), and for high enough s, there exists belief such that (K, W) is supported. These equilibria survive the Intuitive Criterion.

3.4 Discussion

Amongst various equilibria, we rule out an (N, N) pooling equilibrium as an unrealistic case, since it does not explain the fact that many officials were employed from 1977 to 1990. We also disregard equilibria with the depositor's strategy (W, W), since it corresponds to bank-runs in all banks, which we did not witness. The scenarios we have investigated can be classified into two good scenarios (1 and 3), a bad scenario (2), and a potentially bad scenario (4).

Scenario 1 is good because both banks accept *amakudari* officials who are productive to them. A depositor's action on equilibrium is K. Note that for this equilibrium to emerge, it is necessary for $U(A, K, R) > U(A, W, S) = U(A, W, R)$ to hold. That is, the depositor ranks keeping her depositor in a risky bank with the officials higher than withdrawing her deposit from a bank that hire officials. If we assume the depositor to be reasonably risk averse, then the risky bank's project needs to be not too risky, *i.e.*, the certainty equivalent of the return has to be high enough. It is a good scenario since the risky bank hires *amakudari* officials and its project is quite likely be successful.

Similar to this is Scenario 3. A safe bank does not accept *amakudari* officials but a risky bank does. They are productive only for the risky bank, so this outcome is efficient in that sense. Depositor keeps her deposit on equilibrium, which is desiable, since the safe project is, by definition, safe and profitable, and the risky project is promising, since the condition for this equilibrium $U(A, K, R) > U(A, W, S) = U(A, W, R)$, which is the same as Scenario 1, has to be met.

Might these scenarios describe the Japanese economy during the bubble and its preceding periods? Depositors have witnessed many financial institutions collapse during the past decade, and banks that accepted *amakudari* officials were not immune to this finaicial distress. After the bubble burst at the beginning of the 1990s, we have witnessed the growing amount of non-performing loans in the banking sector, which eventually forced the Japanese government to prepare public funds worth 60

trillion Japanese Yen as of March 1999. These good scenarios do not appear to describe the bad situation in the Japanese economy, although of course we do not deny the importance of factors that our model does not account for.

Investigation of the rest of the scenarios is quite interesting. Scenario 2 is where *amakudari* officials are productive for neither of the banks. However, even so, both banks accept *amakudari* officials since not accepting leads to withdrawals by the depositor, hence liquidation of the project. This scenario is inefficient in that sense. In addition, note that the condition for this pooling equilibrium is $U(N, W, S) = U(N, W, R) > U(N, K, R)$. It means that, given a depositor's risk aversion, the inequality is likely to be met the riskier the risky project. That is, the depositor keeps her deposit in a risky bank even if the project the bank has is very risky, because she believes the bank is actually safe. This is a terrible scenario because unproductive *amakudari* officials are hired and paid in order to trick the depositor, and due to that she is in jeopardy of losing her funds. Note that if the inequality is not met, it implies a unique equilibrium is (N, N) where neither of banks hires *amakudari* officials.

Scenario 4 can be as bad as this one. If $U(N, K, R) > U(N, W, S) = U(N, W, R)$ is met, then a safe bank accepts the officials who are productive for them, but a risky bank does not accept the officials who are unproductive for them (this is an (A, N) separating equilibrium). So this outcome is efficient in that sense. Depositor's strategy on equilibrium is (K, K) so she keeps her deposit for either bank, which is desiable, since the safe project is by definition safe and profitable, and the risky project is promising from the inequality. However, if this inequality is reversed, which is the same as in the terrible scenario we previously saw, we might get the (A, A) pooling equilibrium where both banks accept *amakudari* officials. In this equilibrium, depositor's strategy is to keep her deposit. We have a situation where a risky bank hires and pays unproductive *amakudari* officials in order to trick the depositor. The depositor who actually keeps her deposit in a risky bank is in danger of losing her funds.

This appears to be consistent with the bad-loan problems in the Japanese banks in the late 1990s. One possibility is that the MOF shirked the bank monitoring during the bubble and its preceding periods. One of the explanations of the *amakudari* practice in the banking industry is a lifelong incentive scheme for the MOF officials. If they are concerned about their future career after their retirement, and if they are in the position to affect banks' prudential behaviour through the regulation, then it might have been the case that they tried to shirk monitoring in the banking industry. The reason is the following. Lenient monitoring would have lead the inequality $U(N, K, R) > U(N, W, S) = U(N, W, R)$ to be reveresed to $U(N, W, S) = U(N, W, R) > U(N, K, R)$. In Scenario 2, this corresponds to a possible change from (N, N) pooling equilibrium to (A, A) pooling equilibrium, and in Scenario 4, this corresponds to a change from an (A, N) separating equilibrium to an (A, A) pooling equilibrium. In both cases, it implies more job opportunities for the *amakudari*

officials after their retirement from the MOF.

This implication from our model is similar to the common agreement that is seen in the existing empirical literature. Hociuchi and Shimizu (2001), Suzuki (2001), van Rixtel (2002), and Yamori (1998) all have found that banks that accepted *amakudari* officials tend to behave in a non-prudential manner. Our study suggests the possibility that the existence of the *amakudari* practice might have weakened the MOF's general prudential regulation in the banking sector. As van Rixtel (2002) claims, the *amakudari* practice may not be merely an incentive scheme or a reward mechanism for the MOF officials in the sense that it may affect banks' performance in the subsequent periods. However, our story suggests that this incentive scheme per se might have caused an undesirable equilibrium to emerge. In order for the incentive scheme to sustain, the MOF needed banks to hire their retiring officials. Under an (N, N) pooling equilibrium, it is not possible, whereas this scheme is sustainable in an (A, A) pooling equilibrium, which emerges when supervision is lenient, but at the expense of depositors being jeopadised to losing their funds.

We conclude our discussion by making some comments about the reality of our model in the Japanese banking system. Some might question whether depositors were that concerned about the banks' types in Japan. In our model, a depositor's main concern is the type of a bank, but in the presence of the Deposit Insurance Law, how realistic is it? We would consider that a depositor could be concerned about the type of a bank even though the Law existed. Under the Law, only up to 10 million Japanese Yen per depositor would be protected.[6] For big depositors who we envisaged in our model, the existence of the Law did not mean complete protection of their deposits.

Our focus has been the static nature of the *amakudari* practice. Ideally, the MOF's attitude towards regulating the banking industry should be incorporated in the model endogenously, which involves dynamics. Our static model could be regarded as the second stage of a two-stage game, in which the first stage being the MOF's decision making regarding its attitude towards prudential regulation. Our model also does not explain a time-persistent nature of the *amakudari* practice, which Horiuchi and Shimizu (2001) have found. Extending the model to incorporate dynamics of the *amakudari* practice is a possible direction for further research in this area.

4 Conclusion

We have explored the *amakudari* practice in the Japanese banking system, focusing particularly upon the relationship between banks and depositors. Our signalling model predicts various equilibria depending upon (1) productivity of officials, (2) depositor's risk aversion, and (3) the riskiness of banks, and we have related these

[6] See Nakaso (2001).

equilibria to the existing literature. We have explained why the *amakudari* practice might undermine bank monitoring using a concrete theoretical setting. We have shown that the existence of the *amakudari* practice might have weakened the MOF's *general* prudential regulation in the banking sector, because it could have led to more job opportunities for the retired MOF officials. This is similar to but is also different from what the existing empirical literature found: Banks that accepted *amakudari* officials tended to show non-prudent behaviour.

After the *Jusen* problem, there was public outrage directed towards the MOF for injecting public money into *Jusen* companies managed by *amakudari* officials. This controversy, combined with several other scandals, culminated in the function of supervision being taken away from the MOF and transferred to the Financial Supervisory Agency (FSA) in June 1998. However, the new regulatory regime does not appear to prevent lenient supervision as long as the *amakudari* practice remains unchanged, and so the research concerning the *amakudari* practice remains important.

Further research should be directed towards both theoretical and empircal studies. As discussed in the text, our static model has its limitation in explaining the reality of the *amakudari* practice — that is, the time-persistent nature. Incorporating dynamics into our model will be the next theoretical step. At the same time, incorporating the MOF's attitude towards the prudential regulation into a dynamic model could be interesting. Needless to say, in the paper, we have merely presented sufficient conditions for each of equilibria to emerge. We have provided discussion regarding the veracity of some interesting equilibria, but an intriguing question as to which of those equilibria was really likely should be addressed empirically.

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A Appendix

We have investigateed equilibria for only limited cases in the text. Here we provide the summary of all the equilibria for all the scenarios. Equilibria can be obtained in the way we demostrated in the text, which is available from the authors upon request.

A.1 Case I: When *amakudari* officials are productive for both banks

There is no separating equilibrium. A risky bank always mimics a safe bank so as to avoid liquidation of the project. In five scenarios, there exists a unique pooling equilibrium where (A, A) is the bank's strategy and (K, K), (K, W), or (W, W) is the depositor's strategy. In the last scenario, in addition to this pooling equilibrium, another pooling equilibrium (N, N) emerges where (W, K) or (W, W) is the depositor's strategy. However, this equilibrium does not appear to fit the reality where 100 *amakudari* officials are hired every year in regional banks. As long as $U(A, K, R) > U(A, W, S) = U(A, W, R)$, we have an (A, A) pooling equilibrium.

This requires that a depositor is not too risk averse and/or the risky project is not too risky.

Scenario	(A, A)	(N, N)	(A, N)	(N, A)
(a)	(K, K) or (K, W)	NO	NO	NO
(b)	(K, K)	NO	NO	NO
(c)	(K, K) or (K, W)	NO	NO	NO
(d)	(K, K) or (K, W)	NO	NO	NO
(e)	(K, K) or (K, W)	NO	NO	NO
(f)	(K, K), (K, W) or (W, W)	(W, K) or (W, W)	NO	NO

Table 3: Equilibria for Case I

A.2 Case II: When *amakudari* officials are unproductive for both banks

Again there is no separating equilibrium. Either of banks always mimics a safe bank so as to avoid liquidation of the project. In three scenarios, there exists a unique pooling equilibrium where (N, N) is the bank's strategy and (K, K) or (W, K) is the depositor's strategy. In the rest of the scenarios, in addition to this pooling equilibrium, the same pooling equilibrium (N, N) with the depositor's strategy (W, W) as well as another pooling equilibrium (A, A) emerge, where for the latter, (K, W) or (W, W) is the depositor's strategy. The condition for an (A, A) pooling equilibrium in Case II is $U(N, W, S) = U(N, W, R) > U(N, K, R)$. In plain words, it means that a depositor is reasonably risk averse and/or the risky project is very bad.

Scenario	(A, A)	(N, N)	(A, N)	(N, A)
(a)	(W, W) or (K, W)	(W, W) , (W, K) or (K, K)	NO	NO
(b)	NO	(K, K)	NO	NO
(c)	(W, W) or (K, W)	(W, W) , (W, K) or (K, K)	NO	NO
(d)	(K, W)	(W, K) or (K, K)	NO	NO
(e)	NO	(K, K)	NO	NO
(f)	NO	(W, K) or (K, K)	NO	NO

Table 4: Equilibria for Case II

A.3 Case III: When *amakudari* officials are productive only for a risky bank

In five out of six scenarios, there exists a unique separating equilibrium (N, A) with the depositor's strategy (K, K). A safe bank does not accept the officials whilst a risky bank does always. As long as $U(A, K, R) > U(A, W, S) = U(A, W, R)$, we have this equilibrium. But when this is reversed, the separating equilibrium vanishes and two pooling equilibria emerge. One is (N, N) with (W, W) or (W, K) and the other is (A, A) with (W, W).

Scenario	(A, A)	(N, N)	(A, N)	(N, A)
(a)	NO	NO	NO	(K, K)
(b)	NO	NO	NO	(K, K)
(c)	NO	NO	NO	(K, K)
(d)	NO	NO	NO	(K, K)
(e)	NO	NO	NO	(K, K)
(f)	(W, W)	(W, K) or (W, W)	NO	NO

Table 5: Equilibria for Case III

A.4 Case IV: When *amakudari* officials are productive only for a safe bank

In three scenarios, there exists a unique separating equilibrium (A, N) with the depositor's strategy (K, K). A safe bank accepts the officials whilst a risky bank does not. As long as $U(N, K, R) > U(N, W, S) = U(N, W, R)$, we have this equilibrium. But when this inequality is reversed, the separating equilibrium vanishes and two pooling equilibria emerge. One is (A, A) with (W, W) or (K, W) and the other is (N, N) with (W, W).

Scenario	(A, A)	(N, N)	(A, N)	(N, A)
(a)	(K, W) or (W, W)	(W, W)	NO	NO
(b)	NO	NO	(K, K)	NO
(c)	(K, W) or (W, W)	(W, W)	NO	NO
(d)	(K, W)	NO	NO	NO
(e)	NO	NO	(K, K)	NO
(f)	NO	NO	(K, K)	NO

Table 6: Equilibria for Case IV