MORAL HAZARDS

IN JAPAN’S MAIN BANK SYSTEM

by

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Abstract

In the early 1990s, financial distress in the Japanese corporate sector surged, taking with it the bad debts of many large banks. The experience prompts us to ask whether Japanese banks are as effective in monitoring and screening borrowers as they were once said to be.

This paper addresses that question with a simple theoretical model of the relationship between debt finance and bank monitoring behaviour, in the context of Japan's main bank system. The model confirms standard theoretical results that Japan's main banks are more likely to produce monitoring when main bank lending yields a high return to the bank, and when the bank has low priority in adverse states. But there are sharp limitations to these principles when the market in financial intermediation is contestable by non-main bank sources of finance. In certain circumstances, these alternative sources of finance can force the main bank to price debt in a way that is inconsistent with the provision of monitoring. If this occurs, the main bank is effectively exposed to a form of moral hazard.

The chief implications of the model are that the pattern of financial liberalisation in Japan and the operation of an accommodating monetary policy may help to explain some of the failings of corporate monitoring systems in the latter 1980s and early 1990s.

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1. Introduction

Recently, apparent failures of bank lending in Japan have raised questions about the ability of Japanese main banks to perform their functions as monitors of the corporate sector. Major banks have been sharply criticised by the public and officiامل alike, for having maintained bad lending policies, and for having been too slack in their monitoring of corporate borrowers during the heady boom of the late 1980s.

Most of the attention has so far revolved around heavy bank lending to enterprises that were engaged in speculative activity. It seems that to combat shrinking margins during the mid 1980s, Japanese banks began to lend aggressively, targeting high risk/high return borrowers. Moreover, the banks are widely thought to have devoted insufficient effort to ensuring that the funds they lent were wisely used.

While it is certainly important to explain the direction of credit to speculative enterprise, such as real estate, it is also important to look beyond the headline phenomena, and to consider the possibility that the banks might also have mismanaged their lending relationships with their more stable and traditional clients. After all, long-term relationships between banks and industry are a subject of great interest for students of the Japanese economy. Corporate finance and industrial organisation theorists have long regarded the financial intermediation and corporate monitoring functions of the Japanese banking system as a source of the nation’s post-war growth and prosperity. At a time when that banking system is under fierce criticism for having mismanaged its exposure to some elements of the corporate sector, it seems sensible to question whether bank performance in general is as good as it was once thought to be.

A particularly useful framework for dealing with these questions is the main bank system. This system describes the pervasive phenomenon of intimate and complex links between Japanese firms and their principal creditors (Sheard, 1989). At the risk of some simplification, a main bank relationship is often said to exist when a firm meets a substantial proportion of its financial needs through the intermediation of one bank—its main bank. In return for the preferential business that it receives from the firm, the main bank implicitly undertakes the monitoring of the firm and, more importantly, it usually bears the responsibility for organising expensive workouts, if the firm encounters financial distress.

All the evidence suggests that this arrangement worked very well for Japan’s liquidity constrained corporate sector in the post-war high-growth period.1

* This paper draws heavily on research that I undertook while I was a PhD student at the Australian National University and a visiting researcher at the Bank of Japan (Gower, 1995). I am grateful for helpful advice from Peter Drysdale, Gerald Garvey, Akiyoshi Horiuchi, Warwick McKibbin, John Pitchford, Paul Sheard, Naoyuki Yoshino, and an anonymous referee of Pacific Economic Papers. Seminar participants at the Australia-Japan Research Centre, the Bank of Japan and Keio University also made valuable contributions. The financial assistance of the Japan Foundation and the hospitality of the Bank of Japan and the Economic Planning Agency are gratefully acknowledged. Errors are my own.
At that time, firms relied heavily on banks for their corporate financial needs. In return for performing the essential financial intermediation function, and for monitoring corporate borrowers intensively, the monetary authorities underwrote the profits of the banks, via a complex array of formal and informal financial regulations.

In the financially deregulated environment of the 1980s and 1990s, where competition is fiercer and bank returns on lending are much less protected, there are good grounds for questioning the ongoing feasibility of such a system. The returns from banking have clearly been pressured by the liberalisation of the Japanese capital markets, and evidence that banks are even earning a lower return on their main bank relationships is beginning to accumulate (Weinstein and Yafeh, 1995). It is worth asking why this has been happening, and what implications the declines in returns to lending might have for the provision of corporate monitoring through the main bank system.

In this paper, I approach these questions with a simple model of main bank debt pricing. The model is designed to show that competition in the bank lending market can undermine the provision of monitoring by a firm’s main bank, since competition reduces the main bank’s return to monitoring. In this regard, the model confirms standard theoretical results to the effect that the main bank system is able to produce monitoring when so-called main bank rents are high and the main bank is a junior claimant. But the application of these principles can be distorted by two moral hazards when the lending market is contestable by non-main bank lenders who enjoy senior status as creditors.

The following section motivates this idea in more detail by briefly reviewing a popular approach to the determinants of effective main bank monitoring. Section 3 presents a formal model that explains the pricing of main bank debt, and the way in which competition in the lending market determines whether or not main banks monitor their loans properly. Section 4 contains a discussion of these results in relation to the theory of main banks, and it sets the findings in the context of recent Japanese experience. In the final section, the main arguments are summarised, and some suggestions for further research are offered.

2. Theoretical Motivation

Recent literature asserts that main banks are an efficient way of organising the monitoring of Japanese firms. Aoki (1994) has coined the expression of “integrated monitoring” to describe the way in which a certain bank, from which a firm borrows a substantial portion of its external finance (the main bank), accepts responsibility for the monitoring of that firm at all stages of its life cycle. It monitors prior to providing finance (ex-ante monitoring or project evaluation); it monitors during the lifetime of the firm (interim monitoring); and it resolves any financial distress that the firm may encounter (ex-post monitoring).

---

1 See, for example, Patrick (1993).
3 Detailed discussions of the phases of monitoring and other definitive properties of the main bank system are available in Aoki et al. (1994) and Sheard (1994).
Aoki has identified a threat to this arrangement in the form of the declining profitability of bank lending. He makes the point that the returns to main banks, which he calls main bank rents, are particularly important to the functioning of capital markets when they support an integrated monitoring structure. A main bank will only monitor if the return from doing so and the price of not doing so are sufficiently high. A similar point is made by Patrick (1993, p.56), who argues that mild financial repression can generate returns to banking that facilitate the development of close relationships between banks and firms.

This insight into the dependence of main bank monitoring on rents is highly plausible, but it is incomplete for a number of reasons. One of these is that it is not yet fully linked to the way in which rents are appropriated. Rents that are meant to support integrated monitoring may conceivably be appropriated at different stages by players against whom the main bank competes in lending markets, and so the main bank’s commitment to ex-ante and interim monitoring could be undermined by free-riding. An analysis that juxtaposes the incentives of non-main bank lenders against those of the main bank will reveal the conditions under which this issue is a legitimate threat to monitoring.

Another issue that needs to be explored further is the state contingency of main bank returns. Aoki (1994, p.15) argues that low deposit rates of interest have underpinned integrated monitoring by widening lending margins and thus providing main banks with the ex-ante rents that form the incentive to monitor. However, a deposit contract is not state contingent: depositors are entitled to a return both ex-ante and ex-post of a borrower’s financial distress. As a result, the conditions under which deposit costs should influence the bank’s preference for a monitored borrower over an unmonitored one are slightly obscure.

There are therefore at least two reasons for which Aoki’s hypothesis of rent-indexed monitoring deserves clarification. In the first place, there is a need to recognise the possibility of free-riding in integrated monitoring and, in the second place, it is worth inquiring into the state contingency of main bank rents and their effects on ex-ante and interim monitoring.

A very simple theoretical model is developed in the next section to explore these questions. It shows, inter alia, that main banks do not necessarily monitor well simply because low deposit costs make lending more profitable. In fact, the reverse is possible: low deposit costs can activate moral hazards that actually obstruct monitoring. By a similar argument, the model also shows that while assigning senior claimant status to non-main bank lenders may appear to ensure monitoring by the main bank, it constitutes a moral hazard if it encourages non-main bank lenders to rely on their senior claimant status in their pricing behaviour.

---

4 Aoki first recorded a finding of diminishing bank rents in his 1984 study. However, in that study he did not link banking profitability to integrated main bank monitoring as thoroughly as he has done in his more recent work. The argument that rents have been driven down by a compression of effective borrowing and lending rates is well canvassed in Bank of Japan (1991) and Nakajima and Taguchi (1995).
3. A Simple Model of Main Bank Debt and Monitoring

The model of this section draws heavily on a technique that was developed by Shapiro and Stiglitz (1984) in their analysis of labour markets. In this financial context, the key optimising agents consist of a representative main bank and a non-main bank financial intermediary. A cost-minimising, risk neutral final borrower is used to fix the equilibrium.

The Main Bank

In this model, the main bank is a large city bank which maximises its profit in continuous time over an infinite horizon by acting as a delegated monitor. The central bank requires it, under the terms of a franchise contract, to accept an interest bearing deposit (of given size), to lend that deposit to an infinitely lived borrower, and to monitor that borrower. The deposit contract is strictly enforceable and its cost is determined exogenously, by the central bank, through its monetary policy. The bank’s interest payments on deposits appear as $d$ per unit time. The repayments by the firm amount to bank receipts of $r_f$ per unit time.

The bank’s income and deposit liability flows occur indefinitely unless the borrower encounters financial distress. In this case, financial distress implies the application of ex-post monitoring by the main bank to restore the borrower to a condition in which it is able to meet debt repayments.\(^5\) There are two sets of circumstances under which financial distress might arise: either the borrower has an unforeseeable accident, or it fails because the main bank neglects to monitor it. The former type of failure happens to monitored and unmonitored firms alike with simple probability $b$ per unit time.

The chance that a firm will fail through the neglect of the bank follows a Poisson process and it is given by the rate of that process, which I denote with $q$. The choice of a Poisson process means that, in long-run equilibrium, all unmonitored projects encounter financial distress at least once. This is a fairly easy assumption to justify if the final borrower operates in a sufficiently competitive final product market. If ex-ante and interim monitoring improve the position of the borrowing firm in some way, then, analytically speaking, they are a source of quasi-rents. Those that enjoy these rents should eventually drive into distress those that do not. By such a process, the long run financial distress of unmonitored borrowers is inevitable. A variation on this argument uses the familiar assumption that managers of unmonitored borrowing firms use firm assets to consume private perquisites. In the long run, competition in the borrower’s final product market means that firms which are immunised by main bank monitoring against such cancerous management should drive into difficulty, if not out of existence, those borrowers which are not so protected.

To avoid exposure to $q$, the main bank could monitor the firm at a cost per unit time of $c$. By incurring $c$, it could identify projects which are sound, and it

\(^5\) The association between financial distress and continuation of the firm is for ease of exposition. It is possible to construct a scenario in which financial distress amounts to liquidation of the borrower. This depends, among other things, on the bank experiencing a delay in recruiting a new borrower and on the management of liquidation being costly for the main bank.
could force the borrower to undertake them. This cost is best thought of as interim monitoring but, under some circumstances, it could also include a component of ex-ante monitoring. In practice, the two types of monitoring may overlap considerably.

The choice as to whether or not to incur $c$ is modelled here as being binary. In reality, it could well be continuous, but it is not strictly necessary to present the model in these terms. Suppose that $c$ is the minimum level of monitoring expenditure that is required to eradicate such borrower failure as is driven by $q$. The main bank could spend some amount on monitoring that is less than $c$, but the marginal cost of that investment in monitoring capacity may exceed its marginal return. Likewise, it could spend an amount on monitoring that exceeds $c$, but this increment would not reduce the prospect of borrower failure below $b$. Under these assumptions, it is reasonable to approximate the main bank’s choice over monitoring expenditure in binary terms.

If financial distress occurs for any reason, then the bank will be required to resolve it. While the borrower is financially distressed, the bank will earn no interest on the loan (although it will still have to meet its commitments to depositors), and it will incur ex-post monitoring costs of $f$ per unit time.6 The (simple) probability that the firm will be restored to financial health in any small interval is given by $a$. This term is perhaps best thought of as the expected speed at which banks can repair their financially distressed borrowers. Once restored to financial health, a loan is treated as it was before the financial distress.7 In other words, loans that failed because of shirking are subject to shirking again after the borrower has recovered. Similarly, loans that failed by accident are again monitored after the financial distress has passed.

The equilibrium tendency of firms to drift into and out of financial distress may look like a mathematical complication with only superficial value, but this is not the case. Since the main bank is assumed not to abandon its borrowing clients in the event of their financial distress, and since the resolution of financial distress is a time consuming process in any event, the expected ‘speed’ at which loans move between bad and good states (and vice versa for that matter) is important in the main bank’s valuation of the costs and benefits that accrue to it from incurring $c$. To put this in slightly more general terms, if we believe that a distinguishing feature of main bank relationships is that they survive through good and bad states, then we ought to admit the importance of the duration of those states to the bank’s returns.

A final assumption on which to focus is the compulsory nature of main bank ex-post monitoring. There are at least five justifications for this.8 First, financial distress is highly visible. A bank that repeatedly shirks ex-post monitoring

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6 I place no limits on the form that financial recontracting might take. The main bank can decide upon its own response to financial distress and, provided it does so optimally, $f$ will be the outcome of a cost minimising approach.

7 Under appropriate assumptions about the relative magnitudes of the variables and parameters of the model, this will be the optimal policy of the bank. Less realistic equilibria are also possible, but I do not explore them here.

8 See Aoki et al. (1994, p. 15) for a discussion of the difficulties that main banks have in shirking their ex-post monitoring.
would expose itself to sanctions by the monetary authorities.\textsuperscript{9} Second, Japanese banks secure scant tax relief for bad debts. They therefore have strong incentives to resolve privately the financial distress of debtors rather than concede that a loan is non-performing and suffer the taxation consequences.\textsuperscript{10} Third, there is the possibility of retribution by other creditors. Sheard (1994b) suggests that this is a particularly compelling incentive to undertake ex-post monitoring where the main bank participates in a reciprocal delegated monitoring arrangement. Fourth, as Hoshi \textit{et al.} (1990) point out, the main bank is a prominent provider of finance for the firm. It is therefore likely to have sufficient private incentive to intervene in order to restore the firm to a position in which it is profitable. Finally, I invoke the arguments of Packer and Ryser (1992), that the Japanese legal system is sufficiently costly that banks frequently find it optimal to manage financial distress privately.

Given these conditions, the problem for the bank is to decide whether or not it ought to shirk its ex-ante/interim monitoring obligations; that is, whether or not it is optimal to incur \( c \). From the assumptions, the value of the loan in its different states is:

\[
R^S_S = \int_0^\infty (b+q)e^{-(b+q)t} \left[ \int_0^T e^{-\delta t}(r_M - d)dt + e^{-\delta T}R^M_{CS} \right]dT
\]

\[
R^M_{CS} = \int_0^\infty \alpha e^{-\alpha T} \left[ \int_0^T e^{-\delta t}(-f-d)dt + e^{-\delta T}R^M_S \right]dT
\]

\[
R^N_N = \int_0^\infty be^{-bT} \left[ \int_0^T e^{-\delta t}(r_M - d-c)dt + e^{-\delta T}R^M_{CN} \right]dT
\]

\[
R^M_{CN} = \int_0^\infty \alpha e^{-\alpha T} \left[ \int_0^T e^{-\delta t}(-f-d)dt + e^{-\delta T}R^M_N \right]dT
\]

Where \( \delta \) = discount rate.

\( T \) = stochastically determined time at which the state of the loan changes.

\( R^S_S \) = the value of a loan which is not being monitored.

\( R^M_{CS} \) = the value of an unmonitored loan that is financially distressed.

\( R^N_N \) = the value of a loan which is being monitored.

\( R^M_{CN} \) = the value of a monitored loan which is financially distressed.

Evaluating (la) through (Id) gives the following:

\[
\delta R^M_S = r_M + (b+q)(R^M_{CS} - R^S_S) - d
\]

\textsuperscript{9} In their seminal study of main bank ex-post monitoring, Pascale and Rohlen (1983) suggest that the Ministry of Finance exerted considerable pressure on Sumitomo bank to rescue Mazda in the late 1970s.

\textsuperscript{10} \textit{The Economist} (May 2, 1992, p.36).
\[ \delta R_{CS}^M = (R_S^M - R_{CS}^M) - f - d \]  
(2b)

\[ \delta R_N^M = r_M + b(R_C^M - R_N^M) - c - d \]  
(2c)

\[ \delta R_{CN}^M = \alpha (R_N^M - R_{CN}^M) - f - d \]  
(2d)

The main bank will shirk its ex-ante or interim monitoring if and only if \( R_S^M > R_N^M \). From the system of equations (2), this is true when:

\[ f < \frac{\alpha \delta + b + q}{q} - r_M \]  
(3)

Inequality (3) has several obvious features. First, if ex-post monitoring is expensive, then the main bank will not require a great inducement to monitor. That is, it would monitor in return for a relatively low value of \( r_M \), and the pressure for monitored debt in equilibrium would be strong. Likewise, if main banks are able to repair their financially distressed borrowers very quickly (that is, \( \alpha \) is high), they will have relatively weaker incentives to monitor in the ex-ante and interim phases. Conversely, the higher is the cost of ex-ante and interim monitoring, and the greater is the probability of accidental failure, the greater is the inducement that the main bank will require in order to monitor. It goes almost without mention that a high discount rate is also conducive to unmonitored debt.

A more novel aspect of (3) is that the cost of deposits does not directly influence the bank’s decision as to whether or not it ought to shirk its ex-ante and interim monitoring responsibilities. The reason is simply that the bank’s deposit contract is independent of the financial condition of the borrower. While an increase in deposit costs may lower the profitability that flows from a monitored borrower and seem to activate the incentive to shirk (Aoki’s point), it also reduces the value of a borrower which produces no return at all, and so it simultaneously discourages shirking. These considerations perfectly counterbalance one another in the bank’s behaviour and so the cost of deposits is irrelevant to the monitoring decision.\(^{11}\)

If the capital markets were closed by regulation and \( r_M \) were somehow fixed, then inequality (3) would be the end of the matter. Main banks would always monitor borrowers, provided that conditions in the capital market ensured that their returns from doing so, and the penalties for not doing so, were sufficiently high and probable. However, the deregulation of Japanese capital markets that has taken place since the 1980s has introduced to some borrowers a new set of potential intermediaries, whose behaviour can influence the price of finance to the borrower. It is to these alternative intermediaries that I now turn.

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\(^{11}\) This is not equivalent to a denial that deposit costs might be relevant to bank profit. The role of deposit costs as an influence on bank profit is dealt with in the following sub-section. The appendix also shows that they may be relevant to the monitoring decision when the main bank market is perfectly competitive.
The Non-Main Bank Intermediary

Suppose that the capital market is contestable by a non-main bank financial intermediary. This intermediary exists in a perfectly competitive market, and it optimises intertemporally by offering a debt contract to borrowers at a rate of return per unit time, $r_F$. For the purposes of fixing ideas, it may be helpful to think of this intermediary as an institutional holder of corporate bonds.

There are several important respects in which this intermediary differs from the main bank. First, I assume that it is not obliged to monitor the behaviour of borrowing firms and that it would, in any case, be unable to do so at reasonable cost. This is a common assumption about the holders of public debt. Fama (1985) offers some empirical evidence for it, and it is used by Hoshi et al. (1993) and Diamond (1991), among many others.

Second, assume that the deposit expenses of the non-main bank intermediary are higher than those of the main bank. Let the cost of funds to the non-main bank intermediary be $\theta d$, and assume $\theta > 1$. This assumption simply suggests that the city banks are more efficient than their competitors in the collection and management of deposits, and there are several justifications for it. First, note that the segmentation of Japan’s financial markets has meant that a restricted number of large commercial banks have enjoyed preferential access to funds from the monetary authorities. A particular example is that in much of the earlier high growth period, those banks had preferential access to the Bank of Japan’s reserve facility at artificially low rates of interest. There are, of course, other reasons for which main banks might be able to secure deposits more efficiently than some of their competitors. For instance, they often have firms, for which they are main, deposit their employees’ payrolls with them. More generally, it is worth noting that the city banks are, by definition, very large. They are therefore able to exploit any economies of scale in deposit collection and management to an extent that is beyond the reach of other intermediaries. Taken together, these considerations mean that non-main banks are at something of a disadvantage in terms of the cost of their funds.

Third, the debt of the non-main bank financial intermediary is assumed to be senior to that of the main bank. In normal states, the non-main bank receives its contracted rate of return of $r_F$. However, if the borrower becomes financially distressed, then the non-main bank intermediary would still receive a fraction, $\gamma$, of its return as a result of the main bank’s ex-post monitoring.

The assumption that the non-main bank can rely on the main bank for ex-post monitoring in the event of the borrower’s financial distress is admittedly awkward, when there is only one debt contract for sale. It might well be argued that, if the non-main bank earns the (sole) debt contract, then the main bank has no financial commitment to the borrower, and so the main bank tie dissolves.

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12 This assumption is necessary in order for there to be an equilibrium in which the main bank can compete with non-main bank intermediaries.

13 See Ito (1992) for a discussion of the overloan phenomenon and Aoki et al (1994, p.17) for a more general discussion of the privileged access of main banks to cheap funding.

14 Note the assumption that the probability (per unit time) of a borrower recovering from a bout of financial distress is the same as when the main bank has the loan. This assumption is merely for notational convenience, and its relaxation is straightforward.
completely. Of course, if this dissolution occurs, then the non-main bank cannot reasonably expect the main bank to undertake any ex-post monitoring. Therefore, there is no situation in which the non-main bank can credibly price on the basis that \( \gamma > 0 \).

Fortunately, this conjecture presents no serious problems. The model will still work even if the non-main bank cannot depend upon the main bank for ex-post monitoring. It is merely necessary to suppose that, if the main bank does not undertake ex-post monitoring on behalf of the non-main bank, there is an alternative process for managing financially distressed borrowers. For example, financial distress might be resolved either by judicial means, or by the joint actions of a number of other constituents of the firm. It is not even necessary for any such alternative process of distress resolution to respect the seniority of the non-main bank intermediary. Even if the non-main bank foregoes everything in the event of financial distress; that is, \( \gamma = 0 \), the model will still operate properly.

Given these conditions and the assumption that the borrower can solve the main bank's problem, the value of a loan in its various states is:

\[
R^F_S = \int_0^\infty (b + q)e^{-\gamma t} \left[ \int_0^t \left( e^{-\theta d} \right) R^F_C e^{-\gamma T} dT + e^{-\gamma T} R^F_C dT \right] dT
\]

where:
\[ \phi = \text{discount rate.} \]
\[ R^F_S = \text{the value of a loan that is not financially distressed.} \]
\[ R^F_C = \text{the value of a loan that is financially distressed.} \]

Evaluating (4a) and (4b) gives the following:

\[
\phi R^F_S = R_F + (b + q)(R^F_C - R^F_S) - \theta d \quad (5a)
\]

\[
\phi R^F_C = \alpha (R^F_C - R^F_S) + \gamma R_F - \theta d \quad (5b)
\]

We can determine the price that this intermediary would charge for the loan by solving (5a) and (5b) for \( R_F \) under the perfectly competitive condition that \( R^F_S = 0 \). Equation (6) gives this simple solution.

\[
r_F = \frac{\theta d(\phi + \alpha + b + q)}{\gamma(b + q) + (\phi + \alpha)} \quad (6)
\]

Equation (6) can be used to determine whether or not the main bank monitors. Implicit in (3) and (6) is the notion that the borrower has a choice about the terms on which it borrows. It could borrow funds at the level of \( r_M \) which means that (3) holds with equality, thus ensuring that it is monitored. Alternatively, it could compel its main bank to match the price, \( r_F \), that is being offered by the
non-main bank intermediary. To determine the outcome of this choice, assume that the final borrower is risk neutral and that it will reject monitoring if the cost of finance that is associated with it is strictly greater than $r_F$. Under this assumption, monitoring does not take place when:

$$f < c(a + \delta + b + q) - \frac{\theta d(a + \phi + b + q)}{\gamma(b + q) + \alpha + \phi}$$  \hspace{1cm} (7)

Inequality (7) expresses the central results of the model. Before discussing its properties in detail, I pause to define the limits to the main bank’s participation in the market. After all, it is quite possible that the non-main bank intermediary could price finance such that $R^M_N = 0$, that is, the main bank earns negative equilibrium profit. The situation in which this occurs is obtained by determining the level of $r_M$ that sets $R^M_N = 0$. If $r_F$ is less than that value, then the main bank is unable to participate in the market and the system collapses. This eventuates when the following condition is met:

$$d(a + \delta) \frac{\theta(b + q + \alpha + \phi)}{b + q \left[\gamma(b + q) + \alpha + \phi\right]} - \frac{b + q}{\alpha + \delta} < f$$ \hspace{1cm} (8)

Inequality (8) shows that if the non-main bank intermediary were fully insured against borrower failure, and if it were not at a cost disadvantage in the deposit markets ($\gamma = 1, \theta = 1$), then main banks are decidedly uncompetitive. Note, though, that this is only a sufficient condition for the non-existence of main banking. Other, less extreme, parameter values might produce the same result.

4. Discussion

The overriding purpose of the model is to identify the factors that will discourage main banks from monitoring, and force them to accept higher risks on their loans. Its most novel feature is that it exposes a positive relationship between deposit costs and the main bank’s incentive to provide fully integrated monitoring of the borrower. It also shows that assigning junior claimant status to the main bank is not necessarily a good method for ensuring that the main bank monitors its clients.

Consider these results individually, beginning with the arguments over the cost of deposits. The model unambiguously suggests that the cost of deposits has no effect on the incentives of main banks to monitor when the market is not contestable by non-main bank sources of finance. Inequality (7) shows that when that market is contestable, falling deposit costs will actually reduce the main bank’s return, and so they will undermine the incentive of the main bank to deliver fully integrated monitoring.

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15 When main banks compete with one another and when the parameters of the model take one certain values, the appropriate main bank participation constraint may actually be found by setting $R^M_N = 0$. This case is explained in appendix A.
Such an idea sits well with the experience of the Japanese economy in the late 1980s. Over that period, the conduct of bank monitoring is held to have been poor, while monetary policy was quite accommodating, and bank margins were low. That there was a particularly marked decline in the returns to main banks is quite significant.\footnote{This finding is due to Weinstein and Yafeh (1995).} Clearly, the decline in deposit costs reduced the returns to main banks, and their incentives to monitor weakened in the manner that the model suggests.

Such reasoning is sharply at odds with that of some earlier theoretical studies, such as Aoki (1994). Aoki has contended that the rent from main banking is necessary for integrated monitoring, and he suggests that deposit costs are inversely related to main bank rents. In other words, Aoki’s reasoning seems to suggest that lower deposit costs should enhance the main bank’s incentives to provide monitoring because they raise the opportunity cost of a financially distressed borrower.

The present model suggests that this argument tells only part of the story. If the main bank faces no competition at all, low deposit costs will have no effect on its incentives to monitor, because deposit costs are incurred regardless of whether or not the borrower is financially distressed. In this respect, deposit costs have no impact on the opportunity cost of a failed borrower. But if we introduce competitive credit price determination and admit that non-main bank sources of finance might be available to the borrower, it emerges that there is actually an indirect and positive relationship between deposit costs and the main bank’s incentives to monitor. As inequality (7) reveals, this indirect effect works through the impact of lower deposit costs on the pricing behaviour of the non-main bank intermediary. The senior claimant status of these intermediaries, measured by $\gamma$, means that they are insured against the risks that are associated with their pricing decisions. Therefore, as deposit costs decline, they are more prone to price funds so cheaply as to make ex-ante and interim monitoring inconsistent with profit maximisation by the main bank. In short, far from increasing the incentives of main banks to conduct ex-ante and interim monitoring, low deposit costs actually reduce them.

This resembles a moral hazard of insurance problem, in which insurance takes the form of seniority. The greater is the seniority of non-main bank intermediaries (that is, the greater their insurance against financial distress), the stronger is their power to generate pricing outcomes that make more likely the adverse states against which they are insured. Contrary to existing theory on the main bank system, low deposit costs help to enable this mechanism.

A moral hazard problem of this sort takes as its starting point the moral hazards that often appear in other delegated monitoring models. As Stiglitz (1985) observes, monitoring has localised public good properties, and so it is possible that no single provider of finance will have the incentives to undertake monitoring on behalf of the others. Delegated monitoring appears to be one solution to the problem. But this is potentially fraught with moral hazard, since anyone who delegates monitoring implicitly signals that they cannot observe compliance with the delegated monitoring contract at reasonable cost.
The model shows that this moral hazard problem is not necessarily eradicated by integrating monitoring and subordinating the monitor’s claims to those of creditors with whom it competes. Assigning claims to distressed borrowers in this way may appear to be a good method for sterilising the moral hazard problem that the monitor faces ex-ante of financial distress, because it raises the penalties that are associated with shirking. However, this strategy is only effective up to a point. When deposit costs are sufficiently low and $\gamma$ is high, a different moral hazard facing non-main bank intermediaries becomes potent.

This two stage moral hazard theory may partly explain why an accommodating monetary policy seemed to coexist with successful corporate performance in the high growth period of the Japanese economy (the late 1950s through to the early 1970s) but why it also coincided with an apparent breakdown in monitoring arrangements in the late 1980s and early 1990s. In the former period, an accommodating monetary policy did not compromise monitoring arrangements (neither, however, was it as supportive as is commonly argued) because entry to the market in financial intermediation was regulated, and so non-main bank intermediaries were unable to undercut the main bank. Hence, main banks had limited incentives to shirk their monitoring. In such an environment, the monetary authorities were able to maintain low deposit rates in order to achieve macroeconomic objectives without fear of the corporate governance implications of their actions. In contrast, in the latter 1980s, an accommodating monetary policy was more of a threat to monitoring because non-main bank forms of finance were more prevalent and credit was priced more competitively. The moral hazards, to which non-main bank intermediaries are inherently susceptible, became relevant when policy turned accommodating around the time of the 1985 Plaza Accord. Viewed in these terms, the outbreak of financial distress in the corporate sector in the early 1990s and the subsequent criticism of the screening and monitoring performances of major Japanese banks are hardly surprising.

Before leaving the matter of deposit costs, it is worth highlighting the model’s similarities to, and differences from, the predictions of Diamond (1991). In Diamond’s framework, periods of easy credit mean that borrowers with good reputations will acquire a stronger appetite for disintermediated debt, which is unmonitored. This is partly because borrowers’ reputations become more valuable when interest rates are low, and so borrowers are more able to give a credible precommitment to bond financiers that they will not use borrowed funds for private purposes. Hence, monitoring becomes unnecessary, and the borrower is in a position to borrow from bond markets at a price that does not include a monitoring premium.

As we have seen, in the present model, lower deposit costs reduce the provision of monitoring, just as they do in Diamond’s. However, in contrast to Diamond’s model, the effect of the lower deposit costs is unambiguously to raise the probability of the borrower encountering financial distress, because of the priority structure of claims against a financially distressed borrower.

Deposit costs are not the only interesting aspect of inequality (7). The model also shows that low values of $f$ discourage monitoring. In one sense then, if main banks are very efficient at resolving financial distress and can carry out financial recontracting at low cost, they will have weak incentives to monitor bank loans in good states.
Conversely, of course, if financial distress is expensive, the main bank will be more likely to capture the debt contract of the firm on terms that guarantee monitoring. The Bank for International Settlements’ (BIS) capital adequacy requirements might be viewed as one mechanism by which monetary authorities can raise the cost of financial recontracting in order to stimulate monitoring. Under these requirements, bad debts damage a bank’s capital adequacy. To the extent that this capital adequacy is costly to repair, financial distress will be more expensive for the main bank under the regulations than it would otherwise be.

By way of an aside, it is worth noting that the model is able to explain the apparent tendency of the BIS’ regulations to reduce lending by the major commercial banks. Note from inequality (8) that higher values of \( f \) reduce the ability of the main bank to lend profitably. Thus, while higher ex-post monitoring costs increase the incentive of the main bank to monitor, they paradoxically undermine its capacity to lend at all. This might partially explain why commercial bank lending has apparently been slower and more cautious since the introduction of the requirements.17

Another variable that might be important is the cost of ex-ante and interim monitoring, \( c \). On this point, the intuition is straightforward: higher values of \( c \) discourage the main bank from monitoring. Nevertheless, it is quite difficult to speculate on the direction in which \( c \) might actually have moved in Japan. There are at least two factors which suggest that it may have increased. First, the broader spectrum of investment opportunities that economic liberalisation has introduced must surely have made monitoring fundamentally more complex and expensive. Second, it is worth noting that banks are now lending to smaller borrowers. These borrowers are often thought to be more difficult to monitor than the banks’ traditional clients. That being so, the compositional changes that have taken place in the direction of bank lending suggest that banks’ costs of monitoring their loans may have increased. Running counter to these positive cost pressures are other developments which suggest that ex-ante and interim monitoring costs for the banks may have eased. For example, as the Bank of Japan (1992) has pointed out, in recent years, there have been substantial improvements in banking technology which should have reduced the expense of monitoring.

Movements in \( \theta \) are also interesting. With the steady progress of Japanese financial liberalisation, it becomes likely that the difference in the cost of funds to major commercial banks and other types of financial intermediary should be gradually compressed. This being the case, \( \theta \) should have declined toward, or even below, unity. This would raise the ability of the non-main bank intermediaries to induce shirking by the main bank and, by inequality (8), it would weaken the viability of the main bank system.

The final elements of the problem that need to be considered are discount rates. Long planning horizons are important to the maintenance of debt that is main bank monitored. On its own, this verification of a popular belief about the underpinnings of the main bank system is not very interesting; it follows almost directly from the model’s simple setup. Slightly more noteworthy is the finding that

17 That the BIS’ capital adequacy requirements constrict bank lending in Japan is a widely held belief among practitioners in Japan. See, for example, *The Economist* (April 23, 1994, p.73). de Brouwer (1995) demonstrates econometrically that lower asset quality raises minimum loan rates.
an increase in the discount rate of the main bank does not affect the equilibrium to the same extent as an increase in the discount rate of the non-main bank intermediary.

5. Concluding Remarks

Falling profitability in the latter 1980s meant that Japanese banks slackened their monitoring and increased their willingness to bear risks on their loans. The theoretical model of this paper shows formally that this kind of mechanism could have been at work, even in the context of Japan’s widely praised main bank system.

Moral hazards in financial intermediation drive the findings. In the literature on delegated monitoring, much is made of the possibility that monitors might shirk their monitoring and, in so doing, fall prey to moral hazard. In this paper, I have shown that whether or not this happens to Japanese main banks depends in part on the pricing behaviour of their competitors. If non-main banks are well insured by integrated main bank monitoring, then the debt contracts that they offer to borrowers may be priced in such a way as to present the main bank with a moral hazard. Since the non-main banks realise this when they act, they are effectively surrendering to the insurance based moral hazard that they confront by virtue of having debt that is senior to the main bank’s.

A distinguishing feature of this result is that it does not explain the failure of main bank monitoring by analysing the type of finance that borrowers select. Previous studies, such as Hoshi et al. (1993) and Horiuchi (1993), have emphasised that the ability of firms to evade main bank monitoring depends upon the way in which those firms use bond markets. In this paper, I have shown that a firm can be subjected to incomplete monitoring by its main bank, even if it does not use the bond markets at all. The reason is that when non-main bank sources of finance are viable, borrowing firms may threaten their bankers with defection from the main bank relationship. The structure of claims against borrowers in the main bank system underwrites the credibility of these threats, and so main banks may have to price debt in a way that is inconsistent with complete monitoring. Thus, it is not firms’ use of alternative sources of finance per se that constrains main bank monitoring. Rather, it is the mere existence of non-main bank sources of finance and the priority structure of claims in the main bank system which lead to incomplete main bank monitoring.

The model through which these ideas are expressed is still quite basic, and there are many ways in which it might be refined. In closing, I list a few of the more pressing considerations. First, it would be interesting to model the final borrower more thoroughly and to incorporate into this model findings such as those by Hoshi et al. (1993). For various reasons, borrowers may be risk averse and so may be willing to pay their main bank for monitoring even when \( r_M > r_F \).\(^{18}\) Also, a final borrower may wish to diversify its borrowing in ways that allow it to reward its main bank for monitoring, while taking advantage of any cheaper funds

\(^{18}\) See appendix B for a first pass at this issue.
that may be available elsewhere. The indivisibility of debt in my model does not allow for an exploration of this idea.

Diversification is also important from the viewpoint of the main bank. A number of studies in the delegated monitoring literature rely on diversification as a key element in the delegated monitor’s behaviour. In this model, I have not allowed the main bank to diversify its risk and this will undoubtedly affect its monitoring incentives.

Yet another aspect of the model that needs improvement is the treatment of financial distress. I have assumed that the main bank can simply be compelled to perform ex-post monitoring by the central bank. Although the central bank is commonly a source of such pressure, demands that main banks resolve financial distress probably emanate from other sources as well. In particular, if the pressure for main bank ex-post monitoring is applied by non-main bank lenders—as Sheard’s (1994b) reciprocal delegated monitoring hypothesis suggests it is then the incentives of main banks to monitor may be considerably more complex than the way in which they have been represented here.

A further issue that warrants consideration is the matter of deposit markets. In the simple model of this paper, deposit costs are exogenously fixed by the monetary authorities. This is quite a severe abstraction: rates on deposits have been increasingly determined by competitive process since 1985, and so it might be interesting to rework the model so that it accounts for the effects of depositor behaviour upon the banks’ cost of funds. In doing so, it would be particularly interesting to consider the role played by deposit insurance. In the model of this paper, banks provide comprehensive deposit insurance to their depositors. This is not quite an accurate depiction of reality. The Japanese monetary authorities operate a deposit insurance scheme, and, equally importantly, the coverage of this scheme is not comprehensive. Since insurance might well affect depositor behaviour, it might be interesting to explore the relationship between deposit insurance, banks’ deposit costs and the conduct of main bank monitoring.

Another promising extension would be to introduce equity as a financing option. Creditor monitoring can be fundamentally different to shareholder monitoring, and main banks are usually simultaneously creditors of, and shareholders in, their client firms. By focusing on debt finance as the source of the main bank’s monitoring incentives, the theoretical model of this paper eclipses some of the incentives that main banks have to maximise their profits on shareholding. By extending the model to incorporate these incentives, it might be possible to undertake useful extensions of Aoki’s (1984) analysis of the tension between banks and individual shareholders over financial leverage.

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19 See, for example, Diamond (1984) and, for a treatment of the Japanese main bank case, Sheard (1994b).


Stiglitz, J., 1985 “Credit Markets and the Control of Capital” *Journal of Money, Credit and Banking*, 17,133—152.


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Appendix A:
The Model under the Assumption of Perfectly Competitive Main Banking

The model in the body of the paper does not refer to the market in which the main bank exists, and so the net present value of main bank loans fluctuates according to the behaviour of the non-main bank intermediary. In this appendix, I show the workings of the model under the particular assumption that the market in main bank loans is perfectly competitive.

Because this restriction on the main banks’ market is an extreme abstraction from the real world, I have left this analysis to an appendix. Few would argue that city banks are well cast as perfect competitors, notwithstanding whatever discipline they might apply to one another. Nevertheless, assigning them this role is useful both as a means of drawing out some alternative equilibria that were bypassed in the main text, and as a way of asserting the robustness of some of the model’s key results.

To solve the model, assume that there is one representative main bank and a representative non-main bank intermediary. Set \( R^M_S = R^N_S = R^F_S = 0 \), and solve for \( r_M \) and \( r_F \) respectively.\(^{20}\) The solutions provide three iso-profit lines that can be mapped in \((d, r)\) space. In the interests of a compact graphical exposition of them, I have replaced the terms \( r_M \) and \( r_F \) with the generic term \( r \).

I will explore three possible scenarios that arise from this procedure. The first two are fundamentally different from the third. In both of them, there are two panels. Panel A describes the system when the representative main bank does not have to compete with non-main bank sources of finance. The combinations of \( d \) and \( r \) in which main bank lending is feasible (hereafter referred to as the feasible set) is restricted by the lower of the two iso-profit lines for any given value of \( d \).

Panel B in both of these cases redraws the model when the lending market is contested by a non-main bank financial intermediary. Note that the non-main bank intermediary has become unnecessary for the determination of a main bank monitoring strategy. For a given cost of deposits, we can determine an equilibrium level of \( r \) using only panel A of each scenario. Because the borrowing firm wishes to minimise its cost of capital, and because the main bank market is perfectly competitive, a given level of deposits produces a unique equilibrium level of \( r \).\(^{21}\) For example, in panel A of scenario 1, if the cost of deposits is \( d^* \), then the cost of the loan must be \( r^* \). At any other level of \( r \), the main bank would either earn supernormal profit, or it would register losses. For example, at \( r^{**} \), the main bank would be earning negative profit by monitoring, or supernormal profit by shirking. Both possibilities are ruled out under the assumption of a perfectly competitive main bank market, and so the unique equilibrium associated with \( d^* \) is \( r^* \).

There is a simple economic logic to the superfluity of the non-main bank intermediary in this process. All points within the feasible set that the non-main bank might generate are, by definition, intra-marginal. Therefore, like \( r^{**} \) in panel A of scenario 1, they do not qualify as perfectly competitive prices. If the non-main

\(^{20}\) The algebraic solution to \( R^F_S = 0 \) is given in the text.

\(^{21}\) The only case in which the monitoring strategy is not strictly determined is at the point of intersection of the iso-profit functions in each of panels A and B in scenario 1. At this point, the main bank is indifferent between monitoring and shirking.
bank generates a value of $r$ that the main bank could match, then there will, in general, be scope for the main bank to generate a price that is lower still. Indeed, the main bank will be forced to generate that lower price by the incipient competitive pressures that other main banks are applying.

One might therefore wonder as to the analytical value of the non-main bank intermediary in this particular setting. It is still a useful means of showing the conditions under which the main bank system will not be able to produce a cost of capital which is lower than that which the rest of the market would provide. This is drawn out in panel B of the first two scenarios and, more dramatically, in scenario 3.

With that in mind, let us take the scenarios in turn. Panel A of scenario 1 is drawn on the assumption that $c > \frac{f_q}{\delta + \alpha}$ and it has a strong resonance with the imperfectly competitive main bank market in the main text. In that model, ‘low’ deposit costs on a loan did not influence the main bank’s incentives to monitor, but they undermine monitoring once the pricing behaviour of non-main bank intermediaries is admitted to the analysis. Panel A shows us that there are conditions under which the same general result obtains, even without a non-main bank intermediary.

If we add the non-main bank intermediary (panel B) the basic story does not change much. Lower deposit costs still reduce the main bank’s incentives to monitor, as they do in panel A. Additionally, though, they eventually undermine the main bank’s ability to participate in the lending market at all. At very low levels of $d$, the non-main bank could set prices that lie outside the feasible set for the main bank.

**Scenario 1 — Panel A**

![Graph showing Scenario 1 - Panel A](image)
Scenario 2 is slightly different. Here we reverse the inequality which generated scenario 1, and we assume that $c < \frac{\lambda q}{\delta + \alpha}$. Panel A represents a situation that often appears in the more enthusiastic assessments of the monitoring capacity of the main bank system. At all points in the feasible set, the main bank monitors the loan, and there is no deposit cost that could induce it to abandon its commitment to monitoring. This would happen if: the main bank is a cost effective interim monitor; if its priority in the borrower’s adverse states is low; if the firm depends on main bank monitoring for its solvency ($q$ is high); and if the main bank optimises over a very long run ($\delta$ is relatively low).

The situation is slightly different in panel B of the scenario. The introduction of the non-main bank intermediary does not mean that the main bank will ever abandon ex-ante and interim monitoring, but it does introduce the possibility that the main bank might be unable to participate in the market. As in the first scenario, the deposit cost of the loan can eventually fall so far that the main bank system is not viable.
Scenarios 1 and 2 differ from each other in terms of assumptions about the parameters of the main bank’s problem in panel A. Scenario 3 might be a sub-case of either of them (it is drawn as a sub-case of 1). In it, the parameters of the model are such that the main bank is universally unable to participate in the market. The non-main bank’s iso-profit line is always below, and flatter than, either of the main bank’s iso-profit lines. Therefore, all values of $r$ that the non-main bank might
generate lie outside the set of points that are feasible for main bank lending. This scenario arises when \( \frac{\theta (\phi + \alpha + b + q)}{\gamma (b + q) + \phi + \alpha} < 1 + \frac{b}{\delta + \alpha} \).

**Scenario 3**

Differences notwithstanding, the three perfect competition cases make two important points. First, they confirm for a perfectly competitive main bank lending market that there is no case in which lower deposit costs enhance the incentives for main banks to monitor. At best, lower deposit costs make no difference to the main bank’s incentives to undertake ex-ante and interim monitoring. Second, all scenarios demonstrate that, under perfect competition, lower deposit costs undermine the ability of main banks to compete with other classes of financial intermediary.

**Appendix B: Governance of The Firm**

It is a little unrealistic to suppose, as we have done so far, that constituents of the firm have no interest in the monitoring services which the main bank supplies. In this appendix, I relax this assumption and model the behaviour of shareholders, who place some value on the way in which main bank monitoring raises the net present value of their investment.

Imagine that the firm to which the main bank lends is governed by risk neutral residual claimants (that is, shareholders), who are able to protect their investment against defective management by purchasing the monitoring services of a main bank.\(^{22}\) If the firm is in a bad state, the shareholders will receive nothing. If

\(^{22}\) Note that we are assuming a certain harmony of interest between shareholders and the main bank about the type of monitoring that ought to be provided. This abstracts from the tension that
it is in a good state, they earn the surplus, $y \cdot r$, where $r$ is the (competitively determined) payment on debt and $y$ is the return to the firm’s activities, net of returns to all factors other than capital.

Let the net present value (NPV) of a representative shareholder’s investment be $V$, such that a monitored investment has a NPV of $V^N$, and an unmonitored investment has a NPV of $V^S$. Let $V^{NC}$ and $V^{SC}$ be the returns to the shareholder in bad states when the firm is monitored and not monitored. Finally, let the discount rate of shareholders be equal to the discount rate of the main bank. This gives us:

\[ \delta V^N = y - r + b(V^{NC} - V^N) \quad (A1) \]
\[ \delta V^S = y - r + (b + q)(V^{SC} - V^S) \quad (A2) \]
\[ \delta V^{NC} = a(V^S - V^{NC}) \quad (A3) \]
\[ \delta V^{SC} = a(V^S - V^{SC}) \quad (A4) \]

Assuming for the moment that the capital market is not contestable by non-main bank financial intermediaries, the shareholders will pay for debt that is monitored when $V^N > V^S$. Solving the system of equations (A1) to (A4) and substituting in the perfectly competitive solutions $r_M|_{R^y = 0}$ and $r_M|_{R^y = 0}$ for the values of $r$ gives this condition as a function of the structural parameters of the model:

\[ y > c(\delta + a + b + q) - f \quad (A5) \]

Inequality (A5) looks remarkably like (3): in neither inequality do deposit costs feature. In other words, when main banks with identical claimant status compete with one another, the setting of monetary policy does not influence the quality of equilibrium ex-ante and interim monitoring. The variables which do matter are the cost of monitoring and the output that would be foregone in the event of corporate financial distress. In particular, the higher the returns to shareholders, the more likely it is that their choices will produce debt that is monitored. On the other hand, if ex-ante and interim monitoring is expensive, shareholders will baulk at paying the premium for it. Ex-post monitoring features in the reckoning because, as (3) revealed, higher ex-post monitoring costs induce the main bank to monitor at lower levels of $r$. When this is factored into the main bank’s pricing schedule, it

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23 The fact that higher values of $y$ support monitored main bank debt might help to explain the coincidence of the system with Japan’s high growth period: shareholders were simply more prepared to pay for expensive main bank monitoring when the expected stream of income from their investment was high.
emerges that higher financial distress costs will induce shareholders to opt for contracts that provide fully integrated monitoring.

Now consider what would happen if main banks were to compete with non-main bank intermediaries as well as with each other. The equilibrium will depend on which of the scenarios examined in Appendix A is relevant. For instance, it might be that \( r_F < r_M \) and that forcing the main bank to supply credit at \( r_F \) maximises \( V \). If this were so, and if the parameters of the model were to generate scenario 1, then the main bank system would, up to a point, remain feasible under a shirking strategy by the main bank. The same would not be true if the parameters of the model generated scenario 2. In that case, if \( V \) is maximised by \( r_F < r_M, r_{MF}^N = 0 \), it is impossible to satisfy the participation constraint of the main bank, and systemic collapse inevitably occurs.

The ambiguity over which situation applies makes for an indeterminate equilibrium. Consider the full range of possibilities generated by scenarios 1 and 2. In scenario 1, if inequality (A5) is not satisfied and (8) is, then the main bank system collapses. If neither inequality (A5) nor inequality (8) holds, then the main bank system remains intact but ex-ante and interim monitoring are not provided. In this case, it is not possible for lower deposit costs to increase the pressure for an equilibrium debt contract that is characterised by ex-ante and interim monitoring.

Assume now that the parameters of the model are such as to place us in the context of scenario 2 and, for notational convenience, that \( \delta = \delta \). If inequality (A6) is satisfied, then monitoring by the main bank takes place. If (A6) is not satisfied, then the main bank system collapses.

\[
y > (\delta + \alpha + b + q) \frac{d(\delta + \alpha + b) + bf + c(\delta + \alpha)}{(\delta + \alpha)q} - \frac{\theta d(\delta + \alpha + b + q)\delta + \alpha + b}{[\gamma(b + q) + \delta + \alpha]q} \tag{A6}
\]

Inequality (A6) is a little too convoluted, and its relevance too conditional upon other inequalities, for it to convey any clear intuition. And yet it has some interesting features, the main one being that it does not rule out the possibility that falling deposit costs could push the equilibrium toward or into a region in which fully integrated monitoring takes place. It turns out that this unusual case will arise when scenario 2 is relevant and (A7) is satisfied.

\[
1 > \frac{\theta(\delta + \alpha)}{\gamma(b + q) + \delta + \alpha} \tag{A7}
\]

This final result resembles (8) in that we cannot be sure whether higher deposit costs raise or lower the viability of the main bank system. However, it qualifies (7) and (8) by showing that lower deposit costs could actually enhance the likelihood of integrated equilibrium monitoring. Other things equal, if \( \theta \) is low enough and \( \gamma \) high enough for (A7) not to hold, then higher deposit costs will mean that the main bank is priced out of the market as deposit costs rise. Under a loose monetary policy regime, this would not occur.
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