

Depositors' selection of banks and the deposit insurance system in Japan: Empirical evidence and its policy implications

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Abstract:

This paper studies market discipline on banks by depositors in Japan. We stress the importance of depositors' selection of banks, which together with regulatory and supervisory schemes can strengthen corporate governance in banking. The effectiveness of depositor discipline is, however, weakened by the existence of deposit insurance system. In order to examine the effectiveness of depositor discipline in Japan, we use a sample of 120 banks during the period FY 1998 to FY 2001, and find that depositors' tendency to select banks based on asset risk exposure clearly strengthened ahead of the partial lift of the freeze on the payoff system (April 2002). At the same time, depositors, expecting "too-big-to-fail" policy by the government, tended to opt for larger banks regardless of their risk exposures and performance. The latter selection mechanism, however, would not offer good discipline on banks. Makeshift solutions to containing banking crises such as delaying the full introduction of the payment system and promoting bank mergers may invite further moral hazard among banks and potentially lead to destabilization of the financial system.

Key words: Governance, Market discipline, Bank contagions, Deposit Insurance, Japan

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1. Introduction

After the burst of the bubbles and for the subsequent decade, the problems of non-performing loans in the Japanese banking sector had been the most important policy issues to be solved in a quick and comprehensive manner. Except for a few cases, however, the government continued to adopt “forbearance” or “protection-oriented” policies in order to prevent the outbreak of large-scale banking crises. In this sense, the year of 2002 might be remembered as a year in which Japan opted for policy measures that would significantly affect the future course of the nation's financial system. In April 2002, for example, full protection of bank deposits - in effect since fiscal 1996 -- was partially lifted. Time deposits, foreign-currency deposits and certificates of deposit (CDs) are now guaranteed only up to ¥10 million in principal plus interest. Protection for ordinary and current deposits was scheduled to be limited as of April 2003.

Following Prime Minister Junichiro Koizumi's instructions at the end of July 2002, however, full introduction of a "payoff"-style limited deposit protection scheme was postponed for another two years with the intent of safeguarding settlement functions in the banking sector. Subsequently, banks were opted to introduce a new type of non-interest-bearing, redeemable-on-demand deposit (the "payment and settlement deposit") that will receive full protection starting in April 2005. On Oct. 30 2002, the government introduced its "Program for Financial Revival," a set of measures designed to resolve the major banks' problems with nonperforming loans. The program considers new methods to assess banks' assets more strictly but does not go far enough in reinforcing governance within the banking sector - an area requiring special focus. In

December 2002, the Diet enacted a law providing what appear to be excessive incentives to promote mergers among regional banks, shinkin (credit association) banks and credit cooperatives. One is compelled to note that these measures, which would maintain the full protection of bank deposits regardless of form and promote bank mergers at any cost, run counter to moves to solve the problem of nonperforming loans, as they only obscure the responsibility of banks' management.

In order to correct such failings of financial oversight, we must first reexamine the issue of governance in the banking sector. In this paper, I would like to underline the importance of market discipline, in particular the discipline imposed by depositors in their function as creditors to banks, and also of depositors' choice of banks as a premise for such discipline. As we shall see, in a regulated industry such banking, regulation and other means of discipline imposed by the supervisory authorities are important but imperfect. And in particular, whenever a financial administration confronts multiple conflicting dilemmas, as in today's Japan, the imposition of discipline accompanied by some sort of market mechanism is believed to play a supplementary role to government's regulation and supervision.

In the sections below, I would like to first summarize governance in banking relative to that in non-financial sectors, noting the importance of depositors' (or other creditors') discipline. I then discuss the relationship between depositor-imposed discipline and the deposit insurance system, examining both conditions in other countries and the empirical evidence of bank selection by Japanese depositors. Finally, I seek to assess the introduction of "payment and settlement deposits", the postponement of full

introduction of a payoff system, and the current incentives to promote bank mergers.

2. The Importance of governance in banking and depositor discipline

I would like to first focus on some general concepts of governance in banking. Typically when we discuss corporate governance, the assumption is that we are dealing with the governance of non-financial companies: banks and other financial institutions are seen as key providers of corporate discipline. To better understand the true nature of a banking crisis involving non-performing loans, it is useful to reexamine governance of banks within the context of the conventional corporate-governance literature, although such a perspective has been somewhat overlooked in the field of economics. As concrete viewpoints of analysis, shareholders' discipline, creditors' discipline, and rivals' (other financial institutions') discipline can be cited.

Unique features of banks: "opacity" and government regulations

One important point in studying the unique features of banks in regard to these forms of discipline is the "opacity" of banking and government regulations (Caprio and Levine 2002). There can be no question about the banking sector being regulated, but the concept of "opacity" may require some additional attention. First of all, products and services provided by banks are basically traded on a "promise of future payment," making it difficult to judge their quality immediately. This problem is particularly serious with bank loans, as an efficient secondary market with sufficient liquidity does not exist (as it does for most other financial products). Also, it is comparatively easier for financial institutions to hide risk than for non-financial companies, for instance, by

manipulating asset risk allocations or extending forbearance loans to troubled corporate borrowers. Using evaluations by bond analysts, Morgan (1997) has shown that analysts tend to disagree more when rating bank debentures than corporate bonds, and that raters' evaluations tend to be split more as loan-to-asset ratio rises and as securities-to-asset ratio or capital-to-asset ratio declines. Banks are thus opaque in the sense that it is difficult to adequately measure the current performance of individual corporate borrowers (risks) (Caprio and Levine (2002)).

This "opacity" worsens problems of information asymmetry. It is more difficult for shareholders and creditors (depositors) to monitor or take over bank managements and easier for bank managers to pursue their personal interests. And inasmuch as the banking sector is heavily regulated, government restrictions and protections can further inhibit governance mechanisms from functioning properly. For instance, restrictions on new entries into the banking sector weaken discipline by competitors while the deposit insurance system deprives protected depositors of monitoring incentives. Government regulations further inhibit the market's ability to discipline banks through large shareholders and takeover activity. In short, banks face insufficient discipline from shareholders, creditors and competitors.

Failure by the regulatory authorities: issues of reputation and forbearance

In any country, the regulatory and supervisory authorities play a prime role in disciplining banks. Compared to other regulated industries, however, the banking industry is more difficult to control due to its "opacity" problem. Also, if we define the regulatory and supervisory authorities as agents entrusted by taxpayers, we can see

that these agents do have incentives to pursue self-interest. For instance, if the authorities are responsible for both ex ante and ex post monitoring, an ex post discovery of a bank's wrongdoing would reveal that the ex ante check of the bank had been insufficient. Given such a prospect, the regulatory authorities may overlook misconduct out of concern for their own reputation and may even lose the incentive to identify misconduct ex post (Boot and Thakor (1993)). "Forbearance policy" enables the authorities to avoid responsibility for lax monitoring in prior stages and has been cited as one of the major factors that deepened the savings and loan (S&L) problem of the United States in the 1980s. Today, this same pattern of behaviour is causing significant delays in enabling Japan to address its nonperforming loan problem.

Importance of discipline by depositors

If bank discipline by regulatory authorities cannot be perfect, we must identify some kind of market discipline as a supplement. Given the "opacity" issue and the influence of government regulations, both important factors in banking governance as we have seen, one important area of focus is risk-taking activities by banks. Banks that suffer from capital depletion due to intensifying competition and/or the bursting of economic bubbles tend to embark on the undesirable path of "gambling for resurrection," investing in high-risk assets while counting on government's bailouts (in the form of deposit insurance and capital injection) should insolvency occur. Discipline by shareholders is hardly effective in suppressing such risk-taking activities by banks because both shareholders and bank managements prefer to seek upside risks. Creditors (depositors), on the other hand, are not entitled to any special benefits even if a bank's high-risk bet succeeds, while they will suffer some portion of the losses should

the bank fail due to excessive risk-taking. Therefore, a bank's creditors should have a great incentive to suppress its excessive risk-taking activities.

One effective approach for banks and non-financial companies alike is the "contingent governance" system, under which shareholders play a governance role in normal situations but creditors take over once corporate performance deteriorates. Under the theoretical framework put forward by Dewatripont and Tirole (1994), the regulatory and supervisory authorities should monitor and control banks while representing the interests of creditors, who are mostly small depositors and thus incapable of effective monitoring (due to the free-rider problem). However, even if small-lot depositors are incapable of monitoring, they have the option to shift deposits from one bank to another ("bank selection") if they deem their chosen bank highly likely to fail. Such selection can be expected to perform a discipline function by means of "exit" not "voice," as defined by A. O. Hirschman (1970).

To sum up, banking governance poses unique difficulties not present when dealing with ordinary, non-financial companies. These difficulties stem from the intrinsic "opacity" of banks and from the presence of government restrictions in the banking sector. For instance, "opacity" aggravates the agency problem, or conflict of interest, between a bank's management and its external investors, while the presence of regulation weakens the discipline function provided by competition from rival banks. In addition, even though the regulatory authorities play a prime role in controlling or disciplining banks, they may themselves pursue own interests. Given these circumstances, it is important to effectively utilize the market's disciplinary function, namely by utilizing the creditors

(depositors) who have a major incentive to curb banks' risk-taking activities, even though depositors' pressures can be made somewhat less effective by the presence of a deposit insurance system.

3. Discipline by Depositors and Deposit Insurance System

I have emphasized that discipline by depositors can play a significant complementary role in banking governance, particularly when the regulatory and supervisory authorities are not performing as intended. For depositor discipline to work effectively, however, two institutional factors are important, and we outline these below.

Efficiency of deposit insurance system and schemes to cope with bank failures: influence on depositor discipline

The first factor is the structure of the deposit insurance system. Full protection of deposits reduces incentives for depositors to select and monitor banks. From a disciplinary perspective, lower levels of deposit protection are more desirable. Using data from 67 countries over 1980 to 1997, Demirguc-Kunt and Detragiache (2002) showed that a banking crisis is more likely to occur in countries with an explicit deposit insurance system, particularly those that provide greater protections, than in countries with an implicit deposit insurance system. Therefore, in order to provide a check on moral hazard within the sector, the maximum deposit covered by deposit insurance should be set so as to provide a minimum safety net for small depositors who cannot shoulder the costs of selecting and monitoring banks or who have no incentive to do so.

At the same time, however, deposit insurance systems have been lauded for their ability to calm depositors thereby preventing banking runs and panics. As demonstrated by the Diamond-Dybvig model (1983), it is theoretically possible, depending on depositor expectations, for runs to occur even on a solvent bank and to spread to other banks through contagion ("contagious bank runs"). In other words, the possibility of such indiscriminate runs on banks is substantially associated with the *raison d'etre* of a deposit insurance system. However, it is not necessarily self-evident how frequently such contagion leading to systemic risk would occur. It is necessary to draw a clear line between runs on insolvent banks already doomed to fail and runs that spread to solvent banks.

For instance, using comprehensive data on banks during the U.S. Great Depression, Calomiris and Mason (2000) showed that bank failures between 1929 and 1932 occurred due to factors inherent to individual banks or regions where they were located; no contagion or liquidity crisis occurred. (Though they do conclude that the banking crisis in early 1933 cannot be explained by fundamentals.) It is thus not appropriate to give excessive emphasis to the possibility of contagious bank runs.

The second institutional factor is the pace and certainty with which deposits will be paid off in the event of bank failure, under a given degree of a deposit insurance coverage. Even when deposits are fully protected, depositors would be greatly inconvenienced if repayments were to be greatly delayed. Such prospects can prompt depositors to shift their deposits to safer banks, thereby assisting the depositor-discipline function. Therefore, taking all other conditions are given, higher

costs accompanying the repayments of deposits improve depositor discipline.

The U.S. Great Depression vs. Japan in the 1990s

Inasmuch as depositor discipline, deposit insurance and deposit repayment systems all have their respective tradeoffs, it is not necessarily clear which combination is optimal. In this section, I compare the U.S.'s experience during the Great Depression with Japan's in the 1990s, based on Calomiris and Mason (2001).

Calomiris and Mason (2001) were the first to note that the direct costs of bailing out insolvent banks in the Great Depression (1929-33) amounted to only 3% of GDP, compared to 20% to 30% for countries hit by the Asian currency crisis and Japan (prospective). They went on to stress that depositor discipline functioned better in the U.S. due to the absence of a deposit insurance system (one was set up in 1934) and because the liquidation of assets by failed banks proceeded slowly and the repayment of deposits took a very long time, causing a serious liquidity problem (which caused a significant negative impact on the macro economy by dampening consumption). In fact, banks for which the risk of bankruptcy rose sharply due to capital impairment suffered greater deposit withdrawals during the Great Depression period. At the time, recapitalization through stock issuance was not a feasible option for banks due to the problem of adverse selection. To lower the risk of bankruptcy, banks had to improve their asset portfolios rapidly by shifting toward low-risk assets (and reducing high-risk assets) while substantially cutting dividends (Calomiris and Wilson (1998)). As with the Reconstruction Finance Corp.'s (RFC) purchase of preferred stocks, Depression-era bank bailout programs were designed to complement market discipline, providing no

assistance to banks with capital deficiencies and imposing strict conditions on banks receiving assistance (Calomiris and Mason (2001)).

In Japan, the Deposit Insurance Corp. was established in 1971, but its deposit repayment function in case of a bank failure has never been invoked. The DIC itself remained nonfunctional up until 1992 when it provided loans to Iyo Bank to help reinforce its capital base. Spurred on by the myth that the government would never let a bank fail, the regulatory authorities had long adopted policies encouraging strong banks to absorb faltering ones. With such a comprehensive safety net in place, Japanese depositors have hardly had any incentive to monitor and discriminate among banks. Furthermore, as Calomiris and Mason (2001) have emphasized, the Japanese accounting system lacks transparency even in comparison with the U.S. accounting system of the 1930s, while the failure of depositor discipline has acted to extend the life of capital-deficient banks ("zombie banks"). The U.S. experience points to the importance of utilizing the depositor-discipline function to minimize the final cost of settling a banking crisis.

4. Empirical analysis of bank selection by depositors in Japan

It is quite conceivable that the failure of depositor discipline has contributed to the aggravation of Japan's nonperforming loan problem. From the mid-1990s onward, however, bank failures became much more a realistic issue and an environment has begun to emerge, for the first time in Japan, in which depositors have awakened to the need to discriminate among bank and thus to protect their deposits. In addition, in April

2002, full protection of bank deposits - in effect since fiscal 1996 -- was partially lifted. Time deposits, foreign-currency deposits and certificates of deposit (CDs) are now guaranteed only up to ¥10 million in principal plus interest.

Such an institutional change in the deposit insurance system has possibly affected depositors' behavior. It is well predicted that depositors had become more selective before the lift of full protection of time deposits. We will examine this hypothesis in an empirical manner below.

Data and methodology

To examine depositors' behavior, we focus on the effect of bank characteristics on deposit growth. When depositors perceive that the probability of their bank failures is high, they will withdraw their funds from the risky banks and transfer them to safer banks. Thus, the variables of bank risk-taking are assumed to have a negative effect on deposit growth.

We use a sample of panel data for 120 banks (115 regional banks and 5 city banks (DKB, Fuji, Tokyo-Mitsubishi, Asahi, Daiwa)) during the period March 1999 to March 2002, which is obtained from the Nikkei NEEDS Financial Quest Data Base. We use balanced bank panel data with no mergers or no closure in the sample period. Our dependent variable is the year-on-year growth in deposits.

The first explanatory variable represents banks' asset risks ("an asset risk factor"). We select three proxies to measure banks' balance sheet conditions. The first measure is a

capital-asset ratio, which is defined as the ratio of own capital to total assets. The second one is the ratio of loans to total assets. Loans might be riskier than other type of bank assets including government bonds. The third one is the non-performing loan ratio (risk management loans / total loans). We expect that banks with lower asset risks have higher deposit growth. This means that the deposit growth is positively correlated to the level of the capital ratio and negatively correlated to the loan-asset ratio and the non-performing ratio.

The second explanatory variable is an indicator of banks' liquidity risks, which is defined as the ratio of cash and deposits (to other banks) to total assets. Banks with a large volume of liquidity assets are perceived to be safer since these assets can allow banks to meet unexpected deposit withdrawals. We expect this variable ("a liquidity risk factor") to have a positive impact on the deposit growth.

The third explanatory variable is bank profitability, which is measured by the return on assets (operation income / total assets = ROA). By controlling for asset and liquidity risks, we expect this variable ("a profitability factor") to have a positive effect on the deposit growth.

The fourth explanatory variable is a proxy for bank size. The failures of larger banks would have a more negative impact on firms or banks that have maintained relationships with such distressed banks (negative externality). Thus, "Too-big-to-fail" policies are likely to be adopted to large banks. By expecting such a possibility, depositors may prefer to choose larger banks or city banks than other relatively small

and regional financial institutions with even lower risks, since contagious bank run could not prevent solvent banks from failing. We use (1) the logarithm of total assets and (2) the city bank dummy (=1 for city banks and =0 otherwise) as a proxy for bank size. We expect the bank size or the city bank dummy to have a positive impact on the deposit growth. We use one-year lagged variables for all explanatory ones. We show descriptive statistics on the bank characteristics in Table 1 and a correlation matrix for the explanatory variables in Table 2.

Empirical results 1: The effect of bank risk characteristics on total deposit growth

Table 3 presents the results of regressions with the capital ratio as an asset risk factor. Regressions (1) – (5) reports OLS ones for each year over FY 1998 - 2001 (March 1999 - March 2002). The impact of the capital ratio on the deposit growth is positive and statistically significant in FY 1998, 1999, and 2001 (1 per cent level). The absolute size of the coefficient on the capital ratio is much larger in FY 2001 than in other years and slightly more statistically significant (regression (4)). On the other hand, the coefficients on the liquidity risk are negative and most of them are statistically insignificant. Similarly, the coefficients on the profitability are statistically insignificant. The coefficients of the asset size are positive in FY 1999, 2000 and 2001 and statistically significant only in FY 2001 (1 percent level, regression (4)). An alternative “too-big-to-fail” indicator, the city bank dummy, also has a positive and statistically significant impact on the deposit growth (1 per cent level).

These results show that among the determinants of the deposit growth, the capital ratio (the asset risk factor) may be the most important. In addition, depositors seemed to

become more selective in choosing their banks in FY 2001. The positive correlation between capital-to-asset ratios and deposit growth strengthened in FY 2001, shortly the payoff system on time deposits was lifted. Also, only in FY 2001, there is a distinct correlation between bank size and deposit growth is observed with deposits rising sharply at large-scale banks (or major commercial banks), reflecting depositors' expectations of the government's "too big to fail" policy.

To test whether the capital ratio and the asset size have statistically different impacts on the deposit growth in FY 2001, we add the variables of the capital ratio and the asset size multiplied by the FY 2001 dummy in the two-way fixed model (with bank dummy variables and period effects). Both of the two variables are positive and statistically significant. Thus, we confirm that the asset risk and "too-big-too-fail" factors have distinctive effects on the depositors' behavior in FY 2001.

Tables 4 and 5 present the alternative specifications of regressions with the loan-asset ratio and the non-performing loan ratio as the measures of asset risks respectively. The coefficients on the loan-asset ratio are negative but statistically significant only in FY 1998 and 2001 (regressions (1) and (4) in Table 4). The absolute size of coefficient on the loan-asset ratio is relatively larger in FY 2001, but has no statistically different impact on the deposit growth in the same year (shown in regression (7) in Table 4). The non-performing loan ratio produces a negative and statistically significant effect on deposit growth in each year of the sample (Table 5). Again, the absolute size of the coefficient on the non-performing loan ratio is much larger in FY 2001, however, is not statistically different from those in other years (shown in regression (7) in Table 5). On

the other hand, the variable of the bank size (the asset size and the city bank dummy) has a distinctive impact on the deposit growth in FY 2001 even in these alternative specifications using different asset risk measures (regressions (7) in Tables 4 and 5). Tables 4 and 5 also report that the profitability has statistically significant and positive effect on the deposit growth in FY 2000 and 2001.

Empirical results 2: The effect of bank risk characteristics on time deposit growth

The above empirical analysis uses the growth of total deposits as a dependent variable. One might think that a growth in time deposits would be more correlated to bank risks since time deposits are a major item of deposits that have lost the full protection in the newly introduced deposit insurance scheme. Tables 6, 7 and 8 report the regressions with a growth in time deposits as a dependent variable. For three asset risk measures, they all have statistically significant and different impacts on the time deposit growth in FY 2001 (Tables 6, 7 and 8). In addition, the absolute effects of these asset risks on time deposit growth are larger than that on total deposit growth. This result is consistent with the content of the regulatory change in the deposit insurance scheme.

Unlike the previous results (Tables 3, 4 and 5), however, the asset size (or the city bank dummy) has a small but *negative* impact on time deposit growth in FY 2001, and this effect is statistically different from those in other years (regressions (5) and (7) in Tables 6, 7 and 8). How could we reconcile this result with the positive impact of the asset size on total deposit growth? One explanation is that there might be two types of deposit transfers from time deposit accounts to ordinary deposit accounts, which are still under full protection. One is such a transfer from a bank to another. The other is a transfer

within the same bank. It is noted that the latter transfer does not change the level of the total deposits inside the banks. If larger banks are subject to disproportionately larger deposit transfers within themselves, the time deposit growth would be lower than those of smaller banks, but total deposit growth would be higher in larger banks, which could obtain additional deposits from smaller banks in their ordinary accounts, due to the “too-big-to-fail” effect. Thus, a larger decrease in time deposits might be offset by much more bigger increase in ordinary deposits in larger banks. Indeed, the results from regressions with the ordinary deposit growth as a dependent variable (not reported here) show that the asset size and the city bank dummy have large positive and statistically significant impacts on ordinary deposit growth in FY 2001 and this is again statistically different from those in other years.

Empirical results 3: The case of Shinkin banks

Here, we will examine whether the above distinctive behavior of depositors in FY 2001 can be seen among other types of financial institutions. We use a sample of Shinkin banks (332 ones in FY 2001), which are smaller and more regionally oriented financial institutions but larger than credit cooperatives. Table 9 presents the results. The non-performing loan ratio, as expected, has a negative and statistically significant impact on total deposit growth for the sample of Shinkin banks (regression (1) in Table 9).

It is noted, however, that depositors can not freely choose a Shinkin bank that they want to select based on bank fundamentals, since the operating areas of Shinkin banks are more limited than those of ordinary banks. Depositors are forced to compare

Shinkin banks only within a certain restricted area. In such a case, relative asset risks might be a better indicator for depositors to select banks. We use a relative measure of the non performing loan ratio (a difference from the prefecture average). At the same time, not only deposit transfer among Shinkin banks but also deposit flight to ordinary banks or postal saving would occur in the area with those banks of which non-performing ratio are high on average. Thus, we use the average non-performing ratio in each prefecture as a prefecture-specific variable. To control for other region-specific factors, we use the dummy of the three major metropolitan areas (=1 for a shinkin bank operating in these area, =0 otherwise). Shinkin banks in these areas are likely to have higher asset risks, due to a larger decrease in land prices seen there.

Both the relative and average non-performing loan ratios have negative and statistically significant effect on the deposit growth (regression (2) in Table 9). In addition, an alternative prefecture-specific variable, the dummy of the three major metropolitan areas has also a negative and statistically significant coefficient (regression (3) in Table 9). Thus, depositors seemed to choose Shinkin banks with lower asset risks in terms of the non-performing ratios in FY 2001. They might transfer their money from a risky Shinkin bank to a safer one (the relative effect of asset risks) or to different types of financial institutions or assets (the prefecture-specific effect).

Related empirical literature

A seminal empirical work on depositors discipline on Japanese banks is Hosono (2003). This is complementary to ours. His sample period is from FY 1991 to FY 1999, earlier than our sample period. He also estimated regressions by the type of banks, major

banks and regional ones. He examines the effect of asset risks not only on deposit growth but also on deposit interest rates. The variables of asset risks are a real estate loan share, a bank failure dummy and a non-performing loan ratio. He reports that depositors' selection of banks are more evident among regional banks and the magnitude of depositors' reaction to bank asset risks are larger in the second half of the 1990s than in the first half. This implies that depositors became more selective in choosing banks, perceiving the higher possibility of bank failures.

In summary, depositors' tendency to select banks based on asset risk exposure clearly strengthened ahead of the partial lift of the freeze on the payoff system. At the same time, depositors tended to opt for large-scale banks (in terms of assets) and major commercial banks regardless of their risk exposures and business performance. Depositors of large banks also transferred their money from the time deposit accounts to the ordinary ones within the same banks. It must be noted that bank selection based on risk exposure is "good selection" because it induces bank action to reduce the risk of bankruptcy and brings better discipline to bank management, but that scale-based selection does not necessarily lead to better discipline and is thus deemed undesirable. I would like to address this point further discuss in the following sections.

5. Assessing the postponed full introduction of the payoff scheme and the measures to encourage mergers

The payoff scheme

The government decided to put off full introduction of the payoff scheme initially

planned for fiscal 2003 (i.e., lifting full protection of current and ordinary deposits) despite positive developments in fiscal 2001 and 2002, as depositors became more selective about banks and market discipline began to work (as seen in lower deposit growth at banks with greater risk exposures). To ensure stability in the clearing and settlement function of banks, the government decided to introduce "payment and settlement deposits" (a new type of deposits subjected to full protection) in April 2005.

The special full protection measures adopted in fiscal 1996 were initially meant to remain in place for five years, to be replaced by the payoff system in April 2001. The government decided to delay the schedule by one year, however, as concerns mounted over management problems at small and midsize financial institutions. At the same time, full protection over current and ordinary deposits was left in place until April 2003.

How should we assess the fact that the reintroduction of the payoff system has been put off again and again? First of all, the government's commitment to the full protection of deposits in time of financial crisis deserves certain credit because it helps subdue depositor anxieties and prevents a panic run on banks. Such a blanket guarantee on bank deposits has been implemented in various countries that experienced a banking crisis in the 1990s, including Finland (1992), Sweden (1992), Japan (1996), Mexico (1995), Indonesia (1998), South Korea (1996), Malaysia (1998), Thailand (1997), Jamaica (1998), Kuwait and Turkey (Garcia (2002)).

Such an extraordinary measure, however, must be accompanied by a drastic

restructuring of the banking sector, including the disposal of bad loans following a certain grace period, and should later be replaced by a partial protection system once the crisis is over. For instance, Sweden, Finland and South Korea lifted full protection in 1996, 1998 and 2001, respectively. (South Korea is to maintain full protection over deposits in non-interest-bearing settlement accounts through the end of 2003.) All three countries solved their banking crises and nonperforming loan problems at an early stage. By contrast, if a country is slow to solve its nonperforming loan problem, as has been the case in Japan, concerns over a financial crisis cannot be dispelled and its government has no choice but to delay the introduction of a limited protection scheme. If the credibility of a government's plan to introduce a payoff system is impaired, however, banks may lose motivation to solve their nonperforming loan problems and to complete restructuring while deposits remain fully protected, thus creating a moral hazard. Should this happen, the possibility of a banking panic rises further and the introduction of the payoff system becomes even more difficult, thus setting off a vicious cycle. Introducing full protection over bank deposits to cope with instability in the financial system increases potential instability in the system if the government loses credibility by failing to stick to its initial plans to lift extraordinary measures such as those outlined above.

Full protection over "payment and settlement deposits": is it unique to Japan?

While the repeated postponement of the plan to reintroduce the payoff system is a "double-edged sword," the institutionalization of full protection over the new "payment and settlement deposits" is emerging as a major focal point of the latest decision. Three conditions have been assumed for these new deposits: 1) deposits must be redeemable

on demand; 2) payment and settlement services must be provided; and 3) deposits should bear no interest. Meanwhile, the potential for disruption in bank settlements - because of the likelihood that it takes time to identify depositors and establish the necessary legal system - has been cited as a reason why bank deposits must be fully protected in Japan. (See the Financial System Council's report of Sept. 5, 2002 on measures to stabilize bank settlement functions.) Indeed, with partial protection, it takes time to determine the amount insured for each depositor. The U.S., however, has established very swift procedures under which the Federal Deposit Insurance Corp. would begin payment to depositors, whether insured or not, at one or two business days after a bank failure (Kaufman and Seelig (2000)).

Institutional consideration, however, does not justify continuation of the full protection of deposits as an extraordinary measure. For one thing, swift deposit payment systems such as those in the U.S. are rather exceptional. In European nations, it can take several months to pay the insured depositors of a failed bank (and several years for uninsured depositors), while problems of depositor identification are not at all unique to Japan. Despite this, among OECD member countries, only Japan and Turkey maintain a system to fully protect depositors. Secondly, the main beneficiaries of maintaining such a mechanism are companies and other large depositors. These are the very depositors who should have the highest incentives to monitor and select banks as they maintain large deposits and must rely on the banks for settlement transactions, a business lifeline. Providing full protection for such depositors is tantamount to negating the deposit market's most effective function in bank discipline. A greater priority should be given to establishing a mechanism to enable swift payment of both insured and

uninsured deposits.

Problems concerning introduction of "payment and settlement deposits"

It is also necessary to cautiously think about the meaning of creating "payment and settlement deposits" as a new type of bank account. For instance, in the U.S. and Europe, the standard individual bank account is a current account that bears no interest; people usually use checks for settlement. Although Japan also has a current account for individuals, people normally use an ordinary account as their main bank account, and since the launch of the "Zengin" Data Telecommunication System in 1973, direct debits and deposits through this ordinary account have become a common means of payment settlement. However, despite being used for payment settlement, ordinary accounts have continued to bear interest and no account maintenance fee has been charged. To compensate, remittance fees have been kept at relatively high levels. As interest rates remain at ultra-low levels, it is important to actively reexamine ways the current account system, now an international standard, might be better utilized.

From the standpoint of banks, the introduction of a new type of bank account leads to a major cost increase. In addition to substantial initial expenses for publicizing it to customers and introducing new computer systems, banks pay higher deposit insurance premiums for full deposit protection than for partial protection. Given such circumstances, the Financial System Council concluded in its report that it is not appropriate to mandate that all banks introduce the "payment and settlement deposit."

As a policy, allowing such an option in the introduction of a new type of deposit would be

suicidal. An attempt to introduce a new deposit despite a substantial cost increase would indicate a bank's desperate need to win depositor confidence at any cost, thus credibly signaling a high risk of bankruptcy. On the other hand, sound banks can demonstrate their soundness by not introducing them. Given such prospects, even banks wishing to introduce the new deposits would have no choice but hesitate to do so. Meanwhile, should a bank dare to introduce the "payment and settlement deposit," it would likely transfer the increased cost to depositors by eliminating interest or raising account maintenance fees. But the burden of insuring bankruptcy risk should be primarily born by banks themselves. The adoption of risk-based premiums (under which premium rates differ depending on individual banks' risk exposure) in the U.S. and 20 other countries stems from such an idea. Therefore, a bank's move to transfer its costs to depositors is, in itself, conducive to moral hazard. For depositors meanwhile, this move would provide incentive to prefer an ordinary or current account at an absolutely sound bank to a newly introduced deposit for which they would have to pay new costs.

Assessment of government measures to promote bank mergers

In addition to the postponement of the full introduction of the payoff system, the Diet enacted a law in December 2002 to promote bank mergers - explicitly targeted at weak regional banks and cooperative-type financial institutions - to reassure depositors. Under the new law, the DIC would help banks recover their original capital adequacy ratio should the ratio drop as a result of merging with a weakly capitalized bank. Also, deposits at a merged bank would be protected for the maximum amount of ¥10 million multiplied by the number of banks merged, instead of ¥10 million, under the payoff

system as a special measure applicable for one year following their merger. In other words, the legislation is meant to forcibly promote mergers, even those with no economic rationality, through an intentional "lavish spending" policy. This is a policy that attempts to reassure depositors by making banks too big, exploiting and turning around the problematic "too big to fail" principle. As discussed earlier, it is important to remember that we saw both "good selection" (shifting toward banks with less risk exposure) and "bad selection" (preferring banks with greater sizes) when depositors' discrimination among banks strengthened in fiscal 2001. The postponement of the payoff system and the introduction of the fully protected "payment and settlement deposits" lessen selection incentives for depositors. But this merger promotion scheme, in which the government effectively promulgates the idea that big banks are safe, is even more dangerous as it may encourage "bad selection" by depositors.

Concluding remarks

Delaying the full introduction of the payoff system and promoting bank mergers may be effective as an immediate, makeshift solution to containing a financial crisis. But such measures invite further moral hazard among banks and potentially lead to destabilization of the financial system. Rather than such short-sighted measures, it is important to design a mechanism that facilitates prompt payments to depositors, whether insured or uninsured, in case of a bank failure. Japan may as well draw upon measures taken by the U.S. regulatory authorities that, for instance, enable information on troubled financial institutions to be accumulated through prompt corrective actions (Kaufman and Seelig (2000)). Such a measure not only facilitates a smooth shift to partial protection under the deposit insurance system but also enables

the orderly closure of a troubled large bank. This also promotes the "good selection" of banks based on fundamentals such as asset risk.

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Table 1 Descriptive statistics on bank characteristics

March 1998 - March 2002	Mean	Median	Std. Deviation	Minimum	Maximum	Cases
Growth in deposits	0.0076	0.012	0.041	-0.31	0.23	480
Non-performing loan ratio (one-year lag)	0.056	0.050	0.029	0.0079	0.18	474
Loans / total assets (one-year lag)	0.70	0.71	0.061	0.44	0.85	480
Capital ratio (one year lag)	0.042	0.042	0.012	0.0013	0.073	480
(Cash+deposits) / total assets	0.037	0.032	0.020	0.0068	0.15	480
Operating profits / total assets (one-year lag)	0.0059	0.0058	0.0023	-0.0018	0.013	480
Log (total assets) (one-year lag)	14.4	14.4	1.1	12.0	18.2	480

Table 2 Correlation matrix for explanatory variables

March 1998-March 2002	Growth in deposits	Non-performing loan ratio (one-year lag)	Loans / total assets (one-year lag)	Capital ratio (one year lag)	(Cash+deposits) / total assets (one-year lag)	Operating profits / total assets (one-year lag)	Log (total assets) (one-year lag)
Growth in deposits		-0.27	-0.052	0.28	-0.17	0.17	0.032
Non-performing loan ratio (one-year lag)			0.15	-0.21	-0.0094	-0.10	0.14
Loans / total assets (one-year lag)				-0.23	-0.34	0.14	-0.45
Capital ratio (one year lag)					0.00073	0.15	0.14
(Cash+deposits) / total assets						-0.11	0.27
Operating profits / total assets (one-year lag)							-0.011

Number of observations: 480

Table 3 The effect of bank fundamentals on growth of total deposits (using the capital ratio as a bank asset risk)

	FY 1998 (March 1999)	FY 1999 (March 2000)	FY 2000 (March 2001)	FY 2001 (March 2002)	FY 2001 (March 2002)	FY 1998 - 2001 (March 99-March 2002)	FY 1998 - 2001 (March 99-March 2002)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Independent variables: Growth in total deposits							
Constant	0.23 (5.30) ^{***}	-0.010 (-0.37)	-0.058 (-1.37)	-0.28 (-4.49) ^{***}	-0.095 (-4.18) ^{***}	-0.25 (-0.55)	-0.031 (-0.07)
Capital ratio (one-year lag)	0.92 (3.01) ^{***}	0.54 (2.74) ^{***}	0.22 (0.68)	1.91 (4.38) ^{***}	2.09 (4.81) ^{***}	1.88 (5.01) ^{***}	1.36 (3.57) ^{***}
Capital ratio (one-year lag) × FY 2001 dummy							1.24 (3.53) ^{***}
(Cash+deposits) / total assets (one-year lag)	0.075 (0.52)	-0.31 (-2.77) ^{***}	-0.22 (-1.39)	-0.50 (-1.78) [*]	-0.35 (-1.30)	-0.14 (-0.87)	-0.18 (-1.20)
Operating profits / total assets (one-year lag)	0.44 (0.31)	0.50 (0.51)	2.43 (1.62)	0.42 (0.18)	1.34 (0.58)	0.94 (0.86)	0.20 (0.19)
Log (total assets) (one-year lag)	-0.018 (-6.26) ^{***}	0.00041 (0.21)	0.0037 (1.23)	0.015 (3.17) ^{***}		0.012 (0.39)	-0.0063 (-0.21)
Log (total assets)(one-year lag)×FY 2001 dummy							0.017 (4.85) ^{***}
City bank dummy					0.070 (2.94) ^{***}		
Adjusted R-squared	0.28	0.12	0.027	0.24	0.23	0.15	0.24
Number of observations	120	120	120	120	120	480	480

1. t statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

2. Regressions (6) and (7) are estimated by the two-way fixed effect model (with firm dummy variables and period effects).

Table 4 The effect of bank fundamentals on growth of total deposits (using the loan-asset ratio as a bank asset risk)

	FY 1998 (March 1999)	FY 1999 (March 2000)	FY 2000 (March 2001)	FY 2001 (March 2002)	FY 2001 (March 2002)	FY 1998 - 2001 (March 99-March 2002)	FY 1998 - 2001 (March 99-March 2002)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Independent variables: growth in total deposits							
Constant	0.35 (4.63) ^{***}	0.0019 (0.035)	-0.043 (-0.59)	-0.063 (-0.53)	0.13 (2.27) ^{**}	0.67 (1.26)	0.56 (1.08)
Loans / total assets (one-year lag)	-0.11 (-1.67) [*]	-0.018 (-0.40)	-0.011 (-0.19)	-0.17 (-1.90) [*]	-0.22 (-2.77) ^{***}	-0.31 (-2.57) ^{**}	-0.14 (-1.05)
Loans / total assets (one-year lag) × FY 2001 dummy							-0.033 (-0.45)
(Cash+deposits) / total assets (one-year lag)	-0.081 (-0.51)	-0.33 (-2.74) ^{***}	-0.22 (-1.33)	-0.55 (-1.84) [*]	-0.46 (-1.58)	-0.27 (-1.62)	-0.23 (-1.39)
Operating profits / total assets (one-year lag)	1.27 (0.87)	1.61 (1.73) [*]	2.64 (1.75) [*]	5.22 (2.21) ^{**}	6.43 (2.81) ^{***}	2.77 (2.60) ^{***}	1.99 (1.90) [*]
Log (total assets) (one-year lag)	-0.019 (-6.06) ^{***}	0.0016 (0.76)	0.0038 (1.17)	0.012 (2.10) ^{**}		-0.031 (-0.91)	-0.036 (-1.07)
Log (total assets)(one-year lag)×FY 2001 dummy							0.018 (4.10) ^{***}
City bank dummy					0.050 (1.91) [*]		
Adjusted R-squared	0.25	0.066	0.023	0.14	0.14	0.11	0.16
Number of observations	120	120	120	120	120	480	480

1. t statistics in parentheses. "****", "***" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

2. Regressions (6) and (7) are estimated by the two-way fixed effect model (with firm dummy variables and period effects).

Table 5 The effect of bank fundamentals on growth of total deposits (using the non-performing loan ratio as a bank asset risk)

	FY 1998 (March 1999)	FY 1999 (March 2000)	FY 2000 (March 2001)	FY 2001 (March 2002)	FY 2001 (March 2002)	FY 1998 - 2001 (March 99-March 2002)	FY 1998 - 2001 (March 99-March 2002)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Independent variables: Growth in total deposits							
Constant	0.23 (4.89) ^{***}	-0.0021 (-0.075)	-0.023 (-0.54)	-0.16 (-2.34) ^{**}	0.032 (1.49)	-0.067 (-0.14)	0.18 (0.39)
Non-performing loan ratio (one-year lag)	-0.000028 (-1.82) [*]	-0.23 (-2.72) ^{***}	-0.34 (-2.99) ^{***}	-0.62 (-3.82) ^{***}	-0.67 (-4.11) ^{***}	-0.000055 (-2.92) ^{***}	0.12 (0.87)
Non-performing loan ratio (one-year lag) × FY 2001 dummy							-0.12 (-0.87)
(Cash+deposits) / total assets (one-year lag)	-0.076 (-0.49)	-0.33 (-2.95) ^{***}	-0.24 (-1.56)	-0.41 (-1.44)	-0.25 (-0.91)	-0.23 (-1.40)	-0.25 (-1.60)
Operating profits / total assets (one-year lag)	0.98 (0.67)	1.11 (1.21)	2.67 (1.87) [*]	3.84 (1.73) [*]	5.06 (2.30) ^{**}	2.44 (2.29) ^{**}	1.82 (1.73) [*]
Log (total assets) (one-year lag)	-0.016 (-4.99) ^{***}	0.0020 (1.04)	0.0033 (1.14)	0.014 (2.96) ^{***}		0.0047 (0.15)	-0.017 (-0.54)
Log (total assets)(one-year lag)×FY 2001 dummy							0.019 (5.19) ^{***}
City bank dummy					0.060 (2.45) ^{**}		
Adjusted R-squared	0.25	0.12	0.09	0.21	0.20	0.11	0.18
Number of observations	120	120	120	120	120	480	480

1. t statistics in parentheses. "****", "***" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

2. Regressions (6) and (7) are estimated by the two-way fixed effect model (with firm dummy variables and period effects).

Table 6 The effect of bank fundamentals on growth of time deposits (using the capital ratio as a bank asset risk)

	FY 1998 (March 1999)	FY 1999 (March 2000)	FY 2000 (March 2001)	FY 2001 (March 2002)	FY 2001 (March 2002)	FY 1998 - 2001 (March 99-March 2002)	FY 1998 - 2001 (March 99-March 2002)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Independent variables: Growth in time deposits							
Constant	0.45 (8.65) ^{***}	0.16 (4.44) ^{***}	0.0081 (0.16)	0.066 (0.61)	-0.27 (-7.06) ^{***}	-1.19 (-1.73) [*]	-1.40 (-2.14) ^{**}
Capital ratio (one-year lag)	0.67 (1.86) [*]	0.40 (1.58) [*]	0.61 (1.59)	4.13 (5.50) ^{***}	3.80 (5.18) ^{***}	2.41 (4.26) ^{***}	1.10 (1.91) [*]
Capital ratio (one-year lag) × FY 2001 dummy							3.43 (6.45) ^{***}
(Cash+deposits) / total assets (one-year lag)	0.011 (0.64)	-0.012 (-4.48) ^{***}	-0.24 (-1.24)	-0.57 (-3.25) ^{***}	-0.77 (-1.68) [*]	-0.22 (-0.95)	-0.23 (-1.03)
Operating profits / total assets (one-year lag)	0.34 (0.02)	1.32 (1.06)	2.79 (1.53)	-2.68 (-0.66)	-4.28 (-1.08)	0.18 (0.11)	0.56 (0.36)
Log (total assets) (one-year lag)	-0.033 (-9.40) ^{***}	-0.012 (-4.98) ^{***}	-0.0040 (-1.09)	-0.026 (-3.25) ^{***}		0.073 (1.54)	0.093 (2.03) ^{**}
Log (total assets)(one-year lag)×FY 2001 dummy							-0.014 (-2.70) ^{***}
City bank dummy					-0.15 (-3.82) ^{***}		
Adjusted R-squared	0.44	0.22	0.036	0.25	0.23	0.58	0.62
Number of observations	120	120	120	120	120	480	480

1. t statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

2. Regressions (6) and (7) are estimated by the two-way fixed effect model (with firm dummy variables and period effects).

Table 7 The effect of bank fundamentals on growth of time deposits (using the loan-asset ratio as a bank asset risk)

	FY 1998 (March 1999)	FY 1999 (March 2000)	FY 2000 (March 2001)	FY 2001 (March 2002)	FY 2001 (March 2002)	FY 1998 - 2001 (March 99-March 2002)	FY 1998 - 2001 (March 99-March 2002)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Independent variables: growth in time deposits							
Constant	0.51 (5.75) ^{***}	0.20 (2.91) ^{***}	-0.022 (-0.25)	0.79 (3.87) ^{***}	0.16 (1.64)	0.13 (0.16)	-0.071 (-0.09)
Loans / total assets (one-year lag)	-0.51 (-0.69)	-0.041 (-0.74)	0.042 (0.57)	-0.57 (-3.84) ^{***}	-0.42 (-3.19) ^{**}	-0.47 (-2.53) ^{**}	-0.30 (-1.50)
Loans / total assets (one-year lag) × FY 2001 dummy							-0.40 (-3.59) ^{***}
(Cash+deposits) / total assets (one-year lag)	0.021 (0.11)	-0.27 (-1.81) [*]	-0.18 (-0.90)	-0.74 (-1.43)	-0.99 (-1.99) ^{**}	-0.41 (-1.67) [*]	-0.23 (-0.94)
Operating profits / total assets (one-year lag)	0.58 (0.34)	2.13 (1.86) [*]	3.07 (1.66) [*]	8.94 (2.20) ^{**}	5.04 (1.30)	2.56 (1.60)	3.48 (2.19) ^{**}
Log (total assets) (one-year lag)	-0.033 (-8.82) ^{***}	-0.012 (-4.56) ^{***}	-0.0023 (-0.59)	-0.039 (-4.05) ^{***}		0.011 (0.22)	0.027 (0.53)
Log (total assets)(one-year lag)×FY 2001 dummy							-0.023 (-3.59) ^{***}
City bank dummy					-0.19 (-4.35) ^{***}		
Adjusted R-squared	0.43	0.21	0.017	0.16	0.18	0.56	0.58
Number of observations	120	120	120	120	120	480	480

1. t statistics in parentheses. "****", "***" and "**" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

2. Regressions (6) and (7) are estimated by the two-way fixed effect model (with firm dummy variables and period effects).

Table 8 The effect of bank fundamentals on growth of deposits (using the non-performing loan ratio as a bank asset risk)

	FY 1998 (March 1999)	FY 1999 (March 2000)	FY 2000 (March 2001)	FY 2001 (March 2002)	FY 2001 (March 2002)	FY 1998 - 2001 (March 99-March 2002)	FY 1998 - 2001 (March 99-March 2002)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Independent variables: Growth in time deposits							
Constant	0.45 (8.23) ^{***}	0.17 (4.96) ^{***}	0.060 (1.17)	-0.33 (-2.78) ^{**}	-0.037 (-1.04)	-0.94 (-1.34)	-1.13 (-1.64)
Non-performing loan ratio (one-year lag)	-0.000011 (-0.62)	-0.32 (-3.11) ^{***}	-0.44 (-3.16) ^{***}	-1.30 (-4.57) ^{***}	-1.24 (-4.53) ^{***}	-0.000057 (-2.01) ^{**}	0.77 (3.65) ^{***}
Non-performing loan ratio (one-year lag) × FY 2001 dummy							-0.77 (-3.65) ^{***}
(Cash+deposits) / total assets (one-year lag)	0.031 (0.17)	-0.25 (-1.84) ^{**}	-0.25 (-1.31)	-0.39 (-0.78)	-0.58 (-1.24)	-0.32 (-1.33)	-0.30 (-1.24)
Operating profits / total assets (one-year lag)	0.44 (0.26)	1.43 (1.27)	3.35 (1.92) [*]	4.77 (1.23)	2.44 (0.66)	2.17 (1.35)	3.37 (2.09) ^{**}
Log (total assets) (one-year lag)	-0.031 (-8.49) ^{***}	-0.011 (-4.87) ^{***}	-0.0041 (-1.15)	-0.027 (-3.27) ^{***}		0.062 (1.28)	0.075 (1.57)
Log (total assets)(one-year lag)×FY 2001 dummy							-0.0094 (-1.67) [*]
City bank dummy					-0.17 (-4.18) ^{***}		
Adjusted R-squared	0.43	0.26	0.09	0.20	0.20	0.56	0.58
Number of observations	120	120	120	120	120	480	480

1. t statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

2. Regressions (6) and (7) are estimated by the two-way fixed effect model (with firm dummy variables and period effects).

Table 9 Depositors' selection of Shinkin banks (FY 2001)

	FY 2001 (March 2002)	FY 2001 (March 2002)	FY 2001 (March 2002)
	(1)	(2)	(3)
Independent variables: growth in deposits			
Constant	3.35 (5.73)***	2.56 (2.57)**	0.84 (3.08)**
Non-performing loan ratio	-0.24 (-5.32)***		
The prefecture's average of non-performing ratio		-0.17 (-2.07)**	
A difference in non-performing loan ratio from the average in the operating		-0.20 (-4.16)***	-0.21 (-4.28)***
Dummy of a bank that operates in the three largest metropolitan areas			-0.0092 (-1.87)*
Adjusted R-squared	0.076	0.077	0.054
Number of observations	332	332	332

1. t statistics in parentheses. "****", "***" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

2. Regressions are estimated by OLS procedure.