Preliminary and incomplete

QUANTITATIVE EASING AND JAPANESE BANK EQUITY VALUES

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ABSTRACT

One of the primary motivations offered by the Bank of Japan (BOJ) for its quantitative easing program -- whereby it maintained a current account balance target in excess of required reserves, effectively pegging short-term interest rates at zero -- was to maintain credit extension by the troubled Japanese financial sector. We conduct an event study concerning the anticipated impact of quantitative easing on the Japanese banking sector by examining the impact of the introduction and expansion of the policy on Japanese bank equity values. We find that excess returns of Japanese banks were greater when increases in the BOJ current account balance target were accompanied by "non-standard" expansionary policies, such as raising the ceiling on BOJ purchases of long-term Japanese government bonds. We also provide cross-sectional evidence that suggests that the market perceived that the quantitative easing program would disproportionately benefit financially weaker Japanese banks.

Keywords: quantitative easing, Bank of Japan, liquidity trap, Japanese banks

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1. Introduction

Convinced that Japan's economic fundamentals were too severely distressed to be rectified with standard monetary policy measures, on March 19, 2001 the Bank of Japan announced a new policy of "quantitative easing." Under this policy, the BOJ increased its current account target far beyond the level of commercial bank required reserves. This had the expected impact of reducing the already-low overnight call rate effectively to zero. In addition, the BOJ committed to maintain the policy until the core consumer price index registered "stably" a zero percent or an increase year on year.

In motivating the policy change, the minutes of the policy meeting [BOJ (2001b)] revealed that the Policy Board had paid particular attention to financial market conditions, including the adjustment associated with commercial bank disposal of non-performing loans and the recent downgrading of the credit of 19 Japanese banks by a major rating agency. In particular, the Policy Board members acknowledged the disjoint between the laudable goal of cleaning Japanese bank balance sheet of problem loans and of the need for accelerated credit creation by Japanese banks.

Given these considerations, a primary goal of the BOJ's quantitative easing program was clearly to provide assistance to the nation's troubled banking sector. In this paper, we examine the market's perception of the ability of quantitative easing policy to achieve such goals by conducting event studies concerning the announcements of the introduction and expansion of the quantitative easing policy.

The ability of quantitative easing to have an impact on the banking sector is controversial. Given that Japanese interest rates were already low at the launch of the policy, many authors [e.g. Eggertson and Woodford (2003)] were skeptical that any of

the components of the quantitative easing policy, even the so-called non-standard components such as increasing the ceiling on BOJ purchases of Japanese Government Bonds (JGBs), could have any real effects. Subsequent to the implementation of the policy, many characterized the policy as a failure, pointing out that overall Japanese bank lending actually declined over the period in which the policy was implemented and expanded, despite the rapid growth in narrow money that took place [Kimura, et al (2002)]. Still, the fact that banks were under pressure to enhance their financial positions during this period by disposing of problem loans could imply that in the absence of the BOJ's quantitative easing program the rate of credit extension could have fallen at an even more rapid pace. Moreover, there is a possibility that if quantitative easing succeeded in reducing longer-term rates, it could have disproportionately benefited weaker Japanese banks.

In its recent financial stability report on Japan, the International Monetary Fund [IMF (2003)] argues that the experience has been a mixed blessing for the Japanese financial system. On one hand, the report acknowledges that low nominal interest rates have had the positive impact of stabilizing the sector and preventing an acceleration of deflation. On the other hand, they argue that low nominal rates increase the difficulty of assessing individual bank and loan conditions, and thereby slow the process of shutting down problem Japanese banks.

The IMF report also argues that the flattening of the yield curve associated with BOJ purchases of longer-term JGBs has made it more difficult for some banks to achieve profitability, rather than less, as net interest margins have declined. Low nominal rates

may have also dampened activity in the inter-bank call market, which could further reduce profits for some classes of banks.

While these arguments leave the ultimate impact of quantitative easing on the overall banking sector uncertain, it appears likely, as the IMF has suggested, that the quantitative easing policy disproportionately favors weak Japanese banks over strong ones. Weak banks would disproportionately benefit from the deterioration of regulatory conditions under low nominal rates, and would be likely to suffer less from the reduced inter-bank market activity.

In this paper, we examine the market's expectations concerning the absolute and relative impact of the introduction and extension of the BOJ quantitative easing policy on the Japanese banking sector. Examining the period from the start of quantitative easing in March 2001 to the end of 2004, we identify 10 dates associated with significant announcements concerning changes in the BOJ's quantitative easing policy. We then categorize these events in terms of whether they included standard expansion of the quantitative easing policy, identified as an increase in the target for commercial bank current account balances at the BOJ, or whether they also included other enhancements, particularly those that would be expected to have the impact of flattening the Japanese yield curve by reducing longer-term interest rates.

We then conduct an event study examining the impact of these events on the overall banking portfolio. Our results demonstrate that while raw bank returns usually responded positively to expansion of the quantitative easing program, the overall banking sector experienced significantly greater excess returns when increases in its current account balance targets were accompanied by increases in the ceiling on long-term JGB

purchases. Indeed, Japanese banks earned statistically significant positive excess returns on all dates in our study when increases in the current account were accompanied by increases in the ceiling on BOJ purchases of long-term JGBs.

We then turn to a standard cross-sectional event study to examine whether the quantitative easing policy was perceived as disproportionately benefiting weaker Japanese banks. We calculate the excess returns of 87 Japanese banks on the event date marking the introduction of the quantitative easing program, as well as the two event dates on which the overall banking portfolio exhibited statistically significant positive excess returns. We find one variable, the rate of time deposit growth, to be a robustly negative indicator of bank excess returns at statistically significant confidence levels. These results support the hypothesis that weak banks were expected to disproportionately benefit from the quantitative easing policy, as depositors were removing time deposits from problem Japanese banks at this time due to the anticipated partial reduction in deposit insurance guarantees on these deposits.

Finally, we also provide some evidence concerning the impact of the introduction of quantitative easing on Japanese industries and firms. At the industry level, we calculate industry excess returns on the event window surrounding the announcement of the quantitative easing policy, and find that positive excess returns were more prevalent among financially troubled Japanese industries. At the firm level, we examine the sensitivity of the excess returns of 49 financially-troubled Japanese firms to the financial positions of their main banks. We find some evidence, as anticipated, that excess returns were larger among firms with weaker main banks. Again, this suggests some anticipation

by the market that the quantitative easing policy would disproportionately encourage additional credit extension by problem Japanese banks.

The remainder of this paper is divided into six sections. Section 2 discusses monetary policy by the Bank of Japan under quantitative easing. Section 3 examines the economic arguments concerning whether the quantitative easing policy should or should not have real effects. Section 4 examines the empirical evidence concerning the impact of the introduction and expansion of quantitative easing on the overall Japanese banking portfolio and on a cross-section of banks. Section 5 extends the analysis to Japanese industries and firms. Section 6 concludes.

2. Japanese monetary policy under quantitative easing

2.1 The zero interest rate policy

The Bank of Japan (BOJ) initially attempted to intensify its expansionary policy through standard interest rate reduction channels, by bringing the unsecured call rate close to the zero bound. In September 1998, the BOJ Policy Board reduced the unsecured call rate to 0.25 percent. In February 1999 it reduced rates again to 0.15 percent and announced that further declines would be steadily promoted. These interest rate reductions were termed the "zero interest-rate policy," as the BOJ reduced the call rate close to its boundary level of zero percent. At the same time, the BOJ announced a plan to continue the zero interest-rate policy until "the situation allows for the prospect of the elimination of deflationary concern".

The BOJ abandoned its zero interest rate policy in August 2000. The Policy Board [BOJ 2000] reported that "… the Bank of Japan feels confident that Japan's economy has

reached the stage where deflationary concern has been dispelled, the condition for lifting the zero interest rate policy," and increased the call rate to 0.25 percent. This reversal was criticized by both the Ministry of Finance (MOF) and the Economic Planning Agency (EPA), who insisted that it the policy reversal was premature. The MOF and the EPA both requested a postponement of the vote at the Policy Board until the next meeting under Article 19 of the Bank of Japan Law. However, the BOJ rejected the government's request to postpone the vote and approved lifting of the zero interest-rate policy by a 7 to 2 majority.

After six months of continued weakness, the BOJ returned to its zero-interest rate policy by reducing the call rate to 0.15 percent in February 2001. Moreover, the return to the zero interest rate policy was quickly followed by a set of policies chosen at the BOJ Policy Board's March 19, 2001 meeting, self-described as "… monetary easing as drastic as is unlikely to be taken under ordinary circumstances."[1] The Policy Board noted that Japan's economy had failed to return to a sustainable growth path, and again faced a threat of deterioration, and concluded that more aggressive policy was warranted.[2]

The primary policy innovation was replacing the call rate as the main operating target for money market operations with the outstanding balance of the current accounts at the Bank of Japan. The BOJ initially announced that it intended to increase the current account balance approximately 1 trillion yen to a target of five trillion yen. As this new

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[1] "New Procedures for Money Market Operations and Monetary Easing," Bank of Japan, March 19, 2001.

[2] The announcement was after 17:00, which means that the information was not reflected by the market prices on March 19 (Monday). March 20 was a national holiday (Spring Equinox Day), and stock market was closed. Therefore, March 21 (Wednesday) was the first trading day after the announcement.

target level exceeded required reserves, the change was intended to ensure that the Bank provided ample liquidity to the market, as well as reduce the call rate from its 0.15 percent level to a level close to the zero bound. For that reason, targeting the current account balance is also sometimes referred to as "excess reserve targeting" [e.g. Ito and Mishkin (2005)].

The Policy Board also made a commitment to maintain its new targeting procedure until the core consumer price index (excluding perishables) registered "stably" a zero percent or positive increase year on year.[3] Finally, the Bank also announced its intention to increase its rate of long-term government bond purchases from its the current level of 400 billion yen per month to a larger unspecified level, subject to the constraint that its stock of long term "effectively held" government bonds be kept below its outstanding stock of banknotes.[4]

2.2 Quantitative easing period

Policy decisions under quantitative easing are displayed in Table 1. The BOJ expanded its current account target ten times between March 2001 and December 2004, when the target reached its current upper level of Y35 trillion. The increases in current account balances were achieved primarily through monthly purchases of JGBs in open market operations. Monthly purchases grew from 0.4 trillion yen in March 2001 to 1.2 trillion yen in May 2004 [Oda and Ueda (2005)].

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[3] It should be noted that the BOJ did not view this condition as implying that it had adopted a formal inflation targeting procedure, as had been requested by many of its critics, because it had refrained from announcing a desired long-term inflation target.

[4] The stock of effectively held long-term bond purchases adjusted the overall holdings to take account of the government bond sales under gensaki repurchase agreements.

The BOJ was generally successful in keeping its monthly current account balances within its announced target ranges, as shown in Figure 1. Still, there were short deviations from the target ranges, most notably in 2005, as reports of insufficient supply hindering the ability of the BOJ to achieve its stated current account target prompted calls for reducing the current account target range.

In explaining its decisions to increase its current account balance target, the BOJ usually stressed the need for a liquidity injection into the financial sector. For example, in its explanation of its December 19, 2001 decision to increase its current account target from "above six trillion yen" to the 10-15 trillion yen range, the BOJ noted that "Japan's economy is deteriorating broadly and [is] likely to undergo a severe adjustment phase for the time being. Against this background, looking at the stock market as well as the markets for commercial paper and corporate bonds, price differentials are widening reflecting the credit conditions of each firm. As such, financial institutions and investors are becoming more cautious." The announcement added that "There is concern that, if the deterioration in the financial environment goes too far and adversely affects financing by firms in good condition, it could exert downward pressure on economic activity and prices."[5]

3. Anticipated Impact of Quantitative Easing

The subsequently-released minutes of the March 2001 BOJ monetary Policy Board meeting[6] revealed that there was considerable uncertainty among the Policy Board

[5] Bank of Japan (2001a).

[6] Bank of Japan (2001b).

members about the impact of quantitative easing. It was generally agreed that the policy would quickly push the overall call rate almost all the way to 0, as it did.[7] It was also reported that, "A few members were of the opinion that the economic effects of an increase in the outstanding balance of the current accounts at the Bank were uncertain in some respects, but, at the same time, it could not be denied that it might have some effects. Thus, the Bank, in view of the economic situation, should try out the measure as long as no significant harmful effect could be anticipated."[8]

However, the minutes also revealed doubts among some of the Policy Board members concerning the potential for quantitative easing to have any positive impact. One member remarked that "… since quantitative targeting would not necessarily reduce the overnight call rate to close to zero percent, the targeting of zero interest rates had a stronger commitment effect."[9]

The uncertainty over the impact of quantitative easing is driven by the monetary operations associated with targeting the BOJ current account balance. Basically, the BOJ swaps near-zero interest-bearing assets (short-term JGBs), for zero-interest bearing assets (claims on deposits at the BOJ). The net impact of such a transaction on bank behavior is therefore unclear.

The potential for quantitative easing, i.e. expanding the current account when the interest rate is already at the zero bound has been examined recently in a number of

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[7] Indeed, because foreign banks were seen as more creditworthy than Japanese banks who themselves enjoyed rates close to 0 percent, the uncollateralized overnight call rate actually dipped modestly into negative territory from time to time [e.g. Nishioka and Baba (2004)].

[8] Bank of Japan (2001b).
[9] Ibid (2001b).

papers. First, quantitative easing can influence future interest rate expectations [e.g. Svennson (2001) and Eggertson and Woodford (2003)], by increasing the length of time the public expects interest rates to be maintained at near-zero levels. The central bank can also influence public expectations through credible statements about future monetary policy, such as the commitment to maintain zero interest rates until certain economic conditions are achieved.

Second, quantitative easing can alter the composition of the central bank balance sheet [e.g. Bernanke and Reinhart (2004)]. For example, the central bank can push down longer-term yields on government securities by increasing its purchases of longer-term assets.

Third, quantitative easing can expand the overall supply of reserves and the money stock [e.g. Bernanke and Reinhart (2004)]. If money is an imperfect substitute for other assets, private investors will push down yields on other assets as they attempt to rebalance their portfolios towards those assets. In addition, if the central banks replaces interest-bearing government debt with non-interest bearing currency, quantitative easing can have an expansionary fiscal impact, as demonstrated by Auerbach and Obstfeld (2003).

Most would consider the potential for "non-standard" expansionary policy at the zero bound, such as purchases of longer-term securities or other non-standard asset, to succeed in having an expansionary impact to be greater than the potential for expansion through increases in the current account target alone [e.g. Orphanides (2004)]. As mentioned above, the Bank of Japan pursued such non-standard policies in a number of dimensions over the course of the quantitative easing era. In particular, the ceiling on

purchases was increased 4 times, from an initial limit of 400 billion yen to a limit currently of 1.2 trillion yen. In addition, the BOJ increases the maturity limit on bills purchased, and then subsequently renewed the extension.

However, there is even uncertainty about the potential for these non-standard policies to have any tangible impact. For example, purchases of longer-term securities do not affect long-term interest rates in Eggertson and Woodford's (2003) model if they do not change expectations about future interest rate levels. Moreover, they argue that empirical evidence suggests that the effect of changes in the composition of public debt on relative yields is small.[10] Shirakawa (2002) confirms that the impact of both increases in quantitative easing and outright purchases of long-term securities have had little impact on long-term Japanese interest rates.

Empirical evidence about the success of the quantitative easing program has been mixed. Using an event study framework, Bernanke et al (2004) fail to find any evidence of an impact of policy statements by the Bank of Japan on expectations of future monetary policy. However, the same authors find that bond yields in Japan during the quantitative easing period were significantly lower than they would have been predicted to be by their estimated term-structure model, suggesting that quantitative easing may have had real effects.

The more central question to our analysis is the anticipated impact of quantitative easing on the financial sector. To understand what the anticipated impact would be on

[10] Much of the empirical argument against the potential for manipulating the term structure through open market operations is based upon the perceived lack of success of "Operation Twist," launched under the Kennedy Administration in the United States in an effort to flatten the yield curve. However, as Bernanke, et al (2004) point out, the operation was relatively small, leaving the experience questionable as a basis for assessing the potential for manipulating the yield curve through purchases of longer maturity assets.

commercial banks, it is useful to begin by considering the question of why commercial banks would be willing to hold such large quantities of current account balances at the BOJ. The current account balances maintained by the BOJ have far exceeded the required reserves faced by Japanese commercial banks, on an order of magnitude of approximately Y 25 trillion. There are a number of reasons why banks might be willing to hold excess reserves. First, banks may be interested in securing liquidity, both currently and in the future. Maeda, et al (2005) report that counterparties bid in open market operations more actively when there is greater uncertainty about their liquidity needs. Second, trading in JGBs with the BOJ can achieve desired portfolio rebalancing. The quantity of bidding motivated by portfolio rebalancing needs is greater when financial markets are particularly volatile.

Precautionary demand for liquidity by banks may allow expansion of current account balances to affect the risk tolerance and willingness to lend of commercial banks. For example, Shirakawa (2002) noted that while demand for excess reserves fell soon after the September 2001 terrorist attack in most developed countries, demand stayed high in Japan due to concerns over corporate bankruptcies and falling equity prices. He notes that the introduction of the Lombard-type lending facility by the BOJ in particular might have had an expansionary impact on bank risk tolerance. Kimura et al (2002) also argue that easing liquidity could have a stabilizing impact on financial markets and perhaps induce a portfolio shift resulting in credit creation.

Still, it is relatively well agreed that the quantitative easing period failed to increase overall bank lending, as overall lending decreased over the quantitative easing period while the money stock grew at around a 3% rate [Kimura et al (2002)].

Nevertheless, quantitative easing could have had a disproportionate impact on certain types of banks, particularly weaker Japanese banks. For example, the International Monetary Fund [International Monetary Fund (2003)] has argued that by pushing down the yield curve to historic lows, the BOJ actually assisted problem banks in remaining in operation and delayed the needed consolidation of the Japanese banking industry.

Of course, bank equity values could also be affected by the impact of changes in quantitative easing on current and expected future macroeconomic conditions. Shirakawa (2002) reports that Japanese short-term Treasury yields, which rose as high as 3 basis point in December 2001 due to bank liquidity concerns were pushed down to almost zero subsequent to the current account target increase from Y 10 trillion to Y 10 15 trillion.

The empirical evidence concerning the impact of quantitative easing is more limited. Romer (1992) finds that the end of the United States great depression was largely attributable to increases in the money supply, suggesting that policies analogous to quantitative easing played a role in ending that episode. Oda and Ueda (2005) find some evidence that increases in the BOJ current account balances were associated with greater credibility of the zero interest rate policy, however they find no significant impact on bond risk premia at medium and long-term maturities.

4. Empirical Evidence

4.1 Return on overall banking portfolio

In this section, we examine the impact of changes in the BOJ quantitative easing policy on Japanese bank equity values. We pursue an event study approach,

concentrating on the impact of decisions expanding the scope of the BOJ's quantitative easing efforts from the inception of the program in March 2001 through the end of 2004.

We examine both the overall return to the banking sector as well as its excess return according to a standard capital asset pricing model specification. It is possible that bank equity values could respond to increases in the intensity of quantitative easing over and above the response levels of the market as a whole.[11] If it this is the case, we are interested in identifying the components of changes in quantitative easing policy that disproportionately benefited the banking sector. Towards that end, we estimated a simple CAPM specification to evaluate bank excess returns on our event dates

$$BANK_t = \alpha + \beta R_{mt} + \sum_{e=1}^{10} \gamma_e D_{e,t} + \varepsilon_t \qquad (1)$$

where $BANK_t$ represents the daily stock return of the TOPIX bank index, R_{mt} represents the market portfolio return for day *t,* proxied by the return on the overall TOPIX index, and $\varepsilon_{i,t}$ is assumed to be an i.i.d. disturbance term.

$\gamma_{i,e}$ represents the sensitivity of the bank portfolio to the BOJ meeting announcement represented by the dummy variable $D_{e,t}$, . This variable takes value one on the event date t and zero otherwise. The event dates correspond to the ten dates identified as changes in BOJ policies in Table 2. . Estimation is done using ordinary least squares with White's general heteroskedasticity correction. Our estimation period runs

[11] As in Oda and Ueda (2005), it is also possible that the actual events observed on our experiment dates are attributable to other simultaneous developments, such as the Governor's comments, on the dates that the current account target was raised. We proceed under the assumption that the primary event on the studied dates was the BOJ monetary policy announcement specified in the text.

from Jan. 4, 2001 through Dec. 30, 2004, and includes a total of 983 trading days.

We estimate events within a single-day event window. However, the March 19, 2001 monetary policy meeting decision was announced after the close of trading on that day, and the next day was a national holiday. As a result, we evaluate the "one-day" return around that event day as the return on the following Wednesday, March 21 (see Figure 2).

Our initial results are shown in Table 2. First, we note that the raw return on these dates on which the quantitative easing policy was expanded was generally positive. The raw return on the banking index was positive 7 out of the 10 event dates, with an average daily raw return to the TOPIX banking portfolio of 2.7%. However, these dates all corresponded to positive returns for the market index as well, as the overall market responded positively to the extension of the quantitative easing policy. The average TOPIX return on one of these event dates was 1.8%. In addition, the bank portfolio is estimated to be very sensitive to the return on the market portfolio, with a point estimate for β equal to 1.218.

The highest individual event day excess returns, of 2.8 and 2.6 percent respectively, occurred on August 14, 2001 and the change subsequent to the meeting on December 19, 2001. Looking at Table 2, these were both dates where in addition to increasing the target for BOJ current account balances, the ceiling on BOJ purchases of long-term JGBs was increased. There were also two later event dates when the ceiling was raised, including February 28, 2002 and October 30, 2002. On these dates, we also obtained statistically significant positive point estimates for the daily excess returns on the bank portfolio, registering 0.5% and 0.8% respectively. It follows that Japanese

banks earned statistically significant positive excess returns on all event dates when in addition to raising its current account target, the BOJ increased its ceiling on long-term JGBs.

In contrast, there were five event dates where current account balances were increased but ceilings on long-term JGBs were not increased. On three of these five dates, Japanese banks earned negative excess returns that were statistically significant at at least a five percent confidence level. The average return on these five dates was only 0.1%, far below the average for the ten event dates.

The results suggest that banks disproportionately benefited, i.e. achieved statistically measurable positive excess returns, when in addition to raising its current account balance the BOJ acted to flatten the yield curve, either by raising the limit on purchases of long-term JGBs or by raising the maturity limit on BOJ bills purchased.[12] Nevertheless, quantitative easing appears to also benefit banks by stimulating the overall economy through, for example, a reduction in future expected interest rate levels. This would impact the overall economy, including banks, but may manifest itself as an overall increase in the TOPIX index, rather than a disproportionate return on bank equities. As banks have large market betas, this benefit to banks may manifest itself through an increase in the raw return on the overall bank portfolio rather than an increase in bank excess returns.

4.2 Shifting market betas

[12] A large positive excess return was also earned on October 10, 2003, when in addition to raising the current account target and renewing the higher maturity ceiling on bills purchased the BOJ committed to continue its quantitative easing policy until the CPI registered a 0% or positive increase year-on-year.

The above specification assumed that the market beta was constant throughout our sample period. However, it is possible that the changes in the intensity of the quantitative easing program could also affect banks' market betas. To ensure that our market beta estimates are not being contaminated by the changes in BOJ policy, we allow the bank portfolio market beta to shift on each event date.

Specifically, we generalize equation (1) to the following specification:

$$BANK_t = \alpha + \beta R_{mt} + \sum_{e=1}^{10} \beta_e \left(R_{mt} \times D_{et} \right) + \sum_{e=1}^{10} \gamma_e D_e + \varepsilon_t \qquad (2)$$

where equation (2) is the same as equation (1) with the addition of the third term allowing for time-varying market betas. D_{et} is a dummy variable equal to 0 prior to the date of event e and 1 afterwards, while β_e represents the coefficient estmate on the beta shift for event date e.

Our results are shown in Table 3. None of the market beta shifters is statistically significant, even at a 10% confidence level. The coefficients on the event dates are quite similar to those with constant βs. The two largest event dates are again August 14, 2001 and December 19, 2001, with returns of 3.1% and 2.6% respectively. As before, the excess return estimates for event dates where the BOJ only increased the current account balance target were much smaller.

Since none of the coefficient estimates for the market beta shifters was significant at even a 10% confidence level and our allowance for shifting market betas had little impact on the qualitative results for our coefficients of interest, we continue under the assumption that the market beta coefficient was constant throughout our sample period.

4.3 Parametric evidence

We next turn to parametric evidence concerning the impact of the different forms of quantitative easing on the overall banking portfolio. Table 1 groups the various event dates into three dummy variables. CA represents a dummy variable that takes value 1 on all event dates when the BOJ raised its current account balance target. YC represents a dummy variable that takes value 1 on all event dates when the BOJ pursued actions associated with flattening the yield curve. We include all increases in the limit on the ceiling on long-term JGB purchases and increases or renewals in increases of maturity limits on bills purchased.

Finally, LT is a dummy variable that takes value 1 on the subset of event dates in YC that involved increases in the limit on the ceiling on long-term JGB purchases. The last dummy is almost identical to the second one, and is intended as a test of the robustness of our results. In particular, we are concerned about the extra-normal return experienced by banks on October 10, 2003. As mentioned above, in addition to the increase in the current account target and the limit on long-term JGB purchases, the BOJ announced its conditions for ending its quantitative easing policy, raising its commitment to maintain the policy for some period of time. To the extent that this policy change results in lower expected future short-term rates, it may also be a policy associated with "flattening the yield curve." Nevertheless, we isolate the events where limits on the ceiling on long-term JGB purchases were raised to isolate the impact of this type of policy change. As above, we estimate the bank portfolio market beta jointly with our test of the significance of the event dates. We first test the significance of the increases in the current account targets alone with the simple speification

$$BANK_t = \alpha + \beta R_{mt} + \gamma_{CA} CA + \varepsilon_t \quad (3)$$

where our variable of interest is γ_{CA}. Our results are shown in Table 3. It can be seen that we obtain a similar estimate for our market beta of around 1.2. It can also be seen that increases in the current account balance alone appear to be priced positively with a coefficient estimate of close to 0.9 percent, although our coefficient estimate is statistically insignificant.

However, many of these event dates also included other changes in BOJ policy, particularly changes associated with flattening the yield curve through easing the restrictions on BOJ purchases of long-term JGB bonds or increasing the maturity limit on bills purchased by the BOJ. To investigate whether excess returns on the banking portfolio were attributable to current account target increases or these yield curve flattening events, we add the YC and LT dummies in models 2 and 3.

The addition of these dummy variables markedly reduces the coefficient estimate on the current account dummy. This variable now enters insignificantly different from zero. In contrast, both of the yield curve dummies are economically and statistically significant. The overall yield curve dummy (YC) enters significantly with a coefficient estimate of 1.7% at a 5% confidence level. The dummy for only increases in the limit on long-term JGB purchases has a modestly smaller point estimate at 1.5% and is also statistically significant at a 5% confidence level.

The parametric results therefore support our results from overall bank portfolio returns on individual event dates. While banks generally did better on days when the BOJ raised its current account balance target, it appears that they did measurably better

when these current account target increases were accompanied by other policy changes that could have the impact of flattening the yield curve.

4.2 Cross-Sectional Evidence

In this section, we examine the impact of changes on BOJ quantitative easing policy on a cross-section of 87 Japanese banks. There has been some speculation [e.g. International Monetary Fund (2003)] that the BOJ quantitative easing policy has disproportionately benefited weaker Japanese banks. We therefore turn to important event dates to examine whether or not this is the case. In particular, we conduct cross sectional analysis on the March 19, 2001 event date, corresponding to the introduction of the quantitative easing program, as well as the two event dates that yielded statistically significant excess returns to the overall banking index, August 14, 2001 and December 19, 2001. Recall that both of these event dates included increases in the ceiling on BOJ purchases of long-term JGBs in addition to increases in the BOJ current account target.

We again evaluate the excess return on bank i on date t in terms of a capital asset pricing model

$$AR_i(t) = R_{it} - \alpha_i - \beta_i R_{mt} \tag{4}$$

where AR_{it} is the estimated excess return of bank i on date t and α_i and β_i are estimated market model parameters, and R_{mt} is again the rate of return of the market portfolio on day *t,* proxied by the return on the TOPIX index. Note that we initially estimate bank-specific market betas. We repeat the study under the assumption of common bank market betas below. We estimate the market model parameters over our

entire sample.[13] There were 87 banks that traded continuously over this period, which determined our sample size. All stock price data was obtained from the *Toyo Keizai Shinposha* stock price data set.

We estimate the standard error of daily abnormal returns on day t, $S_i(t)$, is as follows

$$S_i(t) = \sigma_i \sqrt{1 + \frac{1}{100} + \frac{(R_{mt} - \overline{R}_{mt})^2}{\sum_{s=-120}^{-21} (R_{st} - \overline{R}_{mt})^2}} \tag{5}$$

where σ_i is the residual standard error from our market model estimation and $\overline{R}_{mt}$ is the mean return on the market portfolio during the estimation period.

Individual bank excess returns for the March 19 event date are shown in the appendix. Of the 87 banks in our sample, 27 exhibited positive excess returns at at least a 10% confidence level, while only two had measurably negative returns.

We next turn to the implications of bank characteristics for excess returns on the March 19 event date. In particular, we concentrate on indicators of firm financial conditions. If the quantitative easing policy was expected to disproportionately favor financially weak firms, we would expect indicators of relatively poor financial conditions to obtain a positive coefficient. Individual bank data was obtained from the Japanese Bankers Association *Analysis of financial statements of all banks*, individual bank financial reports, and the Deposit Insurance Corporation of Japan web site.[14]

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[13] As a robustness check, we also estimated the market model parameters for the March 19, 2001 event using 100 daily returns beginning 120 trading days before the event day ($t \in [-120,-21]$). These results were very similar to those reported, and are available from the authors on request.

[14] The DICJ web site address is http://www.dic.go.jp/english/index.html.

We include seven indicators of individual bank financial conditions in our specifications: First, we include bank *Liquidity ratios,* measured as the ratio of cash, reserve, and call loans to total bank assets. We also include bank *Bad loan ratios,* measured as the ratio of non-performing loans requiring risk management, as defined by the Japanese Banking Law, to net bank assets. We include measures growth in overall and time deposits relative to the previous fiscal year, labeled *Deposit growth* and *Time deposit growth* respectively. We also include a dummy variable, *International operations,* which takes value 1 if a bank is engaged in international operations and 0 otherwise. We also include a dummy variable labeled *Dividend,* which takes value 1 if banks failed to pay the median level of dividends paid by their regulatory class in the previous fiscal year and 0 otherwise.[15] We include a dummy variable, *Public funds,* which takes value 1 for banks which have received public funds and value 0 otherwise. Finally, we include a dummy *Bank Type,* which takes value 1 if a bank is a city or trust bank.

Under the hypothesis that the quantitative easing program was expected to disproportionately benefit weaker commercial banks, we would expect a positive coefficient on the *Bad loan ratio* and *Dividend* variables, which both indicate financial distress, and a negative coefficient on the *liquidity ratio, Deposit growth* and *Time deposit growth* variables.

The Time deposit growth variable, in particular, may be an indicator of financial strength for the events we consider in our cross-section study. In 2001 the Japanese government announced a plan to replace its total deposit insurance guarantees by March

[15] Median dividend payouts for City and Trust banks was 7 yen a share, while median payouts for regional banks was 5 cents a share.

2002 with a partial deposit insurance system, where coverage would be limited to 10 million yen per depositor on time deposits. This reduction in insurance coverage was referred to locally as the "pay-off" policy. The public responded to the announcement by reallocating their savings portfolios towards demand deposits prior to the announced date of the policy change: Demand deposits increased from 139 trillion yen in March 2000 to 152 trillion yen in March 2001, while time deposits decreased from 282 trillion yen to 278 trillion yen. In addition, while aggregate deposits grew over this period, several notable banks that subsequently failed experienced sharp deposit declines. Spiegel and Yamori (2004) find that time deposit growth was related to financial strength during this period for Japanese regional banks that had adopted market price accounting.

Our expected sign on the *International operations* and the *Public funds* variables are unclear. Involvement in *International operations* usually implies a larger bank with branches abroad, which would tend to be a safer bank. However, during our event period, large banks were known to be heavily dependent on the deferred tax assets in their balance sheets, and therefore were under greater pressure to liquidate their problem loans. Nevertheless, we condition for international operations because involvement in international operations subjects Japanese banks to a higher capital standard.

In the case of the *Public funds* variable, it is clear that the need to obtain public funds would certainly indicate financial distress. However, banks that obtained public funds would presumably be in superior condition after receiving their funds injection than those which had failed to receive any public funds, leaving some ambiguity concerning the expected coefficient sign.

The results are shown in Table 5. For the March 19th event date, four variables enter significantly at at least the 10% confidence level. These include the *Bad loan ratio* variable, which enters significantly at a 5% confidence level with its expected positive coefficient, and the time deposit growth variable, which also enter at a 5% confidence level with its expected negative sign. These results suggest that the market expected the quantitative easing program to disproportionately benefit banks in poor financial condition and banks that had been losing, or at least not gaining, time deposits.

The two variables with uncertain expected coefficient signs both enter significantly at a 10% confidence level. The *International operations* variable enters negatively, suggesting that banks uninvolved in international operations were expected to benefit more from the quantitative easing policy. This would be in line with the notion that banks with international operations would tend to be larger banks with less financing difficulties holding all else equal. The *Public Funds* variable also enters negatively. This would be surprising if banks that received public funds were still in worse shape than those that did not receive public funds. However, that may not be the case, as we discussed above, if the public fund injection was sufficient to markedly improve their situation, particularly after our other conditioning variables adjusts for the share of non-performing loans and other characteristics.

We also examine cross-section event studies for the two event dates that result in statistically significant positive excess returns on the overall banking portfolio, August 14, 2001 and December 19, 2001. On the August 14th date, two of the variables enter significantly. The *time deposit growth* variable again enters significantly at a 5% confidence level with its expected negative sign, suggesting that the market expected that

quantitative easing would disproportionately benefit banks with difficulties raising deposits. The *Dividend* variable also entered at a 1% confidence level with the incorrect negative sign. This would suggest that banks that failed to meet the median dividend payout of their regulatory class would be expected to disproportionately benefit less from the quantitative easing program than other Japanese banks. As only problem banks tend to miss their dividend payments, this result conflicts with the hypothesis that the quantitative easing program was expected to disproportionately benefit weaker Japanese banks.

The *Time deposit growth* variable also enters significantly with its expected negative sign on our December 19 event date, again at a 5% confidence level. In addition, the overall deposit growth variable entered significantly positive at a 5% confidence level. This is not that anticipated sign, but the results for overall deposits may reflect anticipation (which proved to be true) that the removal of deposit insurance on demand deposits would be delayed.[16]

In summary, our cross-section results identify *Time deposit growth* as a robust indicator of excess returns on either the introduction or the expansion of the BOJ quantitative easing policy. This would seem to be a particularly good indicator of bank weakness as public anticipation of the payoff policy induced depositors to move their time deposits out of problem banks. As such, our results weakly support the contention that the quantitative easing policy was expected to disproportionately benefit weaker Japanese banks. However, other indicators of bank financial strength, such as the *Bad loan ratio* variable, only entered significantly on the news of the introduction of the

[16] Spiegel and Yamori (2004) fail to find evidence of depositor discipline in terms of overall deposit growth.

program, suggesting that discrepancies in the impacts of the expansions of the program across Japanese banks were limited.

5. Impact on industries and firms

Given our results that suggest that the quantitative easing policy to some extent disproportionately benefited weaker banks, it seems natural to ask whether weaker firms also disproportionately benefited from the policy. To investigate this question, we next turn to the impact on Japanese equities sorted by industry. We use indices of weighted equity values for 32 industries calculated by TSE. As above we estimate individual industry excess returns according to the CAPM model in equation (3).

Our results are shown in Table 6. Ten of the industries enter significantly positively at a least a 10% confidence level, including Pharmaceuticals, Electric Power and Gas, Retail Trade, Air Transportation, Land Transportation, Foods, Metal Products, Real Estate, Fishery, Agriculture and Forestry, and Construction. A number of these industries experienced significant financial difficulties during this period, particularly the construction industry, the real estate industry and the retail trade industry. In addition, a number of the other industries that experienced significantly positive excess returns on our event date were highly indebted, including the Electric Power and Gas, Land Transportation, and Air Transportation industries. Both of these conditions suggest conditions of financial distress, and their positive excess returns on our event date suggest that the quantitative easing policy was expected to disproportionately benefit weaker industries. In contrast, there were four industries that experienced significantly negative excess returns on our event date. These include Non-ferrous metals, Electric Appliances,

Precision Instruments, and Securities. These industries do not seem to be notably troubled, with the possible exception of the securities industry.

We also examined the performance of individual firms on our event date. As in the case of Japanese industry, we would expect that problem firms would disproportionately benefit from the quantitative easing policy as they would be more sensitive to any resulting changes in longer-term interest rates. However, another goal of the quantitative easing program was to encourage additional lending by Japanese banks. As Japanese firms are still sensitive to the credit policies of their main banks, we would expect the impact of quantitative easing to have the greatest impact on weak firms with weak main banks, and the weakest impact on strong firms with strong main banks.[17]

To test this hypothesis we concentrate on a sample of financially-troubled firms, identified as firms receiving speculative-grade credit ratings below Baa- by Moody's investment service. We also limited our sample to firms that had positive trade volume for all of the days in our sample window and had a solvent main bank. In particular, we excluded firms that had government-affiliated main banks such as the Development Bank of Japan or agriculatural main banks, such as the Norinchukin Bank, or and insolvent main bank, such as Nippon Credit Bank.[18].

We regress the cumulative abnormal returns of these firms over the 3/21-3/22 2001 event period on the financial characteristics of their main banks. In particular, we include

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[17] While firms maintained sensitivity to their main banks, the main bank relationship had already eroded considerably by the time of the implementation of the quantitative easing policy [e.g. Spiegel and Yamori (2003)].

[18] We identify the main bank of each firm using the *Nikkei Kaisha Joho* (Nikkei Company Report) published by Nihon Keizai Shinbunsha. The book lists banks with relationships with each firm, and we identify the main bank of each firm as a bank shown at the top of the list.

Capital, the main bank capital-asset ratio, *Liquidity,* a measure of the liquidity position of the main bank, measured as the ratio of cash plus reserves plus call loan balances to total assets, and *Bad Loan,* measured as the ratio of bad loans to bank net assets. Our regression results are:

CAR(0,1) of these firms on three representing variables showing financial conditions of their main banks; capita-asset ratio, liquidity ratio, and bad-loan ratio.

Our results are shown in Table 7. It can be seen that only one of the variables, *Capital,* enters with statistical significance (at a 10%) confidence level. This result provides some weak evidence that the financial strength of a firm main bank influenced its sensitivity to the announcement of the quantitative easing program, with financially weak firms with weak main banks experiencing the strongest relative returns, as predicted. Still, the poor results for the *Liquidity* and *Bad Loan* variables suggest either that the dependence of the problem firms on their main banks is limited or that the *Capital* variable is a sufficient statistic for main bank financial strength.

6. Conclusion

This paper examines the impact of the introduction and expansion of the BOJ quantitative easing program on the equity values of Japanese banks. We find that a weighted portfolio of the overall banking system experienced statistically significant positive excess returns only when increases in the BOJ current account target were accompanied by so-called non-standard monetary policies aimed at flattening the yield curve, such as increases in the ceilings on BOJ purchases of JGBs. However, we also found cases where both types of policies were pursued without yielding statistically

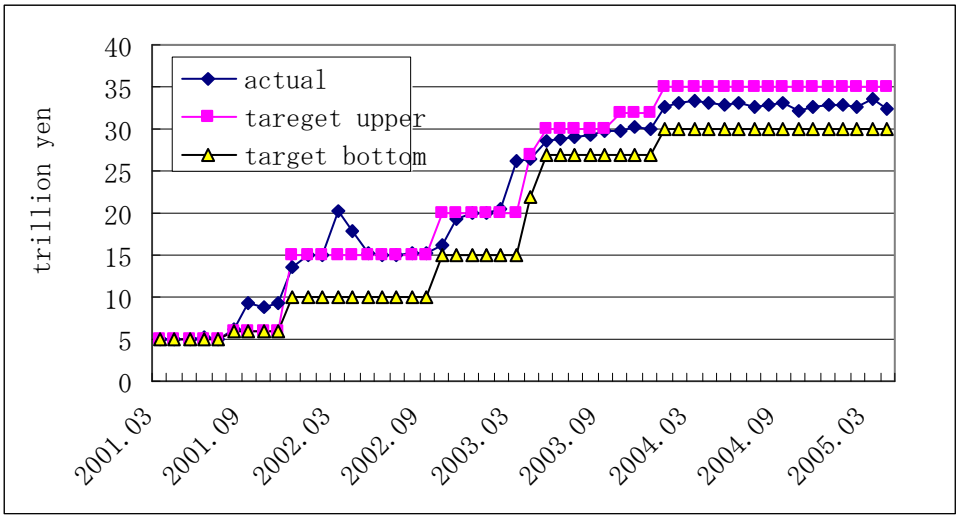
significant excess returns to Japanese banks, suggesting that the pursuit of non-standard policies aimed at flattening the yield curve are necessary, but not sufficient, conditions for yielding positive excess returns to the banking sector.

We also examined cross-sectional evidence concerning the determinants of abnormal returns to Japanese bank equities on several important event dates associated with the introduction and expansion of the quantitative easing policy. Our results support the contention that the quantitative easing policy was expected to disproportionately benefit weak Japanese banks. Finally we also find that the policy was expected to disproportionately benefit weak Japanese industries and firms with financially troubled main banks.

Our results therefore tend to support the notion that quantitative easing may have had the benign impact of strengthening Japanese financial conditions, particularly with respect to weaker Japanese banks. However, as the IMF report cited above discussed, this may not have been an unmixed blessing. If quantitative easing disproportionately benefited the weakest Japanese banks and industries, the policy may have delayed needed restructuring by keeping these weak entities afloat.

Figure 1

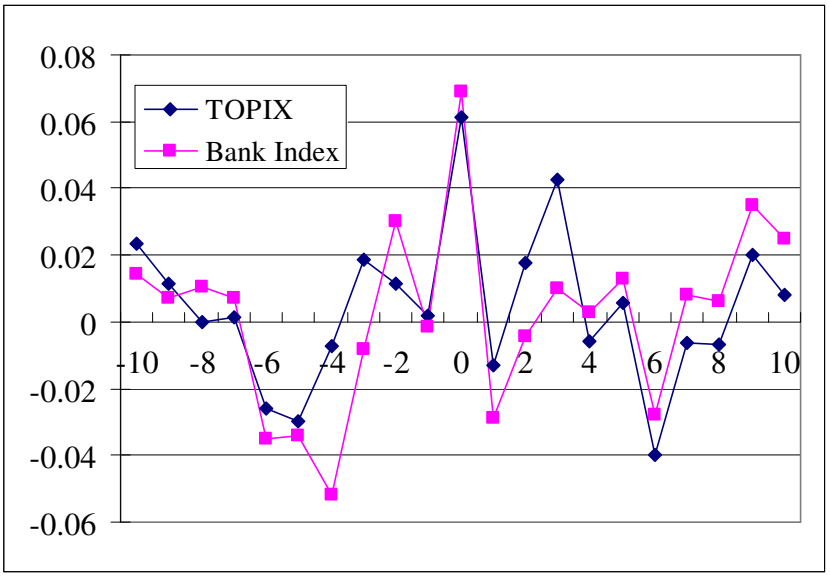
Current Account Target and Actual Deposits



(Note) Figure shows monthly average balance of BOJ current deposits as well as upper and lower target ranges. Prepared by the authors based on Bank of Japan data.

Figure 2

TOPIX and Bank Index around the event day (March 21 2001



Note: due to the national holiday following the BOJ announcement of the quantitative easing policy on March 19. Date 0 for this event is set at March 21.

Table 1

BOJ Monetary Policy Decisions Under Quantitative Easing Policy (3/19/01-12/17/04)

Date	Current Account Balances	Long-term JGB monthly purchase target	Other Changes	CA	YC	LT
3/19/01	Increased Y 1 trillion to Y 5 trillion	Allowed to exceed Y 400 billion limit		1	0	0
8/14/01	Increased Y 1 trillion to Y 6 trillion	Increased Y 200 billion to Y 600 billion		1	1	1
9/18/01	Allowed to exceed Y 6 trillion limit		Discount rate reduced from 0.15 to 0.10, and maximum discount loan term extended to 10 business days	0	0	0
12/19/01	Increased Y 4-9 trillion to Y 10-15 trillion	Increased Y 200 billion to Y 800 billion	Broadened set of acceptable commercial paper and asset-backed securities	1	1	1
2/28/02	Allowed to exceed Y 10-15 trillion target	Increased Y 200 billion to Y 1 trillion	Suspended limit on number of business days for discount borrowing	0	1	1
10/30/02	Increased Y 5 trillion to Y 15-20 trillion	Increased Y 200 billion to Y 1.2 trillion; maturity limit for bills purchased increased to 1 year		1	1	1
3/25/03	Increased Y 2 trillion to Y 17-22 trillion (After 4/1/03)			0	0	0
4/30/03	Increased Y 5 trillion to Y 22-27 trillion			1	0	0
5/20/03	Increased Y 3-5 trillion to Y 27-30 trillion			1	0	0
10/10/03	Increased Y 2 trillion to Y 27-32 trillion	Renewed extension of maturity limit for bills purchased	Commited to maintaining quantitative easing until CPI registers a 0% or increase year on year	1	1	0
1/20/04	Increased Y 3 trillion to Y 30-35 trillion			1	0	0

Note: Table lists BOJ Policy Board meetings at which current account targets were changed. Unlisted meetings included no changes. Note that we also eliminate BOJ decision on March 25, 2003 to increase the current account target by two trillion yen to accommodate the new regulation that required the Japan Post to begin holding about 2 trillion yen in its current deposits at Bank of Japan on April 1, 2003. Definitions of dummy variables CA, YC, and LT are contained in the text.

Table 2
Bank Index Returns on Individual Quantitative Easing Event Dates

Event Date	CA	YC	LT	Raw return on $BANK_t$	*TOPIX* return	Excess Return on $BANK_t$
Mar. 21, 2001	1	0	0	0.069	0.061	-0.006** (0.002)
Aug. 14, 2001	1	1	1	0.061	0.027	0.028*** (0.001)
Sep. 18, 2001	0	0	0	-0.001	0.017	-0.021** (0.001)
Dec. 19, 2001	1	1	1	0.031	0.004	0.026*** (0.000)
Feb. 28, 2002	0	1	1	0.013	0.007	0.005*** (0.001)
Oct. 30, 2002	1	1	1	0.019	0.009	0.008*** (0.001)
Apr. 30, 2003	1	0	0	0.051	0.030	0.015*** (0.001)
May. 20, 2003	1	0	0	-0.003	0.005	-0.008*** (0.000)
Oct. 10, 2003	1	1	0	0.036	0.015	0.017*** (0.013)
Jan. 20, 2004	1	0	0	-0.009	0.004	-0.013*** (0.013)

Note: Estimation by ordinary least squares with White's heteroskedasticity correction. Estimation period runs from January 4, 2001 through December 30, 2004. In estimation of excess return, constant term was estimated to be -0.00 while coefficient on TOPIX was estimated to be 1.218 and was significant at 1% confidence level. Estimated R-squared of regression was 0.599. ** indicates significance at 5% confidence level. *** indicates significance at 1% confidence level.

Table 3
Bank Index Returns on Individual Quantitative Easing Event Dates
(with time-varying market betas)

Event Date	CA	YC	LT	Raw return on $BANK_t$	*TOPIX* return	Market Beta Shift	Excess Return on $BANK_t$
Mar. 21, 2001	1	0	0	0.069	0.061	-0.141 (0.219)	0.004 (0.010)
Aug. 14, 2001	1	1	1	0.061	0.027	0.028 (0.189)	0.031*** (0.003)
Sep. 18, 2001	0	0	0	-0.001	0.017	0.046 (0.183)	-0.020*** (0.002)
Dec. 19, 2001	1	1	1	0.031	0.004	0.069 (0.240)	0.026*** (0.001)
Feb. 28, 2002	0	1	1	0.013	0.007	0.002 (0.167)	0.005*** (0.001)
Oct. 30, 2002	1	1	1	0.019	0.009	-0.036 (0.127)	0.009*** (0.001)
Apr. 30, 2003	1	0	0	0.051	0.030	0.058 (0.345)	0.014 (0.010)
May. 20, 2003	1	0	0	-0.003	0.005	-0.065 (0.359)	-0.008*** (0.001)
Oct. 10, 2003	1	1	0	0.036	0.015	0.281 (0.186)	0.013*** (0.002)
Jan. 20, 2004	1	0	0	-0.009	0.004	-0.085 (-0.131)	-0.013*** (0.000)

Note: Estimation by ordinary least squares with White's heteroskedasticity correction. Estimation period runs from January 4, 2001 through December 30, 2004. In estimation of excess return, constant term was estimated to be -0.001 while permanent coefficient on TOPIX was estimated to be 1.207 and was significant at 1% confidence level. Market beta shift estimates show coefficient for dummy variable that equals one on and after stated event date, and 0 on earlier dates. See text for details. Estimated R-squared of regression was 0.604. ** indicates significance at 5% confidence level. *** indicates significance at 1% confidence level.

Table 4
Returns on Banking Index by Event Date Categories

Dependent variable: Raw return on $BANK_t$

Variable	Model 1	Model 2	Model 3
Constant	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
TOPIX	1.216*** (0.037)	1.217*** (0.037)	1.217*** (0.037)
Increases in current account Balance	0.009 (0.006)	0.000 (0.006)	0.003 (0.006)
Increases in ceiling on long-term JGB purchases or maturity limit on bills purchased		0.017** (0.007)	
Increases in ceiling on long-term JGB purchases			0.015** (0.007)
# of observations	983	983	983
R-squared	0.594	0.596	0.596

Note: Estimation by ordinary least squares with White's heteroskedasticity correction. Estimation period from January 4, 2001 through December 30, 2004. Dummy variables take value one on announcement dates corresponding to named event, zero otherwise. Identification of dummy variables is shown in Table 1. Standard errors are indicated in parentheses. * indicates significance at 10% confidence level. ** indicates significance at 5% confidence level while *** indicates significance at 1% confidence level.

Table 5
Cross-Sectional Results

Event Date	3/19/01	8/14/01	12/19/01
Liquidity ratio	0.010	0.018	0.038
	(0.086)	(0.041)	(0.149)
Bad loan ratio	0.001**	0.000	-0.001
	(0.006)	(0.000)	(0.001)
Deposit growth	0.198	0.080	0.804**
	(0.165)	(0.084)	(0.320)
Time deposit growth	-0.245**	-0.152**	-0.663**
	(0.123)	(0.065)	(0.263)
International operations	-0.016*	-0.005	0.014
	(0.007)	(0.004)	(0.014)
Dividend	-0.002	-0.015***	0.027
	(0.010)	(0.005)	(0.020)
Public funds	-0.016*	-0.008	-0.002
	(0.008)	(0.006)	(0.025)
Bank type	0.015	0.053	0.018
	(0.015)	(0.008)	(0.032)
# of observations	87	87	87
R^2	0.145	0.535	0.188

Note: Estimation by ordinary least squares. Specifications regress cross section of 87 bank returns on bank characteristics on posted event date. Standard errors are indicated in parentheses. * indicates significance at 10% confidence level. ** indicates significance at 5% confidence level while *** indicates significance at 1% confidence level.

Table 6
Industry Excess Returns
3/19/01

Industry	AR(0) (%)	t-value	p-value
Fishery, Agriculture and Forestry	2.12*	1.79	0.076
Mining	-2.84	-0.82	0.416
Construction	2.05**	2.42	0.017
Foods	3.32***	3.85	0.000
Textiles and Apparels	1.09	1.04	0.302
Pulp and Paper	-2.01	-1.29	0.199
Chemicals	0.89	0.95	0.344
Pharmaceutical	7.34***	5.27	0.000
Oil and Coal Products	0.61	0.26	0.796
Rubber Products	2.00	0.75	0.455
Glass and Ceramics Products	0.14	0.11	0.915
Iron and Steel	-0.66	-0.50	0.621
Nonferrous Metals	-4.63**	-2.01	0.047
Metal Products	2.99***	2.96	0.004
Machinery	-1.50	-1.74	0.085
Electric Appliances	-3.11***	-2.95	0.004
Transportation Equipment	1.42	1.22	0.227
Precision Instruments	-6.09***	-4.37	0.000
Other Products	-1.69	-1.24	0.219
Electric Power and Gas	5.01***	4.37	0.000
Land Transportation	4.11***	4.08	0.000
Marine Transportation	0.04	0.02	0.982
Air Transportation	4.25*	1.91	0.059
Warehousing and Harbor Services	1.04	0.85	0.398
Communication	-3.28	-1.59	0.115
Wholesale Trade	-1.57	-1.26	0.211
Retail Trade	4.92***	3.40	0.001
Securities	-3.71**	-2.04	0.044
Insurance	1.55	1.03	0.306
Other Financing Business	1.24	0.82	0.416
Real Estate	2.85*	1.79	0.077
Services	-3.59***	-2.79	0.006

Note: Estimated excess returns by industry using CAPM model on March 21, 2001. * indicates significance at 10% confidence level. ** indicates significance at 5% confidence level while *** indicates significance at 1% confidence level. Reported confidence intervals are relative to standard error of regressions.

Table 7
Impact of 3/19/2001 Announcement on Firms by Main Bank Characteristics

Dependent Variable: CAR(3/21-3/22)

	Estimate	T-Statistic	P-Value
Capital	-0.03*	-1.879	0.07
Liquidity	-0.51	-0.929	0.36
Bad Loan	-0.00	-0.066	0.99
# Obs	49		
R-squared	0.08		

Note: Estimation by ordinary least squares. Regression of cross-section of abnormal returns of 49 problem Japanese firms on event date 3/21/2001-3/22/2001 on financial characteristics of firm main banks. Standard errors are in parentheses. * indicates statistical significance at 10% confidence level.

Appendix: Individual Bank Estimated Excess Returns on 3/19/01

Bank	Type	AR(0)	Std. Error	Bank	Type	AR(0)	Std. Error
Sakura	C	6.33***	2.21	Ikeda	R	0.74	1.58
Tokyo-Mitsubishi	C	1.98	2.21	Hiroshima	R	1.94*	1.15
Sumitomo	C	4.77**	2.19	Yamaguchi	R	-0.93	2.10
Daiwa	C	3.20	3.03	San-in Godo	R	2.13	2.05
Sanwa	C	0.33	2.64	Chugoku	R	1.11	2.49
Tokai	C	-2.70	2.39	Iyo	R	0.27	1.65
Asahi	C	-1.71	2.81	Hyakujuushi	R	1.67	1.01
Daishi	R	4.80***	1.70	Shikoku	R	0.84	0.96
Hokuetsu	R	8.49***	2.79	Awa	R	-1.64	1.42
Fukuoka	R	-0.60	2.04	Kagoshima	R	3.60	2.58
Nishi-Nippon	R	6.09***	1.57	Shinwa	R	0.76	1.71
Chiba	R	-0.35	1.32	Oita	R	0.53	2.03
Yokohama	R	0.21	2.33	Miyazaki	R	2.46	2.68
Joyo	R	6.29***	1.87	Higo	R	3.08	2.19
Gunma	R	1.61	2.10	Saga	R	3.39	2.06
Ashikaga	R	2.29*	1.36	Eighteenth	R	4.19**	1.79
Musashino	R	4.17**	1.83	Ryukyu	R	0.29	1.45
Chiba Kogyo	R	7.58**	3.13	Nagano	R	-5.10**	1.98
Tokyo Tomin	R	9.33***	2.67	Nagoya	R	6.60***	1.99
77	R	5.63***	2.08	Hokuyo	R	6.14**	3.09
Aomori	R	0.18	1.73	Aichi	R	3.42	2.28
Akita	R	1.63	2.48	Daisan	R	4.75***	1.25
Yamagata	R	9.19***	2.11	Chukyo	R	2.40	2.19
Iwate	R	4.09*	2.45	Hiroshima-Sogo	R	-1.85	1.28
Toho	R	-1.12	2.12	Higashi- Nippon	R	6.02***	1.71
Michinoku	R	-0.75	1.67	Fukuoka City	R	9.00***	1.87
Hokkaido	R	1.17	2.67	Ehime	R	1.26	0.91
Shizuoka	R	0.33	2.19	Keiyo	R	5.39***	1.90
Juroku	R	0.21	1.49	Kyusyu	R	-0.03	1.35
Hokuriku	R	4.69**	2.27	Tochigi	R	7.17***	1.97
Suruga	R	-4.34	3.73	Kita-Nippon	R	2.06	2.22
Hachijuni	R	1.13	2.25	Kagawa	R	0.16	1.09
Yamanashi Chuo	R	0.94	2.53	Towa	R	-0.32	1.22
Ogaki Kyoritsu	R	0.33	1.70	Tokushima	R	0.42	0.81

Fukui	R	2.41	1.66	Fukushima	R	0.60	1.13
Hokkoku	R	10.07***	1.72	Daito	R	-0.78	0.96
Shimizu	R	-1.93	1.92	Minato	R	-2.52	1.95
Shiga	R	0.09	1.52	Mitsubishi Trust	T	1.38	2.17
Nanto	R	-4.00	3.19	Sumitomo Trust	T	3.35	2.88
Hyakugo	R	0.92	1.84	Yasuda Trust	T	4.80**	2.10
Kyoto	R	6.55***	1.57	Nippon Trust	T	2.00	2.65
Kiyo	R	0.67	1.68	Toyo Trust	T	-0.81	2.38
Kinki-Osaka	R	9.44**	3.91	Chuo Mitsui Trust	T	-3.84*	2.05
Mie	R	-2.14	2.04				

* indicates significance at 10% confidence level. ** indicates significance at 5% confidence level while *** indicates significance at 1% confidence level.

Type:
C: City Bank
R: Regional Bank
T: Trust Bank
Type:
C: City Bank
R: Regional Bank
T: Trust Bank

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