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Gains in bank mergers: Evidence from the bond markets

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Abstract

We present evidence that the adjusted returns of merging banks' bonds are positive and significant across pre-merger and announcement months. The cross-sectional evidence indicates that the primary determinants of merger-related bondholder gains are diversification gains, gains associated with achieving too-big-to-fail status, and, to a lesser degree, synergy gains. We obtain the same finding when we examine the acquiring banks' credit spreads on new debt issues both before and after the merger. We also provide the first study that shows acquirers benefit by the lower cost of funds on post-merger debt issues.

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1. Introduction

Corporate mergers can affect bondholders in several ways. If the merger is synergistic, both bondholders and shareholders gain because firm value can increase by achieving economies of scale and scope and by eliminating less-efficient management (see Jensen and Ruback, 1983). In nonsynergistic mergers, bondholders can still gain if the merger reduces cash flow volatility and leads to a lower risk of default (see, e.g., Lewellen, 1971; Higgins and Schall,1975; and Galai and Masulis, 1976).

In the case of bank mergers there are at least two additional layers of complexity. First, the federal deposit insurer might consider the combined bank too big to fail (TBTF) as a result of the merger. This strategy allows all uninsured liabilities to have de facto insurance coverage and thereby maximizes the value of the implicit guarantees received from the government. Second, unlike nonfinancial firms, banks are subject to regulatory capital requirements. As a result, shareholders cannot simply increase leverage to make up for a merger that coinsures bondholders. Hence, even with no TBTF, bondholders could gain and shareholders could lose as bondholders expropriate some of the gains associated with the acquisition.

To the best of our knowledge, no study has examined changes in required returns on banks' debt around the time of a merger. In this paper we examine first the reaction of nonconvertible bond prices of both the acquiring and target banks around merger announcements, and then changes in the credit spread of the acquiring institution’s new debt issues after the merger. Our results contrast sharply with those reported for mergers of nonfinancial firms. We observe that bondholders of both acquirer and target banks realize significant positive risk- and

maturity-adjusted returns around the merger announcement month. During the seven consecutive pre-merger months and the announcement month, bondholders realize positive returns. The sum of cumulative adjusted bond returns is 4.3% for target banks during this period, significantly exceeding the acquiring banks' bond returns of 1.2%. Overall, our findings indicate that bond market participants perceive the bank merger as a default-risk reducing event.

Our cross-sectional tests focus on identifying the factors that determine the merger announcement month risk- and maturity-adjusted bond returns. Our analysis shows that all three possible rationales (diversification, TBTF, and, to a lesser degree, synergy) account for increased bondholder returns. The acquiring banks of our sample do not significantly increase their leverage ratios post-merger. This finding supports the argument that bank bondholders might benefit from the coinsurance effect. However, after we control for degree of diversification, geographic overlap, and expected changes in leverage and asset quality following merger, our analysis shows that the incremental asset size is a positive and significant determinant of the announcement month returns.

We also find that bond returns do not increase monotonically with the asset size of the firm involved in the merger, which is consistent with the existence of TBTF gains. Bondholders of medium-size banks (those that can push the combined bank's asset size above the TBTF threshold asset size) realize the highest returns whereas bondholders of megabanks (those that can be considered TBTF at the time of merger) and smaller banks earn relatively lower adjusted returns.

We provide evidence that the relation between announcement month abnormal equity returns and adjusted bond returns is positive and significant, which rules out the possibility that bondholders gain at the expense of equity holders. This evidence is consistent with both the TBTF

and synergy rationales. In fact, we also find that the positive effect of the incremental size on adjusted bond returns is larger for in-state mergers, which can be explained by the realization of larger synergies and greater market power in this type of mergers.

When we examine changes in credit spreads, our findings substantiate those of the bond-return analysis. We find that credit spreads are higher for those acquirers that attain less diversification (less reduction in equity volatility for the acquirer). After we control for bond characteristics, market conditions, and changes in the balance sheet variables due to leverage and non-performing loans, we find that only the medium-size banks realize significant credit-spread reductions. We estimate that the average decline in credit spreads for this group is around 15 basis points. We observe no significant credit-spread reduction in mergers that involve acquirers that can be considered very large banks or small banks. Again, we attribute this result to the existence of TBTF gains in bank mergers.

The paper is organized as follows. Section 2 estimates and provides an analysis of bondholder returns around the merger announcement month. Section 3 estimates the changes in credit spreads of the acquiring banks' new debt issues after the merger announcement. Section 4 concludes the paper.

2. Analysis of bondholder returns

2.1. Sample and data

We construct the sample merger cases for the analysis of bond returns by using the Mergers and Acquisitions database of the Securities Data Company (SDC). We obtain the merger announcement dates from the SDC database and double-check the dates by using ProQuest, which gives us access to the *Wall Street Journal* database of articles and abstracts.

We include merger cases in our study if they meet the following criteria:

1. The merger case is completed during the 1991 through 1997 period. We exclude more-recent mergers because the Lehman Brothers Fixed Income Database, the data source for monthly returns, ends in March 1998.
2. Both acquirer and target are commercial banks. To avoid any possible effects that are special to thrift institutions, we exclude those cases that involve the takeover of a savings and loan institution.
3. The target bank's assets are equal to at least 5% of the acquiring bank's assets before the merger. Similar to Houston, James, and Ryngaert (2001), we enforce this threshold so that we pick up those merger cases in which the target is large enough to affect the security prices of the acquirer.
4. The acquirer has not announced the purchase of another commercial bank or savings and loan during the period beginning three months before and ending two months after the merger announcement. We impose this restriction to minimize the possible contamination of the merger announcement by news of other merger announcements by the same bank.

Next, we use the Lehman Brothers Fixed Income Database to check whether nonconvertible bonds are available for both the acquirer and the target banks identified in the first step. We include bonds if they meet the following criteria:

1. The Lehman Brothers Database has consecutive returns for five months around the announcement date either for the acquirer or the target that are based on "live" trader-quoted prices. We exclude matrix prices because these prices can be unreliable (Warga and Welch, 1993).

2. Bonds are not rated BB+ or below. We use this restriction because there is no matching index.
3. Bonds do not have a maturity less than, or equal to, four years. This restriction ensures that the cross-sectional variation in returns is not affected by some banks having only short-maturity bonds, which by definition have low sensitivity to changes in default risk.
4. Return observations are not problematic. The data errors of the Lehman Brothers Database are well known (Elton, Gruber, Agrawal, and Mann, 2001) and require that we examine data for unusually high or low returns. We eliminate six monthly observations, those are lower than -9% (-14.6%, -9.64%, -28.48%, and -10.01%) and those that are higher than 9% (23.29% and 11.23%).

These selection criteria produce a list of 282 bonds corresponding to 66 merger cases. Out of the 66 cases, 48 have bond returns only for the acquirer, three have bond returns only for the target, and 15 have bond returns that meet our selection criteria for both the acquirer and the target banks. Appendix A presents the list of sample merger cases with their corresponding announcement dates.

2.2. Risk- and maturity-adjusted bond returns

We follow Warga and Welch (1993) by using a risk- and maturity-adjusted holding-period return procedure that allows us to measure the abnormal gains realized by the merging-banks' bondholders around the merger announcement. The procedure involves calculating the difference between the monthly raw bond return and the return of an index, with rating and maturity characteristics that are similar to those of the specific bond.

We use the corporate indexes from the Merrill Lynch U.S. domestic bond series. Merrill Lynch has 24 corporate indexes, which are divided into AAA, AA, A, and BBB ratings, and within each rating, into one-to-three years, three-to-five years, five-to-seven years, seven-to-ten years, ten-to-15 years and greater than 15 years. We use weighted averages and treat as a single bond with a single bond return the risk- and maturity-adjusted returns of multiple bonds issued by the same bank. We base the weight of each bond on the amount outstanding on the merger announcement date. We follow this procedure to avoid biases that could be caused by a few firms having many outstanding bonds.

We estimate adjusted returns for each month of a 12-month event period around the announcement month for each case. The event month is numbered zero and the event window period begins in month t = –12 and ends in month t =12. When there are multiple bonds, to have the highest possible number of observations for the 25-month event period, we include those bonds that have the longest series of returns that meet the criteria specified above. Our final sample comprises 192 bonds that correspond to the 66 cases.

Table 1 reports our findings. The adjusted bond returns are positive for most months for both the acquirer and the target banks around the merger month. For target banks, the largest positive adjusted return (1.27%) occurs six months before the merger. The next two-largest significant returns are realized in month -3 (0.67%) and the announcement month (0.7%). The positive returns run consecutively for seven months before the merger for the bondholders of the merging banks. However, the acquiring banks' bondholders realize only 1.24% during this period plus the announcement month, whereas the target bank bondholders realize an impressive 4.33% adjusted return. Furthermore, the announcement-month return for the target banks (0.7%) is significantly higher than the return for the acquiring banks. This finding is consistent with Billett,

King, and Mauer (2003), who for a large sample of nonfinancial mergers during the 1979 through 1997 period, also find average target excess bond returns significantly exceed the average acquirer excess returns.

Figure 1 plots the separate cumulative adjusted bond returns for acquirer and target banks. The plots demonstrate a gradual increase in bond returns for both groups, starting roughly eight months before the announcement month. Although the target banks' bondholders experience the first sharp increase in bond prices approximately six months before the merger, the acquiring banks' bond prices start to rise gradually eight months before the merger. We also observe that the differential gain is sustained following the announcement month.

Figure 1 also shows that the market anticipates mergers. Both Kane (2000) and Houston, James, and Ryngaert (2001) show that acquisitions are largely anticipated, since many banks are known for their growth-through-acquisition strategies. This anticipation is particularly important in the midst of a consolidation wave (Calomiris, 1999). On July 16, 1991, the *Wall Street Journal* reported that the Chemical and Manufacturers Hanover merger news had ignited a powerful rally in bank bonds on July 15, 1991 (Mitchell and Raghavan, 1991). The article also stated that "Prices of bonds issued by several of the big New York money center banks jumped as much as three points, which amounts to about $30 for a bond with a $1,000 face amount. In contrast, prices of most other investment-grade corporate bonds ended little changed or modestly lower yesterday, as did prices of U.S. Treasury bonds, municipal bonds and mortgage-backed securities…The bonds of some large regional banks also rose on speculation that more mergers will occur among those concerns as well." Clearly, one crucial merger event can signal market participants to impound their anticipations in the bond prices of the possible merger partners. In

any case, Figure 1 is consistent with bond markets perceiving bank mergers as a default-risk-reducing transaction.

2.3. Cross-sectional analysis of bond returns

Bank mergers can increase bond value through synergy and diversification gains (see Piloff and Santomero, 1998, and Berger, Demsetz, and Strahan, 1999 for a review of the evidence). However, Akhavein, Berger, and Humphrey (1997) and Demsetz and Strahan (1997) report that high leverage ratios and riskier loan portfolios offset the risk-reducing potential of diversification at large bank holding companies. Thus, diversification and synergy gains should be examined after controlling for asset risk and leverage.

In contrast to nonfinancial mergers, an additional consideration in bank mergers is the TBTF effect. Evaluation of the regulators' TBTF strategy has become more relevant since the passage of the FDIC Improvement Act of 1991 (FDICIA). To mitigate the TBTF policy, FDICIA requires regulators to act promptly and find a low-cost resolution in the handling of insolvent banks. However, Kane (2000) reports that FDICIA left the door open for the TBTF strategy by authorizing "a systemic risk exception for cases where least-cost resolution would have serious adverse effects on economic conditions or financial stability." Therefore, bondholders must also assess whether or not the merged bank will reach a size that will include it in the "systemic risk" class.

To investigate these possible sources of bondholder gains, we estimate the following regression equation, using the bond returns of both acquirer and target banks:

$$AR_i = b_0 + b_1 CVOL_i + b_2 INOUT_i + b_3 CNPL_i + b_4 CLEV_i + b_5 LISIZE_i + b_6 INOUT_i * LISIZE_i + b_7 DBIG_i + b_8 DSML_i + e_i, \quad (1)$$

where AR is the announcement month risk- and maturity-adjusted bond return for acquirer or target bank I, and CVOL controls for the gains due to the diversification effect. Similar to Dennis

and McConnell (1986), we use equity volatility to capture this effect. DeLong (2001) also uses the correlation coefficient between the acquiring bank's and the target bank's historical stock returns to classify bank mergers as synergistic or diversifying. We define CVOL as the percentage change between the portfolio volatility of the merging banks and the own-bank's equity return volatility before the merger**.**

We construct this variable by first calculating the volatility of a portfolio that contains equity of the acquirer and target banks in proportion to their asset size. That is,

$$VOL_P = \sqrt{w_A{}^2 VAR_A + w_T{}^2 VAR_T + 2 w_A w_T COV_{AT}} \quad , \tag{2}$$

where VAR is the variance of weekly equity returns one-year prior to the merger announcement date for the bank, w is the bank's weight, and A, T, and P denote the acquirer, target, and combined bank, respectively; COV is the covariance between the weekly equity returns of the acquirer and the target bank during the 12-month period preceding the merger announcement.

We interpret VOL_p as the expected volatility that incorporates the diversification gains to be attained after the merger. We take the percentage change in the equity return volatility of the combined bank (VOL_P) relative to the merging bank's equity return volatility (VOL_i) and denote this variable as $CVOL_i$. We construct VOL_i as the standard deviation of weekly returns one-year prior to the merger announcement of bank i, whose bondholders' returns are being explained. Therefore, $CVOL_i$ captures the change in equity volatility expected by the bondholders at the time of the merger. A higher CVOL value implies less diversification and we expect the sign of CVOL to be negative.

The binary variable INOUT takes the value of one if the merger is between banks with headquarters in different states, and zero otherwise. This variable allows us to capture geographic diversification gains, and we expect its sign to be positive. However, the INOUT variable can also

show a negative sign if an out-of-state merger creates fewer opportunities for increased market power (Prager and Hannan, 1998) or less cost savings. The latter assumption draws on Houston and Ryngaert (1994), and Houston, James, and Ryngaert (2001), who find, by means of a geographic overlap index, that stock price reaction is greater for mergers with greater overlap. The opportunity to realize cost savings is significant for this type of merger because there is a greater potential to close redundant local branches.

We introduce CNPL to control for any merger-related changes in asset portfolio quality that might change the bond's default-risk. The variable CNPL is the percentage change in the ratio of nonperforming loans (nonaccrual loans and loans 90 days or more past-due) to total assets of the combined bank relative to the merging bank's nonperforming loans ratio. The ratio for the combined bank is calculated by consolidating the two banks' balance sheets for the year ending before the merger announcement. A higher CNPL implies that the nonperforming loans should rise after the merger. Therefore, CNPL should be negatively related to adjusted bond returns (AR).

We let CLEV control for merger-related changes in leverage ratios. This variable measures the percentage change in the leverage ratio (book value of liabilities over the sum of book value of liabilities, preferred stock, and market value of common stock) of the combined bank relative to the merging bank's leverage ratio. We calculate the leverage ratio for the combined bank by consolidating the two banks' balance sheets for the year ending before the merger announcement. Like CNPL, a higher CLEV value implies higher expected default risk and this should be negatively related to AR.

Choosing a proxy to capture the TBTF effect is not straightforward. The incremental size attained by the merger seems to be a natural proxy. Therefore, we use as an explanatory variable

LISIZE, the logarithm of the incremental size attained by the bank in the merger. However, this variable can measure the impact of other factors. For example, Demsetz and Strahan (1997) show that large bank holding companies (BHCs) are better diversified than small BHCs. Furthermore, the benefits of the creation of internal markets could increase with the size of the bank (see Stein, 1997; Houston, James, and Marcus, 1997). Thus, asset size can capture gains unrelated to TBTF.

One way to tighten the TBTF test is to allow for the existence of banks that already have TBTF status before the merger. These banks should not gain any benefits by merely increasing their size. The tests should also allow for smaller institutions that are far enough away from the TBTF threshold, and therefore should not realize size-related gains. In contrast, the medium-size banks, which rapidly approach or pass the TBTF threshold as a result of a merger, should be the true beneficiaries of this policy.

In Eq. (1), the construction of variables DBIG and DSML reflect these concerns. DBIG is a binary variable that takes the value of one when the acquiring bank's asset size is more than 2% of assets of all depository institutions at the end of the year prior to the announcement, and zero otherwise. Eight banks (listed in Appendix C) fall into this category. The second variable, DSML, is also a binary variable that takes the value of one when the bank's asset size is less than 0.35% of industry assets. Eighteen banks fall into this latter category. The coefficients of these two variables test differences between the corresponding group's and the medium-size banks' ARs. Thus, DBIG represents those banks that are already TBTF before merging, and DSML represents those that are sufficiently distant from being TBTF. The TBTF hypothesis predicts that the coefficients of these two variables will be negative.

We also include an interaction term of LISIZE with INOUT. If the effect of the incremental size on bond returns depends on synergies that are stronger for in-state mergers, then we expect this variable to have a negative sign.

2.4. Results

We obtain our data on balance-sheet variables from the quarterly Consolidated Financial Statements (FR-Y9 reports) that each U.S. bank holding company files with the Federal Reserve Board. Our data on equity returns and capitalization come from the Center for Research in Securities Prices (CRSP) files.

Our sample consists of 72 observations, comprising 54 acquirers and 18 targets, and resulting in 57 merger cases. From the 63 acquiring banks included in the estimation of bond returns, we exclude nine cases from the cross-sectional analysis because of missing equity returns in the CRSP equity returns file for the target.

Table 2 reports the descriptive statistics. In Table 2, columns (1), (2), and (3) divide the sample into three groups, representing the mega-size (BIG), medium-size (MID), and small-size (SML) institutions. We express asset size values in constant (December 2000) dollars. We observe that on average, medium- and small-size banks merge with banks that have asset sizes roughly equal to their own. Although in medium-size mergers the combined bank's asset size reaches $100 billion on average, the combined size in mergers between the small-size institutions reaches only $27 billion. On the other hand, the mega-size institutions, which have an average pre-merger asset size of $178.5 billion, are likely to merge with medium-size institutions.

In Table 2, we are also interested in the comparison between the small- and medium-size groups. As a result of the merger, small-size banks reduce nonperforming loans and leverage and attain the highest reduction in equity volatility (diversification). In contrast, the medium-size

banks increase their nonperforming loans and leverage and do not diversify as much as does the small-size group. Nevertheless, medium-size banks realize a significantly higher return than do the smaller banks.

Table 3 reports the estimates of Eq. (1). In almost all specifications we observe that the degree of diversification attained in the merger is a significant determinant of the bondholder returns. The proxy variable CVOL shows that the higher the reduction in the expected volatility of equity, the better-off the bondholders. This result is stronger than the findings reported by Asquith and Kim (1982) and Dennis and McConnell (1986) for nonfinancial mergers and shows that bondholders in bank mergers benefit from diversification.

In most specifications, INOUT is positive and significant, capturing the positive effect that geographic diversification has on bond returns. The control for portfolio quality, CNPL, is negative as we expected, though either marginally significant or not significant at all. The change in the leverage ratio, CLEV, is not significant.

The remaining variables show that bondholders favor increases in bank size. Column (1) reports that the incremental size attained in the merger (LISIZE) is positive and significant. We also see that DSML is negative and significant, which implies that the small-size banks' adjusted bond returns are significantly lower than the medium-size banks' adjusted bond returns. On the other hand, DBIG has a negative but insignificant sign. The interaction term of LISIZE with INOUT turns out to be negative and significant. Together with the positive sign of LISIZE, this finding implies that for an identical increase in size, gains to bondholders are higher if the merger is in-state. This result provides some support for the synergy hypothesis, given the potential for increase in market power and cost reductions is stronger for in-state mergers. Column (2) replaces

LISIZE with the logarithm of the ratio of the incremental size attained in the merger to the pre-merger size (LSRAT). This variable has a positive and significant sign.

Other papers have found that similar size-variables are significant to explain abnormal equity returns. For example, Kane (2000) reports that abnormal equity returns are positively related to target size. James and Weir (1987) and DeLong (2001) report that abnormal equity returns are positively related to the relative size of target to bidder. Therefore, asset size seems to have a positive effect on both bond and equity returns.

In sum, the results in columns (1) and (2) show that the medium-size banks' bondholders benefit the most from bank mergers, and that the relation between size and adjusted bond returns is not monotonic.

To further validate this result, column (3) examines how increases in size relate to the initial size of the merging bank. We construct two new variables, DBIG*LISIZE and DSML*LISIZE. For the banks that are already TBTF before merging, the increase in size should not be significant. For the small-size banks, as long as they merge with small-size banks, the incremental size should also not affect adjusted bond returns either, since these banks are too far away from the TBTF threshold. Therefore, we expect the sign of the interaction terms to be negative, which would show that it is the medium-size banks that benefit when merging, and that this benefit increases with the size of the partner. Consistent with this expectation, we observe that the coefficient on the incremental size (LISIZE) is positive and the coefficients on the interaction terms are negative. This finding provides additional support for the argument that medium-size banks benefit the most from increases in size.

In column (4) we try another specification**.** We replace the size variables with the binary variable DTBTF that equals one if the bank jumps into the TBTF category after the merger but

was not TBTF pre-merger (it was smaller than 2% of industry assets before the merger and becomes larger than 2% after) and equals zero otherwise. The advantage of this variable over the other size variables is that it also takes into account the possibility of a small bank merging with a very large one and therefore getting nearer the TBTF threshold. The new binary variable is positive and significant and indicates that the banks that become TBTF after the merger gain, on average, more than either the banks that did not jump into the TBTF category after the merger or the banks that were already TBTF before the merger.

2.5. Robustness checks

2.5.1. Changing the size cutoff levels

The size cutoff levels, which we set at greater than 2% of banking industry assets and smaller than 0.35% of industry assets, are ad hoc choices. To conduct robustness checks on different cutoff levels for these binary variables, we first replace the small-size bank threshold, 0.35%, with 0.45%. For the TBTF threshold, we use two additional cutoff levels--greater than 2.5% and 1.5% of industry assets, respectively. In column (5) of Table 3, we report the results only for the 2.5% and 0.45% thresholds. The findings of Section 2.4 are robust to the choice of all cutoff levels. Small-size banks' adjusted bond returns are significantly lower than the medium-size banks' bond returns, even if we change the threshold from 0.35% to 0.45%.

We find similar results when we try the new thresholds for the specification that uses the DTBTF variable. The dummy variable is always positive and significant. In Table 3, column (6), we report the regression for the 2.5% threshold. We note that the explanatory power of the specification increases as we narrow the TBTF group (adjusted R^2 is 0.05 for the 1.5% threshold, 0.24 for the 2%, and 0.28 for the 2.5%). Thus, the positive and significant coefficients for the

DTBTF variables in specifications (4) and (6) provide strong evidence that those banks which jump into the TBTF category realize higher adjusted returns compared to those that do not.

2.5.2. Adjustment for the clustering problem

The reported standard errors in Table 1 and the cross-sectional regressions might suffer from a clustering problem (overlapping in calendar time of some merger announcements). As Appendix A shows, among the bidders in Table 1 are nine cases with two mergers announced in the same month, two cases with three mergers announced in the same month, and one case with four mergers announced in the same month. For targets, there are three cases with two mergers announced in the same month. In the cross-sectional regressions there are eleven cases with two mergers announced in the same month, two cases with three mergers announced in the same month, two cases with four overlaps, one case with five overlaps, and one case with six overlaps. Such clustering of announcement dates requires adjustments both in Table 1 standard errors and in the cross-sectional regressions.

To correct the standard errors reported in Table 1, we follow the technique summarized in Collins and Dent (1984) and Campbell, Lo, and MacKinlay (1997). Jaffe (1974) introduced this technique, which eliminates the clustering problem by building portfolios of the securities that experience the same critical event at the same point in calendar time. Mean and standard deviation of returns are then calculated across portfolio and security returns, which do not face a clustering problem. The new significance levels obtained using this approach yield qualitatively similar results as those reported in Table 1.

To handle the clustering problem in cross-sectional regressions, we follow White (1980) to obtain a heteroscedasticity- and cross-correlation-consistent covariance matrix. This approach

corrects the covariance matrix of the least-square estimators similar to White's derivation of the heteroscedastic consistent estimator. Following White's technique we, estimate the matrix

$$S_0 = \frac{1}{n}\sum_{i=1}^{n} e_i^2 x_i x_i' + \frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n} e_i e_j x_i x_j', \quad (3)$$

where $e_i e_j = 0$ if i, j occur in different calendar months. We then estimate

$$Var_{OLS} = n(X'X)^{-1} S_0 (X'X)^{-1}, \quad (4)$$

and check that the matrix is nonnegative definite. Finally, we use the matrix elements to determine the significance of the least-squares estimators. We observe that our results remain unchanged as a result of this correction, with the two exceptions that the ratio of nonperforming loans becomes more significant and CVOL becomes marginally significant.

2.6. Results on equity returns

As noted above, regulatory constraints on banks' leverage ratios can account for the positive adjusted bondholder returns. To examine the change in the leverage ratio for our sample of banks, we follow Kim and McConnell (1977). We compare the leverage ratio (book value of liabilities over book value of assets) of the consolidated balance sheet of bidder and target the year before the merger with the same ratio for the acquirer after two years. We find that the merging banks are highly leveraged pre-merger and that they do not increase the leverage ratios in any significant manner following the merger. We find that in 58% of the cases there is a decrease in leverage at the end of the year in which the merger becomes effective. The average decrease in the leverage ratio is 0.31%, which is statistically significant. When we compare the first year after the merger (instead of the year of the merger) with the pre-merger situation, we find a decrease in 54% of cases, but the change in the pre-merger leverage ratio is -0.34%, which is not statistically significant.

Overall, our results support the hypothesis that merging banks do not increase leverage in a significant way following the merger. However, if only the coinsurance effect was at work, this hypothesis would predict that bondholders would gain and equity holders would suffer as a result of the acquisition. A number of studies report increases in combined equity value around the merger announcements (see, e.g., Cornett and Tehranian, 1992; Kane 2000; Houston, James, and Ryngaert, 2001). Houston, James, and Ryngaert show further that the combined returns increase significantly over time, with the 1991 through 1996 deals showing superior performance relative to the 1985 through 1990 deals. In contrast, Hannan and Wolken (1989), Houston and Ryngaert (1994), Pilloff (1996), and DeLong (2001) do not report significant combined returns. However, their findings may be due to choosing mergers completed before 1991 (Hannan and Wolken, Houston and Ryngaert, and Pilloff) or for not allowing separately for the post-1991 period (DeLong).

To analyze equity return behavior for our sample banks and compare equity returns with the monthly bond returns, we obtain monthly equity returns from CRSP. Following Houston, James, and Ryngaert (2001), we calculate abnormal returns as the difference between monthly bank equity returns and the CRSP value-weighted market index return. Figure 2 plots the cumulative abnormal equity returns for acquirer and target banks separately. As with the adjusted bond returns shown in Figure 1, we observe a gradual increase in equity returns for both groups, starting eight months before the announcement month. The abnormal returns are positive in most months for both groups, with the largest positive abnormal return for the target banks occurring on the announcement month. We note that these results support the earlier studies that examine equity return behavior around bank merger announcements.

The observation that both equity holders and bondholders realize positive returns around the merger indicates that bank mergers do not shift wealth between these two claimholders. On the contrary, it appears that both types of claimholders gain from bank mergers. To formally test the relation between bondholder and equity holder gains, we estimate the following regression equation for the same sample of acquirers and targets as described in Section 2.3:

$$AR_i^B = \underset{(0.09)}{0.136} + \underset{(0.01)}{0.03^{**}} AR^E \qquad Adj R^2 = 0.12 \qquad N = 72 \quad . \tag{5}$$

AR^B and AR^E denote the adjusted bond returns and abnormal equity returns, respectively, for each acquirer or target. The heteroskedasticity-consistent standard errors appear in parentheses. The adjusted R^2 is 12% for the 72 observations included in the sample. We observe that the relation between bond and equity returns is positive and significant at the 5% level. This finding validates our expectation that bondholder gains are not realized at the expense of shareholders. Moreover, this result is evidence that bank mergers create value, and is consistent with both the synergy and TBTF hypotheses.

3. Analysis of changes in credit spreads of the acquiring banks

In this section we examine the credit spreads of new debt issues of the acquiring bank before and after the merger. The main question is whether or not the cost of funding changes for the acquiring bank after the merger.

3.1. Sample and data

From the merger cases analyzed in the previous section, we select those in which 1) the acquirer issues fixed-rate nonconvertible debt not more than two years before the announcement date, and 2) the combined bank issues debt within two years after the merger becomes effective. These restrictions yield 25 cases. To this sample we add four mergers that were announced in

1998. We also add nine cases that we exclude from the bond return analysis for not having complete price data in the Lehman Brothers Database. This brings our sample size to 38 cases.

We obtain bond data from the SDC's New Issues database. The number of bonds issued during this four-year period varies across cases. As a rule, we take the five bonds issued nearest the respective dates. However, we find that in most cases, there are fewer than five issues that have our required characteristics within two years before or after a merger. Our sample results in 176 fixed-rate nonconvertible debt issues for 38 different merger cases. In six of these 38 cases, the acquirer buys more than one bank in a short period of time. For these cases we include all bonds issued both before the first announcement and after the last merger effective date. Appendix B reports the details for each case.

In addition to yield-to-maturity, we obtain from the SDC database data that include the issue date, credit rating, seniority, issue size, maturity, and years of call protection. Appendix B reports the average rating of the acquiring bank before the merger and the acquirer's average rating post-merger for each case.

We assign a numerical value to individual bond ratings, using the following scale: AAA+ = 1, AAA = 2, AAA- = 3, AA+ = 4, AA = 5, AA- = 6, A+ = 7, A = 8, A- = 9, BBB+ = 10, BBB = 11, BBB- = 12, and BB+ = 13. Thus, the larger the value, the worse the rating. We observe that in only eight out of 38 cases, the acquirer's average rating post-merger is worse than its pre-merger rating.

Appendix B also reports the average credit spreads of the acquiring banks both before and after the merger. We calculate credit spread as the difference between the yield at issue and the yield of a U.S. Treasury security of comparable maturity. Consistent with the ratings behavior, the average credit spreads also decline during the post-merger period. We note that in 27 out of 38

cases the average credit spread after the merger is lower than it is before the merger announcement.

3.2. Credit spreads

To investigate the determinants of the credit spreads (SPREAD) we use the following ex ante credit spread model:

$$\begin{aligned} SPREAD_{it} = {} & c_0 + c_1 MAT_{it} + c_2 CP_{it} + c_3 JN_{it} + c_4 IS_{it} + c_5 TR_{it} + c_6 FI_{it} + \\ & + c_7 VOL_{it} + c_8 NPL_{it} + c_9 LEV_{it} + c_{10} ACSZ_i + + c_{11} M * DBIG_{it} \\ & + c_{12} M * DSML_{it} + c_{13} M * DMID_{it} + e_{it} \end{aligned} \quad . \qquad (6)$$

The intuition underlying the above model is that after controlling for the market conditions, a bond's credit spread is determined by bond- and bank-specific characteristics. This structure follows the models used by Flannery and Sorescu (1996), Gande, Puri, and Saunders (1999), and Morgan and Stiroh (2001). Eq. (6) augments the standard variables with those that capture possible merger-related gains. It also tests for the existence of size-related credit spread changes.

In our model, we first control for differences in credit spreads that can be caused by differences in maturity, callability, and seniority of the issues made by the acquiring bank *i* at time *t*. Variables MAT and CP are the log of the number of years to maturity and the log of the number of years with call protection, respectively, and JN is a binary variable that takes the value of one if the issue has a junior standing, and zero if it is a senior debt issue. We expect MAT and JN to be positively related with SPREAD, because credit spreads rise with maturity and the junior status of the bond. However, we expect CP to be negatively related to SPREAD, because a longer call protection period implies less chance of callability and hence less value of the call option.

We next control for differences in spread caused by differences in the liquidity of the bonds of a particular name. We follow Hancock and Kwast (2001) and use the logarithm of the

issue size, IS, as a proxy for liquidity, assuming that higher liquidity is achieved by a higher issue size. If there are liquidity differences in our sample bond issues and if IS captures the liquidity effect, then we expect SPREAD will be negatively related with IS.

To control for aggregate variations of the credit spreads, we include CS, the difference between the yield on bonds of firms that provide financial services and the ten-year Treasury rate. We obtain the yield index from Merrill Lynch. It excludes bonds from banks and thus avoids a possible endogeneity problem. We expect CS to have a positive sign.

The next set of variables in Eq. (6) measures the impact of the merger on bond spreads. The variable VOL captures the diversification effect, and is calculated as follows. For all the bonds issued by the acquiring bank before the merger, VOL is the standard deviation of weekly equity returns one year prior to the issue date. For the bonds issued immediately after the merger becomes effective, VOL is the standard deviation of a portfolio that contains the equity of both the acquirer and the target banks in proportion to their asset size, as described in Eq. (2). Therefore, a higher value of VOL for the post-merger period implies that a bank attains less diversification after the merger. Thus, we expect credit spreads and VOL to be positively related.

The variable NPL denotes the percentage of nonperforming loans to total assets of the quarter previous to the bond issue date, and includes the nonaccrual loans and loans 90 days or more past-due. We calculate LEV, our leverage measure, as the ratio of the book value of debt to the market value of assets. We define the market value of assets as the sum of the book value of liabilities and preferred stock the quarter prior to the issue date and the market value of common stock the day before the bond issue date. Both NPL and LEV control for asset quality and capital structure changes that occur with the acquisition of another bank. We expect NPL and LEV to be positively related to credit spreads.

The last control variable is the acquirer's pre-merger log asset size, ACSZ. This variable is constant for all observations that correspond to the same case, and assesses whether or not the bond markets treat large-size banks favorably. Because previous studies show that size and credit spreads are negatively related (see Flannery and Sorescu, 1996; Morgan and Stiroh (2001), we expect that ACSZ will have a negative sign.

We set the binary variable M equal to one for bonds issued after the merger, and zero for bonds issued before the announcement. This variable captures changes in an acquirer's credit spread that are due to merger-related changes in the acquirer's size. We note that the model controls for other merger-related changes such as asset quality, diversification, and leverage. In addition, as a robustness check, we also include the bond's rating in Eq. (6). Thus, the binary-variable M captures the remaining significant factor in the merger event, which is the change in the asset size of the acquirer. According to the TBTF hypothesis, this variable should be negatively related to the credit spreads. However, as long as ratings do not adjust immediately to the new information, a negative sign could also be due to the bank being more profitable and less likely to default after the merger. It could also be the case that this dummy variable is capturing reductions in volatility that are not captured by our noisy volatility estimates (equity volatility measures are very noisy and are measured with considerable error). Therefore, we devise a tighter test of the TBTF hypothesis. As we did in Section 2, we examine the significance in the reduction in credit spreads for banks that belong to different size groups. Thus, we introduce the interaction terms of M with the indicator variables DBIG, DMID, and DSML, where DBIG and DSML have the same definitions as in Eq. (1). Appendix C provides a list of the banks that fall into the DBIG category. DMID is a binary variable that takes the value of one if the bond belongs to a bank whose assets represent less than 2% but more than 0.35% of industry assets before the merger,

and zero otherwise. When DBIG and DMID are interacted with the merge binary variable, M, the coefficients of these binary variables indicate the average decrease in spreads for each of the size groups. Since the TBTF hypothesis predicts that small banks and mega-banks should not benefit from increasing their size, but that medium-size banks will benefit, we should observe that only the coefficient of M*DMID is significant and negative.

3.3. Results

Table 4 shows the descriptive statistics of the pre- and post-merger bond and firm characteristics. We find that for our sample of acquiring banks before the merger, the number of bond issues (82) is slightly lower than the issues of the combined banks (94). The average size of the issue is also smaller during the pre-merger period.

In Table 5 we report the regression results when we use the White (1980) estimator for the covariance matrix. The specification in column (1) corresponds to Eq. (6). As expected, we find that the credit spreads vary positively and significantly with maturity and seniority, and negatively with the number of years of call protection. The issue size variable, IS, is not significant. The control for aggregate variations in the credit spreads, CS, has the expected positive sign and is highly significant. The variables that control for firm characteristics are significant and have the expected signs. We see that spreads increase with leverage and the percentage of nonperforming loans.

The coefficient of VOL is significant and positive, indicating that credit spreads are higher for those banks that attain less diversification (as measured by a higher value of VOL). This finding is consistent with diversification being one of the reasons for the decrease in spreads after a merger, and corroborates the findings for adjusted bond returns in Section 2.

The coefficient of ACSZ is negative and significant in all specifications, which implies that on average, the larger banks pay a lower credit spread in their bond issues. This result supports the findings of Flannery and Sorescu (1996) and Morgan and Stiroh (2001). We also observe that the coefficient of M is negative and significant, which indicates that an acquiring bank significantly reduces its cost of debt in the postmerger period after controlling for several significant factors. The specification in column (2) adds the bond's rating, RTG, to Eq. (6). With this addition, the seniority variable loses significance but the merger variable keeps its significance.

The coefficients of M*DBIG and M*DSML in columns (3) and (4) are not significant, indicating that the changes in credit spreads of mega-banks and small banks are not material. In contrast, the coefficient of M*DMID shows that when banks in the medium-size group acquire another bank, they experience an average decrease of 15.5 basis points (or 14.8 basis points when RTG is included in specification (4)). We attribute this decrease to the increase in size attained in the merger.

Columns (5) and (6) in Table 5 investigate the impact of mergers on the rating sensitivity of credit spreads. We construct a new variable, M*RTG. When we include this variable in the regression with the RTG variable, M*RTG measures the merger-related change in the sensitivity of credit spreads to changes in ratings. We expect the sign of M*RTG to be negative as our sample banks approach the TBTF threshold after the merger. Column (5) shows that this result obtains.

Furthermore, we construct the variables M*RTG*DBIG, M*RTG*DMID, and M*RTG*DSML to examine which specific size group experiences the larger reduction in the rating-sensitivity of credit spreads. Consistent with the TBTF, the results in column (6) show that

it is the medium-size banks that experience a significant decline. The other two groups do not show any significant decline.

As a robustness check we re-estimate the specification in column (4) given in Table 5 by using different thresholds. We use the same cutoff points explained in Section 2.5.1 and our results remain qualitatively the same. In column (7) we report the specification with the 2.5% and 0.45% thresholds. For all thresholds, the coefficients of M*DBIG and M*DSML are not significant, indicating that the changes in credit spreads of mega-banks and small banks are not material. In contrast, the coefficient of M*DMID (for the new thresholds) shows that when banks in the medium-size group acquire another bank, they experience a significant decrease in their cost of funds.

These findings support the results of our bond return analysis in Section 2 and provide additional evidence indicating that a potential benefit of bank mergers to acquirers is lower cost of new debt issues. However, this benefit is not uniform across size groups. The findings show that medium-size banks that can push the combined bank-asset size beyond the TBTF threshold after the merger reduce their cost of funds more than mega-banks and small banks.

4. Conclusion

This paper examines bond returns and bond credit spreads around the announcement of bank mergers during the 1991 through 1998 period. We show that bondholders of bidder and target banks gain significant positive bond returns in the months leading to the merger announcement. We also provide evidence that the relation between announcement-month bond and equity returns is positive and significant. This finding supports the argument that bank

mergers are not shifting wealth from shareholders to bondholders. Our cross-sectional regressions identify diversification, TBTF, and, to a lesser degree, synergy as possible sources of these gains.

We support these observations by showing that on average, the credit spreads in the acquiring bank's new bond issues decline significantly following the merger. After we control for bond and bank characteristics, the decline is significantly explained by the degree of diversification attained and whether or not the banks attain TBTF status as a result of the merger. Thus, this paper shows, for the first time, that one significant benefit to the acquirer is lower cost of funds on debt issues post-merger.

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Table 1: Risk- and maturity-adjusted bond returns for acquirer and target banks

We calculate risk- and maturity-adjusted returns as the difference between monthly bond returns and the return of a Merrill Lynch bond index with similar rating and maturity characteristics as for the specific bond. We obtain bond returns from Lehman Brothers Database. Our index data is the corporate indexes from Merrill Lynch U.S. domestic bond series. We calculate cumulative bond adjusted returns (CAR) as the sum of the bond adjusted returns.

	Acquirer						**Target**					
Event month	Mean	Std.Dev.	*t*-statistics for mean	% pos.	CAR	Obs (N)	Mean	Std.Dev.	*t*-statistics for mean	% pos.	CAR	Obs. (N)
-12	0.178	0.764	1.725 *	51.79	0.178	56	-0.339	0.833	-1.523	40.00	-0.339	15
-11	-0.030	1.143	-0.193	62.50	0.148	56	-0.493	1.739	-1.134	35.29	-0.832	17
-10	-0.023	1.156	-0.147	49.09	0.125	55	-0.375	1.493	-1.035	27.78	-1.207	18
-9	0.019	0.707	0.204	48.21	0.144	56	-0.003	1.330	-0.008	50.00	-1.210	16
-8	0.173	0.935	1.375	58.93	0.318	56	-0.039	2.068	-0.076	52.94	-1.249	17
-7	0.127	0.707	1.342	56.14	0.445	57	0.123	1.998	0.253	50.00	-1.126	18
-6	0.029	0.505	0.424	57.89	0.473	57	1.272	2.316	2.265 **	83.33	0.146	18
-5	0.121	0.784	1.167	51.72	0.595	58	0.641	1.852	1.428	38.89	0.788	18
-4	0.234	0.793	2.306 **	56.45	0.829	62	0.381	0.809	1.943 *	55.56	1.169	18
-3	0.360	1.233	2.296 **	60.32	1.188	63	0.666	1.196	2.296 **	66.67	1.835	18
-2	0.149	0.624	1.880 *	65.08	1.337	63	0.382	1.488	1.059	44.44	2.217	18
-1	0.149	0.634	1.849 *	68.25	1.486	63	0.159	0.633	1.038	66.67	2.376	18
0	0.074	0.868	0.671	52.38	1.560	63	0.704	1.045	2.777 **	72.22	3.080	18
1	0.057	0.525	0.858	58.73	1.617	63	0.232	0.586	1.636	72.22	3.313	18
2	0.288	0.703	3.203 ***	69.35	1.906	62	0.221	1.161	0.786	61.11	3.534	18
3	0.040	0.618	0.508	53.23	1.946	62	0.230	0.642	1.474	55.56	3.764	18
4	-0.012	0.528	-0.171	45.16	1.934	62	0.177	0.536	1.324	64.71	3.941	17
5	0.146	0.537	2.089 **	53.33	2.080	60	0.048	0.512	0.360	43.75	3.988	16
6	0.201	0.665	2.279 **	65.52	2.281	58	0.418	0.948	1.709	68.75	4.407	16
7	0.041	0.462	0.667	55.17	2.322	58	-0.333	0.965	-1.336	31.25	4.074	16
8	0.023	0.596	0.285	61.11	2.345	54	-0.087	0.379	-0.859	33.33	3.987	15
9	0.074	0.486	1.092	53.85	2.419	52	-0.041	0.231	-0.639	35.71	3.946	14
10	-0.011	0.620	-0.130	47.06	2.408	51	-0.051	0.216	-0.810	30.77	3.896	13
11	0.050	0.510	0.681	56.00	2.458	50	0.271	0.945	0.994	69.23	4.167	13
12	-0.012	0.345	-0.253	42.00	2.445	50	0.440	1.141	1.337	61.54	4.607	13

*, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively. The significance levels are based on a two-tailed test.

Table 2: Descriptive statistics for the returns sample

BIG represents those banks with a pre-merger size greater than 2% of banking industry assets. SML represents the banks with a pre-merger size less than 0.35% of banking industry assets. MID are those banks with a pre-merger size less than 2% but more than 0.35% of industry assets at the beginning of the merger year. ACQ denotes the acquirer bank. TAR represents the target bank. AR is the risk- and maturity- adjusted return for the event month. We calculate this return as the difference between monthly bond returns and the return of a Merrill Lynch bond index with similar rating and maturity characteristics as for the specific bond. Bond returns are obtained from Lehman Brothers Database. ISIZE is the incremental size attained in the merger expressed in billions of December 2000 dollars. LISIZE is the natural log of ISIZE. SRAT is the ratio of the incremental post-merger size over the pre-merger size. LSRAT is the natural log of SRAT. INOUT is a binary variable that takes the value of one if the merger is out of state and zero otherwise. CVOL measures the percentage change between the portfolio volatility of the merging banks and the own-bank's equity return volatility before the merger. CNPL measures the percentage change between the consolidated ratio of nonperforming loans to total assets of the merging banks and the own-bank's ratio before the merger. CLEV measures the percentage change between the consolidated leverage ratio (book value of liabilities over the sum of book value of liabilities and market value of equity) of the merging banks and the own-bank's leverage ratio before the merger.

	BIG	MID	SML	ACQ	TAR	TOTAL
	Mean (Std.)	Mean (Std.)	Mean (Std.)	Mean (Std.)	Mean (Std.)	Mean (Std.)
AR(%)	0.20	0.36	-0.11**	0.07††	0.70	0.23
	(0.27)	(1.16)	(0.64)	(0.94)	(1.04)	(1.00)
OSIZE (Bill $)	178.35***	49.63	14.32***	57.90	46.71	55.10
	(58.33)	(24.02)	(4.51)	(58.25)	(35.49)	(53.46)
ISIZE (Bill $)	63.10	41.97	13.09***	16.53†††	98.80	37.10
	(66.33)	(64.58)	(15.30)	(21.92)	(84.89)	(58.06)
SRAT	0.42	0.88	1.06	0.29†††	2.63	0.88
	(0.52)	(1.64)	(1.38)	(0.29)	(2.16)	(1.49)
LISIZE	10.62**	9.63	8.68**	8.96†††	11.12	9.50
	(1.01)	(1.46)	(1.40)	(1.24)	(0.93)	(1.50)
LSRAT	-1.43	-1.07	-0.83	-1.63†††	0.69	-1.05
	(1.07)	(1.32)	(1.43)	(0.88)	(0.74)	(1.32)
INOUT	0.75	0.74	0.50*	0.69	0.67	0.68
	(0.46)	(0.44)	(0.51)	(0.47)	(0.49)	(0.47)
CVOL(%)	-5.91	-9.01	-12.14	-7.67†	-14.78	-9.45
	(10.41)	(7.23)	(18.17)	(7.97)	(17.00)	(11.24)
CNPL(%)	1.60	4.26	-6.94	2.34	-2.37	1.16
	(6.17)	(21.91)	(28.61)	(17.52)	(35.01)	(22.96)
CLEV(%)	-0.29	0.38	-0.34*	0.21	-0.12	0.13
	(1.01)	(1.65)	(1.26)	(0.78)	(2.78)	(1.52)
N	8	46	18	54	18	72

*, **, *** test the differences in means between the MID and BIG and the MID and SML groups at the 10%, 5%, and 1% significance levels, respectively. †, ††, ††† test the differences in means between the ACQ and TAR groups at the 10%, 5%, and 1% significance levels, respectively.

Table 3: Determinants of risk- and maturity-adjusted bond returns in bank mergers

The observations correspond to 54 acquirers and 18 targets. AR is the risk- and maturity-adjusted return of the event month. We calculate this return as the difference between monthly bond returns and the return of an index with similar rating and maturity characteristics to the specific bond. We obtain bond returns from Lehman Brothers database. Our index data is the corporate indexes from the Merrill Lynch U.S. domestic bond series. CVOL measures the percentage change between the portfolio volatility of the merging banks and the own-bank's pre-merger equity return volatility. INOUT is a binary variable that takes the value of one if the merger is out-of-state and zero otherwise. CNPL measures the percentage change between the consolidated ratio of nonperforming loans to total assets of the merging banks and the own-bank's pre-merger ratio. CLEV measures the percentage change between the consolidated leverage ratio (book value of liabilities over the sum of book value of liabilities and market value of equity) of the merging banks and the own-bank's pre-merger leverage ratio. LISIZE is the logarithm of the incremental size attained by the own-bank in the merger expressed in constant (December 2000) million dollars. LSRAT is the logarithm of the ratio of incremental size over pre-merger size. DBIG_x is a binary variable that takes the value of one when the bank's pre-merger size is greater than x% of banking industry assets. DSML_y is a binary variable that takes the value of unity when the bank's pre-merger size is less than y% of banking industry assets. DTBTF_z is a binary variable that takes the value of unity when the bank's pre-merger size is less than z% of banking industry assets, and its postmerger size is more than z%, zero otherwise. Coefficient estimates have heteroskedasticity-consistent standard errors. *t-statistics* appear in parentheses below each coefficient estimate.

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-3.877***	0.985**	-4.057***	0.1246	-3.608***	0.0509
	(-2.846)	(2.054)	(-3.012)	(0.5697)	(-2.606)	(0.250)
CVOL	-0.013*	-0.014**	-0.013*	-0.0124*	-0.015**	-0.016**
	(-1.849)	(-2.082)	(-1.715)	(-1.7174)	(-2.208)	(-2.232)
INOUT	3.138**	1.627	3.236**	-0.3233	3.163**	-0.2815
	(2.159)	(1.417)	(2.249)	(-1.270)	(2.058)	(-1.186)
CNPL	-0.008*	-0.006*	-0.008**	-0.0065	-0.007*	-0.004
	(-1.946)	(-1.763)	(-2.016)	(-1.5310)	(-1.953)	(-1.470)
CLEV	-0.030	-0.034	-0.040	-0.0724	-0.014	-0.080
	(-0.518)	(-0.5703)	(-0.653)	(-1.160)	(-0.273)	(-1.267)
LISIZE	0.465***	-	0.487***	-	0.431***	-
	(2.787)		(2.913)		(2.591)	
INOUT*LISIZE	-0.376**	-0.222	-0.387**	-	-0.3754**	-
	(-2.178)	(-1.608)	(-2.262)		(-2.053)	
LSRAT	-	0.326**	-	-	-	-
		(2.491)				
DBIG_2	-0.422	0.077	-	-	-	-
	(-1.359)	(0.298)				
DSML_0.35	-0.394**	-0.873***	-	-	-	-
	(-2.251)	(-2.867)				
LISIZE*DBIG_2	-	-	-0.047	-	-	-
			(-1.470)			
LISIZE*DSML_0.35	-	-	-0.049**	-	-	-
			(-2.218)			
DTBTF_2	-	-	-	1.2252**	-	-
				(2.444)		
DBIG_2.5	-	-	-	-	-0.166	-
					(-0.827)	
DSML_0.45	-	-	-	-	-0.361**	-
					(-2.179)	
DTBTF_2.5	-	-	-	-	-	1.380**
						(2.565)
Adjusted R^2	0.257	0.158	0.267	0.244	0.244	0.285
F-stat	4.077***	2.666**	4.231***	5.572***	3.862***	6.655***
Number of obs.	72	72	72	72	72	72

*, **, and *** indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

Table 4. Descriptive statistics for the yield sample

This table presents summary statistics of the bond characteristics for 82 pre-merger and 94 postmerger bond issues of the acquiring banks. SPREAD is credit spread, which we define as the yield of the bond minus the yield of a Treasury bond with similar maturity. We construct RATING according to the following scale: AAA+ = 1, AAA = 2, AAA- = 3, AA+ = 4, AA = 5, AA- = 6, A+ = 7, A = 8, A- = 9, BBB+ = 10, BBB = 11, BBB- = 12, and BB+ = 13. JUNIOR is one if the bond is subordinated and zero otherwise. Pre-merger volatility is measured as the standard deviation of the acquiring bank's weekly equity return one year before the issue date for bonds issued pre-merger. We measure the post-merger volatility of the combined bank as the standard deviation of the portfolio of the merging banks' equity returns during the year preceding the merger announcement. NPL is the percentage of nonperforming loans over total assets. LEVERAGE is percentage of book value of liabilities to market value of assets, which we define as book value of liabilities and preferred stock plus market value of common stock. We average the variables within each merger case and then across cases.

	Acquiring Bank (Pre-merger)			Combined Bank (Post-merger)		
	Mean	Median	Std.	Mean	Median	Std.
Spread	0.9	0.8	0.4	0.7	0.7	0.3
Rating	8.8	9.0	1.8	8.6	8.6	1.5
Maturity	9.7	10.0	3.9	8.9	9.3	5.1
Years of call protection	9.1	10.0	3.7	8.3	8.5	4.3
Junior	0.7	1.0	0.4	0.5	0.5	0.4
Issue size ($ million)	165.6	150.0	79.5	176.3	150.0	108.2
Volatility	3.6	3.5	1.1	3.3	3.0	1.2
NPL	1.2	0.9	0.9	1.0	0.6	0.8
Leverage (%)	88.0	89.6	5.5	84.4	85.9	5.6
Total assets ($ billion)	64.8	38.5	73.9	110.3	68.6	124.1
Number of bond issues	82			94		

Table 5: Determinants of the credit spread

The dependent variable is credit spread, which we define as the yield of the bond minus the yield of a Treasury bond with a similar maturity. Independent variables are MAT (log of years of maturity), CP (log of years with call protection), JN (one if the bond is subordinated, zero otherwise), IS (log of size of the issue), CS (difference between Merrill Lynch index of bond returns for the financial sector, excluding banks and the 10-year Treasury rate), VOL (volatility of bank's equity return one year before the issue date for bonds issued before the merger and volatility of the portfolio of the two merging banks for bonds issued after the merger), LEV (market value of leverage), NPL (percentage of nonperforming loans over total assets), RTG (rating), ACSZ (acquirer's pre-merger size), M (one if issued post-merger, zero otherwise), DBIG_x (one if the bond is issued by a bank whose pre-merger assets are greater than x% of industry assets, zero otherwise), DSML_y (one if the bond is issued by a bank whose pre-merger assets are smaller than y% of industry assets, zero otherwise), and DMID_x_y (one if the bond belongs to a bank whose pre-merger assets are smaller than x% but more than y% of industry assets , zero otherwise). We construct RTG according to the following scale: AAA+ = 1, AAA = 2, AAA- = 3, AA+ = 4, AA = 5, AA- = 6, A+ = 7, A = 8, A- = 9, BBB+ = 10, BBB = 11, BBB- = 12, and BB+ = 13. Coefficient estimates have heteroskedasticity-consistent standard errors. *t-statistics* appear in parentheses below each coefficient estimate.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
C	-0.152	-0.672**	0.073	-0.328	-0.671**	-0.331	-0.238
	(-0.541)	(-2.163)	(0.246)	(-1.133)	(-2.155)	(-1.149)	(-0.758)
MAT	0.456***	0.429***	0.458***	0.440***	0.433***	0.443***	0.452***
	(5.963)	(6.305)	(6.017)	(6.239)	(6.424)	(6.424)	(6.328)
CP	-0.250***	-0.223***	-0.264***	-0.243***	-0.226***	-0.245***	-0.254***
	(-2.723)	(-2.592)	(-2.813)	(-2.691)	(-2.650)	(-2.778)	(-2.769)
JN	0.102**	0.050	0.111**	0.069	0.045	0.065	0.057
	(2.052)	(1.003)	(2.257)	(1.353)	(0.918)	(1.272)	(1.120)
IS	0.012	0.017	0.024	0.026	0.020	0.028	0.033
	(0.402)	(0.584)	(0.706)	(0.801)	(0.683)	(0.862)	(0.959)
CS	0.632***	0.620***	0.626***	0.618***	0.619***	0.618***	0.608***
	(11.129)	(10.719)	(11.277)	(10.852)	(10.785)	(10.960)	(10.671)
VOL	0.060***	0.062***	0.068***	0.067***	0.062***	0.068***	0.064***
	(2.963)	(3.199)	(3.549)	(3.671)	(3.273)	(3.764)	(3.477)
LEV	0.011***	0.010***	0.010***	0.009***	0.009***	0.009**	0.009***
	(3.325)	(2.839)	(3.369)	(2.853)	(2.700)	(2.667)	(2.704)
NPL	0.076**	0.058*	0.075**	0.062*	0.059*	0.063**	0.077**
	(2.379)	(1.770)	(2.417)	(1.931)	(1.836)	(1.978)	(2.323)
RTG	-	0.043***	-	0.032**	0.048***	0.039***	0.033**
		(3.174)		(2.293)	(3.546)	(2.724)	(2.248)
ACSZ	-0.110***	-0.080***	-0.131***	-0.107***	-0.081***	-0.107***	-0.115***
	(-5.234)	(-3.620)	(-4.000)	(-3.403)	(-3.679)	(-3.603)	(-3.413)
M	-0.082***	-0.090***	-	-	-	-	-
	(-2.880)	(-3.173)					
M*RTG	-	-	-	-	-0.013***	-	-
					(-3.653)		
M*DBIG_2	-	-	0.025	0.005	-	-	-
			(0.512)	(0.113)			
M*DMID_2_0.35	-	-	-0.155***	-0.148***	-	-	-
			(-4.359)	(-4.278)			
M*DSML_0.35	-	-	-0.036	-0.059	-	-	-
			(-0.512)	(-0.772)			
M*RTG*DBIG_2	-	-	-	-	-	-0.004	-
						(-0.065)	
M*RTG*DMID_2_0.35	-	-	-	-	-	-0.020***	-
						(-5.058)	
M*RTG*DSML_0.35	-	-	-	-	-	-0.010	-
						(-1.221)	
M*DBIG_2.5	-	-	-	-	-	-	0.026
							(0.463)
M*DMID_2.5_0.45	-	-	-	-	-	-	-0.138***
							(-3.757)
M*DSML_0.45	-	-	-	-	-	-	-0.104
							(-1.579)
Adjusted R^2	0.77	0.78	0.78	0.79	0.79	0.80	0.79
Number of Observations.	176	176	176	176	176	176	176

*, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Appendix A. Sample merger cases

The samples used in the statistical analyses contain different number of banks depending on data availability. The sample code column indicates the sample to which the bank belongs. Code 1 refers to banks included in calculating the risk- and maturity-adjusted returns. Code 2 refers to the banks included in the cross-sectional regressions of the adjusted returns. Code 3 refers to banks included in the credit-spread sample.

Announc. Date	Effective Date	Sample code	Acquirer Name	Size (mill. $)	Sample code	Target Name	Size (mill. $)
5/15/91	1/2/92	1	First Maryland Bancorp., MD	7800		York Bank and Trust Co., PA	1400
6/3/91	3/2/92	1	Banc one Corp., OH	30336		First Illinois Corp., IL	1654
6/17/91	9/19/91	1,2,3	First Union Corp., NC	39600		Southeast Banking Corp., FL	11248
7/15/91	12/31/91	1,2,3	Chemical Banking Corp., NY	74130	1,2	Manufacturers Hanover Corp., NY	61239
7/22/91	12/31/91	1,2,3	NCNB, NC	69100	1,2	C&S/Sovran, VA	49075
8/12/91	4/22/92	1,2,3	BankAmerica Corp., CA	95161	1,2	Security Pacific Corp., CA	78602
9/13/91	3/16/92	1,2	Society Corp., OH	15418	1,2	Ameritrust Corporation, OH	10848
10/11/91	4/1/92	1,2,3	Boatmen's Bancshares Inc., MO	17469		First Interstate of Iowa Inc., IO	1235
10/28/91	6/18/92	1,2,3	Comerica Inc., MI	13300		Manufacturers Ntl. Corp., MI	12507
10/30/91	5/4/92	1,2	National City Corp., OH	24170	1,2	Merchants National Corporation, IN	5806
11/12/91	4/30/92	1,2	Mercantile Bancorp., MO	7398		Ameribanc Inc., MO	1228
12/30/91	11/2/92	1,2	Banc One Corp., OH	46293		Affiliated Bankshares, CO	2728
1/20/92	4/30/92	1	SouthTrust Corp., AL	10000		First American Bank of Georgia, GA	1240
1/27/92	7/1/92	1,2	Dauphin Deposit Corp., PA	3613		FB & T Corp., PA	648
3/4/92	1/15/93	1,2	Keycorp, NY	23156		Puget Sound Bancorp., WA	4784
3/5/92	10/1/92	1,2,3	Boatmen's Bancshares Inc., MO	17635		Sunwest Financial Services, NM	3362
3/18/92	10/15/92	3	NBD Bancorp., MI	29514		INB Financial Corp., IN	6556
5/18/92	12/7/92	1,2	Barnett Banks Inc., FL	32886		First Florida Banks Inc., FL	5434
7/30/92	1/15/93	3	Integra Financial Corp., PA	8847		Equimark Corp., PA	2868
7/30/92	2/17/93	1	SouthTrust Corp., AL	10158		Prime Bancshares, GA	665
8/20/92	2/10/93	1,2,3	Norwest Corp., MN	40293		Lincoln Financial Corp., IN	2250
9/21/92	3/1/93	3	First Union Corp., NC	47720		Dominion Bancshares Corp., VA	8911
11/9/92	6/1/93	1,2,3	First Bank System, MN	17319		Colorado National Bankshares, CO	2976
12/28/92	5/4/93	3	First Fidelity Bancorp., NJ	30000		Northeast Bancorp Inc., MD	2764
1/29/93	8/11/93	1,2,3	Bank of New York, NY	40909		National Community Banks, NJ	4018
3/30/93	9/1/93	1,2,3	Meridian Bancorp Inc., PA	12208		Commonwealth Bancshares Corp., PA	2067
4/21/93	8/13/93	1,2	Huntington Bancshares, OH	13895		Commerce Banc Corp., WV	897
7/27/93	1/17/94	1	Norwest Corp., MN	47800		First United Bank Group Inc., NM	3477
8/2/93	3/16/94	1,2	CoreStates Financial Corp., PA	23699		Constellation Bancorp., NJ	2415
9/20/93	5/31/94	3	Marshall & Ilsley, WI	7850		Valley Bancorporation, WI	4394
9/29/93	3/25/94	1,2,3	First Bank System, MN	23527		Boulevard Bancorp Inc., IL	1564
10/1/93	3/1/94	1,2,3	Society Corp., OH	27040	1,2	Keycorp, NY	32433
11/3/93	8/15/94	1,2,3	Banc One Corp., OH	76500		Liberty National Bancorp of Louisv., KY	4686
11/19/93	6/27/94	1,2	CoreStates Financial Corp., PA	22800		Independence Bancorp Inc., PA	2727
1/28/94	9/1/94	1,2,3	BankAmerica Corp., CA	186933	1,2	Continental, IL	21789
3/21/94	11/29/94	1,2	First Fidelity Bancorp., NJ	34403		Baltimore Bancorp., MD	2305
5/9/94	1/27/95	1,2,3	Fleet Financial Group Inc., MA	46000		NBB Bancorp Inc., MA	2451
7/1/94	1/24/95	1,3	First Bank System, MN	26330		Metropolitan Financial Corp., OH	7855
7/1/94	12/20/94	3	Union Planters Corp., TN	6967		Grenada Sunburst System, MI	2463
8/18/94	3/1/95	1,2	Boatmen's Bancshares Inc., MO	28292		Worthen Banking, AR	3568

8/30/94	2/26/96	1,2	Meridian Bancorp Inc., PA	14782		United Counties Bancorp., NJ	1661
9/22/94	6/12/95	1,2,3	Mercantile Bancorp., MO	12238		Central Mortgage Bancshares, MO	627
2/21/95	11/30/95	1,2,3	Fleet Financial Group Inc., MA	48727		Shawmut Corporation, CN	32399
2/21/95	11/1/95	3	First American Corp., TN	7757		Heritage Federal Bancshares, KY	516
5/8/95	12/27/95	1,2	US Bancorp., OR	21400		West One Bancorp., IH	8793
6/19/95	1/2/96	1,2,3	First Union Corp., NC	96741		First Fidelity Bancorp Inc., NJ	35400
7/10/95	1/2/96	1,2,3	PNC Corp., PA	62094		Midlantic Corp., NJ	13634
7/12/95	12/1/95	3	NBD, MI	47756	1,2	First Chicago Corp., IL	72378
7/19/95	1/2/96	1,2	Banc One Corp., OH	86783		Premier Bancorp., LA	5505
8/4/95	1/2/96	1,2	Mercantile Bancorp., MO	16019		Hawkeye Bancorp., IO	1951
8/7/95	2/16/96	1,2	First Bank System, MN	32712		Firstier Financial Inc., NB	3580
8/25/95	1/31/96	1,2	Boatmen's Bancshares Inc., MO	32367		Fourth Financial Corp., KS	7556
8/28/95	3/31/96	3	Chemical Banking Corp., NY	185281	1,2	Chase Manhattan Corp., NY	118756
8/28/95	5/3/96	1,2	National City Corp., OH	32144	1,2	Integra Financial Corp., PA	14811
9/22/95	3/1/96	1	Republic New York Corp., NY	41637		Brooklyn Bancorp Inc., NY	4139
10/10/95	4/9/96	1,2,3	CoreStates Financial Corp., PA	29032	1,2	Meridian Bancorp, Inc., PA	14563
10/18/95	4/1/96	1,2	Wells Fargo Corp., CA	53374	1,2	First Interstate, CA	55067
10/23/95	3/1/96	1,2	Regions Financial Corp., AL	13848		First National Bancorp. of Gainesv., GA	3112
12/12/95	7/29/96	1,2,3	Bank of Boston Corp., MA	46083		Baybanks Inc., MA	11525
12/19/95	5/3/96	1	Fleet Financial Group Inc., MA	72100		National Westminster Bancorp., NY	31000
1/10/96	7/12/96	1	Firstar Corp., WI	18784		Jacob Schmidt Co., MN	1295
8/30/96	1/6/97	1,2,3	NationsBank, NC	192308	1,2	Boatmens Bancshares Inc., MO	40683
9/16/96	12/31/96	1,2,3	Crestar Financial Corp., VA	18488		Citizens Bancorp., MD	4180
11/4/96	7/2/97	1,2	Southern National Corp., NC	21400		United Carolina Bancshares Corp., NC	4366
3/14/97	10/1/97	1,2	Marshall & Ilsley, WI	14763		Security Capital, WI	3658
3/20/97	8/1/97	1,2	First Bank System, MN	36000	1,2	US Bancorp., OR	33213
5/5/97	9/30/97	1,2,3	Huntington Bancshares Inc., OH	21604		First Michigan Bank Corp., MI	3564
6/24/97	12/16/97	1,2,3	Wachovia Corp., NC	47491	1,2	Central Fidelity Banks Inc., VA	10570
7/21/97	12/1/97	1,2,3	First Union Corp., NC	143000		Signet Banking Corp., VA	11853
8/29/97	1/1/98	1,2,3	NationsBank, NC	264562	1,2	Barnett Banks, FL	44005
10/20/97	6/12/98	1,2,3	Banc one Corp., OH	113127		First Commerce, LA	9311
11/18/97	4/28/98	1,2,3	First union Corp., NC	157274	1,2	CoreStates, PA	47591
12/1/97	3/31/98	3	National City Corp., OH	54684		First of America Bank Corp. of Kal., MI	21691
12/8/97	5/1/98		First American Corp., TN	10600	1,2	Deposit Guaranty Corp., MS	6800
4/13/98	10/2/98	3	Banc One Corp., OH	115901		First Chicago NBD Corp., IL	114804
4/13/98	9/30/98	3	NationsBank, NC	314503		BankAmerica Corp., CA	265436
6/8/98	11/2/98	3	Norwest Corp., MN	96094		Wells Fargo Corp., CA	94820
7/1/98	11/20/98	3	Star Banc Corp., OH	13856		Firstar Corp., WI	19972

Appendix B. Number, average rating, and average credit spread of the bond issues by the acquiring bank and the combined bank

Acquirer	Target	Acquiring bank (Pre-merger)			Combined bank (Post-merger)		
		Number of issues	Average rating	Average credit spread	Number of issues	Average rating	Average credit spread
Norwest Corp.	Wells Fargo Corp.	4	6.0	0.4	3	7.0	0.2
Banc One Corp.	First Chicago NBD Corp./ First Commerce	5	6.2	0.6	1	7.0	1.4
BankAmerica Corp.	Security Pacific Corp.	4	9.0	1.8	4	8.8	0.9
Society Corp.	Keycorp	1	10.0	0.9	4	9.3	0.5
Chemical Banking Corp.	Manufacturers Hanover Corp.	1	10.0	1.6	5	9.2	0.9
BankAmerica Corp.	Continental	4	8.8	0.9	5	8.4	0.6
Fleet Financial Group Inc.	Shawmut Corporation/ NBB Bancorp Inc.	3	11.0	1.0	1	10.0	0.6
First Union Corp.	First Fidelity Bancorp Inc.	3	9.0	0.9	2	9.0	0.8
CoreStates Financial Corp.	Meridian Bancorp, Inc.	1	9.0	0.7	1	9.0	0.6
NBD	First Chicago Corp.	1	7.0	0.6	2	8.0	0.3
Chemical Banking Corp.	Chase Manhattan Corp.	4	8.8	0.8	5	8.2	0.7
NationsBank	BankAmerica Corp.	3	7.3	0.8	5	7.0	1.0
Star Banc Corp.	Firstar Corp.	2	9.0	0.4	2	9.0	0.8
National City Corp.	First of America Bank Corp.	2	8.0	0.5	4	8.0	0.7
NationsBank	Barnett Banks	2	7.0	0.7	2	6.0	0.2
First Union Corp.	CoreStates/ Signet Banking Corp.	3	8.7	0.4	3	8.0	1.2
NationsBank	Boatmens Bancshares Inc.	3	8.0	0.5	3	7.7	0.6
Banc One Corp.	Liberty National Bancorp.	2	6.5	0.7	2	7.0	0.8
Comerica Inc.	Manufacturers Ntl. Corp.	1	9.0	1.0	1	9.0	1.0
NBD Bancorp.	INB Financial Corp.	1	6.0	0.7	1	6.0	0.6
Norwest Corp.	Lincoln Financial Corp.	5	7.0	0.6	5	6.0	0.4
First Union Corp.	Dominion Bancshares Corp./ Southeast Banking C.	2	8.0	1.6	2	9.5	0.9
Bank of New York	National Community Banks	4	9.0	0.8	5	8.0	0.4
First Fidelity Bancorp.	Northeast Bancorp Inc.	1	10.0	1.4	1	11.0	0.8
Union Planters Corp.	Grenada Sunburst System	2	12.5	1.4	1	12.0	0.9
PNC Corp.	Midlantic Corp.	3	7.7	0.3	1	8.0	0.0
Crestar Financial Corp.	Citizens Bancorp.	1	10.0	0.8	1	10.0	1.0
Marshall & Ilsley	Valley Bancorporation	1	8.0	0.7	2	7.0	0.4
Bank of Boston Corp.	Baybanks Inc.	1	11.0	0.8	1	8.0	0.2
NCNB	C&S/Sovran	2	9.0	1.5	5	8.4	0.7
Integra Financial Corp.	Equimark Corp.	1	11.0	1.2	1	11.0	1.1
First American Corp.	Heritage Federal Bancshares	1	12.0	1.1	1	12.0	0.9
Meridian Bancorp Inc.	Commonwealth Bancshares Corp.	1	11.0	1.0	1	10.0	0.7
Huntington Bancshares Inc.	First Michigan Bank Corp.	2	9.0	0.2	2	9.0	0.5
Wachovia Corp.	Central Fidelity Banks Inc.	2	4.5	0.4	3	6.3	0.9
Mercantile Bancorp.	Central Mortgage Bancshares	1	12.0	1.4	3	10.0	0.6
Boatmen's Bancshares Inc.	Sunwest Financial Services/ First Interstate of Iowa	1	9.0	1.4	1	9.0	0.9
First Bank System	Metropolitan Financial/ Boulevard Bancorp/ Colorado National Bankshares	1	10.0	0.9	2	9.0	0.7
Total		82			94.0		

Appendix C: Banks in each size category

1. Returns Sample

Bank's asset size is more than 1.5% of industry assets at the end of the year preceding the announcement of the acquisition: (13 cases). NationsBank (at the time of the merger with Barnett Banks and Boatmens), First Union (at the time of the merger with Corestates, Signet Banking and First Fidelity), BankAmerica (at the time of the merger with Security Pacific and Continental), Security Pacific (at the time of the merger with BankAmerica), Banc One (at the time of the merger with First Commerce, Liberty National and Premier Bancorp), Chemical (at the time of the merger with Manufacturers Hanover), and Chase Manhattan (at the time of the merger with Chemical).

Bank's asset size is more than 2% of industry assets at the end of the year preceding the announcement of the acquisition: (8 cases). NationsBank (at the time of the merger with Barnett Banks and Boatmens), First Union (at the time of the merger with Corestates and Signet Banking), BankAmerica (at the time of the merger with Security Pacific and Continental), Banc One (at the time of the merger with First Commerce), and Chase Manhattan (at the time of the merger with Chemical).

Bank's asset size is more than 2.5% of industry assets at the end of the year preceding the announcement of the acquisition: (5 cases). NationsBank (at the time of the merger with Barnett Banks and Boatmens), First Union (at the time of the merger with Corestates and Signet Banking), and BankAmerica (at the time of the merger with Continental).

2. Credit spread sample

Acquirer's asset size is more than 1.5% of industry assets at the end of the year preceding the announcement of the acquisition: (12 cases). BankAmerica/Security Pacific, BankAmerica/Continental, Chemical/Chase Manhattan, NationsBank/Boatmens, NationsBank/Barnett Banks, NationsBank/BankAmerica, First Union/CoreStates, Norwest/Wells Fargo, Banc One/First Chicago, Chemical/Manufacturers, First Union/First Fidelity, Banc One/Liberty National.

Acquirer's asset size is more than 2% of industry assets at the end of the year preceding the announcement of the acquisition: (7 cases). BankAmerica/Security Pacific, BankAmerica/Continental, Chemical/Chase Manhattan, NationsBank/Boatmens, NationsBank/Barnett Banks, NationsBank/BankAmerica, First Union/CoreStates/Signet Banking.

Acquirer's asset size is more than 2.5% of industry assets at the end of the year preceding the announcement of the acquisition: (6 cases). BankAmerica/Continental, Chemical/Chase Manhattan, NationsBank/Boatmens, NationsBank/Barnett Banks, NationsBank/BankAmerica, First Union/CoreStates/Signet Banking.

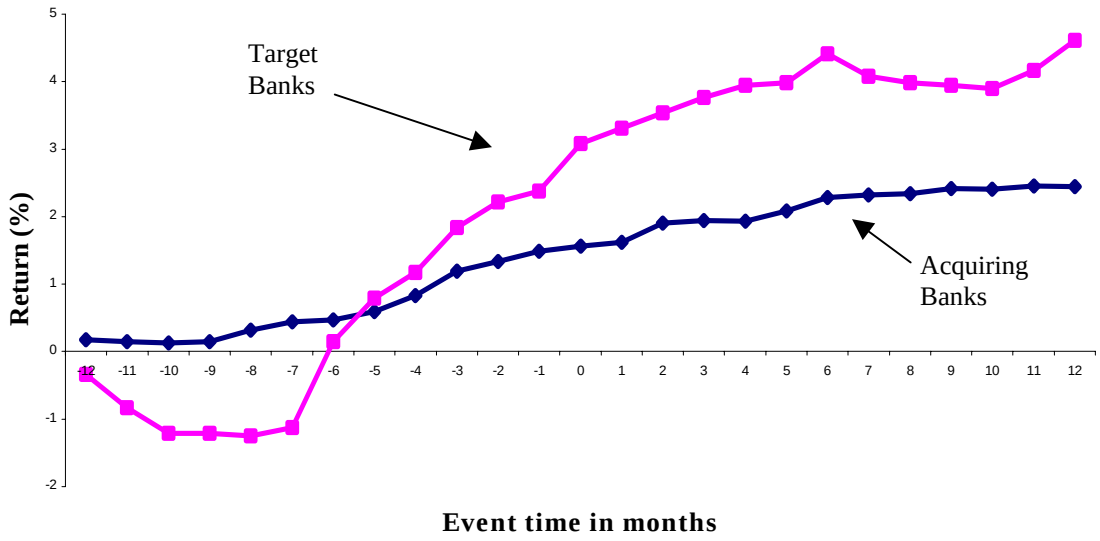

Figure 1. Risk- and maturity-adjusted bond cumulative returns around the bank merger announcements. We compute debt returns from traded-quoted prices of the Lehman Brothers Database. We adjust each return by subtracting the return of an equivalent Merrill Lynch bond index that matches bond maturity and rating. We first average returns across all bonds belonging to the same firm, then across firms.

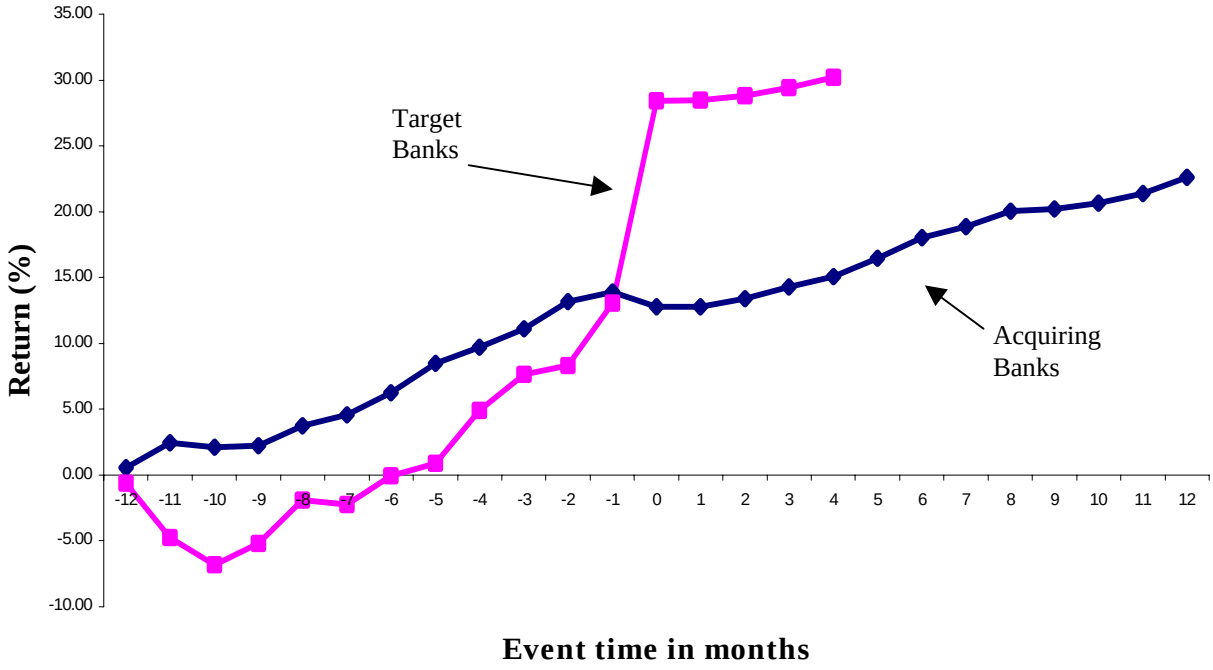

Figure 2: Market adjusted equity cumulative returns around the bank merger announcements. We compute market-adjusted equity returns as the difference between monthly equity returns and the return on the CRSP value weighted portfolio. The majority of our sample target banks' shares stop trading, as mergers become effective four months after the announcement month.