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The Effect of Bank Mergers on Loan Prices: Evidence from the U.S.

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The Effect of Bank Mergers on Loan Prices: Evidence from the U.S.

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Abstract

Bank mergers can increase or decrease loan spreads, depending on whether the increased market power outweighs efficiency gains. Using proprietary loan-level data for U.S. commercial banks, I find that, on average, mergers reduce loan spreads, with the magnitude of the reduction being larger when post-merger cost savings increase. My results suggest that the relation between spreads and the extent of market overlap between merging banks is non-monotonic. Market overlap increases cost savings and consequently lowers spreads, but when the overlap is sufficiently large, spreads increase, potentially due to the market-power effect dominating the cost savings. Furthermore, the average reduction in spreads is significant for small businesses.

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During the 1990s, the number of commercial banks in the United States decreased from about 12,500 to about 8,000, primarily due to a wave of bank mergers that led to an increase in the average size of banks. In this paper I analyze the implications of bank mergers for borrowers in the U.S. In particular, I investigate whether mergers create efficiency gains, which are passed on to borrowers through reductions in loan rates, or whether the enhanced market power of the merged banks widens loan spreads. For this purpose, I use a proprietary loan-level data set provided by the Federal Reserve Board, which covers characteristics of the new commercial and industrial (C&I) loan extensions of a stratified sample of U.S. commercial banks. Since the data include nearly all of the largest acquirers, my merger sample spans 62% of acquirer assets and 51% of target assets from the universe of bank mergers in the U.S. between 1990 and 2000.

Mergers can increase the efficiency of banks through direct synergies, as well as re-optimization of the loan portfolios and risk diversification.[1] Holding loan characteristics constant, if the marginal cost savings due to economies of scale or scope are passed on to borrowers, then we should expect interest rates to decline after the mergers.[2] However, if merging banks have significant geographical overlap in their markets of operation, then mergers can lead to an increase in market power, which would in turn increase the cost of capital for borrowers. The net effect on loan prices depends on whether the market power or efficiency effect dominates (Williamson, 1968, 1975).

I find that acquiring banks, on average, reduce spreads on their new extensions of C&I loans after a merger, provided that the merger does not significantly increase the concentration in the banking markets. The average reduction in loan spreads is both larger and more persistent for

[1] See, for example, Akhavein, Berger, and Humphrey (1997), Berger, Demsetz, and Strahan (1999), and Walter (2004) for types of efficiencies due to bank mergers.
[2] As shown by Farrell and Shapiro (1990), mergers must create economies of scale or cross-learning effects if the consolidated firms reduce the prices.

the non-mega acquirers, i.e., those banks with total gross assets of less than $10 billion. On average, mega acquirers reduce spreads within the first two years after the mergers, but this decline is reversed in the third year. These results are consistent with the view that the largest banks engage in competitive price cuts following the mergers to increase their market share, and that they then reverse these price reductions.

I find that the decline in spreads after the mergers is highly significant for small loans of less than $1 million. This finding is somewhat counterintuitive, since a number of theoretical and empirical papers suggest that large banks rely heavily on "hard" (quantitative) information, and consequently lend mostly to large and transparent borrowers. On the other hand, small banks better utilize "soft" (qualitative) information and specialize in lending to small and opaque borrowers (see, e.g., Petersen and Rajan, 1994; Berger and Udell, 2002; Stein, 2002; Cole, Goldberg, and White, 2004; and Berger, Miller, Petersen, Rajan, and Stein, 2005). Contrary to this argument, my findings show that small borrowers typically pay lower interest rates to banks that have expanded during the previous few years through mergers.

I find that the reduction in spreads is significantly greater for acquirers with a larger-than-median decline in operating cost ratios. This finding suggests that operating efficiencies explain the documented fall in loan spreads. Further, consistent with theory, there is a non-monotonic relation between loan spreads and the extent of market overlap between the acquirer and the target. The reduction in spreads is substantially larger after in-market mergers in which the merging banks have some geographical overlap of markets before the merger, and thus have more potential for cost savings through consolidation of overlapping operations. However, if the overlap is sufficiently extensive so that concentration of banking markets substantially increases the market power of the acquirer, the effect reverses and spreads on loans significantly increase

after the mergers. Following Hannan and Prager (1998), I also consider separately nine mergers that significantly increase the Herfindahl-Hirschman Index in the targets' markets and find that the spreads increase significantly after these mergers.

Out-of-market acquirers could exploit potential alternative sources of synergy, such as scale efficiencies or risk diversification. They could also attempt to increase their share of the new markets by strategically offering lower rates. After incorporating the structure of the targets' markets into my regressions, I find that acquirers significantly reduce spreads within the first year after the merger only if the new markets entered were dominated by larger banks. This finding suggests that in a market dominated by small banks, there is no need for large acquirers to reduce loan spreads, since they are likely to be already more competitive than existing incumbents.

I further examine whether my results are driven by a post-merger improvement in the quality of the acquirers' loan portfolios. First, I show that my findings hold when I control for risk ratings of individual loans, which are available for only the later part of my sample period. In this subsample, I find no significant change in the average or median risk rating of the loan portfolio post merger. Second, I show that there is no significant change in the extent of nonperforming loans of the acquirer after the merger over the entire sample.

I also consider whether the findings are driven by a post-merger decrease in demand for the quantity of services supplied by the merged bank. Consistent with the operating efficiency argument, I find that on average, the market share of the acquirer after the merger is significantly larger than the market share of the pro-forma bank (target plus acquirer before the merger).

Because of the possibility that the results could occur due to the endogeneity of the timing of mergers in my sample, I use the timing of the removal of intrastate and interstate

banking restrictions as an exogenous instrument (see, e.g., Jayaratne and Strahan, 1998). I find that the post-merger reduction in loan spreads on small loans is robust to using this instrument.

Finally, I analyze whether the small-business lending of the merged banks changes following the merger. I find that the ratio of the small-business lending to total assets of the acquirer after the merger is not significantly different from the same ratio of the pro-forma bank before the merger. Although at first glance, this finding could appear to be inconsistent with some earlier studies, a possible explanation for the discrepancies could be the substantial improvements in information technology in the late 1990s. Specifically, the "credit scoring" models have reduced large banks' aversion to small businesses, by providing "hard" information on small loans. Thus, my findings complement those of Petersen and Rajan (2002), who show that the physical distance between small businesses and their banks has been increasing, providing evidence for the possible weakening of large banks' "soft" information constraints.

My paper contributes to the literature that investigates the effects of bank mergers on pricing terms. Due to data limitations, this literature is still developing and prior studies reach mixed conclusions.[3] There is some empirical evidence on the unfavorable effects of increased market concentration, due to big bank mergers, on deposit rates (Hannan and Prager, 1998), personal-loan rates (Kahn, Pennacchi, and Sopranzetti, 2005), and real-estate loan rates (Garmaise and Moskowitz, 2006). On the other hand, Drucker (2005) shows that commercial bank mergers among the 50 largest banks do not result in significant changes in the pricing of their large syndicated loans. Drucker concentrates mainly on the effect of mergers between commercial banks and investment banks on large syndicated loans.

[3] Theory on this topic is also scant. Park and Pennacchi (2009) show that market extension mergers by large multi-market banks are expected to benefit borrowers but harm depositors.

To my knowledge, this is the first paper to use loan-level data for C&I loans of U.S. banks to dynamically analyze the effect of commercial bank mergers on loan prices. The most related study is Sapienza (2002), who concludes that horizontal mergers with small targets result in lower loan rates in Italy. Sapienza also finds that mergers have different distributional effects on borrowers, and that banks reduce lending to small borrowers after mergers. However, contrary to Sapienza, I find that the reduction in loan spreads is significant for small loans, and that larger acquirers do not significantly drop small-business lending of smaller targets, showing the favorable effects of large banks' mergers on small businesses. This finding is consistent with Petersen and Rajan (1995), who argue that credit should be cheaper for smaller borrowers in a concentrated market than if similar firms were to obtain credit in a more competitive market.

A related literature uses stock returns to measure efficiency gains from mergers and also finds mixed evidence (see, e.g., James and Weir, 1987: Houston and Ryngaert, 1994; and Karceski, Ongena, and Smith, 2005). However, insignificant results could be due to efficiency gains being offset by a negative signal if stock is used to finance the merger (see, e.g., Houston and Ryngaert, 1997), or simply because the time period under consideration (1980s) lacks sufficient "in-market" mergers, which constitute the primary source of bank merger gains (e.g., Houston, James, and Ryngaert, 2001). Calomiris and Karceski (2000) argue that insignificant stock returns to the combined bank could be because, in a competitive market, a significant portion of the efficiency gains is passed on to customers. Therefore, the effect on the loan spreads should be a more useful measure of the efficiency gains. Further, Houston, James, and Ryngaert (2001) find that market revaluations of the target and the acquirer are smaller than the imputed present value of cost savings due to the mergers. They attribute some of this difference to pass-through to customers.

This paper also adds to the studies that explore the potential effect of large bank mergers on credit availability to small businesses. Although Strahan and Weston (1998) find no significant change in lending to small businesses, Peek and Rosengren (1996), Berger, Saunders, Scalise, and Udell (1998), Sapienza (2002), Degryse, Masschelein, and Mitchell (2005), and Bonaccorsi di Patti and Gobbi (2007) provide evidence of a significant decline in the amount of small-business lending after large bank mergers. There are also some papers that demonstrate the favorable effects of banking consolidation on small-business lending. For example, Black and Strahan (2002) find that the rate of new incorporations in a state increases as the share of small banks decreases due to the mergers. Further, using data on publicly traded firms, Correa (2007) shows that small firms have better access to credit after interstate bank acquisitions are permitted.

Another related paper is Zarutskie (2006), who empirically examines the effect of the increase in competition due to the banking deregulation. Zarutskie uses firm-level data on private companies and provides evidence for the adverse effect of banking competition on the amount of external debt used by newly formed firms. She does not analyze the competition's effect on the loans' pricing terms, which is the main focus of my paper.

The paper is structured as follows. Section 1 describes the data and the sample. Section 2 presents the statistical method, the main results, and the results for various subsamples of mergers and loans. Section 3 incorporates the market overlap between the merging banks and the competitiveness of targets' markets into the analyses. Section 4 relates the findings to gains in operating efficiency. Section 5 uses the variation in dates of banking deregulation as an instrument for the timing of mergers. Section 6 explores briefly the effect of mergers on credit availability to small businesses. Section 7 concludes.

1. Data and Sample Description

1.1 Data

The primary data source for this paper is the Federal Reserve Board's Survey of Terms of Business Lending (STBL). The STBL provides proprietary data on the characteristics of individual C&I loan extensions of a stratified sample of roughly 300 U.S. commercial banks and 50 branches of foreign banks. It covers all C&I loans (new loans, takedowns under revolving credit agreements, and renewals) of a given bank with a face value of at least $1,000, disbursed within the first business week of February, May, August, and November.

The flow nature of the data, which covers new loans and renewals, is ideal for my analysis since the effects of a merger are reflected mostly in new loans, rather than the entire portfolio of existing loans. The information on loan characteristics is detailed, including the stated rate of interest, loan size, total size of the commitment (line of credit) under which the loan was extended, maturity, frequency of payments, whether the loan is secured or not, whether the loan is fixed or floating-rate, etc. One limitation of the data is the lack of information on the characteristics of the borrowing firms. Following such earlier studies as that by Berger, Saunders, Scalise, and Udell (1998), I use the total amount of commitment as the proxy for the size of the borrower if the loan is drawn under commitment, and otherwise I use the face amount of the loan.

The survey covers nearly all of the large banks and a sample of small and medium-sized banks in the U.S.[4] If and when a bank decides not to report any more, STBL chooses another

[4] I delete small acquirers with gross total assets of less than $100 million from the sample, since they have both very short time series with many gaps and a very small number of loans (only one in some quarters). I lose only 0.7% of all STBL loan-level observations by doing so. Including these observations does not alter loan-level coefficients, but could distort the bank-level results.

bank with similar characteristics to replace it.[5] The Federal Reserve System uses this survey to measure the average cost of business borrowing in the U.S. economy. Since the survey is not used for regulatory purposes, concerns about reporting and sample selection biases are alleviated.

I match the STBL to the quarterly Reports of Condition and Income (Call Reports) for aggregate bank-level income statement and balance sheet data. Data on small-business loans are obtained from the June Call Reports. Note that the analyses include commercial banks rather than bank holding companies since lending decisions are mostly made at the bank level, rather than at the holding company level. The FDIC's branch-level Summary of Deposits (SOD) data are used to determine which local banking markets are served by the sample banks. The other data source is the National Information Center (NIC) Data File, which provides information on merging banks and dates of the mergers.

1.2 Sample selection and statistics

Table 1 provides statistics on the STBL banks from 1987 to 2003. The survey is biased towards larger banks. The sum of gross total assets of all surveyed banks has a mean of about $2.7 trillion over 68 quarters, which corresponds, on average, to 53% of all banking assets. The mean (median) bank in the survey has gross total assets of about $9.8 billion ($1.2 billion). The net return on assets has a mean and median of 1%, and the nonperforming loans ratio is, on average, 2%. Panels B and C of Table 1 describe the respective characteristics of the acquirers and targets, as of one quarter before the merger. Compared to the median bank in the sample, the median acquirer is larger (with $6.1 billion in gross total assets) and the median target is smaller (with

[5] There are nine acquirers, which left the sample as targets of other mergers within three years after their acquisitions. The findings are robust to excluding them. I thank the referee for pointing out this check.

about $184 million in gross total assets). The net return on assets is larger for the median acquirer than for the median target (1.2% vs. 0.9%).

[Place Table 1 around here]

Because there was a large increase in the number of bank mergers during the 1990s, I choose this decade for the merger sample. This increase is due to the removal of intrastate and interstate branching restrictions on banks, which took place in the 1980s and early 1990s, and which was officially finalized by the Riegle-Neal Act of 1994 (e.g., Berger, Kashyap, and Scalise, 1995; and Andrade, Mitchell, and Stafford, 2001). Because research suggests that it can take up to three years for the consolidating firms to realize efficiency gains completely (e.g., Berger, Saunders, Scalise, and Udell, 1998; and Focarelli and Panetta, 2003), I construct a sample of loan-level observations spanning 68 quarters between 1987 and 2003. This sample covers a total of 2,160,883 bank-loan-quarter observations for this time period, including a three-year period before the first and after the last merger in the sample.

Table 2 presents summary statistics for the loan-level observations. The mean face value of all loans is $727,143, and the mean value of the total commitment is about $5.3 million. The average spread (i.e., the effective annual interest rate, net of the Treasury rate of the same duration as the loan) is 4.25% for the entire sample and 2.75% for the sample of large loans of above $25 million. Weighted by the loan size, which is equal to the total commitment amount if the loan is drawn under commitment and to the face value of the loan otherwise, 82% of all loans are under commitment, and that this ratio increases to 96% for loans larger than $25 million. On average, 73% of the value of all loans is secured by some type of collateral and 75% is floating-rate.

[Place Table 2 around here]

I refer to any consolidation of two non-failing commercial banks as a "merger" if the charter of the target disappears and the acquirer survives. After banking deregulation, one common type of merger is the consolidation of several branches of the same bank, which earlier had to operate in different states with separate charters because of the branching restrictions of the time period. These "within family" mergers are excluded from the merger sample because merging banks were parts of the same organization prior to the merger.

Between 1990 and 2000, there were 2,274 commercial bank mergers in the U.S. If there is more than one merger of a given acquirer within the same quarter, it is used as a single data-point in my empirical analyses. Doing so reduces the number of mergers to 1,857 "merger-quarters," which are quarters in which the acquirer merges with at least one target. Out of this universe, STBL covers 263 merger-quarters, corresponding to 350 mergers by 121 acquirers. Since the survey includes nearly all of the large banks, these 263 merger-quarters represent a significant portion of the mergers in the U.S.: 62% of all acquirers' assets and 51% of all targets' assets.

2. Dynamic Effect of Mergers on Loan Prices

2.1 Test and variable definitions

To analyze the effect of mergers on loan prices, I estimate the following regression for acquirers in the event time with a six-year window around the merger:

$$\begin{aligned} Spread_{i,k,t} &= \alpha + \beta_1 AftrMrgrOne_{k,t} + \beta_2 AftrMrgrTwo_{k,t} + \beta_3 AftrMrgrThree_{k,t} \\ &+ \beta_4 AftrMrgrOne_{k,t} * SizeRatio1_{k,t} + \beta_5 AftrMrgrTwo_{k,t} * SizeRatio2_{k,t} + \beta_6 AftrMrgrThree_{k,t} * SizeRatio3_{k,t} \\ &+ \lambda_1 X_{i,k,t} + \lambda_2 Y_{k,t-1} + d_t + f_k + \varepsilon_{ikt} \end{aligned} \quad (1)$$

The dependent variable, *Spread,* is the effective annual interest rate on loan i of bank k in

quarter t minus the Treasury rate of a duration equal to that of the loan.[6] For the fixed-rate loans, the equal-duration Treasury rate is subtracted from the effective interest rate. For the floating-rate loans, the appropriate duration is the next repricing interval, but the data for this variable are only available after 1997. However, for most of the floating-rate loans reported after 1997, the expected repricing interval is up to a month. Therefore, I use either the one-month Treasury rate, or, if the maturity is less than a month, then I use the Treasury rate that corresponds to the maturity of the loan. The data I use are the one-, three-, six-month constant maturity Treasury bills and one-, two-, three-, five-, seven-, ten-, twenty-year Treasury note rates. I calculate the rates for maturities other than these by simple interpolation and extrapolation.

The results are robust to using alternative choices of interest rates, such as using a one-day Treasury rate for floating-rate loans or using the prime rate, equal-duration London Inter Bank Offer Rate (LIBOR), and swap rates instead of the Treasury rates. I also include the average spread per quarter for all banks in the data other than the acquiring banks in each regression.

I use three after-merger dummy variables, which span three years before and after the merger for the acquirers. *AftrMrgrOne*, *AftrMrgrTwo*, and *AftrMrgrThree* are dummy variables equal to zero for 12 quarters before and after the merger, except that *AftrMrgrOne* is equal to one for the first four quarters after the merger, *AftrMrgrTwo* is equal to one for quarters 5 - 8 after the merger, and *AftrMrgrThree* is equal to one for quarters 9 - 12 after the merger. The regressions also include interactions of these after-merger dummies with *SizeRatio1-3*, which are the corresponding mergers' size ratios of the target over the acquirer. In other words, interactions

[6] The effective annual interest rate is the ratio of the realized yield from compound interest for one year, to the amount of the loan. The data do not include fees charged on loans. However, fees are unlikely to bias the results, since large banks generally have certain fee structure policies that are based on loan sizes. These policies do not systematically vary by borrower characteristics and are not expected to change for the acquirers after the mergers.

take the value of zero for 12 quarters before the merger and are equal to the total assets of the target over the total assets of the acquirer during one to three years after the merger, depending on which after-merger dummy is used. For merger-quarters in which an acquirer merges with more than one target, the target size corresponds to the sum of the gross total assets of all these targets.

Each regression includes a set of loan characteristics ($X_{i,k,t}$) and a set of bank-specific controls measured as of t-1 ($Y_{k,t-1}$). Bank-level controls include the natural logarithm of the gross total assets of the acquirer, *AcquirerSize*, and its nonperforming loans ratio, *NonperformRatio*, which is the sum of loans over 90 days late and loans not accruing over total loans, both as of t-1. The first loan-level control is *LoanSize*, the natural logarithm of the size of the loan as a proxy for the size of the borrowing firms. *LoanSize* is equal to the total commitment (line of credit) amount if the loan is drawn under commitment, and otherwise to the face amount of the loan, because the size of the total commitment is likely to be a better proxy for the size of the borrower. *LoanSize* is potentially endogenous since it could be affected by mergers. Other loan characteristics include *DummyCommit,* which is equal to one if the loan is drawn under a formal or informal commitment, and zero otherwise. *DummyFixed* is equal to one if the loan is a fixed-rate loan, and equal to zero if it is a floating-rate loan. *DummySecured* is equal to one if the loan is secured by a collateral of any kind, and zero otherwise. The findings reported below are also robust to including maturity of the loan as a control.

In addition to these main variables, the regressions include some market-related controls. *StateDummy* is a dummy variable equal to one if the target and the acquirer do business in the same state before the merger. I include this variable because the elimination of intrastate restrictions was the most important reason for the increasing number of mergers in the 1990s.

The results are robust to including a dummy variable representing whether the financial services industry of the target's state was deregulated. *MrktHHI* is the natural logarithm of the weighted average Herfindahl-Hirschman Index, weighted by the deposits of the acquirer in the markets it serves.[7] Bank fixed effects (f_k) and quarter dummies (d_t) are included in each regression. I account for serial correlation by allowing for clustering of the error term at the bank level.[8]

2.2 Results

Table 3 reports the results of the basic regressions for the entire sample of loans and all types of mergers. Note that the number of observations differs across columns because of some missing data. I drop merger-quarters that have both in-state and out-of state mergers of a given acquirer in specifications that include the state dummies.

[Place Table 3 around here]

Column (1) of Table 3 shows the basic regression results when I include only the lagged size of the acquirer and lagged nonperforming loans ratio in addition to three after-merger dummies. Column (2) adds the interactions. The favorable effect on loan prices starts during the first year after the merger, but becomes more significant during the second year. The coefficient on the first-year after-merger dummy equals -6.9 basis points, which is significant at the 5% level. Its size increases when other controls are added. The second-year dummy has a coefficient of -11.2 basis points and varies between -7.4 and -12.7 basis points (always statistically significant at the 1% level) when I include other controls but no interactions. A change of seven basis points corresponds to about 2% of the average spread in the data.

[7] The Herfindahl-Hirschman Index is calculated as the sum of the squares of the deposit market shares of all banks in a given market. I use deposits rather than loans, because there is no market-level data for bank loans.
[8] See Petersen (2009) for a detailed explanation for why the correction for clustering is essential.

The regressions in Columns (2), (5), and (7) of Table 3 include interactions of size ratios with the after-merger dummies. The interaction of the second-year dummy with the corresponding merger's size ratio has a significant negative coefficient, implying that the decline in loan spreads during the second year post merger becomes larger as the relative size of the target increases. Interactions corresponding to the first and third year after-merger dummies are not statistically different from zero.

Starting in Column (3) of Table 3, I include loan-level controls. Their coefficients are consistent with those found in other studies. Loans under commitment have lower spreads than loans not under commitment. Since the commitment dummy is highly correlated with loan size, loan size is excluded from this regression. Loan size, which is the proxy for the size of the borrower, has a negative and statistically significant coefficient [see Columns (4)–(7)]. Loans secured by collateral of any kind have higher spreads than unsecured loans (Berger and Udell, 1990), and floating-rate loans have higher spreads than do the fixed-rate loans. Including loan size increases the (unreported) R-squared from 0.17 to 0.35 and to 0.4 when I also include dummies for secured loans (*DumSecured*) and fixed-rate loans (*DumFixed*). Therefore, in the rest of the paper, the regressions include all the bank- and loan-level controls [as in Column (5)]. However, since loan characteristics can be endogenous, I also run all regressions by excluding these characteristics. The findings remain robust. The significant reduction in spreads is also robust to including state dummies and the average Herfindahl-Hirschman Index of the acquirer's markets.[9]

While Focarelli and Panetta's (2003) evidence suggests a period of about three years for efficiency gains to be fully realized, my analysis shows that on average, the decline in spreads

[9] Because of a change in the definition of banking markets, I cannot calculate the Herfindahl-Hirschman Index for 2002 and 2003. Therefore, these two years are excluded in the last two columns of Table 3.

starts during the first year and peaks during the second year after the merger. When I decompose the first-year effect into quarters, I find that a significant negative change comes in the third and fourth quarters after the merger.[10]

2.3 Results with "after-last-merger" dummies

The survey covers many large acquirers, and such acquirers may have many mergers within a short time. In the sample, 39 of the 263 merger-quarters are the second merger quarter in a row, and 98 are merger-quarters of the same bank, which had at least one merger within the past year. As a consequence, after-merger dummies could overlap in taking the value of one within their corresponding years after the merger, reducing the variation in the sample and lowering the magnitudes of the estimates. In addition, the last merger in a succession of mergers might have the biggest effect.

To compare the economic significance of coefficients, I create a set of new "After-Last-Merger" dummies by modifying the variables *AftrMrgrOne - AftrMrgrThree* such that, in a given quarter, the corresponding year's after-merger dummy is switched on for only the very last merger, ignoring all the other mergers even if they occurred during the last three years. Columns (1) and (2) of Table 4 compare the coefficients of the new after-last-merger dummies to those of the original after-merger dummies. The difference in the magnitude of the coefficients is noticeable. The average decline in spreads during the first (second) year after the merger is 17.2 (15.2) basis points when the after-last-merger dummies are used, but the same decline is only 9.1 (7.4) basis points when the overlapping after-merger dummies are used.

[10] Since standard errors in all regressions are corrected for the clustering of observations at the bank level, it is unlikely that the significance of the *t*-statistics is due to the large cross-sectional variation. Nevertheless, I repeat the same set of regressions, this time by using the averages of the variables at the bank-quarter-level, with similar results.

[Place Table 4 around here]

2.4 Subsamples based on acquirer size

In the regressions in Table 3, the decline in spreads is both statistically and economically significant during the first and second years following the merger, but not during the third year. A possible explanation for this pattern is that, since the effect disappears after three years, efficiency gains are not passed on to the borrowers. Instead, the reduction in spreads could be due to strategic price cuts in the first two years.

Panel B of Table 4 considers the subsample of mergers by acquirers that are non-mega banks, i.e., acquirers with gross total assets of less than $10 billion ("Non-Mega Acquirers"). Column (3) of Table 4 shows that when the effect of mega-mergers on loan spreads is excluded, the coefficient on the third-year after-merger dummy (after-last-merger dummy) becomes -15.4 (-17.2) basis points, which is significant at the 1% (5%) level. Further, this decline persists after the third year. Although not reported, the regressions in which the subsample of mega acquirers is used result in a statistically significant decline in spreads within the first and second years, but an increase in spreads in the third year after the mergers. Again, a potential explanation for this finding is that some of the largest acquirers strategically cut the spreads within the first two years to increase their market share, and that they then reverse these reductions. Alternatively, since these mega acquirers tend to do a number of acquisitions sequentially, some correlated factors for which I cannot control could be affecting their loan spreads after three years. As the event window around the merger lengthens, it could be more difficult to control for these factors, clouding my ability to measure the marginal effect of the merger on spreads accurately.

2.5 Subsamples based on loan size

There are a number of reasons why the effect of mergers on loan spreads could differ by loan size. Loan size undoubtedly is related to borrower size. Additionally, as explained in the introduction, commitments to large companies are fundamentally different from loans to small businesses, since they are made based on different lending technologies. Moreover, given that acquirers generally buy smaller targets, new additions to the acquirers' loan portfolios would most likely be smaller loans of the targets. Furthermore, Table 2 shows that acquirers already charge much lower spreads on large commitments to the existing borrowers than on smaller loans. Therefore, I expect merger gains to be reflected more with smaller borrowers.

Table 5 presents the results for subsamples based on the loan size, which is equal to the total commitment amount if the loan is drawn under commitment, and otherwise equal to the face value of the loan. Following prior studies, I classify small loans as loans with a loan size of less than $1 million, although the results are similar using $250,000 or $100,000 as boundaries. Spreads on small loans decrease, on average, by 17.4 basis points during the first year and by 12.9 basis points during the second year after the merger. A change of 17 basis points corresponds to more than 3.5% of the average spread on small loans in the sample. This finding is consistent with Petersen and Rajan (1995), who argue that credit should be cheaper for smaller borrowers in a concentrated market than if similar firms were to obtain credit in a more competitive market.

[Place Table 5 around here]

If the after-last-merger dummies are used (not reported), the first and second year reductions in spreads become 25.9 and 21 basis points, respectively. All these coefficients are significant at the 1% level. In the remainder of the paper, I report only the results of the

regressions using after-merger dummies, which tend to lead to smaller spread reductions than do the after-last-merger dummies.

The largest decline in spreads during the first and second years post merger is for the smallest borrowers. Using after-merger dummies, the decline amounts to 23.4 and 16.1 basis points for loans of size less than $100,000, and 21.2 and 16.2 basis points for loans of size less than $250,000 (not reported in tables). All these coefficients are significant at the 1% level. On the other hand, the change in spreads on large loans (i.e., loans larger than $1 million) is not statistically different from zero. For large loans, the coefficients of the interactions of size ratios with the second and third year after-merger dummies are significant and positive, meaning that spreads increase post merger as the relative size of the target significantly increases. Interactions become insignificant when dummies for secured loans (*DumSecured*) and fixed-rate loans (*DumFixed*) are excluded. However, excluding these loan-level controls does not noticeably alter the coefficients on the after-merger dummies for large loans.

In Panel B of Table 5, I focus on mergers of non-mega acquirers with gross total assets of less than $10 billion. Spreads on small loans decline, on average, by 9.5 basis points during the first year and by 14.7 basis points during the third year post merger. The decline during the second year is 7.5 basis points but is not statistically significant. However, I expect the second-year reduction in spreads to be significant for relatively larger mergers, since the coefficient on the interaction of the size ratio with the second-year after-merger dummy (5.4 basis points) is negative and significant. For large loans, the coefficients on after-merger dummies are not statistically significant.

2.6 Changes in loan portfolios following mergers

One potential explanation for my findings is that there could conceivably be a change in the riskiness of the acquirer's loan portfolio following the merger. Since STBL data do not link loans to the firm characteristics of the borrowers, I cannot directly control for changes in these characteristics, nor can I track existing borrowers of the acquirer post merger. However, loan characteristics can be used as proxies for the borrower characteristics in all regressions.

Additionally, since targets are, on average, much smaller and riskier than their acquirers (see Table 1), the additions to the acquirer's portfolio are likely to be relatively smaller and riskier borrowers of the targets. Hence, if kept in the portfolio, such borrowers should increase, rather than decrease, the portfolio's riskiness. Because STBL primarily covers large banks, I can identify only 30 targets of the 350 mergers in the sample that are likely to be relatively larger targets. Yet, spreads on target portfolios are, on average, 34 basis points *greater than* the spreads on acquirer portfolios (significant at the 1% level) one quarter prior to the merger. This difference is significant both for small loans (at the 1% level) and for large loans (at the 5% level). Consequently, it is unlikely that changes in loan portfolios explain the reduction in spreads, since loans acquired in the merger tend to be riskier than the acquirer's loans.

I also run my main regressions using only pro-forma banks, pooling loan-level observations of these 30 targets in the survey and their 23 acquirers before the mergers. Panel C of Table 5 presents the regression results from comparing the spreads of the pro-forma banks to the spreads of the acquiring banks after the mergers. There is a marked increase in the economic significance of the after-merger dummies, especially for small loans. The coefficient on the first-, second-, and third-year dummies are -35.4 and -49.5 (both significant at the 1% level), and -39.5 basis points (significant only at 12% level), respectively. For large loans, these coefficients

become significant only for relatively larger acquisitions. The coefficient on the interaction of the size ratio with the third-year after-merger dummy is -56.9 basis points, significant at the 1% level.

Nevertheless, to examine whether an after-merger improvement in the quality of acquirer loan portfolios is driving the findings, I perform a number of tests using all the available loan- and bank-level data. First, I use the internal risk-ratings of individual loans, which the STBL started covering in the second quarter of 1997. The survey classifies banks' internal risk ratings on a 1-5 scale, where a higher number indicates greater risk. Table 6 presents the estimates when I use all loans (Panel A) and only small loans (Panel B), for the time period for which internal risk ratings for individual loans are available (There are 100 mergers in the sample after the first quarter of 1997.) Columns (1) and (2) of each panel show regressions for all mergers without and with risk ratings as controls, respectively. Columns (3) and (4) show the same regressions for only the non-mega acquirers, those with gross total assets of less than $10 billion. I exclude the dummy variable that corresponds to the safest risk category, *RiskRating=1*. Compared to the loans in the safest risk category, loans in the riskier categories have, on average, significantly higher spreads. Moreover, the main results still hold. For all loans and all mergers, the average decline in loan spreads is 16.6 and 7.9 basis points during the first and second years after the merger. The significant post-merger reduction in loan spreads is robust to including risk ratings as controls, and, as in the previous analyses, it is larger and more persistent when mega-acquirers are excluded. Panel B of Table 6 shows similar results with economically larger coefficients for the subsample of small loans. Since banks use characteristics of borrowing firms in assigning internal risk ratings, controlling for risk ratings alleviates concerns that improvements in borrower quality are driving my findings.

[Place Table 6 around here]

I also examine whether there is any post-merger change in the average and median risk ratings and the percentage of each rating category within the loan portfolio, using data from the time period for which the risk rating data are available. In a regression using the mean (median) rating as the dependent variable and the one-year after-merger dummy as the independent variable, the coefficient of the after-merger dummy is 0.05 (0.03) with a *t*-statistic of 0.49 (0.28). Further, when the percentages of each rating category in loan portfolios are used as dependent variables, the coefficient of one-year after-merger dummy (not reported) is not statistically different from zero. These findings suggest that when using the internal risk rating of banks, risk does not decrease following mergers.

Second, I use the nonperforming loans ratio of the acquirer as a proxy for changes in the riskiness of the loan portfolio. A regression of the nonperforming loans ratio on the three-years-after-merger dummies suggests that, relative to the same ratio before the merger, the ratio, and hence the riskiness, of the acquirer's loan portfolio post merger does not change.[11] I also check for a possible longer-term change by using five-year after-merger dummies and the conclusions remain unaltered.

Loan characteristics are used as control variables in all regressions. Therefore, possible changes in the volume of certain types of loans within the acquirer's portfolio post merger are unlikely to drive the results. Nevertheless, I run regressions (not reported) relating the ratio of the volume of loans with certain characteristics to the total volume of loans of a given bank on after-merger dummies. For example, the main results of this paper would be similar if, given loan size, the volume of secured loans, or fixed-rate loans, or loans under commitment were to increase in

[11] The coefficients for all three years after the merger are both economically and statistically not different from zero. The results are available from the author upon request.

bank portfolios after the merger. The only significant coefficients in these regressions are on the first-year after-merger dummy for secured loans and for floating-rate loans. As Table 3 shows, secured loans and floating rate loans have higher spreads, given their size; therefore, these positive coefficients would not drive the results. On the contrary, they would bias first-year results in the opposite direction.

I also analyze the changes in loan characteristics for small and large loans and for the subsamples that I analyze in the remainder of the paper. Further, I run all regressions by excluding very short-term or very long-term loans. I also exclude demand loans with no stated maturity. My findings are robust to all these checks.

3. Market Overlap and Target's Market Structure

It is likely that the potential for cost savings and market power depends on the geographical overlap of markets between the acquirer and the target. Therefore, in this section, I consider the extent to which market overlap affects the change in loan spreads following mergers.

3.1 In-market compared to out-of-market mergers

I define in-market mergers as mergers of two banks that both serve at least one common banking market before the merger. In contrast, out-of-market mergers are market-extension mergers, in which the target and the acquirer do not have any market overlap. In-market mergers have much more potential than out-of-market mergers for exercising market power and creating efficiency gains. First, compared to a merger with no market overlap, the concentration of the after-merger banking market, hence the market power of the acquirer, is more likely to increase. Second, the consolidated bank will probably have more offices to consolidate, more overlapping operations

from which to choose the most efficient, more common local expertise to share, and consequently more synergy to create.[12]

For out-of-market acquirers, there is no potential for efficiency gains through consolidating operations or closing the least efficient of overlapping branches. However, the consolidated bank can enjoy other types of cost efficiencies, such as scale economies. Moreover, if one motive for the merger is to expand market share, these merged banks are likely to offer lower rates to gain more market share.

Separating in-market mergers and market-extension mergers in the U.S. is a relatively difficult task, since most of the banks, especially the larger ones, operate in many markets. Thus, the target and the acquirer can overlap in some markets but not in others. Since branch-level loan data are not available for the U.S. commercial banks, I use their deposit shares in each market. Because the Justice Department and banking authorities also use the deposit market shares of banks to calculate the concentration in local banking markets (e.g., Hannan and Prager, 1998), assuming that banks generally make loans in the same markets where they collect deposits is not unreasonable. In the U.S., antitrust analyses define a banking market as a Metropolitan Statistical Area (MSA) or a non-MSA rural county. Equation (2) defines the market overlap between the acquirer and the target:

$$MrktOverlap = \frac{\sum_{n} \min(Deposit_{Acq}, Deposit_{Trgt})}{\sum_{n} (Deposit_{Acq} + Deposit_{Trgt})}, \qquad (2)$$

where $Deposit_{Acq}$ and $Deposit_{Trgt}$ are, respectively, the total deposits of the acquirer and the target in n markets, in which either the acquirer or the target operates.[13] I construct *MrktOverlap_Trgt*

[12] See Houston and Ryngaert (1997), DeLong (1998), Kane (2000), and Houston, James, and Ryngaert (2001). These studies show that gains to stockholders of the target and/or the acquirer are positively correlated with the geographical overlap between the merging banks. Penas and Unal (2004) show a similar effect for the bondholders.

by replacing the denominator of the above ratio with the total deposits of the target. Mean (median) *MrktOverlap* is 0.044 (0.013) and mean (median) *MrktOverlap_Trgt* is 0.554 (0.769). In 33% of all mergers, the target and the acquirer have zero market overlap, and in about 71% of all mergers they overlap less than the mean overlap of 0.044. So the majority of the mergers in the sample are in-market mergers with some, but not full, market overlap.

To examine the effect of the market overlap on spreads, I consider subsamples of mergers with different degrees of market overlap. The first subsample consists of merger-quarters in which the acquirer and the target have zero market overlap before the merger. I label these pure market-extension mergers "Out-of-Market Mergers**.**" The remaining mergers, which are between banks that have at least one overlapping market before the merger, I label as in-market mergers. I classify the subgroup of in-market mergers, for which *MrktOverlap* is in the upper 25th percentile and *MrktOverlap_Trgt* is larger than or equal to its mean value, as "In-Market Mergers with Large Market-Overlap." Note that since the upper 25th percentile value of the *MrktOverlap_Trgt* is one (i.e., full overlap), the mean ratio is used as a cutoff. The conclusions are robust to using the median ratio or restricting the *MrktOverlap* to be larger than its mean value. I designate the remaining in-market mergers as "In-Market Mergers with Small Market-Overlap." If the acquirer has even a single branch in one of the target's markets, the consolidation is treated as an in-market merger with a small market overlap. Merger-quarters that have both in-market and out-of-market mergers are excluded (only 12 in number).

An acquirer can also have different types of mergers that follow each other over a short time. To have a clean test of the effect of different types of mergers on spreads, an in-market merger (out-of-market merger) of a given acquirer is included only if it happens not less than

[13] Houston and Ryngaert (1997) and Houston, James, and Ryngaert (2001) use a similar equation but with the number of bank branches rather than total deposits.

three years after an out-of-market merger (in-market merger) of the same acquirer. The final sample consists of 42 "Out-of Market," 84 "In-Market with Small Market-Overlap," and 50 "In-Market with Large Market-Overlap" merger-quarters.

In Table 7, I analyze two subsamples of mergers based on the market overlap between the acquirer and the target. For mergers in which there is zero market overlap (Panel A), the only statistically significant change in loan spreads is a decline of 8.3 basis points for small loans in the first year after the merger (significant at the 10% level). Consistent with the hypotheses, the results both statistically and economically become less significant when only out-of-market mergers are analyzed.

[Place Table 7 around here]

Panel B of Table 7 presents findings for the "In-Market Mergers with Small Market-Overlap," for which there is more potential for cost savings and not much concern for an increase in market power. The decline in loan spreads during the first and second year after the merger increases to, respectively, 15.4 and 12.9 basis points for all loans, and 21.1 and 17.6 basis points for small loans. These coefficients are statistically significant at the 1% level, and they are also statistically different from those in Panel A. Further, spreads on large loans decline by 7.6 and 6.5 basis points (both significant at the 5% level), and 9.8 basis points (significant at the 10% level), during the first, second, and third years after the merger. In other words, the reduction in spreads is much larger for in-market mergers with small overlap than for out-of-market mergers.

Panel A of Table 8 shows the regression results for the subsample of "In-Market Mergers with Large Market-Overlap." As explained above, this subsample could include some mergers that have so much overlap as to create some concerns for market power, but also have much more potential for efficiency gains. Coefficients on the after-merger dummies are -10.7 basis

points for the first year, which is significant at the 5% level; -10 basis points for the second year, which is significant at the 10% level; and -12.8 basis points for the third year, which is not statistically significant. For small loans, these coefficients become -13.5 basis points for the first year, -15.5 basis points for the second year, and -22.2 basis points for the third year, all of which are significant at the 5% level. For large loans, the coefficient on the first-year after-merger dummy, -7.2 basis points, is also statistically significant at the 10% level. These findings suggest that for this subsample, the market power effect is, on average, outweighed by the higher potential for efficiency gains.

[Place Table 8 around here]

Panel B of Table 8 presents results for the upper 10^{th} percentile cutoff, which corresponds to a market overlap of 0.124. These 26 mergers, which have much more potential to increase the concentration of banking markets, result, on average, in 17.4, 15.4, and 28.8 basis points higher spreads for large loans for the first, second, and third years after the merger. The third-year increase is statistically significant at the 1% level. Following Hannan and Prager (1998), I also analyze mergers that produce a pro-forma increase in the target-market Herfindahl-Hirschman Index of at least 200 points to a post-merger pro forma index of at least 1800. The spreads on large loans increase significantly after these mergers, but the sample includes only nine of them.

The insignificant change in spreads on small loans is puzzling. One explanation might be the political pressure that banks might face if they were to increase interest rates for small enterprises after mergers. Another explanation could be, as in Calomiris and Pornrojnangkool (2005), that medium-sized borrowers are more likely to be hurt by the increased market power because they are not large enough to access capital markets, and hence are constrained by

relatively larger acquirers in their regions. On the other hand, small borrowers have the alternative of borrowing from small banks.

The findings of this section suggest that, consistent with theory, the relation between spreads and the extent of market overlap between merging banks is non-monotonic. Market overlap increases cost savings and therefore lowers spreads, but when the overlap is sufficiently large, spreads increase, potentially due to the market-power effect dominating the cost savings.

3.2 The effect of the target's market structure

Out-of-market acquirers can have motives for strategic price cuts to extend their market share, depending on the structure of the markets. I use branch-level SOD data as of two quarters before the merger to calculate the percentage of deposits held by different sizes of banks for all targets' markets (as in Berger, Rosen, and Udell, 2001). I define "Small Banks' Markets" as markets in which the market shares of small and medium-sized banks (banks with gross total assets of less than $1 billion) are greater than their median market share (0.35) of all their markets. I define "Large Banks' Markets" as markets dominated by banks with gross assets of more than $1 billion.

Table 9 presents the results for two subsamples of "Out-of-Market" mergers: mergers into "Large Banks' Market" and into "Small Banks' Market." Panel A shows that when out-of-market acquirers enter new markets where a large bank already dominates, they reduce spreads in the first year. This first-year reduction is, on average, 18.5 basis points (significant at the 5% level) for all loans, 20 basis points (significant at the 1% level) for small loans, and 7.9 basis points (not significant at the 10% level) for large loans. Panel B shows the findings for market-extension mergers into Small Banks' Market, where there is no significant change in the spreads

within the first year post merger. If a large acquirer enters a market dominated by small banks, there is no need to reduce spreads to gain market share, since a big acquirer is already more efficient, and therefore charging lower prices on a given loan [see Berger and Udell (1996) who show that large banks typically charge lower interest rates on even small-business loans].[14]

[Place Table 9 around here]

4. Is the Reduction in Spreads Due to Efficiency Gains?

The findings on the market overlap between the acquirer and the target are consistent with theories on efficiency and market power effects. I consider now direct evidence on both the extent to which the decline in spreads is due to efficiency gains and the persistence of these gains.

4.1 Operating efficiencies

Following Focarelli and Panetta (2003), I compare the operating-cost ratios (operating expense over operating income) of the acquirers as of the second year-end after the merger to the operating-cost ratios of the pro-forma banks as of the year-end before the merger. Using the operating-cost ratio is not an ideal way to measure efficiency gains, but I expect acquirers with a larger decline in operating-cost ratios to reduce spreads more than the acquirers with a smaller decline, or even an increase, in these cost ratios.

A decline in the operating cost ratio could be due to both a reduction in operating costs ("cost efficiencies") and also an increase in quantities given prices ("profit efficiency").

[14] As a caveat, there could be some unobservable variables that affect the type of the merger or the structure of the targets' markets and the spreads contemporaneously. Hence, the results could be due to correlation instead of causation.

Akhavein, Berger, and Humphrey (1997) argue that profit efficiencies must also be considered in evaluating merger gains. However, when I calculate the operating cost ratio by using total assets instead of the operating income in the denominator, the results are unaltered.

Table 10 presents the results based on the subsample of mergers, after which "Operating Cost Ratio Declined More than Median" and "Operating Cost Ratio Declined Less than Median" (2%) decline in operating cost ratios. For a clean test, I include a merger with larger (smaller) than median decline only if it is not within three years after another merger with a smaller (larger) than median decline in the cost ratio, ending up with 85 (81) mergers. Also I exclude mergers with the market overlap in the upper 10^{th} percentile from this sample, since, as Panel B of Table 8 shows, the loan spreads, on average, widen after these mergers. The decline in spreads is both economically and statistically much larger for the subsample with a larger than median decline. The difference between subsamples is highly statistically significant.

[Place Table 10 around here]

For the acquirers with a less-than-median decline in their cost ratios, the only significant reduction in spreads is for all loans in the second year after the mergers. This reduction is 8.6 basis points, which is significant at the 10% level. However, mergers with a more-than-median decline in operating cost ratios show a decline of 18.5 and 15.4 basis points, both of which are significant at the 1% level, and 12.3 basis points, which is significant at the 10% level, for all loans during the first, second, and third years post merger, respectively. The decline for small loans is 21.2 and 15.1 basis points, both significant at the 1% level, during the first and second year after the merger. For small loans, the interaction of the second-year after-merger dummy with the merger-size ratio is also negative and significant, with a coefficient of -6.8. More importantly, if operating efficiencies are higher, then the effects of the merger are also reflected

in large loans. Acquirers that enjoy larger than median decline in their operating costs reduce basis point spreads by 21.1 and 25.8, both of which are significant at the 1% level, and 34.3, which is significant at the 5% level, in respectively, the first, second, and third years after their mergers.

It is worth mentioning that the economic significance of the fall in spreads could be understated since the sample includes the acquirer's loans in targets' markets, as well as in other markets. Although technological improvements prevent large banks from price discrimination in different markets, I expect the effect on spreads to be larger in the targets' markets.

4.2 Temporary versus persistent decline in spreads

A possible explanation for the decline in spreads is that it is not due to efficiency gains, but to some strategic price cuts that are later reversed. Consistent with this explanation is the fact that the reduction in spreads appears to disappear during the third year following the merger in some regressions.

However, when I analyze mergers with larger-than-median decline in operating costs (Table 10, Panel A), the third-year coefficients are both statistically and economically significant for the all-loans sample and the large-loans subsample. Further, the significant third-year decline after in-market mergers with both small (Table 7, Panel B) and large overlaps (Table 8, Panel A) and the findings when I exclude mega acquirers (Panel B in both Tables 4 and 5) constitute important evidence that declines in spreads do not disappear in the third year after mergers with more potential for cost savings.

Instead of focusing on only the three years before and after the merger, I also run the same set of regressions by using an alternative after-merger dummy. For a given acquirer and

without differentiating the merger type, the dummy is equal to one in all the quarters after its first merger, and to zero otherwise. Although not reported, regressions using this after-merger dummy result in an 11.1 basis point decline (significant at the 10% level) for small loans. So, regardless of the length of the event window analyzed, on average, spreads decline after consolidation.

4.3 Changes in quantity of bank services after the mergers

I further examine whether the results of this paper are driven by an after-merger decrease in demand for the quantity of bank services. A demand-decreasing story would be consistent with my main findings if, for example, banks merged in response to anticipating a decrease in demand for the merging banks. To distinguish between such a story and my argument of decreasing marginal costs due to mergers, I test for changes in the quantity of bank services provided by the merged bank. Using the FDIC's SOD data to determine the branch-level data on the deposit shares of banks, I find that the average increase in the market share of the acquirer, when compared to the market share of the pro-forma bank (target plus acquirer before the merger), is 2.6%, which is significant at the 1% level. Such an increase in bank services supplied by the merged bank is consistent with lower marginal costs and the reductions in loan spreads resulting from mergers.

5. Deregulation as an Exogenous Instrument for the Timing of Mergers

As noted, the merger sample spans 1990-2000 because of the large increase in the number of mergers during this period. This increase was mainly due to the removal of intrastate and interstate banking restrictions during the 1980s and early 1990s. Deregulation has been widely recognized in other studies as the main reason for the merger wave of the last decade (e.g.,

Mulherin and Boone, 2000; and Andrade, Mitchell, and Stafford, 2001). However, acquirers could conceivably have timed their mergers before the declines in their average spreads. To alleviate concerns on the endogeneity of the timing of the mergers, I use the variation in banking deregulation dates across states as an instrument for the dates of the mergers. Since the results are mainly driven by in-market mergers, the year in which each state allowed "intrastate branching through mergers and acquisitions" is used as the instrument for the timing of in-market mergers [Kroszner and Strahan (1999) provide deregulation dates]. Jayaratne and Strahan (1998, p. 259) argue that the timing of the banking deregulation was exogenous and that "States were just as likely to deregulate branching restrictions during the downswings of the business cycles as during the upswings."

Table 11 presents regression results of the market-level spread on *WithinAfterMrgrThree*, which is instrumented. *WithinAfterMrgrThree* is an indicator variable that is equal to one in all quarters for the three years after an in-market merger if the target operates in that given market, and equal to zero for the three years before the merger. In other words, it spans three after-merger dummies that are used as the main explanatory variables in the previous regressions. The instrumental variable, *Aftr_IntraStateDeregulation*, takes the value of one in all quarters after a state is deregulated if a given market is within that deregulated state, and zero otherwise.[15]

[Place Table 11 around here]

The observations are at the market-quarter level. Hence, the dependent variable is the average loan spread per market, averaged by incorporating the characteristics of the loans

[15] In this section, I extend the sample period so that my analysis can include the 26 states that deregulated their "intrastate branching restrictions through mergers" between 1985 (since my loan-level data go back to only 1985) and 1994. The number of states reduces to, for example, eight if I focus only on the states that deregulated starting in 1990. As a robustness check, I rerun loan-level regressions of the previous sections for this time period. The results remain unaltered.

(whether the loan is secured or not, whether it is under commitment or not, whether it is fixed-rate or not, and whether it is a small-business loan or not) that I used as controls in previous regressions. Each regression includes both time fixed effects (quarter dummies) and market fixed effects. Standard errors are corrected for the clustering of observations at the state level.

Table 11 shows that the decline in the average spread for all loans is about 4.1 basis points during the three years following the merger, but is not statistically significant. However, when I run the same regression for small loans, the coefficient of the predicted three-year after-merger dummy becomes -14.2 basis points, which is significant at the 10% level. Although not reported, the coefficient of the instrument in the first stage is 0.166, which is significant at the 10% level (with an adjusted R-squared of 41%). Clearly, the conclusions of the previous sections are robust to using dates of intrastate banking deregulation as an instrument for the timing of in-market mergers.

6. Effect of Bank Mergers on Small-Business Lending

Although I have shown the favorable pricing effects of mergers on small loans, one question that remains to be answered concerns the effect of mergers on the availability of these small loans. STBL does not provide any borrower information and therefore it is not possible to track what happens to the small borrowers of the pro-forma bank after the merger. I use the June Call Reports, where commercial banks report their aggregate amounts of loans drawn under credit lines of less than $1 million. Unfortunately, the data are annual and became available only after 1993.[16]

[16] Some banks might have reported incorrectly in 1993 due to the ambiguity in instructions, which was corrected in 1994. In order to minimize possibilities of inaccuracy in the data, I dropped observations for 1993 from the sample.

The small-business lending of the pro-forma bank is the sum of the amounts of small-business loans (i.e., those loans with commitments of less than $1 million) in the portfolios of the acquirer and the target before the merger, over their gross total assets. I compare this ratio to the same ratio of the acquirer after the merger. For each merger-year, to examine the statistical significance of the change in ratios after the merger, I run a mean difference test for all mergers and subsamples based on the acquirer size. Since the data are annual, the test uses 122 merger-years, including all mergers of a given acquirer in a given year.

The mean difference test indicates that the change in the mean ratios is negative, but not statistically significant, even for the mega-acquirers subsample. For all mergers, the mean difference is -0.0014 with a *t*-statistic of -1.35. For mega acquirers, i.e., those acquirers with gross total assets of at least $10 billion, it is -0.0019, with a *t*-statistic of -1.42. In fact, for 37 of the total 122 merger-years, the change in the small-business lending ratio is positive, meaning that after the mergers, some acquirers increase small-business lending beyond the small borrowers of the target.

These results indicate that acquirers do not drop all the small-business lending of the smaller targets after the mergers. However, it is possible that they drop very risky borrowers and either keep the relatively transparent ones or obtain new small borrowers through the targets' markets. The reason for the increase in small-business lending in acquirer portfolios could be shifts in lending technologies after the mergers or the diversification motives of the acquirers. Moreover, technological improvements, e.g., credit scoring models, that enable small-business owners to provide more "hard" information about their companies could be the main reason for these small-business loans to stay in large acquirers' portfolios.

7. Conclusion

This paper provides evidence supporting the hypothesis that, on average, bank mergers benefit borrowers through lower interest rates. The after-merger reductions in spreads appear to be related to efficiency gains that are passed on to the borrowers. These efficiencies could be created by changes in lending technologies and diversification of risk, which potentially could have affected the spreads in a relatively short time after the merger. Additionally, the reduction in spreads could be due to scale and/or scope efficiencies, which are likely to have taken longer to be realized. The decline in spreads is both economically and statistically stronger for the mergers with a larger-than-median decline in their operating cost ratios than for the mergers with a smaller-than-median decline in their operating cost ratios. Furthermore, compared to market extension mergers, the decline in spreads is much larger for in-market mergers, in which the acquirer and the target have some market overlap before the merger, and, consequently, more potential for cost savings. However, the effect does not increase monotonically with the market overlap. If the geographical overlap between merging banks is so extensive as to significantly increase the concentration in the banking markets, then on average, the spreads tend to increase after the mergers.

Since targets typically have smaller and riskier loans, the average interest rate in the acquirer's portfolio is likely to increase after the acquirer's portfolio is consolidated with that of the target. However, controlling for loan characteristics, I show that on average, acquirers charge lower rates on their new loans, and that this decline is highly significant for small loans. This latter finding provides evidence for the favorable effects of bank mergers for small businesses.

Although the findings suggest that efficiency gains due to bank mergers are passed on to the borrowers, it is possible that the reduction in spreads results from changes in borrower

characteristics. However, my analysis suggests that this possibility is highly unlikely to be driving the results. The mean and median risk ratings of individual loans, which are available for the later part of the sample period, as well as the nonperforming loans ratio of the acquirers, do not change at all after the mergers. It is unlikely, therefore, that major shifts in the riskiness of loan portfolios are the explanation for the drop in spreads following mergers.

In addition to the pricing effect of mergers, I also explore the effect of mergers on the loan availability to small businesses. After mergers, acquirers could conceivably drop risky, opaque borrowers in the targets' loan portfolios. However, I find that the amount of small-business lending by the acquirer increases after the merger. Additionally, the average change in the ratio of small-business lending of the acquirer after the merger compared to the same ratio of the pro-forma bank before the merger is not statistically significant at the 10% level. The data for the quantities of small-business lending are available only after 1993, and this period mostly coincides with the implementation of credit-scoring technologies for commercial loans. Therefore, technological improvements applied to commercial lending could explain the insignificance of the mean change in small-business lending ratios. These improvements have created opportunities for large banks to acquire more “hard” information about small businesses.

In conclusion, larger acquirers do not impose less-favorable pricing terms on small businesses seeking to borrow. In fact, my findings show that small borrowers typically pay lower interest rates to banks that have expanded during the previous few years through mergers. The favorable effects of the mergers that is reflected in small-business loan prices might indicate that large banks now value small-business lending much more in their portfolios. However, DeYoung, Glennon, and Nigro (2008) provide empirical evidence that lenders that use credit-scoring models experience higher default rates, and Berger, Frame, and Miller (2005) show that

credit scoring is associated with higher prices and more risk for the small loans with a loan size of less than $100,000. How improvements in small-business-lending technologies will affect the composition and the riskiness of large banks' loan portfolios is a topic that deserves further research.

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Table 1
Statistics of banks in Survey of Terms of Business Lending (STBL)

	PANEL A: All Banks in STBL					
	Mean	Median	Std. Dev.	Minimum	Maximum	*N* of Obs.
Total Assets ($ million)	9,749	1,202	32,903	4.1	665,928	21,133
Sum of Total Assets ($ billion)	2,731	2,288	631.5	1,971	4,082	68
STBL Assets/ All Banks' Assets	0.53	0.52	0.03	0.46	0.6	68
Total Loans ($ million)	5,608	719	17,749	2	318,575	21,133
Sum of Total Loans ($ billion)	1,589	1,432	327.4	1,068	2,239	68
STBL Loans/ All Banks' Loans	0.52	0.52	0.03	0.44	0.58	68
Total Deposits ($ million)	6,582	977	20,884	3.9	381,235	21,133
Sum of Total Deposits ($ billion)	1,867	1,670	334	1,376	2,625	68
STBL Deposits/ All Banks' Deposits	0.50	0.49	0.04	0.43	0.58	68
Capitalization	0.08	0.08	0.028	0.0002	0.54	21,133
ROA	0.009	0.01	0.009	-0.18	0.05	19,414
Non-Performing Loans Ratio	0.021	0.012	0.027	0	0.53	21,133

	PANEL B: Acquirers in STBL					
	Mean	Median	Std. Dev.	Minimum	Maximum	N of Obs.
Total Assets ($ million)	16,014	6,100	24,922	145.3	177,083	263
Total Loans ($ million)	10,290	3,334	16,842	58.9	107,340	263
Total Deposits ($ million)	11,558	4,730	17,394	125.4	118,532	263
Capitalization	0.079	0.076	0.016	0.043	0.154	263
ROA	0.012	0.012	0.005	-0.004	0.034	254
Non-Performing Loans Ratio	0.012	0.008	0.012	0.001	0.1	263

	PANEL C: Targets of Acquirers in STBL					
	Mean	Median	Std. Dev.	Minimum	Maximum	N of Obs.
Total Assets ($ million)	1,419	184	5,738	13.4	43,642	333
Total Loans ($ million)	809	90.8	3,449	6.58	43,642	333
Total Deposits ($ million)	1,104	156	4,365	12.2	50,496	333
Capitalization	0.09	0.085	0.04	0.001	0.32	333
ROA	0.007	0.009	0.012	-0.18	0.05	321
Non-Performing Loans Ratio	0.015	0.009	0.019	0	0.13	333

The statistics in Panel A describe the entire sample of bank-quarters covered by Survey of Terms of Business Lending (STBL) from 1987 to 2003. Panels B and C list the summary statistics for the sample of acquirers in the STBL and their targets, as of one quarter before the merger. *Total assets* are the gross total assets of the bank from the Call Reports, and descriptive statistics refer to each bank-quarter. *Sum of Total Assets* is the quarterly sum of the gross total assets of STBL banks. The ratio below this variable corresponds to this value expressed as a percentage of all banking assets in a given year. The GDP price deflator is used to express total assets, total loans, and total deposits in 2003 dollars. *Capitalization* is the ratio of equity to gross total assets. *ROA* is the net income over total assets at the end of the previous year. *Non-performing Loans Ratio* equals to the ratio of loans 90 days late plus loans not accruing, to the total loans.

Table 2
Statistics of loan data

	Average Face Value ($)	Average Commitment Value ($)	Average Spread (%)	% Under Commitment	% Secured by Collateral	% With Floating Rate
	(1)	(2)	(3)	(4)	(5)	(6)
All Loans	727,143	5,299,670	4.25	82	73	75
LoanSize ≤ $100,000	25,508	32,374	5.08	60	73	74
$100,000 < *LoanSize* ≤ $250,000	69,516	181,287	4.69	75	79	82
$250,000 < *LoanSize* ≤ $1 million	128,205	673,184	4.36	84	81	84
$1 million < *LoanSize* ≤ $25 million	911,396	7,069,819	3.77	93	72	78
LoanSize > $25 million	8,800,502	62,119,570	2.75	96	51	80

The statistics describe 2,160,883 loan-level observations of the Survey of Terms of Business Lending (STBL) for the time period from 1987 to 2003. The row titled "*All Loans*" corresponds to all of the loans covered in the survey. The remaining rows differentiate subsamples based on the loan size (*LoanSize*), which is equal to the total commitment amount when the loan is drawn under commitment, and otherwise to the face value of the loan. Column (1) presents the average face value of the loans. Column (2) lists mean values of total commitment amount for the loans drawn under commitment. In Column (3), *Spread* is the effective annual interest rate on the loan minus the Treasury rate of equal duration. Columns (4)-(6) present bank-quarter level mean values of the percentage of total loans made under commitment, secured by collateral, and with a floating rate. Each variable in Columns (4)-(6) is weighted by the loan size.

Table 3
The effect of bank mergers on loan prices - "All Loans" sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
AftrMrgrOne	-0.069	-0.074	-0.097	-0.090	-0.096	-0.091	-0.091
	(2.12)**	(2.13)**	(2.82)***	(2.82)***	(2.73)***	(2.84)***	(2.59)**
AftrMrgrTwo	-0.112	-0.096	-0.127	-0.081	-0.073	-0.074	-0.058
	(3.52)***	(3.17)***	(3.67)***	(3.47)***	(3.01)***	(2.87)***	(2.12)**
AftrMrgrThree	-0.024	-0.029	-0.019	0.020	0.011	-0.005	-0.026
	(0.65)	(0.79)	(0.54)	(0.59)	(0.30)	(0.15)	(0.70)
AcquirerSize	0.077	0.073	0.062	0.015	0.003	0.001	-0.007
	(1.06)	(1.06)	(0.88)	(0.26)	(0.06)	(0.01)	(0.12)
NonperformRatio	1.431	1.704	1.480	1.510	1.715	1.387	1.553
	(1.08)	(1.22)	(1.11)	(1.13)	(1.24)	(1.01)	(1.09)
*AftrMrgrOne*SizeRatio1*		-0.023			0.054		0.017
		(0.38)			(1.06)		(0.42)
*AftrMrgrTwo*SizeRatio2*		-0.096			-0.023		-0.063
		(1.71)*			(0.83)		(1.94)*
*AftrMrgrThree*SizeRatio3*		0.029			0.047		0.067
		(0.34)			(1.05)		(1.13)
LoanSize				-0.292	-0.292	-0.283	-0.284
				(10.91)***	(10.52)***	(12.55)***	(12.18)***
DumSecured			0.426	0.422	0.430	0.464	0.465
			(6.80)***	(8.99)***	(9.04)***	(9.27)***	(9.16)***
DumFixed			-0.832	-0.808	-0.806	-0.885	-0.866
			(7.95)***	(7.09)***	(7.00)***	(8.41)***	(8.21)***
DumCommit			-0.465				
			(4.35)***				
StateDummy						-0.076	-0.077
						(1.75)*	(1.85)*
MrktHHI						0.131	0.150
						(0.84)	(0.93)
AverageSpread	0.941	0.939	0.947	0.953	0.953	0.946	0.945
	(12.58)***	(12.53)***	(11.75)***	(15.23)***	(15.29)***	(14.08)***	(14.07)***
Adj. R^2	0.17	0.18	0.23	0.40	0.40	0.40	0.40
N of Obs.	655,157	634,915	655,155	655,155	634,913	583,649	568,694

The dependent variable is *Spread*, the effective annual interest rate on the loan minus the Treasury rate of equal duration. *AftrMrgrOne*, *AftrMrgrTwo,* and *AftrMrgrThree* are dummy variables (for acquirers) equal to zero for 12 quarters before and after the merger, except that *AftrMrgrOne* is equal to one for the first four quarters after the merger, *AftrMrgrTwo* is equal to one for quarters 5 - 8 after the merger, and *AftrMrgrThree* is equal to one for quarters 9 – 12 after the merger. I also include the interactions of these after-merger dummies with *SizeRatio1-3*, which are the corresponding mergers' size ratios of the target over the acquirer. *AcquirerSize* is the natural logarithm of gross total assets of the acquirer as of *t*-1. *NonperformRatio* is nonperforming loans over total loans of the acquirer as of *t*-1. *LoanSize* is the natural logarithm of the commitment amount if the loan is under commitment, and otherwise is the face amount of the loan. *DummySecured* equals one if the loan is secured by collateral of any kind, and is zero otherwise. *DummyFixed* is one if the loan is a fixed-rate loan and zero if it is a floating-rate loan. *DummyCommit* is equal to one if the loan is under commitment, and is zero otherwise. *StateDummy* is a dummy variable equal to one if the target and the acquirer both do business in the same state before the merger. *MrktHHI* is the natural logarithm of the weighted average of the deposit Herfindahl-Hirschman Index of the banking markets of the acquirer. *AverageSpread* is the average spread per quarter for all banks except for the acquirer. Standard errors are corrected for the clustering of observations at the bank level. Heteroskedasticity-robust *t*-statistics are in parentheses. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4
The effect on loan prices with "After-Merger" compared to the "After-Last-Merger" dummies - "All Mergers" sample and "Non-Mega Acquirers" subsample

	PANEL A: All Mergers		PANEL B: Non-mega Acquirers	
	After-Merger Dummies	After-Last-Merger Dummies	After-Merger Dummies	After-Last-Merger Dummies
	(1)	(2)	(3)	(4)
AftrMrgrOne	-0.091	-0.172	-0.034	-0.076
	(2.84)***	(3.32)***	(0.65)	(1.01)
AftrMrgrTwo	-0.074	-0.152	-0.040	-0.086
	(2.87)***	(3.11)***	(0.74)	(1.22)
AftrMrgrThree	-0.005	-0.086	-0.154	-0.172
	(0.15)	(1.32)	(2.69)***	(2.05)**
AcquirerSize	-0.007	0.025	0.115	0.112
	(0.12)	(0.47)	(1.27)	(1.18)
NonperformRatio	1.553	2.060	3.085	3.147
	(1.09)	(1.52)	(1.75)*	(1.77)*
*AftrMrgrOne*SizeRatio1*	0.054	0.054	0.046	0.042
	(1.06)	(1.09)	(1.26)	(1.50)
*AftrMrgrTwo*SizeRatio2*	-0.023	0.000	-0.032	-0.030
	(0.83)	(0.01)	(1.14)	(1.40)
*AftrMrgrThree*SizeRatio3*	0.047	0.048	0.032	0.007
	(1.05)	(1.00)	(0.99)	(0.43)
LoanSize	-0.284	-0.292	-0.269	-0.269
	(12.18)***	(10.48)***	(12.49)***	(12.45)***
DumSecured	0.465	0.429	0.480	0.480
	(9.16)***	(8.96)***	(7.72)***	(7.73)***
DumFixed	-0.866	-0.810	-0.831	-0.830
	(8.21)***	(7.05)***	(9.72)***	(9.72)***
AverageSpread	0.945	0.953	0.983	0.985
	(14.07)***	(15.39)***	(21.50)***	(21.49)***
Adj. R^2	0.40	0.40	0.41	0.41
N of Obs.	634,913	634,913	292,554	292,554

The dependent variable is *Spread*, the effective annual interest rate on the loan minus the Treasury rate of equal duration. Panel A, "All Mergers," includes the whole sample of merger-quarters. Panel B focuses on a subsample of mergers, "Non-Mega Acquirers," with gross total assets less than $10 billion. Columns (1) and (3) use "After-Merger Dummies," *AftrMrgrOne*, *AftrMrgrTwo,* and *AftrMrgrThree*, which are (for acquirers) equal to zero for 12 quarters before and after the merger, except that *AftrMrgrOne* is equal to one for the first four quarters after the merger, *AftrMrgrTwo* is equal to one for quarters 5 – 8 after the merger, and *AftrMrgrThree* is equal to one for quarters 9 – 12 after the merger. Columns (2) and (4) use "After-Last-Merger Dummies," which are created by modifying the variables *AftrMrgrOne* - *AftrMrgrThree* such that, in a given quarter, the corresponding year's after-merger dummy is switched on for only the very last merger. *AcquirerSize, NonperformRatio, SizeRatio1-3, LoanSize,* and other loan-level controls are as defined in the Table 3. All regressions include both time fixed effects and bank fixed effects. Standard errors are corrected for the clustering of observations at the bank level. Heteroskedasticity-robust *t*-statistics are in parentheses. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5
The effect of bank mergers on loan prices – small compared to large loans

	PANEL A: All Mergers		PANEL B: Non-mega Acquirers		PANEL C: Pro-Forma Banks	
	Small Loans	Large Loans	Small Loans	Large Loans	Small Loans	Large Loans
	(1)	(2)	(3)	(4)	(5)	(6)
AftrMrgrOne	-0.174	0.003	-0.095	0.003	-0.354	-0.032
	(4.01)***	(0.10)	(1.69)*	(0.07)	(3.65)***	(0.18)
AftrMrgrTwo	-0.129	-0.011	-0.075	-0.003	-0.495	-0.054
	(3.95)***	(0.53)	(1.25)	(0.05)	(2.94)***	(0.29)
AftrMrgrThree	0.028	-0.015	-0.147	-0.149	-0.395	0.270
	(0.69)	(0.38)	(2.80)***	(1.14)	(1.60)	(1.57)
AcquirerSize	0.128	-0.103	0.191	-0.022	-0.157	-0.207
	(1.93)*	(1.48)	(1.77)*	(0.27)	(3.14)***	(2.03)*
NonperformRatio	0.294	3.988	2.164	4.054	0.609	-0.845
	(0.17)	(2.27)**	(1.04)	(2.46)**	(1.08)	(2.30)**
*AftrMrgrOne*SizeRatio1*	0.029	0.138	0.026	0.344	0.345	-0.309
	(0.80)	(1.46)	(1.27)	(1.52)	(1.37)	(1.50)
*AftrMrgrTwo*SizeRatio2*	-0.053	0.134	-0.054	0.259	0.551	-0.236
	(1.60)	(2.89)***	(1.70)*	(1.32)	(1.32)	(1.18)
*AftrMrgrThree*SizeRatio3*	0.012	0.158	0.021	0.163	0.078	-0.569
	(0.28)	(2.54)**	(1.34)	(0.92)	(0.22)	(3.83)***
LoanSize	-0.265	-0.269	-0.225	-0.271	-0.276	-0.274
	(7.61)***	(11.96)***	(8.34)***	(11.50)***	(4.96)***	(6.76)***
DumSecured	0.132	0.726	0.175	0.802	0.208	0.745
	(2.85)***	(9.09)***	(2.98)***	(10.29)***	(2.78)**	(5.36)***
DumFixed	-0.608	-1.096	-0.659	-1.000	-0.881	-1.092
	(6.23)***	(8.38)***	(7.10)***	(7.65)***	(4.78)***	(6.47)***
AverageSpread	1.008	0.908	1.040	0.919	0.903	1.040
	(20.59)***	(11.63)***	(28.47)***	(14.83)***	(48.70)***	(4.94)***
Adj.R^2	0.29	0.41	0.28	0.45	0.29	0.39
N of Obs.	345,256	289,657	166,183	126,371	70,232	69,035

This table presents the effect of mergers on the loan *Spread* for different subsamples based on *Loan Size*, which is equal to the total commitment amount if the loan is drawn under commitment, and otherwise to the face value of the loan. "Small Loans" are loans with *LoanSize* less than $1 million. "Large Loans" are loans with *LoanSize* larger than $1 million. Panel B focuses on a subsample of mergers, "Non-Mega Acquirers," with gross total assets less than $10 billion. Panel C includes results for only "Pro-forma Banks" using loan-level data for 30 targets (and their 23 acquirers) covered by the survey. *AftrMrgrOne*, *AftrMrgrTwo,* and *AftrMrgrThree* are dummy variables equal to zero for 12 quarters before and after the merger, except that *AftrMrgrOne* is equal to one for the first four quarters after the merger, *AftrMrgrTwo* is equal to one for quarters 5 – 8 after the merger, and *AftrMrgrThree* is equal to one for quarters 9 – 12 after the merger. *AcquirerSize, NonperformRatio, SizeRatio1-3*, *LoanSize, DumSecured, and DumFixed* are as defined in Table 3. *AverageSpread* is the average spread for small or large loans per quarter for all banks except for the acquirer. Regressions include both time fixed effects and bank fixed effects. Standard errors are corrected for the clustering of observations at the bank level Heteroskedasticity-robust *t*-statistics are in parentheses. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6
The effect of bank mergers on loan prices using risk ratings of individual loans as controls

	PANEL A: All Loans				PANEL B: Small Loans			
	All Mergers		Non-mega Acquirers		All Mergers		Non-mega Acquirers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AftrMrgrOne	-0.166	-0.211	-0.027	-0.032	-0.257	-0.295	-0.021	-0.038
	(3.68)***	(3.79)***	(0.44)	(0.49)	(3.29)***	(3.24)***	(0.28)	(0.49)
AftrMrgrTwo	-0.079	-0.084	0.068	0.065	-0.145	-0.147	0.127	0.122
	(3.05)***	(2.95)***	(0.78)	(0.79)	(4.11)***	(4.03)***	(1.28)	(1.36)
AftrMrgrThree	0.038	0.076	-0.282	-0.264	0.068	0.102	-0.250	-0.233
	(0.75)	(1.24)	(3.63)***	(3.25)***	(0.95)	(1.33)	(3.00)***	(2.71)***
*AftrMrgrOne*SizeRatio1*	0.079	0.020	0.080	0.115	-0.010	-0.024	0.009	0.030
	(0.75)	(0.18)	(0.21)	(0.29)	(0.06)	(0.13)	(0.03)	(0.09)
*AftrMrgrTwo*SizeRatio2*	-0.037	-0.098	-0.384	-0.365	-0.112	-0.158	-0.538	-0.546
	(0.49)	(1.13)	(0.57)	(0.55)	(1.26)	(1.70)*	(0.84)	(0.90)
*AftrMrgrThree*SizeRatio3*	0.003	-0.040	0.158	0.184	-0.097	-0.116	0.116	0.103
	(0.05)	(0.59)	(0.67)	(0.65)	(1.05)	(1.22)	(0.56)	(0.43)
RiskRating=2		0.731		1.040		1.048		1.280
		(4.66)***		(6.27)***		(4.94)***		(6.81)***
RiskRating=3		1.257		1.639		1.473		1.880
		(9.14)***		(9.03)***		(6.96)***		(8.89)***
RiskRating=4		1.367		1.816		1.419		2.054
		(9.87)***		(9.82)***		(7.21)***		(10.40)***
RiskRating=5		1.891		2.236		1.772		2.405
		(15.06)***		(11.40)***		(9.60)***		(12.72)***
Adj.R^2	0.40	0.43	0.40	0.45	0.30	0.32	0.31	0.36
N of Obs.	271,760	271,760	72,080	72,080	153,052	153,052	45,848	45,848

This table presents the effect of mergers on the loan *Spread* after controlling for internal risk ratings of individual loans. In the regressions I use the later part of the data, since risk ratings are available only after the first quarter of 1997. "Small Loans" are loans with *LoanSize* less than $1 million. "Large Loans" are loans with *LoanSize* larger than $1 million. "Non-Mega Acquirers" are acquirers with gross total assets less than $10 billion. *AftrMrgrOne*, *AftrMrgrTwo, AftrMrgrThree, and SizeRatio1-3* are as defined in Table 3. Variables included in all regressions but not reported below are *AcquirerSize, NonperformRatio, LoanSize, DumSecured, DumFixed, and AverageSpread*. They are defined in Table 3 except that *AveregeSpread* includes only small loans in the Panel B. *RiskRating=2-5* are dummy variables that represent the risk ratings of individual loans. A higher number indicates greater risk. I leave out the dummy variable corresponding to the safest risk category. All regressions include both time fixed effects and bank fixed effects. Standard errors are corrected for the clustering of observations at the bank level. Heterokcedasticity-robust *t*-statistics are in parentheses. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7
The effect of "Out-of-Market" compared to "In-Market" mergers on loan prices

	PANEL A: "Out-of-Market" Mergers			PANEL B: "In-Market" Mergers with Small Market-Overlap		
	All Loans	Small Loans	Large Loans	All Loans	Small Loans	Large Loans
	(1)	(2)	(3)	(4)	(5)	(6)
AftrMrgrOne	-0.058	-0.083	0.010	-0.154	-0.211	-0.076
	(0.89)	(1.89)*	(0.13)	(3.54)***	(3.81)***	(2.14)**
AftrMrgrTwo	-0.063	-0.057	0.005	-0.129	-0.176	-0.065
	(0.94)	(0.94)	(0.08)	(3.38)***	(3.24)***	(2.07)**
AftrMrgrThree	-0.059	-0.038	-0.028	-0.000	0.021	-0.098
	(0.67)	(0.47)	(0.35)	(0.00)	(0.25)	(1.72)*
AcquirerSize	-0.134	-0.057	-0.133	0.237	0.235	0.260
	(2.39)**	(0.92)	(1.99)*	(3.30)***	(3.46)***	(2.28)**
NonperformRatio	9.087	3.396	10.432	3.755	3.571	11.054
	(1.66)	(0.55)	(2.19)**	(0.81)	(0.60)	(3.01)***
LoanSize	-0.304	-0.309	-0.231	-0.294	-0.246	-0.273
	(9.92)***	(7.87)***	(5.01)***	(6.02)***	(4.35)***	(22.59)***
DumSecured	0.482	0.070	0.937	0.433	0.166	0.742
	(7.00)***	(0.85)	(15.40)***	(10.41)***	(3.95)***	(7.85)***
DumFixed	-1.037	-0.782	-1.238	-0.631	-0.514	-1.003
	(6.42)***	(5.67)***	(5.55)***	(3.93)***	(3.64)***	(5.30)***
AverageSpread	0.251	0.248	0.751	1.062	1.075	1.042
	(1.60)	(1.74)*	(2.93)***	(50.04)***	(35.48)***	(25.72)***
Adj. R^2	0.43	0.33	0.41	0.40	0.29	0.40
N of Obs.	241,195	118,403	122,792	296,165	179,259	116,906

The dependent variable is *Spread*, the effective annual interest rate on the loan minus the Treasury rate of equal duration. *AftrMrgrOne*, *AftrMrgrTwo,* and *AftrMrgrThree* are dummy variables (for acquirers) equal to zero for 12 quarters before and after the merger, except that *AftrMrgrOne* is equal to one for the first four quarters after the merger, *AftrMrgrTwo* is equal to one for the quarters 5 – 8 after the merger, and *AftrMrgrThree* is equal to one for quarters 9 – 12 after the merger. *AcquirerSize* is the natural logarithm of gross total assets of the acquirer as of *t*-1. *NonperformRatio* is nonperforming loans over total loans of the acquirer as of *t*-1. *LoanSize* is the natural logarithm of the commitment amount if the loan is under commitment, and otherwise is the face amount of the loan. *DummySecured* equals one if the loan is secured by collateral of any kind, and to zero otherwise. *DummyFixed* is one if the loan is a fixed-rate loan and zero if it is a floating-rate loan. Panel A presents basic results for the subsample of "Out-of-Market" Mergers in which the acquirer and target have zero market overlap. Panel B shows the findings for "In-Market Mergers with Small Market-Overlap," the group of merger-quarters, in which the market overlap between the target and the acquirer is within the lower 75th percentile but not zero. Small Loans are loans with *LoanSize* less than $1 million. Large Loans are loans with *LoanSize* larger than $1 million. Both time fixed effects (67 quarter dummies) and bank fixed effects are included in all regressions. Standard errors are corrected for the clustering of observations at the bank level. Heteroskedasticity-robust *t*-statistics are in parentheses. ***, ** and * indicate statistical significance at the 1%, 5%, and 10%, respectively.

Table 8
The effect of "In-Market Mergers with Large Overlap" on loan prices

	PANEL A: "In-Market" Mergers with Large Market-Overlap (in Upper 25th Percentile)			PANEL B: In-Market Mergers with Market-Overlap in Upper 10th Percentile		
	All Loans	Small Loans	Large Loans	All Loans	Small Loans	Large Loans
	(1)	(2)	(3)	(4)	(5)	(6)
AftrMrgrOne	-0.107	-0.135	-0.072	0.108	0.029	0.174
	(2.29)**	(2.52)**	(1.71)*	(1.50)	(0.41)	(2.03)*
AftrMrgrTwo	-0.100	-0.155	-0.043	0.090	-0.045	0.154
	(1.80)*	(2.54)**	(0.78)	(0.94)	(0.49)	(1.63)
AftrMrgrThree	-0.128	-0.222	0.017	0.235	0.136	0.288
	(1.32)	(2.26)**	(0.17)	(2.24)**	(0.99)	(2.89)***
AcquirerSize	-0.137	-0.152	-0.084	-0.162	-0.064	-0.303
	(1.11)	(1.10)	(0.75)	(0.93)	(0.35)	(1.73)*
NonperformRatio	1.629	1.328	1.549	0.743	1.053	0.271
	(2.01)*	(1.77)*	(1.57)	(0.91)	(1.30)	(0.26)
LoanSize	-0.277	-0.252	-0.289	-0.270	-0.269	-0.283
	(13.07)***	(7.13)***	(8.51)***	(9.99)***	(5.81)***	(6.58)***
DumSecured	0.424	0.197	0.562	0.346	0.139	0.543
	(2.83)***	(1.61)	(3.13)***	(1.86)*	(0.95)	(2.52)**
DumFixed	-1.055	-0.823	-1.222	-1.072	-0.973	-1.100
	(8.75)***	(4.82)***	(8.82)***	(7.55)***	(6.19)***	(7.48)***
AverageSpread	0.735	0.850	1.070	0.721	0.820	1.263
	(21.98)***	(22.15)***	(6.25)***	(20.07)***	(21.07)***	(6.26)***
Adj. R^2	0.41	0.23	0.45	0.41	0.25	0.41
N of Obs.	137,647	66,947	70,700	99,471	49,874	49,597

The dependent variable is *Spread*, the effective annual interest rate on the loan minus the Treasury rate of equal duration. *AftrMrgrOne*, *AftrMrgrTwo,* and *AftrMrgrThree* are dummy variables (for acquirers) equal to zero for 12 quarters before and after the merger, except that *AftrMrgrOne* is equal to one for the first four quarters after the merger, *AftrMrgrTwo* is equal to one for quarters 5 – 8 after the merger, and *AftrMrgrThree* is equal to one for the quarters 9 – 12 after the merger. *AcquirerSize*, *NonperformRatio*, *LoanSize*, *DumSecured*, *DumFixed,* and *AverageSpread* are as defined in Table 3. "In-Market Mergers with Large Market-Overlap" is the group of merger-quarters in which the market overlap between the target and the acquirer is in the upper 25th percentile. "In-Market Mergers with Market-Overlap in Upper 10th Percentile" is the group of merger-quarters in which the market overlap between the target and the acquirer is in the upper 10th percentile. Small Loans are loans with *LoanSize* less than $1 million. Large Loans are loans with *LoanSize* larger than $1 million. Both time fixed effects (67 quarter dummies) and bank fixed effects are included in all regressions. Standard errors are corrected for the clustering of observations at the bank level. Heteroskedasticity-robust *t*-statistics are in parentheses. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9
Incorporating the target market structure to examine the effect of "Out-of-Market" mergers on loan prices

	PANEL A: "Out-of-Market" Mergers into Large Banks' Market"			PANEL B: Out-of-Market" Mergers into Small Banks' Market		
	All Loans	Small Loans	Large Loans	All Loans	Small Loans	Large Loans
	(1)	(2)	(3)	(4)	(5)	(6)
AftrMrgrOne	-0.185	-0.200	-0.079	0.016	-0.014	0.054
	(2.85)**	(3.19)***	(1.48)	(0.21)	(0.20)	(0.68)
AftrMrgrTwo	-0.060	-0.096	0.051	-0.083	-0.123	0.002
	(0.53)	(1.14)	(0.34)	(1.46)	(1.83)*	(0.03)
AftrMrgrThree	-0.100	-0.193	0.103	-0.057	0.018	-0.116
	(0.51)	(1.11)	(0.58)	(0.90)	(0.30)	(1.61)
AcquirerSize	-0.005	0.006	0.016	-0.204	-0.007	-0.256
	(0.04)	(0.04)	(0.19)	(1.77)*	(0.08)	(2.88)***
NonperformRatio	11.122	8.315	3.993	7.122	2.967	15.880
	(2.36)**	(1.74)	(1.30)	(1.18)	(0.80)	(2.22)**
LoanSize	-0.316	-0.319	-0.267	-0.288	-0.291	-0.174
	(7.73)***	(6.17)***	(5.72)***	(9.18)***	(9.87)***	(2.04)*
DumSecured	0.502	0.112	0.894	0.326	0.013	0.798
	(3.24)***	(1.81)*	(4.78)***	(4.09)***	(0.10)	(7.46)***
DumFixed	-1.329	-1.070	-1.461	-1.015	-0.698	-1.549
	(13.88)***	(6.16)***	(13.75)***	(4.80)***	(5.73)***	(10.44)***
AverageSpread	0.962	1.016	0.761	0.629	0.640	-0.271
	(4.51)***	(3.50)***	(2.08)**	(10.10)***	(13.26)***	(1.33)
Adj. R^2	0.53	0.41	0.49	0.30	0.22	0.37
N of Obs.	92,651	46,213	46,438	124,537	67,671	56,866

The dependent variable is *Spread*, the effective annual interest rate on the loan minus the Treasury rate of equal duration. *AftrMrgrOne*, *AftrMrgrTwo,* and *AftrMrgrThree* are dummy variables (for acquirers) equal to zero for 12 quarters before and after the merger, except that *AftrMrgrOne* is equal to one for the first four quarters after the merger, *AftrMrgrTwo* is equal to one for quarters 5 – 8 after the merger, and *AftrMrgrThree* is equal to one for the quarters 9 – 12 after the merger. *AcquirerSize, NonperformRatio, LoanSize, DumSecured, DumFixed,* and *AverageSpread* are defined in Table 3. "Out-of-Market" mergers are market extension mergers in which the acquirer and target have zero market overlap before the merger. Panel A shows the results for the subsample of out-of-market mergers into "Large Banks' Market," where the target's markets are dominated by large banks with gross total assets of at least $1 billion. Panel B shows the regression results of out-of-market mergers into "Small Banks' Market," the target markets dominated by small banks with gross total assets of less than $1 billion. Small Loans are loans with *LoanSize* less than $1 million. Large Loans are loans with *LoanSize* larger than $1 million. Both time fixed effects (67 quarter dummies) and bank fixed effects are included in all regressions. Standard errors are corrected for the clustering of observations at the bank level. Heteroskedasticity-robust *t*-statistics are in parentheses. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 10
Operating efficiencies

Mergers after which	PANEL A: Operating Cost Ratio Declined More than Median			PANEL B: Operating Cost Ratio Declined Less than Median		
	All Loans	Small Loans	Large Loans	All Loans	Small Loans	Large Loans
	(1)	(2)	(3)	(4)	(5)	(6)
AftrMrgrOne	-0.185	-0.212	-0.211	0.028	-0.004	0.071
	(4.64)***	(3.81)***	(3.32)***	(0.47)	(0.08)	(0.88)
AftrMrgrTwo	-0.154	-0.151	-0.258	-0.086	-0.074	-0.085
	(3.62)***	(2.44)**	(2.89)***	(1.65)*	(1.51)	(1.45)
AftrMrgrThree	-0.123	-0.048	-0.343	-0.037	0.015	-0.035
	(1.95)*	(0.64)	(2.18)**	(0.41)	(0.16)	(0.40)
AcquirerSize	-0.054	0.015	-0.060	-0.046	0.144	-0.171
	(0.89)	(0.16)	(1.24)	(0.56)	(1.96)*	(1.59)
NonperformRatio	0.073	-0.362	2.621	2.485	-2.246	6.561
	(0.08)	(0.27)	(2.57)**	(1.19)	(0.87)	(2.84)***
*AftrMrgrOne*SizeRatio1*	0.043	0.014	0.163	-0.105	-0.122	-0.042
	(0.95)	(0.46)	(1.02)	(1.02)	(1.67)	(0.34)
*AftrMrgrTwo*SizeRatio2*	-0.041	-0.068	0.109	-0.100	-0.156	0.067
	(1.47)	(2.19)**	(0.83)	(1.50)	(1.53)	(0.60)
*AftrMrgrThree*SizeRatio3*	0.001	-0.015	0.074	0.135	0.046	0.092
	(0.03)	(0.72)	(0.63)	(1.78)*	(0.33)	(0.93)
LoanSize	-0.299	-0.248	-0.277	-0.284	-0.274	-0.242
	(6.04)***	(3.83)***	(15.10)***	(9.71)***	(9.11)***	(4.68)***
DumSecured	0.446	0.146	0.734	0.454	0.183	0.762
	(6.00)***	(2.29)**	(6.52)***	(7.21)***	(2.58)**	(6.72)***
DumFixed	-0.658	-0.504	-0.916	-0.847	-0.665	-1.397
	(5.46)***	(4.31)***	(6.46)***	(5.61)***	(5.03)***	(9.72)***
AverageSpread	0.922	0.983	0.900	0.954	1.000	1.031
	(8.37)***	(10.32)***	(8.23)***	(14.44)***	(15.41)***	(13.91)***
Adjusted R^2	0.40	0.28	0.39	0.39	0.28	0.40
N of Observations	316,197	174,878	141,319	263,715	149,347	114,368

The dependent variable is *Spread*, the effective annual interest rate on the loan minus the Treasury rate of equal duration. *AftrMrgrOne*, *AftrMrgrTwo* and *AftrMrgrThree* are dummy variables (for acquirers) equal to zero for 12 quarters before and after the merger, except that *AftrMrgrOne* is equal to one for the first four quarters after the merger, *AftrMrgrTwo* is equal to one for quarters 5 – 8 after the merger, and *AftrMrgrThree* is equal to one for quarters 9 – 12 after the merger. *AcquirerSize, NonperformRatio, SizeRatio1-3, LoanSize, DumSecured, DumFixed,* and *AverageSpread* are defined in Table 3. Here, I compare the operating-cost ratio (operating expense over operating income) of the acquirer as of the second year-end after the merger to the operating-cost ratio of the pro-forma bank (target plus acquirer) as of the year-end before the merger. Panel A covers the mergers after which the "Cost Ratio Declined More than Median" decline in the operating cost ratio. Panel B shows the regression results for the mergers after which the "Cost Ratio Declined Less than Median" decline in operating cost ratios. Small Loans are loans with *LoanSize* less than $1 million. Large Loans are loans with *LoanSize* larger than $1 million. Both time fixed effects (67 quarter dummies) and bank fixed effects are included in all regressions. Standard errors are corrected for the clustering of observations at the bank level. Heteroskedasticity-robust *t*-statistics are in parentheses. The symbols ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 11
Dates of banking deregulation as an instrument for the timing of mergers

Dependent Variable: Spread		
	All Loans	Small Loans
	(1)	(2)
WithinAftrMrgrThree (instrumented)	-0.041	-0.142
	(0.55)	(1.66)*
AcquirerSize	-0.114	-0.074
	(6.44)***	(3.74)***
NonperformRatio	1.386	1.231
	(1.11)	(0.71)
LoanSize	-0.363	-0.355
	(28.82)***	(9.18)***
Adjusted R^2	0.70	0.48
N of Observations	94,313	49,104

This table presents regression results of the *Spread* on *WithinAfterMrgrThree*, which I instrument. The instrumental variable takes the value of one in all quarters after a state is deregulated if a given market is in that deregulated state, and zero otherwise. *WithinAfterMrgrThree* is also an indicator variable equal to one in all quarters within three years after an *in-market* merger if the target operates in that given market, and equal to zero within three years before the merger. The regressions are at the market-quarter level, where market is defined as MSA or non-MSA county. Hence, the dependent variable is the average *Spread* per market, averaged incorporating characteristics of loans, i.e., whether the loan is secured or not, whether it is under commitment or not, whether it is fixed-rate or not, and whether it is a small-business loan or not, that I use as controls in previous regressions. *AcquirerSize,* is the natural logarithm of the market average of the gross total assets of the acquirers as of *t*-1. *NonperformRatio* is the average nonperforming loans ratio per market. *LoanSize* is equal to the natural logarithm of the market average of the commitment amount if the loan is under commitment, and otherwise to the face amount of the loan. Small Loans are loans with *LoanSize* less than $1 million. Each regression includes both time fixed effects (quarter dummies) and market fixed effects. Standard errors are corrected for the clustering of observations at the state level. Heteroskedasticity-robust *t*-statistics are in parentheses. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.