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## The Effects of Banking Mergers on Loan Contracts

PAOLA SAPIENZA\*

### ABSTRACT

This paper studies the effects of banking mergers on individual business borrowers. Using information on individual loan contracts between banks and companies, I analyze the effect of banking consolidation on banks' credit policies. I find that in-market mergers benefit borrowers if these mergers involve the acquisition of banks with small market shares. Interest rates charged by the consolidated banks decrease, but as the local market share of the acquired bank increases, the efficiency effect is offset by market power. Mergers have different distributional effects across borrowers. When banks become larger, they reduce the supply of loans to small borrowers.

THERE HAS BEEN SIGNIFICANT worldwide banking consolidation in recent years. Berger et al. (1998) show that between 1979 and 1994 in the United States, there were about 3,600 mergers in which two or more banks combined into a single charter. Over the same period, the fraction of gross total assets held by small banks decreased dramatically. In 1996, the Bank for International Settlements (BIS) reported a similar trend in Japan and across Europe, especially during the 1990s. These changes raise many policy concerns. Since banks are an important source of capital, changes in the market structure of banking can seriously affect a wide range of nonbanking industries.

Empirical studies emphasize two facts that are key to assessing the consequences of this consolidation process. First, there is a positive relationship between concentration and prices in banking. Berger and Hannan (1989) find that banks operating in more concentrated local markets pay lower interest rates on deposits. Hannan (1991) also finds that these banks charge higher rates on loans. Second, several studies of the U.S. banking industry note a "size effect" in lending: Large banks tend to lend to medium and large companies, and small banks often specialize in lending to small businesses

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(e.g., Nakamura (1994), Berger, Kashyap, and Scalise (1995), Berger and Udell (1996), Peek and Rosengren (1996), Strahan and Weston (1996)).

These two results raise important questions on the dynamic effect of mergers. What are the consequences of bank consolidation on prices and credit availability? Do consolidated banks sever their relationships with borrowers who were previously financed by acquired institutions? Are some particular types of borrowers more likely to be adversely affected by banking mergers? For example, by increasing market concentration, does consolidation lead to a deterioration of credit terms; that is, to a decrease in lending and an increase in interest rates? Furthermore, is lending reduced for some class of borrowers? That is, do larger consolidated banks reduce the amount of small business lending previously conducted by the acquired institution?

There is extensive empirical literature on banking mergers. However, because there is so little data, none of the studies have analyzed the direct consequences on individual borrowers. Most papers focus on the ex post performance of the consolidated banks and their rivals. Recently, some work has focused on the effect on prices or the supply of loans (e.g., Akhavein, Berger, and Humphrey (1997), Hannan and Prager (1998)). However, these studies have analyzed only aggregate banks' effects, rather than the effects on individual borrowers.

This paper studies the effects of mergers on the companies that borrow money (hereafter referred to as "borrowers"). My analysis distinguishes among different types of bank mergers. Using information on individual loan contracts between banks and companies, I analyze the consequences of banking consolidation on banks' credit policies.

One of the difficulties of such a study is that in general, information on individual loan contracts is not available. To overcome this problem, I use a data set of Italian banks which is unique in several respects. First, it includes a large number of banks (accounting for about 99 percent of total bank lending) and companies (borrowers). For each company, the data set contains the loan contract terms made with each bank from which it is borrowing. Second, to identify banks' and companies' characteristics, the data set includes balance sheet information and other attributes for both companies and banks. Finally, the data include a large proportion of small, privately held companies. Since small borrowers rely heavily on bank debt and have limited access to other sources of capital, my sample is well suited for the purpose of this study.

Using this data set, I present a broad analysis of the effect of bank consolidation on individual borrowers. First, I analyze the changes in credit conditions for existing borrowers of the consolidated institutions, comparing geographical areas where mergers took place and local areas not affected by merger activity. Second, I study the impact of merger activity on the availability of loans, examining the impact of consolidation on the probability of severing prior credit relations, controlling for the quality of the borrowers.

I find several interesting results. First, in-market mergers (involving banks that previously operated in the same geographical area) benefit borrowers if such mergers involve the acquisition of banks with small market shares. In

these cases, interest rates charged by the consolidated banks decrease. This trend is consistent with the view that horizontal mergers generate efficiency gains. However, as the local market share of the acquired bank increases, the efficiency effect is offset by market power. With small out-of-market mergers (involving banks previously operating in different geographical areas) the decrease in interest rates is not as significant as in comparable small, in-market mergers. This supports the view that in-market mergers generate higher efficiency gains than do out-of-market mergers.

Second, I find that consolidation affects borrowers in various ways, depending on how extensive are their alternative sources of finance. If they have many available lenders, they may never suffer from merger activity, even if the merger involving one of their banks is very large. This result suggests that these borrowers have more bargaining power than do borrowers with access to fewer lenders.

Finally, I find that small borrowers of target banks are less likely in the future to borrow money from the consolidated bank than small borrowers of banks that do not merge. Large banks that acquire small banks tend to cut off many more small borrowers than do other banks. These results reinforce and qualify previous findings (Berger et al. (1995)) on the reduction of lending to small borrowers: A contraction in the availability of bank credit for small businesses persists even after controlling for observable characteristics of the borrowers.

The paper is organized as follows. In the next section, I review the theories that guide my empirical work. Section II describes the institutional environment in which the consolidation phase takes place. In Section III, I describe the data and the sample. Section IV analyzes the effects of mergers on the continuing borrowers of the consolidated institutions. Section V reports the consequences of mergers on the probability of severing past credit relations. Section VI concludes.

## **I. Potential Consequences of Mergers**

The ultimate effect of consolidation on borrowers' welfare depends on the motives underlying the decision to merge. Mergers and acquisitions are a means for banks to penetrate new markets, to realize potential economies of scale, to acquire the financial power and prestige associated with greater size, or to discipline non-value-maximizing managers of the target bank. The management of the newly consolidated bank will set its credit policies according to the motives for the bank mergers.

### *A. Efficiency versus Market Power*

According to traditional economic theory, a merger in any industry can lower costs through economies of scale and raise prices by creating market power (Williamson (1968)). The net welfare effect is ambiguous and depends on the relative size of the welfare gains from increased productive efficiency and the welfare losses from the exercise of market power. However, the lit-

erature has identified some *ex ante* characteristics that affect the magnitude of the two offsetting effects (efficiency and market power). These are market overlap between the merging firms, and market competition prior to the consolidation.

I make an important distinction between in-market mergers, which combine banking organizations in the same local market, and out-of-market mergers, in which the acquirer penetrates a new market through the acquisition. These two types of mergers are likely to produce different effects on market structure and efficiency, which in turn affect prices and quantities supplied.

In-market mergers increase the ability to restrict output and raise prices more than can mergers between banks that previously operated in different geographical areas. Loss of competition can stem from the possibility that in a more concentrated market structure, banks' conjectures about each others' reactions will move both banks toward being more cooperative (Salant, Switzer, and Reynolds (1983), Perry and Porter (1985)). The result is a reduction in borrower welfare, because both the consolidated institutions and their rivals will set higher prices after the merger. Thus, prices will increase.

On the other hand, in-market mergers offer many more opportunities for cost savings than do out-of-market mergers, because when there are overlapping operations, the least efficient can be eliminated.<sup>1</sup> For example, when branch offices of the merger partners are located near each other, the least efficient can be eliminated and the customers shifted to the better managed office. If some of these efficiency gains from consolidation are passed on to consumers, the higher concentration can benefit them.

The marginal cost savings and the market share of the merging firms determine the effect of mergers on output and prices. Farrell and Shapiro (1990) show that, in general, "mergers raise prices if they generate no synergy between the merging firms and ... firms with large market share must achieve impressive synergies or scale economies if their merger is to reduce price" (p. 109).

The possibility of exercising market power also depends on the market competition before the consolidation. In general, collusion among agents is easier when the number of relevant players is small. In fact, studies show there is a threshold beyond which market power is exercised (Schmalensee (1989)).

In the banking industry, the interaction between market structure, competition, and prices is complicated by the nature of the loan contract. The literature on financial intermediation emphasizes that banks produce valuable financial information about borrowers (Diamond (1984, 1991), Ramakrishnan and Thakor (1984)). If such information cannot be transferred easily to new, potential lenders, then banks could acquire information-based market power on those borrowers who suffer most from asymmetric information (Rajan (1992), Sharpe (1990)).

As geographic barriers have been lifted in many countries, there have been widespread mergers between banks that previously operated in different geographical areas. However, few researchers have studied the conse-

<sup>1</sup> See Bhagat, Shleifer, and Vishny (1990) for a discussion of sources of gains in acquisitions.

quences of out-of-market mergers and their consequences for consumers are ambiguous. Out-of-market mergers usually have different motives than do in-market mergers, and each type of merger can affect the strategies of the market participants differently. As noted earlier, out-of-market mergers are a way for banks to enter new markets. If the bank's motivation is to gain market share, then it can bring new, aggressive competition to markets that were imperfectly competitive, and it can reduce the possibility of collusive behavior. In these cases, the effect on industry prices might be negative. The consolidated bank with lower marginal costs will try to attract more borrowers by decreasing prices; if borrowers' switching costs are sufficiently low, then rivals will cut prices as well. Still, the efficiency effects of out-of-market mergers are lower than for other types of mergers, simply because there is little scope for combining operations between two banks that have been operating in different areas.

From these theories, I can derive some testable hypotheses on the effect of mergers on loan rates. If the market-power effect increases with the market share of the merger, then interest rates will be higher after in-market mergers that bring banks a larger market share. A change in interest rates by the merging banks is likely to affect other banks that serve the same market. If market power prevails, then rival banks might be able to raise loan rates. However, if the efficiency effect dominates, then rival banks might reduce loan rates to maintain their market share.

The effect of out-of-market mergers is less clear. For unchanged levels of competition, if less efficiency is generated through out-of-market mergers, then the interest rates of the consolidated banks should decrease less after consolidation than they do with in-market mergers.

Few studies analyze the effect of banking mergers on prices and efficiency. Because there is so little data, no one has gone beyond aggregate data. Using balance sheet information, Akhavein et al. (1997) find a substantial increase in profit efficiency, but no statistically significant changes in interest rates.

Some studies analyze the importance of market overlap between the target and the acquirers on price effect. Houston and Ryngaert (1994) find indirect evidence that in-market mergers are more profitable: Stock market returns relate positively to the degree of overlap between target and acquirer. However, their paper does not explain whether the higher profits are derived from increased efficiency or monopoly power. Hannan and Prager (1998) analyze only large horizontal mergers. They find a reduction in aggregate deposit rates paid by consolidated banks and their rivals. This finding is consistent with the model of declining competition.

### *B. Size Effect and Relationship Lending*

Size differences in the merging banks also indicate differences in organizational structure, objective functions, and even in the level of efficiency. Recently, concerns have been raised that the formation of larger and more complex banking organizations could come at the expense of some traditional banking services, particularly lending to small businesses.

Some evidence of the importance of this consequence comes from Nakamura (1994), Berger et al. (1995), Berger and Udell (1996), Peek and Rosen-gren (1996), and Strahan and Weston (1996). These studies show that large and small banks specialize in different size loans. Small banks tend to lend to small businesses and large banks tend to lend to large businesses.

For example, Berger and Udell (1996) show that in the United States, 65 percent of total lending to small business (in monetary value) is financed by small banks with assets less than \$1 billion, but only 12 percent of total lending to small business is financed by banks with more than \$10 billions in assets. This finding suggests that large, consolidated institutions could considerably reduce the amount of small-business lending conducted in the past by the acquired institution. If this is the case, it is important to understand the reasons for this phenomenon.

Two cases are possible: First, the delivery of banking services to small businesses could be a fundamentally different activity from the delivery of services to large borrowers. Petersen and Rajan (1994, 1995) show that lending to small business tends to be relationship driven. Since there is little public information available on firms that have less developed reputation, small and brand-new firms are more likely to be credit rationed. However, with continuous interaction, these firms could be able to provide a lender with enough information to actually increase the availability of credit.

Berger and Udell (1995) argue that small banks have a better technology for lending to small businesses than do large banks. Small-business loans require tighter control and oversight than do loans based on ratio analysis and readily observable information (loans to larger firms). The complexity of large banks can lead to organizational diseconomies that make relationship loans to small businesses more costly. In contrast, senior management of small banks can monitor lending decisions closely and authorize more non-standard, relationship loans.

Stein (2000) shows that in a hierarchical setting, loan officers put less effort into collecting information because they are afraid that somebody higher up in the organization might cut capital allocations. Because loan officers do not have control over capital allocations in large banks, they tend to under-invest in soft information.

Nakamura (1993) shows that small banks have an informational advantage in dealing with small borrowers because they have more detailed information on local economic conditions. Also, loan officers of small banks are not required to follow the standardized, objective criteria for renewing loans that large banks implement to avoid moral hazard problems between branch managers and the main office.

Udell (1989) presents evidence that the formal loan review is used as a means to monitor loan officer performance. Cole, Goldberg, and White (1999) find that large banks rely more on observable firm characteristics in making lending decision than do small banks. Thus, in evaluating loans, the loan officers at small banks use all the special information available to them. Such special information is very valuable in lending to small businesses

with primarily local customers. In contrast, large banks cannot efficiently serve small firms because they cannot efficiently monitor the employee-specific personal relationships. Thus, we see that small banks are more efficient at lending to small firms.

It could also be possible that small banks are intrinsically less efficient than large banks and that most of their small loans are not valuable to start with; that is, they do not meet an opportunity cost test for use of funds. In the past, geographic restrictions on banking and limits to the market for corporate control have created barriers to entry into local markets and perhaps reduced competition. These limitations on market discipline might have allowed some negative net present value loans to be made. Thus, the decision to cut these loans could improve welfare and release resources to other valuable borrowers (Berger et al. (1995)).

The theories that I present above predict different empirical results. If larger banks reduce the supply of credit to small borrowers, then controlling for borrowers' quality and other exogenous conditions, either a reduction of credit available to these borrowers or a denial of credit line renewals will occur. Alternatively, if the reduction of credit to small borrowers is related to the poor quality of these loans, then controlling for borrowers' characteristics, smaller borrowers would not face higher probability of having their lending relationship with the bank severed.

This issue has been investigated recently by Walraven (1997), Berger et al. (1998), Peek and Rosengren (1998), and Strahan and Weston (1998). These studies analyze the consequences of bank consolidation on lending to small borrowers in the United States, using the size of the loan as a proxy for borrower's size. Due to the paucity of data, none of these studies control for borrowers' characteristics.

## **II. The Banking Environment**

I use Italian data to investigate the effects of banking mergers. One particular aspect of the Italian banking system that makes it an interesting academic and policy experiment for examining mergers is that the banking market is geographically delimited within local areas. The relevant geographic units that define the boundaries of local market areas are the 95 Italian provinces. Provinces are local entities defined by Italian law and are very similar to the U.S. counties in terms of size.

Banking operations are tied strictly to the provinces for two reasons. First, branch authorization traditionally has been linked to the market conditions in individual provinces. Until 1990, every bank that operated within the national territory had to apply to open new branches in each province. Branch authorization, granted by the Central Bank, was based on an evaluation of the total number of branches already operating in each province. Second, Italian industrial structure is characterized by many small companies, all of which rely entirely on bank loans to finance themselves. These borrowers are locally based and unlikely to have access to banking services in other



areas of the country. Thus, Bank of Italy (the Italian antitrust authority in banking) has defined the provinces as the “relevant antitrust market” in banking.

This feature of the banking industry allows me to compare provinces where mergers took place to provinces where no merger occurred. Using local market share, I can distinguish between Italian bank mergers that combine banks located in the same province and mergers that take place between banks that previously operated in distinct markets.

The Italian banking industry is similar to that of the United States in several ways. First, both the U.S. and Italian markets are highly fragmented. There are many banks operating in both of these countries, but they tend to concentrate their banking activities in specific geographic areas. The sum of market shares (measured by total assets) of the largest five banks is among the lowest in the world for both the United States and Italy. Cetorelli and Gambera (2001) show that the United States and Italy are among the three countries in which the largest five banks have the smallest total market share (measured by total assets). But, if I measure market concentration within specific geographic markets, then some local markets are highly concentrated in both United States and Italy. In 1994, 49 percent of Italian provinces had an Herfindahl–Hirschman Index (HHI), based on the dollar volume of loans originated by banking institutions, between 1,000 and 1,800, and 26 percent had an HHI greater than 1,800. Similar numbers for the United States are not available. Nonetheless, when Rhoades (1996) uses bank deposits to calculate HHIs, he finds that in 1994, 137 out of 308 Metropolitan Statistical Areas (MSA) had an HHI greater than 1,800. These two facts provide evidence of the fragmentation of the credit markets in both countries.

Second, the Italian banking industry has experienced a pattern of regulatory and structural changes similar to that observed in the United States. The most important regulatory changes affected entry. In the United States, the Riegle–Neal Interstate Banking and Branching Efficiency Act of 1994 deregulated branching. In Italy, branching was liberalized in 1990. Since then, Italian banks have been free to open branches in any region of the country. Consequently, the number of branches increased by 67 percent between 1983 and 1993. The effect of this deregulation in Italy is similar to that of the relaxation of the intrastate branching restrictions in the United States. Entry was also affected by the Second European Directive on banking and financial services. According to this directive, banks operating in one EU country can operate in all the other EU countries.

At the same time, widespread merger activity reduced the number of banks and increased the size of the existing banks. Between 1989 and 1995, 242 mergers involving 221 acquirers, roughly 19 percent of the banks existing in 1989, occurred between Italian banks. The size of this consolidation was impressive. Target banks accounted for 17 percent of the total loans made by the system and 12 percent of the total deposits (De Bonis and Ferrando (1996)). A combination of regulatory changes and innovation in information technology accounts for the increase in mergers. A reallocation of banking

activity from smaller organizations to larger organizations accompanied the shift toward higher concentration. Between 1988 and 1995, the fraction of loans made by the five largest banks increased from 16 percent to 27 percent of the total, while the fraction made by small banks (those smaller than the 100th largest bank) dropped from 24 to 15 percent.

As noted earlier, this process of consolidation was very similar in size to the consolidation that occurred in the United States. Berger et al. (1998) report that between 1989 and 1994, the gross total assets of banks that survived a merger were 15 percent of the industry's gross total assets. In Italy, during the same period, this figure was 12 percent.

### **III. Description of the Data**

I use four data sources. The two main databases come from the Company Accounts Dataset (CAD) and the Credit Register (CR). CAD reports balance sheet and income statements for more than 50,000 Italian companies. CR collects information about any individual loan contracts over 80 million lire (about \$53,000) granted by banks to any customer. For each firm, CR reports the amount of credit granted by each bank and the outstanding balance. In addition, 90 banks (accounting for over 80 percent of total bank lending) agreed to file detailed information about the interest rates charged on each loan. These data, collected for monitoring purposes, are highly confidential.

A subset of CR data includes all the companies that were surveyed for at least one year in CAD. Data on loan contracts are quarterly. Data on balance sheets and income statements are annual.

Aggregate information on total bank loans comes from the prudential supervision statistical returns, where it is reported on a quarterly basis. From this database, I obtain total loans for the various manufacturing sectors, geographical areas, and banks. Using this information, I can compute the local market share of different banks. The same data set provides quarterly information on bank balance sheets and income statements.

The fourth data source is the Bank of Italy, which lists banking mergers. Its data includes the date at which each bank merger occurred, as well as which of the two banks is classified as the active bank (the bidder or the acquirer) or the passive bank (the target) in the transaction.

#### *A. Sample*

My sample period begins in January 1989 and ends in December 1995. The data are quarterly, so there are 28 periods of observation. This sample period is very appropriate to study consolidation for two reasons. First, during this period, the consolidation process was extremely active. Second, in the previous years, there were very few acquisitions in the banking industry. De Bonis and Ferrando (1996) show that between 1984 and 1988, mergers in banking were very limited. Target banks accounted for 0.8 percent of the

total loans granted by the system and 1.42 percent of total deposits. The banks that merged were small and mostly state-owned banks.

My empirical analysis uses a subset of the CR and CAD data sets just described. I restrict my sample to manufacturing firms. To analyze changes in loan contracts before and after the mergers, I further restrict my sample to those companies that borrowed from at least one private bank during the sample period. Because of the differences that exist in managerial or shareholders' objectives between private and state-owned banks (Sapienza (2001)), I exclude contracts with state-owned banks, even though the companies in my sample might have credit lines with state-owned banks.

Because loan characteristics (collateral, etc.) can have an impact on interest rates (Petersen and Rajan (1994), Berger and Udell (1995)), I focus on homogenous loan contracts. I analyze credit lines contracts, the most common loan contracts in Italy, in which banks set both the amount of loan money granted and an interest rate. These loans are not collateralized. Firms may use less than the total amount of loan granted, and they pay interest and fees only on the amount used. The terms of the contract can be modified at any point in time and the bank has no obligation to keep the credit line open. My data include information on the credit line, the amount used, and the interest and fees paid.

These characteristics of the contract make the data particularly well-suited for this analysis. Since banks can modify the term of the contract, the data enable me to analyze the short-term effects of bank consolidation on interest rates and credit availability. Second, unlike in the United States, unused credit lines are costless in these contracts. Thus, firms might not have any strong reasons for severing their credit lines with their bank, and I can reasonably assume that the decision to sever a credit line is more likely to reflect the bank's choice.

The sample comprises 9,068 companies. Table I contains summary statistics on the companies contained in the whole sample. The median firm has 37 employees; 9 million dollars in sales;<sup>2</sup> a leverage, defined as the book value of short- plus long-term debt divided by the book value of short- plus long-term debt plus the book value of equity, of 68 percent; and total assets of 8 million dollars. Return on sales is 8.24 percent. The median company borrows from seven banks, and has a coverage, EBITDA (earning before interest, taxes, depreciation, and amortization) divided by interest expenses, of 1.6 percent. The majority of the companies are privately owned firms. Only 42 companies in the sample are publicly listed, and 98 of the companies are state owned.

From 1989 to 1995, these companies had transactions with a total of 819 private banks. These banks account for over 99 percent of total private-bank lending to nonfinancial firms. During the sample period, there were 138 mergers involving these banks.

<sup>2</sup> All financial figures are expressed in 1995 lire using the GDP implicit price deflator, and then converted in dollars using an exchange rate of \$1 = Lit 1,500.

Table I

**Summary Statistics: Borrowers (All Manufacturing Firms)**

The summary statistics refer to the entire sample of company-quarters. Total assets and sales are expressed in 1995 lire using the GDP implicit price deflator, and then converted in dollars using an exchange rate of \$1 = Lit 1,500. *ROS* is *EBITDA* (earning before interest, taxes, depreciation, and amortization) over sales. Leverage is book value of short- plus long-term debt divided by book value of short- plus long-term debt, plus book value of equity. Coverage is *EBITDA* (earning before interest, taxes, depreciation, and amortization) divided by interest expenses (values above 100 are truncated at 100 and values below zero are truncated at zero). The number of banks is the total number of banks each firm is borrowing from.

Variable	Mean	Median	Std. Dev.
Total assets (millions of dollars)	52	8	1,144
Sales (millions of dollars)	39	9	349
Employees	172	37	2,248
ROS	9.44	8.24	8.80
Age	21	16	27
Leverage	64.69	68.00	21.17
Coverage	2.19	1.58	3.82
Number of banks	9	7	7
Number of banks (excluding state-owned)	4	3	4

Table II includes statistics for all the banks in the sample, as well as for the banks involved in the mergers. The market share for individual banks ranges from 0 to nearly 18 percent if computed on a national basis and from 0 to 99 percent if computed on a local basis. Not surprisingly, the median acquirer in the sample is larger (342 million dollars), less risky (nonperforming loans are 5 percent of total loans), and has a larger market share (0.05 percent on a national basis and 6.37 percent on a local basis) than the median bank in the sample. Target banks are smaller, riskier, and have lower market share.

**IV. Effects on Interest Rates to Continuing Borrowers**

If a bank merger affects the local market, then the consolidated bank will take on a whole set of new actions, which can be completely different from the policies of the target and the acquirer. These actions include decisions on credit terms for businesses that previously borrowed from either the target, the acquirer, or both; the cancelation of existing credit lines; and the acquisition of new borrowers. I deal separately with each of these complex issues.

*A. Methodology and the Basic Test**A.1. Methodology*

I study the effect of mergers on loan rates for continuing borrowers. The theoretical predictions outlined in Section I.A. apply only if all other things

Table II  
Summary Statistics: Banks

The summary statistics in Panel A refer to the entire sample of banks (bank-quarters), in Panel B to the target banks, and in Panel C to the acquirer banks. For the target and the acquirer banks, the statistics refer to the calendar quarter prior to the merger. Total assets are the bank's total assets expressed in 1995 lire using the GDP implicit price deflator, and then converted in dollars using an exchange rate of \$1 = Lit 1,500. *ROA* is *EBITDA* over total assets at the end of the previous year. Bad loans are the total amount of insolvent loans. The total market share is the market share of loans in the entire country. The last row in the table measures the local market share of loans in the geographical market where the bank has the largest market share.

Variable	Mean	Median	Std. Dev.	Min	Max	Obs.
Panel A: All the Banks						
Total assets (billions of dollars)	849	132	3,114	3	73,687	16,955
Percentage of loans over total assets	39.76	40.13	11.00	0.05	96.31	16,783
Percentage of bad loans over total loans	8.24	5.87	7.65	0	49.98	17,008
ROA	0.84	0.75	1.19	-13.79	9.37	16,709
ROA minus difference from the sample mean	0	-0.06	1.17	-14.66	8.45	16,709
Total market share (percentage)	0.16	0.02	0.58	0	17.98	16,805
Market share in the largest local market (percentage)	6.19	1.96	10.86	0	99.37	16,797
Panel B: Target Banks						
Total assets (millions of dollars)	524	59	1,671	5	12,014	138
Percentage of loans over total assets	42.02	42.77	12.65	8.40	93.81	138
Percentage of bad loans over total loans	13.41	11.01	11.89	0	50.00	138
ROA	-0.29	0	1.92	-11.11	2.38	138
ROA minus difference from the sample mean	-1.10	-0.77	1.93	-12.03	1.62	138
Total market share (percentage)	0.09	0.01	0.32	0.00	2.95	138
Market share in the largest local market (percentage)	4.20	0.97	7.52	0.01	48.12	138
Panel C: Acquirer Banks						
Total assets (millions of dollars)	3,342	342	8,289	10	62,899	138
Percentage of loans over total assets	40.55	41.27	7.07	17.09	60.0	138
Percentage of bad loans over total loans	6.27	5.03	4.79	0	21.33	138
ROA	1.03	0.73	1.03	-0.99	7.34	138
ROA minus difference from the sample mean	0.23	-0.03	0.99	-1.44	6.15	138
Total market share (percentage)	0.65	0.05	1.57	0.00	11.35	138
Market share in the largest local market (percentage)	13.25	6.37	16.02	0.09	73.33	138

are equal. In practice, the loan rate is determined along with some other nonobservable loan characteristics (e.g., quality of the monitoring, availability of other services at the same bank, etc.) for which I have no data. With this limitation in mind, I compare interest rates between geographical areas where mergers took place and areas that had no merger activity.

First, I select borrowers and banks that do business in provinces affected by merger activity. To distinguish between in- and out-of-market mergers, I construct two separate subsamples of provinces affected by merger activity. I define a province as being affected by an in-market merger if at least one acquisition involving two or more banks operating in that province occurred during the period of observation. I define a province as being affected by an out-of-market merger if a bank serving the province was taken over by an acquirer that did not operate in the province prior to the acquisition.

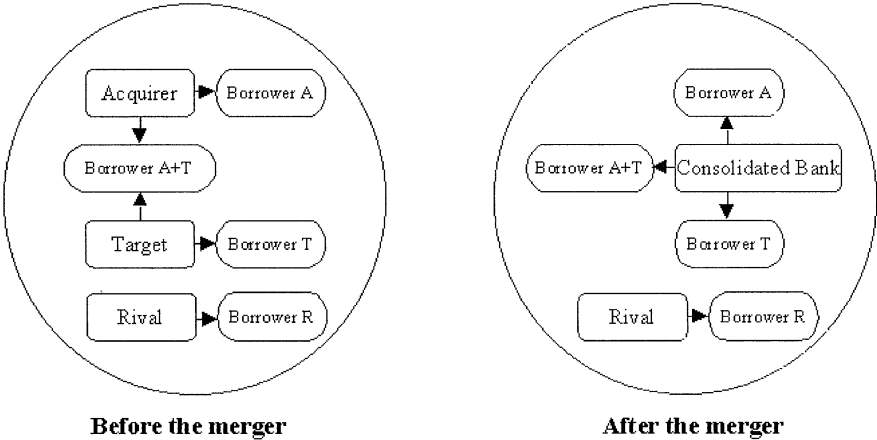
To isolate effects caused by in- and out-of-market mergers, I exclude from each subsample all provinces that are affected by both types of mergers. For each type of acquisition (in- or out-of-market), I consider only a subsample of provinces in which no other type of merger took place (i.e., for in-market mergers, I exclude all the provinces where out-of-market mergers took place, and vice versa). This exclusion reduces the size of the sample affected by mergers by 12 percent.

Figure 1 describes the provinces affected by merger activity. Panel A illustrates only those provinces affected by in-market mergers. Before the merger, the acquirer, target, and future rival banks operated in the province. After the merger, a single new larger bank was formed. The new consolidated bank kept relationships with some of the previous borrowers of either the target or the acquirer (or both), discharged some of them, and acquired new ones. Panel B describes a typical pattern for an out-of-market merger. Before the merger, only target banks and future rivals served the province. The merger forms a new bank. The borrowers at this bank are either previous borrowers of the target bank or new borrowers.

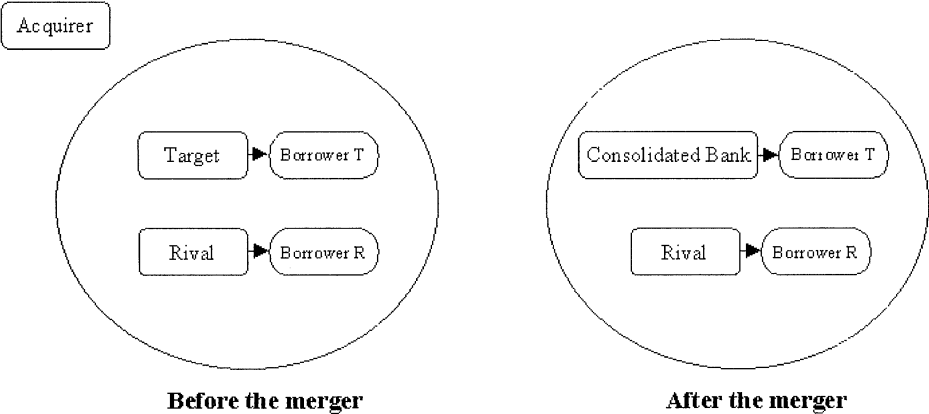
I restrict the sample by excluding all the companies that start a new relationship with the banks in the sample. I define continuing borrowers as borrowers who have borrowed from the banks in previous years. In the case of consolidated banks, continuing borrowers are borrowers who have borrowed from either the acquirer or the target bank (or both) before the merger. The advantage of excluding new borrowers is that it overcomes potential biases due to changes in the composition of borrowers that accompany the consolidation phase.

The exclusion of new borrowers does not solve all the potential selection problems. If consolidation affects the decision of denying the extension of credit lines to past borrowers, the results on interest rates charged to continuing borrowers may be biased. This problem is partially overcome by the use of a fixed-effect model. However, to investigate the issue further, I also implement a two-stage procedure, in which the first stage estimates a model of the decision to extend credit to past borrowers. The results show no significant difference from the analysis of Section IV.

**PANEL A. Areas affected by in-market mergers**



**PANEL B. Areas affected by out-of-market mergers**



**Figure 1.** The figure describes the provinces affected by merger activity. Panel A illustrates provinces affected by in-market mergers. Panel B describes a typical pattern for an out-of-market merger.

I also add to the two subsamples several observations not affected by merger activity. I construct a subsample of provinces where no mergers occur. To capture economy-wide factors and changes in the regulatory framework that influence credit policies, I use banks and companies that do business in these provinces as a control group.

These selection criteria considerably reduce the two subsamples. Table III contains summary statistics of the two subsamples used in the regression analysis.

**Table III**  
**Summary Statistics: Continuing Borrowers**

The summary statistics in Panel A refer to the entire sample of observations used in the in-market merger analysis, and in Panel B to the entire sample of observations in the sample used for the out-of-market analysis. Total assets and sales are expressed in 1995 lire using the GDP deflator, and then converted in dollars using an exchange rate of \$1 = Lit 1,500. *ROS* is *EBITDA* over sales. Leverage is book value of short- plus long-term debt divided by book value of short- plus long-term debt, plus book value of equity. Coverage is *EBITDA* divided by interest expenses (values above 100 are truncated at 100 and values below 0 are truncated at 0). The loan rate is the median interest paid by a firm on its outstanding lines of credit. The number of banks is the total number of banks each firm is borrowing from. Bad loans are the total amount of insolvent loans. *ROA* is *EBITDA* over total assets at the end of the previous year. *MERSIZE*<sub>*k,t*</sub> measures the local market share of the target acquired by bank *k* if bank *k* is a consolidated bank. *SIZE\_RIVAL\_MERG*<sub>*k,t*</sub> measures the total local market share of all targets acquired in the province, for rival banks.

Variable	Mean	Std. Dev.	Obs.
Panel A: In-market Mergers			
Companies' variables			
Total assets (millions of dollars)	81	419	107,501
Sales (millions of dollars)	75	273	107,501
Employees	292	1,142	106,747
ROS	8.91	7.78	107,501
Age	25	32	106,774
Leverage	64.52	19.25	107,501
Coverage	2.36	4.14	107,501
Loan rate minus prime rate	1.85	2.63	107,501
Number of banks	13	9	107,501
Number of banks (excluding state-owned)	6	4	107,501
Banks' variables			
Total assets (millions of dollars)	12,209	11,978	107,501
Percentage of loans over total assets	41.31	4.50	107,501
Percentage of bad loans over total loans	5.86	2.53	107,501
ROA	0.59	0.45	107,501
Operating costs over total assets	3.14	0.48	107,501
Mergers' variables and concentration			
<i>MERSIZE</i> <sub><i>k,t</i></sub>	2.99	3.11	2,842
<i>SIZE_RIVAL_MERG</i> <sub><i>k,t</i></sub>	6.15	4.03	28,738
Herfindahl–Hirschman Index	0.06	0.03	107,501
Panel B: Out-of-Market Mergers			
Companies' variables			
Total assets (millions of dollars)	74	424	91,334
Sales (millions of dollars)	69	258	91,334
Employees	288	1,245	90,872
ROS	8.94	7.21	91,334
Age	23	35	90,630
Leverage	64.34	18.94	91,334
Coverage	2.45	4.16	91,334
Loan rate minus prime	1.53	2.46	91,334
Number of banks	13	10	91,334
Number of banks (excluding state-owned)	6	4	91,334
Banks' variables			
Total assets (millions of dollars)	9,855	7,536	91,334
Percentage of loans over total assets	41.44	4.47	91,334
Percentage of bad loans over total loans	5.66	2.27	91,334
ROA	0.70	0.31	91,334
Operating costs over total assets	3.16	0.49	91,334
Mergers' variables and concentration			
<i>MERSIZE</i> <sub><i>k,t</i></sub>	6.53	3.51	1,965
<i>SIZE_RIVAL_MERG</i> <sub><i>k,t</i></sub>	6.80	4.17	11,703
Herfindahl–Hirschman Index	0.07	0.03	91,334



## A.2. The Basic Test

My basic estimated model has the following specifications:

$$\begin{aligned}
 r_{ikt} = & \alpha_0 + \alpha_1 \text{MERGER}_{k,t} + \alpha_2 \text{MERSIZE}_{k,t} + \alpha_3 \text{RIVAL\_MERG}_{k,t} \\
 & + \alpha_4 \text{SIZE\_RIVAL\_MERG}_{k,t} + \delta \text{CONCENTRATION}_t \\
 & + \beta X_{k,t} + \gamma Y_{i,t-1} + d_t + f_i + \epsilon_{ikt},
 \end{aligned} \tag{1}$$

where  $r_{ikt}$  is the interest rate charged at time  $t$  by bank  $k$  to company  $i$  minus the prime rate.<sup>3</sup>

The interest rate is the ratio of the quarterly payment (interest plus fees) paid by firm  $i$  to bank  $k$  against its quarterly average balance. This measure overestimates the rate of borrowers with a small average balance (because of the existence of fixed fees). For this reason, following Pagano, Panetta, and Zingales (1998), I eliminate the rates referring to credit lines with less than 50 million lire (US\$ 34,000) in average daily balance. In separate regressions (not reported), I reestimate the basic regressions, to make sure that this correction is not driving my main results. Results are unchanged in both specifications. In an alternative specification, I also use the difference between a firm's rate and the average rate in the sample. I obtain results (not reported) that are economically and statistically similar.

$\text{MERGER}_{k,t}$  and  $\text{RIVAL\_MERG}_{k,t}$  measure the impact of mergers on the interest rate charged by consolidated banks and rival banks.  $\text{MERGER}_{k,t}$  is an indicator variable that takes the value of one in all the calendar quarters after a merger if the bank is a consolidated bank, and otherwise is zero.  $\text{RIVAL\_MERG}_{k,t}$  is an indicator variable that takes the value of one in all the calendar quarters after a merger if the bank is a rival bank in the province where the merger occurred, and otherwise is zero.

In Figure 1,  $\text{MERGER}_{k,t}$  and  $\text{RIVAL\_MERG}_{k,t}$  equal zero for all banks before the merger. After the merger,  $\text{MERGER}_{k,t}$  is equal to one for the consolidated bank and is zero for all other banks (rival banks and banks in the control group). After the merger,  $\text{RIVAL\_MERG}_{k,t}$  is equal to one for the rival banks and is zero for all the other banks (if more than one merger occurred in the same province, one bank can be both a consolidated and a rival bank).

The coefficients  $\alpha_1$  and  $\alpha_3$  measure the average impact of consolidation on interest rates for all subsequent calendar quarters. A negative (positive) value for  $\alpha_1$  means that the consolidated banks reduce (raise) interest rates after the mergers. A negative (positive) value of  $\alpha_3$  means that rival banks reduce (raise) rates after consolidation.

The size of the merger presumably affects the impact of consolidation. In regression (1),  $\text{MERSIZE}_{k,t}$  measures the size of the merger where bank  $k$

<sup>3</sup> The prime rate is the weighted average of the prime rates of 34 banks that lend about 70 percent of total bank lending in Italy. The weights are the percentage of loans lent by each bank.

has survived a merger, and  $SIZE\_RIVAL\_MERG_{k,t}$  measures the size of merging activity faced by rival banks. In my analysis, I define the size of the merger as the local market size of the target bank prior to the merger.<sup>4</sup> The merger size measure represents the percentage of loans acquired by the acquirer bank through the merger. For example, in Figure 1, the percentage of loans lent by the target bank measures the size of the merger for both consolidated and rival banks. When more than one merger takes place in the same province, I use the sum of the market shares of all the target banks acquired in the province to capture the size of the consolidation faced by rival banks.

In regression (1),  $MERSIZE_{k,t}$  takes the value of zero if bank  $k$  is not a consolidated bank, and is equal to the local market share of the target bank acquired by  $k$  if bank  $k$  is a consolidated bank.  $SIZE\_RIVAL\_MERG_{k,t}$  takes the value of zero if  $k$  is not a rival bank and is equal to the total local market share of all target banks acquired in the province if bank  $k$  is a rival bank.

During the sample period, market concentration also changed for reasons other than banking consolidation, such as a bank opening or closing its branches in a province. To control for changes in market concentration due to causes different from consolidation, the regression also includes the HHI on loans ( $CONCENTRATION_t$ ). Since market concentration is positively correlated with the number of mergers, the HHI might absorb some of the effect of mergers. Nevertheless, it is necessary to control for changes in market concentration that are unrelated to merger activity.

The main advantage of using individual-level data is to mitigate the importance of potential composition biases. If important changes in the composition of borrowers accompany the consolidation phase, then perhaps the estimated coefficients capture changes in the pool of borrowers. To account for this potential problem, I include among the regressors a vector of firm fixed-effects,  $f_i$ . By using a fixed-effects model and restricting the sample to continuing borrowers, I use a firm before the merger as a control for itself after the merger, and compare the interest rates charged by rival and consolidated banks to the same borrowers.

Another concern is that the coefficients that measure the impact of consolidation might capture eventual specific characteristics of the banks involved in the mergers. To control for this selection problem, I include a vector of bank  $k$  characteristics,  $X_{k,t}$ . This vector comprises bank size (logarithm of total assets), the ratio of operating costs over total assets, and the ratio of nonperforming loans to total loans.

To control for changes in the fundamental risk characteristics of a company, I include  $Y_{i,t-1}$ , a vector of firm  $i$  characteristics measured at time  $t - 1$ . I include the size of the firm (logarithm of sales), leverage (book value of short-plus long-term debt divided by book value of short- plus long-term debt, plus book value of equity) and profitability (return on sales). The regression also includes  $d_t$ , a vector of time fixed-effect.

<sup>4</sup> I also consider a specification in which I use both the acquirer's and the target's size. The results are qualitatively unaffected.

*B. Results**B.1. In-market Mergers*

The results in Table IV show that the effect of in-market mergers on interest rates depends on the size of the merger, as measured by the local market share of the acquired bank. To interpret these results, I examine two coefficients in the basic regression.  $MERGER_{k,t}$  measures the direct impact of a merger on interest rates. The negative coefficient suggests that mergers have a negative effect on interest rates.  $MERSIZE_{k,t}$  measures the effect of mergers on interest rates, as determined by the size of the merger. The positive coefficient suggests that as the size of the merger increases, so does the interest rate. Thus, in-market mergers benefit borrowers if they involve the acquisition of small market shares.

In small in-market mergers, the interest rates charged by both the consolidated bank and the rival banks serving the same market decrease, which is consistent with the efficiency hypothesis. A merger involving a target bank with an average local market share of 2.99 percent decreases the interest rate over prime by 41 basis points, which I calculate by adding the coefficient of  $MERGER_{k,t}$  to the coefficient of  $MERSIZE_{k,t}$  multiplied by 2.99. This effect indicates that the impact of merger activity on interest rates is rather large.

As the local market size of the target bank increases, the efficiency effect is offset by market power. To completely offset the efficiency effect, the local market share of the target bank should be at least 6.15 percent. Acquisitions of larger market shares (from 6.15 to 12.28) cause interest rates to increase up to 80 basis points (since the percentage points over the prime rate paid by the average company in the sample are 1.85, this increase would produce an interest rate over prime of 2.65). These results support the view that mergers between banks that have significant local market overlap *ex ante* will increase interest rates.

Given the size distribution of in-market mergers, the majority of the mergers in my sample results in a reduction of interest rates. Seventy-five percent of the mergers observations have a merger size smaller than 4.6 percent, which corresponds to a reduction of interest rates of at least 20 basis points. Only 10 percent of mergers observations have a size above 7 percent and are associated with an increase in interest rates.

An alternative explanation to the market power hypothesis and one that supports the finding that higher interest rates follow large mergers is that target banks involved in large mergers were systematically underpricing loans prior to mergers. For example, if target banks were in financial distress, then they may have engaged in a policy of undercutting interest rates ("gamble for resurrection") before the acquisitions. This interpretation would be consistent with similar results in other industries (Kim and Singal (1993)). After the merger, the acquiring bank has no incentive to undercut interest rates. If target banks with a high percentage of nonperforming loans have large local market share, then the observed increase in interest rates could be attributed to the correction made by the consolidated bank.

Table IV

**The Effect of Mergers on Bank Rates: In-market Mergers**

The dependent variable is the interest rate charged to firm  $i$  by bank  $k$  at time  $t$  minus the prime rate at time  $t$ .  $MERGER_{k,t}$  is a dummy variable equal to one if at time  $t$  bank  $k$  is a consolidated bank; the variable equals zero otherwise.  $MERGER_{k,t=0,or-1}$  is an indicator variable that takes the value of one if the bank was involved in a merger in the past two quarters and equals zero otherwise.  $MERGER_{k,t=-2,or-3}$  is an indicator variable that takes the value of one if the bank was involved in a merger three or four quarters ago and equals zero otherwise.  $MERGER_{k,t<-4}$  is an indicator variable that takes the value of one if the bank was involved in a merger more than four quarters ago, and is zero otherwise.  $MERSIZE_{k,t}$  is a variable that takes the value of zero if bank  $k$  is not a consolidated bank, and it is equal to the local market share of the target acquired by bank  $k$  if bank  $k$  is a consolidated bank.  $MERSIZE_{k,t=0,or-1}$ ,  $MERSIZE_{k,t=-2,or-3}$ , and  $MERSIZE_{k,t<-4}$  are variables that take the value of zero if bank  $k$  is not a consolidated bank; they are equal to the local market share of the target acquired by bank  $k$  if bank  $k$  was involved in a merger in the previous two quarters, three or four quarters ago, and more than four quarter ago, respectively.  $RIVAL\_MERG_{k,t}$  is a dummy variable equal to one if bank  $k$  is a rival bank, and it equals zero otherwise.  $SIZE\_RIVAL\_MERG_{k,t}$  is a variable that takes the value of zero if bank  $k$  is not a rival bank, and it is equal to the total local market share of all targets acquired in the province if bank  $k$  is a rival bank. All regressions include a time- and a firm-specific effect. The time period is one quarter. By using a fixed-effects model, a firm before the merger controls for itself after the merger. The regression also includes a vector of banks' characteristics,  $X_{k,t}$  bank's size (logarithm of total assets), the ratio of operating costs over total assets, and the ratio of nonperforming loans over total loans, a vector of companies' characteristics,  $Y_{i,t-1}$  size (logarithm of sales), leverage and profitability, and local market concentration,  $CONCENTRATION_t$ , measured by the HHI on loans. The table reports only the coefficients on the consolidated and rival dummy variables and the coefficient for the HHI. The sample is a panel of continuing borrowers in areas where at least one in-market merger occurred and a control sample of a panel of continuing borrowers in areas where no consolidation occurred. In the second column, the sample is restricted, excluding firms that borrowed with target banks prior to the consolidation. Heteroskedasticity-robust  $t$ -statistics are in brackets. The table also reports the  $p$ -value of an  $F$ -test for the hypothesis that the joint effect of all the variables equals zero. The symbol \*\*\* indicates the coefficient is significantly different from zero at the 1 percent level or less; \*\* at 5 percent or less; \* at 15 percent or less.

Variable	Whole Sample (1)	Exclude Borrowers of Target Banks (2)	Whole Sample (3)
$MERGER_{k,t<0}$	-0.81*** (-12.93)	-1.07*** (-12.97)	
$MERGER_{k,t=0,or-1}$			-0.44 (-1.18)
$MERGER_{k,t=-2,or-3}$			-0.71*** (-6.85)
$MERGER_{k,t\leq-4}$			-0.80*** (-10.29)
$MERSIZE_{k,t<0}$	0.13*** (6.66)	0.15*** (5.54)	
$MERSIZE_{k,t=0,or-1}$			-0.04 (-0.33)
$MERSIZE_{k,t=-2,or-3}$			0.14*** (4.13)
$MERSIZE_{k,t\leq-4}$			0.14*** (5.25)
$RIVAL\_MERG_{k,t}$	0.01 (0.25)	-0.00 (-0.09)	-0.00 (-0.09)
$SIZE\_RIVAL\_MERG_{k,t}$	0.05*** (5.18)	0.05*** (5.47)	0.05*** (5.47)
$CONCENTRATION_t$	5.87*** (4.05)	5.95*** (4.11)	5.95*** (4.11)
$N$ obs.	107,501	106,370	107,501
Adjusted $R^2$	0.62	0.62	0.62
$p$ -value of $F$ -test	0.0001	0.0001	0.0001

Two arguments can be used to reject this alternative explanation: First, the coefficient of  $SIZE\_RIVAL\_MERG_{k,t}$  provides strong evidence in favor of the market power hypothesis. The positive sign suggests that rival banks increase interest rates when the consolidation in the province is large. A one-standard-deviation increase in the size of the mergers increases the interest rates charged by rival banks by 12 basis points. The increase in interest rates for borrowers who borrow from rival banks is both economically and statistically significant. Second, the borrowers of target banks who continue their borrowing relationship with the consolidated bank are only a small fraction of the sample and are unlikely to drive the results of the regressions.

Column 2 of Table IV lists the results of running regression (1), excluding the borrowers of target banks. If these results were driven by changes in interest rates to ex-borrowers of target banks, then excluding these borrowers should make the effect disappear. Instead, the estimated coefficients confirm my previous findings.

The coefficient of  $CONCENTRATION_t$  is statistically significant and has the expected sign. After the inclusion of  $CONCENTRATION_t$  among the regressors, the coefficient of  $MERSIZE_{k,t}$  is still statistically and economically significant. This finding suggests that the competitive behavior of banks differs, depending on how they acquired market power (home-grown or by acquisitions). If a bank wants to grow in a given geographic area, it must attract new borrowers and offer special services or interest rates. Only after having captured borrowers and established a dominant position, can the bank use its market power to increase interest rates.

On the other hand, a bank that grows through mergers can exploit market power, at least toward its continuing borrowers, right away. If information cannot easily be transferred to new potential lenders, then the current bank can exploit the power of the information associated with a previous relationship. Thus, my results support the theoretical literature that finds an additional market power effect in banking that is related to information. This information can be exploited by consolidated banks in dealing with their continuing borrowers.

The regression also controls for banks' characteristics, for firms' characteristics, time dummies, and fixed-effects for firms (coefficient not reported). With the exclusion of two coefficients (the ratio of nonperforming loans to total loans and return on sales), all the coefficients of the control variables are statistically and economically significant at the one percent level. Moreover, all four joint tests for banks' controls, firms' controls, time dummies, and fixed-effects reject the hypothesis that the coefficients are simultaneously zero at the one percent level.

The results thus far suggest that in-market mergers have nonneutral effects on loan rates for continuing borrowers. I explore whether the magnitude of this effect varies over time. Both academics and practitioners argue that the gestation period of restructuring following a merger can be as long as three years (Berger et al. (1998)). To investigate this issue, I modify my basic specification so my explanatory variables can measure the

impact of mergers over time. I introduce three new variables that measure the direct effect of mergers:  $MERGER_{k,t=0,or-1}$  is an indicator variable that takes the value of one if the bank was involved in a merger in the past two quarters;  $MERGER_{k,t=-2,or-3}$  is an indicator variable that takes the value of one if the bank was involved in a merger three or four quarters ago; and  $MERGER_{k,t<-4}$  is an indicator variable that takes the value of one if the bank was involved in a merger more than four quarters ago. Similarly, the size of the merger is interacted with the merger dummies introduced above, generating three new variables:  $MERSIZE_{k,t=0,or=-1}$ ,  $MERSIZE_{k,t=-2,or=-3}$ , and  $MERSIZE_{k,t<-4}$  measure the effect on interest rates of the size of the mergers according to when the merger took place.

The results listed in Column 3 of Table IV confirm my previous finding that in-market mergers generate both efficiency gains and market power. However, in the short run, the effect is neither statistically nor economically significant, as indicated by the coefficients and  $t$ -statistics of  $MERGER_{k,t=0,or-1}$  and  $MERSIZE_{k,t=0,or=-1}$ . In the third quarter and in all the subsequent quarters, the effect is similar to the one discussed in the basic regression and is statistically and economically significant. The  $F$ -tests cannot reject the hypothesis that the  $MERGER_{k,t=-2,or-3}$  and  $MERGER_{k,t<-4}$  coefficients are equal and that  $MERSIZE_{k,t=-2,or=-3}$  and  $MERSIZE_{k,t<-4}$  are equal. These results suggest that it takes four to six months for the consolidated banks to revise loan rates, and that the effect is permanent.

## B.2. In-market Mergers: Subsample Analysis

Thus far, the results have shown that consolidation has an economically and statistically significant effect on the interest rates paid by continuing borrowers, above and beyond the effect of loan concentration. For further evidence on the nature of this relation, I explore in this section the magnitude of the effect across types of borrowers.

Recent studies show that competition in the banking industry depends not only on the number of potential lenders, but also on the way information is transferred from one lender to another. If transferring information is costly, then borrowers cannot easily switch from one bank to another. Banks can exercise market power, even when the number of lenders in the market is large. This suggests that borrowers with different outside options can be affected in different ways by banking consolidation.

My data include information on the total number of banking relationships for each borrower in the sample. Using this information as a proxy for the borrower's ability to find alternative sources of financing, I can test whether the impact of banking consolidation and the market-power effect of large in-market mergers differs across borrowers and depends on their bargaining power. With this information, I reestimate the basic regression, splitting the sample according to the number of banking relationships engaged in by different borrowers.

Table V

**The Effect of Mergers across Borrowers with Different Numbers of Banking Relationships: In-market Mergers**

The dependent variable is the interest rate charged to firm  $i$  by bank  $k$  at time  $t$  minus the prime rate at time  $t$ .  $MERGER_{k,t}$  is a dummy variable equal to one if at time  $t$  bank  $k$  is a consolidated bank; it equals zero otherwise.  $MERSIZE_{k,t}$  is a variable that takes the value of zero if bank  $k$  is not a consolidated bank, and it is equal to the local market share of the target acquired by bank  $k$  if bank  $k$  is a consolidated bank.  $RIVAL\_MERG_{k,t}$  is a dummy variable equal to one if bank  $k$  is a rival bank; it equals zero otherwise.  $SIZE\_RIVAL\_MERG_{k,t}$  is a variable that takes the value of zero if bank  $k$  is not a rival bank, it is equal to the total local market share of all targets acquired in the province if bank  $k$  is a rival bank. All regressions include a time- and a firm-specific effect. The time period is one quarter. By using a fixed-effects model, a firm before the merger controls for itself after the merger. The regression also includes a vector of banks' characteristics,  $X_{k,t}$  bank's size (logarithm of total assets), the ratio of operating costs over total assets, and the ratio of non-performing loans over total loans, a vector of companies' characteristics,  $Y_{i,t-1}$  size (logarithm of sales), leverage and profitability, and local market concentration,  $CONCENTRATION_t$ , measured by the HHI on loans. The table reports only the coefficients on the consolidated and rival dummy variables and the coefficient for the HHI index. All samples are panels of continuing borrowers in areas where at least one in-market merger occurred and control samples of panels of continuing borrowers in areas where no consolidation occurred. In Column 1, the sample is restricted to borrowers with three or fewer bank relationships. In Column 2, the sample is restricted to borrowers with four to eight bank relationships. In Column 3, the sample is restricted to borrowers with more than eight bank relations. Bank relationships is the number of private banking institutions with which the borrower has a nonzero credit line in each calendar quarter. Heteroskedasticity-robust  $t$ -statistics are in brackets. The table also reports the  $p$ -value of an  $F$ -test for the hypothesis that the joint effect of all the variables equals zero. The symbol \*\*\* indicates the coefficient is significantly different from zero at the 1 percent level or less; \*\* at 5 percent or less; \* at 15 percent or less.

Variable	Number of Banking Relationships		
	$\leq 3$ (1)	4–8 (2)	$\geq 9$ (3)
$MERGER_{k,t}$	−0.83*** (−5.66)	−0.75*** (−6.33)	−0.68*** (−4.39)
$MERSIZE_{k,t}$	0.08*** (2.27)	0.20*** (5.43)	0.02*** (3.41)
$RIVAL\_MERG_{k,t}$	−0.02 (−0.24)	0.00 (−0.07)	−0.01 (−0.51)
$SIZE\_RIVAL\_MERG_{k,t}$	0.02*** (2.46)	0.06*** (4.80)	0.01*** (4.69)
CONCENTRATION	8.32*** (4.60)	4.9* (1.71)	4.94 (1.42)
$N$ obs.	36,751	47,674	23,076
Adjusted $R^2$	0.66	0.59	0.57
$p$ -value of $F$ -test	0.0001	0.0001	0.0001

Table V reports estimates of the effect of consolidation for borrowers with three or fewer banking relationships (Column 1), borrowers with four to eight banking relationships (Column 2), and borrowers with more than eight banking relationships (Column 3). I define banking relationships as the num-

ber of private credit institutions with which each borrower has a loan contract in each calendar quarter.

The results show that consolidation affects borrowers differently, depending on the number of banking relationship that they have.

First, I consider very large mergers. The results from the previous section show that large mergers have a positive effect on interest rates. Borrowers with many banking relationships (more than eight) do not suffer at all from an increase in market power. Even after a very large merger involving their lending institutions (the size of the largest merger in the sample, measured by the local market share of the target bank, is 12.28 percent), these borrowers' loan rates fall by 43 basis points (Column 3).<sup>5</sup> The results in Column 1 also show that the market power effect is very small for continuing borrowers of the consolidated bank who have few banking relationships. For example, the loan rates for continuing borrowers of those banks involved in the largest mergers increased by only 15 basis points.

Consolidated banks extract most of their market power from borrowers with more than three and less than eight loan relationships (Column 2, Table V). After very large mergers, these borrowers' loan rates increased by 170 basis points. In general, consolidation tends to be more harmful for these borrowers. On average, interest rates increase following consolidations when the local market share of the target bank is greater than 3.75 percent. When I perform an *F*-test on the hypothesis that the coefficients are equal in the three equations, the test rejects the hypothesis at the one percent confidence level.

One possible interpretation of these results is that the effect of banking consolidation depends on the number of alternative available options to the borrowers. Rajan (1992) and Sharpe (1990) show that the availability of alternative sources of finance can curtail the bargaining power of banks. When a large consolidation occurs, the outside options diminish for borrowers. The bargaining power of the bank should increase. However, this effect differs across borrowers. Borrowers with many banking relationships should be affected least by the consolidation of one of their banks, because they have many alternative sources of finance. Even before the consolidation, borrowers with few outside options pay a premium for their loans because their bank has an information monopoly over them. This claim is also confirmed by the coefficient on the HHI. Thus, consolidation does not significantly change the bank's relative market power over borrowers with few lending relationships, because lending to these borrowers is already associated with market power of the bank over the borrower.

These results generally support the predictions of the literature. However, several caveats are in order. There are at least two shortcomings associated with using the number of banking relationships as a measure of the borrowers' access to alternative sources of finance. First, firms might rely on non-banking sources of finance; if so, this measure can underestimate the ability

<sup>5</sup> This is computed by adding the coefficient of  $MERGER_{k,t}$ ,  $-0.68$ , to the coefficient of  $MERSIZE_{k,t}$  multiplied by 12.28.



of firms to borrow from other institutions. Second, each borrower could be at full capacity on its other lines of credit; if that is the case, the number of banking relationships alone could overestimate the borrowers' ability to raise funds from other banks.

In Italy, multiple banking relationships are widespread. The average number of banking relationships in the sample makes the results more difficult to interpret. Although there are several papers that attempt to explain multiple banking and why some countries' firms use it more than others,<sup>6</sup> we have only a limited understanding of this phenomenon and its implications for banking competition. In the standard banking models, it is theoretically difficult to reconcile the fact that borrowers with three banking relationships have very few outside options, or that borrowers with six banking relationships do not have enough bargaining power to prevent consolidated banks from extracting market power. Models that explain multiple banking as a possible equilibrium outcome reconcile this fact. For example, Detragiache et al. (2000) suggest that if the banking system is fragile, firms optimally choose multiple banking to avoid the risk of a profitable project being prematurely liquidated. Following this reasoning, it is possible that three banking relationships in countries with a fragile banking system do not ensure enough bargaining power to the firm.

Overall, these caveats suggest that the results of this section should be interpreted with caution. Nevertheless, the results provide some insights about the interaction between market structure, competition, and prices in banking, and they suggest the importance of more research in the area.

### *B.3. Out-of-Market Mergers*

Table VI presents the results of the estimation of equation (1) for out-of-market mergers. Banks that acquire small market shares (i.e., a local market share of 0.5 percent) lower interest rates for continuing borrowers. The average borrower benefits from a decrease in the interest rate over prime of about 32 basis points. Compared to similar sized in-market acquisitions, out-of-market mergers lead to much smaller decreases in interest rates (32 basis points as opposed to 73 basis points). The difference between the effect of mergers in the two types of acquisition is statistically significant. This finding supports the view that in-market mergers generate higher efficiency gains than do out-of-market mergers.

The coefficient of  $RIVALMERG_{k,t}$  is negative and statistically significant at the five percent level. Rival banks always react to the entry of a new acquirer by decreasing interest rates, which suggests that out-of-market mergers are "entry-like." However, the reduction in loan rates by rival banks is small (2 basis points).

<sup>6</sup> Studies on multiple banking include Bolton and Scharfstein (1996) and Dewatripont and Maskin (1995). Papers that investigate cross-countries differences in the number of banking relationship include Detragiache, Garella, and Guiso (2000) and Ongena and Smith (2000).

Table VI

**The Effect of Mergers on Bank Rates: Out-of-Market Mergers**

The dependent variable is the interest rate charged to firm  $i$  by bank  $k$  at time  $t$  minus the prime rate at time  $t$ .  $MERGER_{k,t}$  is a dummy variable equal to one if at time  $t$  bank  $k$  is a consolidated bank; it equals zero otherwise.  $MERGER_{k,t=0,or-1}$  is an indicator variable that takes the value of one if the bank was involved in a merger in the past two quarters; it equals zero otherwise.  $MERGER_{k,t=-2,or-3}$  is an indicator variable that takes the value of one if the bank was involved in a merger three or four quarters ago; it equals zero otherwise.  $MERGER_{k,t\leq-4}$  is an indicator variable that takes the value of one if the bank was involved in a merger more than four quarters ago; it equals zero otherwise.  $MERSIZE_{k,t}$  is a variable that takes the value of zero if bank  $k$  is not a consolidated bank, and it is equal to the local market share of the target acquired by bank  $k$  if bank  $k$  is a consolidated bank.  $MERSIZE_{k,t=0,or-1}$ ,  $MERSIZE_{k,t=-2,or-3}$ , and  $MERSIZE_{k,t\leq-4}$  are variables that take the value of zero if bank  $k$  is not a consolidated bank, and they are equal to the local market share of the target acquired by bank  $k$  if bank  $k$  was involved in a merger in the previous two quarters, three or four quarters ago, and more than four quarter ago, respectively.  $RIVAL\_MERG_{k,t}$  is a dummy variable equal to one, if bank  $k$  is a rival bank; it equals zero otherwise.  $SIZE\_RIVAL\_MERG_{k,t}$  is a variable that takes the value of zero if bank  $k$  is not a rival bank, and it is equal to the total local market share of all targets acquired in the province if bank  $k$  is a rival bank. All regressions include a time- and a firm-specific effect. The time period is one quarter. By using a fixed-effects model, a firm before the merger controls for itself after the merger. The regression also includes a vector of banks' characteristics,  $X_{k,t}$  bank's size (logarithm of total assets), the ratio of operating costs over total assets, and the ratio of nonperforming loans over total loans, a vector of companies' characteristics,  $Y_{i,t-1}$  size (logarithm of sales), leverage and profitability, and local market concentration,  $HERF_t$ , measured by the HHI on loans. The table reports only the coefficients on the consolidated and rival dummy variables and the coefficient for the HHI. The sample is a panel of continuing borrowers in areas where at least one out-of-market merger occurred, and a control sample of continuing borrowers in areas where no consolidation occurred. In Column 2, the sample is restricted to continuing borrowers of banks involved in mergers in which the target bank is small (gross total assets less than 1 billion dollars) and the consolidated bank is large (gross total assets greater than 1 billion dollars). In Column 3, the sample is restricted to mergers in which the consolidated bank has a similar size as the target bank. Heteroskedasticity-robust  $t$ -statistics are in brackets. The table also reports the  $p$ -value of an  $F$ -test for the hypothesis that the joint effect of all the variables equals zero. The symbol \*\*\* indicates the coefficient is significantly different from zero at the 1 percent level or less; \*\* at 5 percent or less; \* at 15 percent or less.

Variable	Whole sample (1)	Large Acquirers Small Targets (2)	Other Mergers (3)	Whole Sample (4)
$MERGER_{k,t<0}$	-0.36*** (-4.54)	1.75** (2.13)	-0.33*** (-4.19)	
$MERGER_{k,t=0,or-1}$				-0.33 (-1.05)
$MERGER_{k,t=-2,or-3}$				-0.42*** (-3.63)
$MERGER_{k,t\leq-4}$				-0.30*** (-4.33)
$MERSIZE_{k,t<0}$	0.08*** (6.94)	-0.49** (-2.17)	0.07*** (6.88)	
$MERSIZE_{k,t=0,or-1}$				0.01 (0.25)
$MERSIZE_{k,t=-2,or-3}$				0.05*** (3.56)
$MERSIZE_{k,t\leq-4}$				0.07*** (3.75)
$RIVAL\_MERG_{k,t}$	-0.02** (-1.65)	-0.70 (-0.55)	-0.06*** (-2.81)	-0.03** (-1.80)
$SIZE\_RIVAL\_MERG_{k,t}$	-0.004 (-0.62)	0.00 (0.60)	-0.004 (-0.74)	-0.004 (-0.62)
$CONCENTRATION_t$	4.54*** (2.70)	-10.36 (-1.06)	5.14*** (3.01)	4.55*** (2.7)
$N$ obs.	91,334	1,641	89,693	91,334
Adjusted $R^2$	0.65	0.78	0.62	0.62
$p$ -value of $F$ -test	0.0001	0.0001	0.0001	0.0001

When the local market share of the target is large enough, the consolidated bank increases the interest rate charged to its continuing borrowers (the coefficient  $MERSIZE_{k,t}$  is positive and statistically significant), but rival banks do not raise interest rates. This finding is puzzling. It appears to oppose the view that consolidated banks compete more aggressively with local banks than do target banks.

One possible explanation is that this result hinges on the different lending focuses of the consolidated and the target banks. If large and small banks have different credit policies, interest-rate charges could reflect differences between large and small banks.

To test for this possibility, I examine the relation between mergers and interest rates, taking into account the relative size of the merging banks. I divide the entire sample into two subsamples. The first group includes mergers in which the target bank is a small or medium-sized bank (gross total assets less than 1 billion dollars) and the consolidated bank is large (gross total assets greater than 1 billion dollars). In all of the remaining mergers ("mergers of equals"), the consolidated bank is similar in size to the target bank.

Column 2 of Table VI shows that after mergers involving a large shift in size for the acquired bank, the interest rate charged to continuing borrowers increases substantially, between 11 and 151 basis points, computed by adding the coefficient of  $MERGER_{k,t}$  to the coefficient of  $MERSIZE_{k,t}$  multiplied by the local market share of the target bank; in the subsample, the latter ranges between 0.5 and 3.5. This result supports the hypothesis that large banks taking over smaller banks can reduce the supply of loans to small businesses through price rationing. The negative coefficient of  $MERSIZE_{k,t}$  also supports this hypothesis: As the size of the target bank increases, there is less divergence in lending focus between acquirer and target, and the interest rate increases by a smaller amount.

The result for the mergers of equals (Column 3) is puzzling. Large out-of-market mergers do cause an increase in interest rate. Berger et al. (1995) offer a possible explanation. Suppose that target banks misprice loans systematically (charging a lower interest rate) because of a limited market for corporate control. After deregulation, when it is feasible to acquire banks in other areas, the acquiring banks could take over banks that were run inefficiently. After these mergers, the pricing policy of the consolidated bank would shift interest rates upward. This explanation is also supported by the result that rival banks do not raise interest rates after mergers.

For in-market mergers, to identify the short- and long-term effects on interest rates, I extend my analysis to include explanatory variables that measure the impact of mergers over time. In Column 4 of Table VI, I follow the same specification used for in-market mergers described in Section IV.B.1.  $MERGER_{k,t=0,or-1}$ ,  $MERGER_{k,t=-2,or-3}$ , and  $MERGER_{k,t<-4}$  measure the direct effect of mergers after different periods, in the first two quarters, in the subsequent two, and in all the subsequent periods, respectively.  $MERSIZE_{k,t=0,or-1}$ ,  $MERSIZE_{k,t=-2,or-3}$ , and  $MERSIZE_{k,t<-4}$  capture the effect of merger size over time.

The coefficients and  $t$ -statistics of  $MERGER_{k,t=0,or-1}$  and  $MERSIZE_{k,t=0,or-1}$  show that there is no significant short-term effect of out-of-market mergers on interest rates. The change in the interest rates charged by consolidated banks is statistically and economically significant in the subsequent quarters. However, there is no evidence that the consolidated bank acts substantially differently in the third and fourth quarter or any of the subsequent quarters. An  $F$ -test cannot reject the hypothesis that the  $MERGER_{k,t=-2,or-3}$  and  $MERGER_{k,t<-4}$  coefficients are equal and that  $MERSIZE_{k,t=-2,or-3}$  and  $MERSIZE_{k,t<-4}$  are equal. These results suggest that it takes four to six months for the consolidated banks to revise loan rates, and that the effect is permanent.

#### B.4. Robustness of the Results

There are several potential problems with the specification discussed in the previous sections. First, the regression imposes a restriction on the estimation: Though mergers occurred at different points in time during the calendar quarter, the regression treats all of the mergers within the calendar quarter as equally affecting loan rates that quarter. Unfortunately, I have no information on loan rates within the calendar quarters. This problem is not severe because changes in lending in the quarter following the merger are negligible, as shown in Column 3 of Table IV and Column 4 of Table VI.

Since I have no information on loans associated with mergers occurring prior to 1989, my results could be biased. Loans associated with mergers prior to 1989 might be treated as loans occurring in a  $MERGER_{k,t} = 0$  market. This problem is not likely to be relevant, because there were very few mergers taking place prior to 1989. To ensure that this problem is not driving any of my results, I use Focarelli, Panetta, and Salleo's (1999) sample to identify the banks in my sample involved in mergers between 1985 and 1989. I reestimate the basic model excluding from the sample all provinces in which the target banks of these pre-1989 mergers were located. By doing so, I lose observations in both the merger provinces sample and the control group sample (roughly 10,000 observations in the in-market mergers sample and 12,000 observations in the out-of-market mergers sample). The results (not reported) are not affected by this change. Of course, I cannot rule out this problem completely, because it may be possible that the banks in my sample were involved in mergers prior to 1985. However, merger activity was very limited in 1984 and nonexistent prior to 1984 (De Bonis and Ferrando (1996)).

Another problem is that the merger coefficients are likely to be biased toward finding no effect, since a merger that occurred later in the sample period has far fewer subsequent loans associated with it than mergers that occurred at the beginning of the sample period. This is a serious problem, and one which affects all of the literature. To measure the downward biases, I reestimate the same regression on a smaller sample, excluding later-in-sample mergers but including the later-in-sample observations in the control provinces. The results (unreported) on the coefficient of  $MERGER_{k,t}$  and  $MERSIZE_{k,t}$  are slightly larger, which suggests that the main regressions underestimate the merger effect.

I include multiple deals in which one bank subsequently buys two or more banks in the sample. This avoids sample selection effects that could bias the results against finding a merger effect. However, this approach treats the multiple mergers in which one bank buys two or more banks in subsequent periods as individual deals. If Bank A acquires Bank B one quarter and Bank C in the subsequent quarter, the  $MERGER_{k,t}$  dummy is set equal to one for all the periods after the first merger. The effect of the two subsequent mergers will be distinguishable only by the coefficient that captures the size of the merger. To consider the possibility of a specific “multiple merger effect,” I modify the model, interacting the  $MERGER_{k,t}$  dummy with an indicator variable equal to one if the bank is involved in multiple mergers. The results (unreported) show that the coefficient is not significant in either the in-market mergers or the out-of-market mergers regressions.

Another possible concern with the out-of-market results is that the sample of borrowers affected by out-of-market mergers contains some provinces located in the south of Italy (7 out of 25). Since the southern provinces are less developed, the efficiency effect in these provinces might be driven entirely by mergers involving acquirer banks that come from more efficient areas of the country. Since my regressions include a fixed-effect at the firm level, they already take into account provinces’ effects. Thus, this is not likely to be a problem. Rather than speculate, I reestimate the basic model, excluding the observations on southern provinces. I use two alternative samples. First, I exclude from my basic sample all the southern provinces in which some mergers occurred during the sample period. Second, I exclude all the observations about southern provinces, excluding southern provinces even from the control sample. In both cases, all the results remain the same, and the main results are not affected by these changes.

Finally, as mentioned before, the loan rate is only one dimension of the loan contract. There are other characteristics of the relationship between banks and borrowers that I cannot control for. Although the loan contracts included in the sample have many homogenous characteristics, borrowers might have other contemporaneous contracts with the bank (deposits, collateralized loans) that might affect the dependent variable in the regression. Also, the quality of the service provided by a bank can vary across banks and across times. Quality of service could account for some of the changes in interest rates that I observe in the data. Unfortunately, I cannot rule out any of these possibilities. The results of this section must therefore be interpreted with these caveats in mind.

## **V. Bank Consolidation and Dropped Borrowers**

One policy concern regarding banking consolidation is that banks may drop some of their borrowers after a merger. These borrowers could find it difficult to establish new relationships with other banks. There are at least two important aspects to this question. First, does the size effect in lending exist? Is it true that large banks find it less convenient to extend credit to small businesses, even considering the quality of the borrower? Second, if

large consolidated banks reduce their lending to small businesses, does this have negative consequences on small borrowers in the long run? Is it possible that this action is offset by the reactions of other banks?

In this section, I investigate only the first question. There are many studies that show that large banks focus on large borrowers, and small banks lend to small businesses. Also, many papers show that when banks become larger after consolidation, they reduce the amount of small-business lending from previous levels maintained by the acquired institution. These empirical observations can be reconciled with two hypotheses.

On the one hand, small banks might focus on small-business lending because in the past, banking regulation may have allowed small banks to make inefficient lending decisions (Berger et al. (1995)). If many small loans are unprofitable, then the reduction of credit to small borrowers can be the result of a decision by large newly consolidated banks to cut unprofitable loans.

On the other hand, the different lending focus between large and small banks might hinge on their different organizational structures. If large banks do not have the ability to effectively monitor small businesses, they could decide to cut their loans to borrowers with positive NPV projects.

Because of the lack of data connecting loans to the quality of the borrowers, the literature has not been able to distinguish between these two alternative hypotheses. Without knowing borrowers characteristics, it is impossible to distinguish whether the decision to reduce loans is based on borrowers' size or borrowers' quality.

#### A. Methodology and Results

In estimating the probability of a borrower being dropped, I face one possible endogeneity problem. If efficient banks take over risky or inefficient banks that have a high percentage of bad loans, then the dropped borrowers are simply bad borrowers who would have been dismissed anyway if the acquired bank had been liquidated.

To correct for this selection problem, I construct a sample of control banks that did not merge. I select control banks by matching the size, profitability, and riskiness characteristics of the target and acquirer banks (measured during the period before the acquisition). To account for the possible endogeneity effect mentioned above, I allow matching banks to be banks that could later fail. To estimate the effect of merger activity on the probability of losing credit relations, I follow borrowers of both merging banks and control banks over time, at the same time controlling for the fundamental risk characteristics of a company.

I estimate the following probit model by maximum likelihood:

$$\begin{aligned} \Pr(DROPPED_{ikt}) = F(\alpha_0 + \alpha_1 MERGER_{k,t} + \alpha_2 MERGER_{k,t} * SIZE_{i,t-1} \\ + \alpha_3 SIZE_{i,t-1} + \alpha_4 ROS_{i,t-1} + \alpha_5 LEVE_{i,t-1} \\ + \alpha_6 AGE_{i,t}). \end{aligned} \quad (2)$$

$DROPPED_{ikt}$  is equal to one, if in the calendar quarter  $t$ , firm  $i$  loses the credit line with bank  $k$ ;  $DROPPED_{ikt}$  equals zero otherwise.  $F(\cdot)$  is the cumulative distribution function of a standard normal variable.  $MERGER_{k,t}$  is a dummy variable equal to one if, at any time  $s < t$ , bank  $k$  is involved in a merger.

To investigate the existence of a size effect in lending, I interact the merger dummy with the size of the borrower, which I measure by the logarithm of sales.  $SIZE_{i,t-1}$ ,  $ROS_{i,t-1}$ ,  $LEVE_{i,t-1}$ , and  $AGE_{i,t}$  control for firm-specific characteristics (size, profits, leverage, and age of the firm, respectively) at time  $t - 1$ . Table VII reports the estimates of this model, as well as  $t$ -statistics based on heteroskedastic-robust standard errors.

Column 1 of Table VII reports the estimates obtained by pooling borrowers of target and acquirer banks, as well as the borrowers of matching banks. As the table shows, mergers increase the probability of borrowers being cut off. This effect is statistically significant at the one percent level. The coefficients are the effect of a marginal change in the corresponding regressor on the probability of being severed, which I compute at the sample mean of the independent variables. The probability of interrupting the lending relationship with the borrowers is 1.3 percent higher for a bank that merges than for an otherwise comparable bank. Small borrowers who are clients of merging banks have a higher probability of being severed. A one-standard-deviation decrease in the logarithm of sales from its mean increases the probability of losing the relationship with the consolidated bank by 0.7 percent. In every year, the probability that one relationship is severed is 3 percent. Thus, this roughly corresponds to a 25 percent increase in the sample average probability of losing the credit line.

The results on the control variables show that with the exception of  $AGE_{i,t}$ , all the coefficients of the firms' control are statistically significant. An  $F$ -test rejects the hypothesis that the joint effect of all the firm's controls equals zero. This result implies that the observable firm characteristics are an important determinant of the bank's choice to renew loans. The coefficient of  $SIZE_{i,t-1}$  suggests that in the absence of banking mergers, small firms have more stable relationships with their banks than do otherwise similar larger firms. A one-standard-deviation decrease in the logarithm of sales decreases the probability that a firm loses the credit line with its bank by 0.44 percent, which corresponds to a 15 percent decrease in the sample average probability. This result is consistent with the relationship lending literature (Petersen and Rajan (1994, 1995)). The coefficients of leverage and profitability also have the expected signs and are economically and statistically significant. An increase in leverage increases the probability of losing the banking relationship, and an increase in profitability has the opposite effect.

I gain further insights into the existence of a size effect in lending by dividing the sample into previous borrowers of target and acquirer banks. The strong negative correlation between the size of the bank and the share of small business loans, documented in the literature, suggests that firms who borrow from target banks are more likely to lose their credit relation-

**Table VII**  
**Determinants of Dropped Borrowers**

The dependent variable in each regression is one, if in the calendar quarter  $t$ , the firm  $i$  loses the credit line with bank  $k$ ; it equals zero otherwise. The reported coefficients are probit estimates of a marginal change in the corresponding regressor on the probability of losing the banking relationship, computed at the sample mean of the independent variables. The estimation method is maximum likelihood probit. The sample is restricted to all the target banks' and the acquirer banks' borrowers prior to the acquisition. I use borrowers of matching banks as a control group. In Column 2, the sample is restricted to borrowers of acquiring banks and matching banks of the acquirers. In Column 3, the sample is restricted to borrowers of target banks and matching banks of the targets.  $MERGER_{k,t}$  is a dummy variable equal to one if at time  $t$ , bank  $k$  is a consolidated bank; it equals zero otherwise.  $SIZE_{i,t-1}$  is the logarithm of sales.  $LEVERAGE_{i,t-1}$  is book value of short- plus long-term debt divided by book value of short- plus long-term debt plus book value of equity.  $ROS_{i,t-1}$  is EBITDA over sales.  $AGE_{i,t}$  is the age of the company. The regression also includes a constant term and calendar year dummies (not reported).  $t$ -statistics based on heteroskedastic-robust standard errors are reported in brackets. Pseudo  $R^2$  is defined as one minus the log-likelihood ratio test. Chi-squared is the  $p$ -value for the likelihood ratio test that all the coefficients are simultaneously equal to zero. The symbol \*\*\* indicates the coefficient is significantly different from zero at the 1 percent level or less; \*\* at 5 percent or less; \* at 15 percent or less.

Variable	Whole Sample (1)	Acquirers (2)	Targets		
			All Targets (3)	Small Targets (4)	Large targets (5)
$MERGER_{k,t}$	0.013*** (4.49)	-0.003 (0.84)	0.077** (5.85)	0.120*** (3.31)	0.043** (3.34)
$MERGER_{k,t} * SIZE_{i,t}$	-0.001*** (-5.37)	-0.001* (-1.95)	-0.005*** (-6.06)	-0.007*** (-3.67)	-0.003*** (-3.32)
$SIZE_{i,t}$	0.003*** (14.37)	0.003** (-9.11)	0.005*** (11.37)	0.006*** (9.52)	0.003*** (4.88)
$LEVERAGE_{i,t}$	0.009*** (7.50)	0.009*** (6.99)	0.008*** (2.58)	0.002 (0.27)	0.013*** (3.43)
$ROS_{i,t}$	-0.008*** (-2.89)	-0.007** (-2.34)	-0.014** (-1.83)	-0.004 (-0.36)	-0.022** (-2.34)
$AGE_{i,t}$	-0.000 (-0.13)	-0.000 (-0.13)	0.000 (0.34)	0.0002*** (2.63)	-0.000 (-1.03)
$N$ obs.	548,287	477,149	71,138	19,379	51,762
Pseudo- $R$	0.12	0.13	0.15	0.40	0.11
Chi-squared	0.0001	0.0001	0.0001	0.0001	0.0001

ship with the consolidated bank than would otherwise identical borrowers from acquirer banks. The data supports this hypothesis. A likelihood ratio test rejects at a one percent level the equality of the coefficients in the two subsamples.

Column 2 of Table VII shows that the effect on previous borrowers of the acquirer bank is very limited. The coefficient of the merger dummy is not statistically significant and the coefficient of  $MERGER_{k,t} * SIZE_{i,t-1}$  is very small. By contrast, for firms who borrow from the target bank prior to the merger, the probability of future credit denial increases by 7.7 percent after



their bank is taken over (Column 3 of Table VII). Small borrowers of target banks are even more likely to lose their credit line after bank consolidation. A one-standard-deviation decrease in the logarithm of sales increases the probability of losing the credit relationship by 2.4 percent. This corresponds to an 83 percent increase in the sample average probability of losing the credit line.

These results show that large consolidated banks are more likely to deny credit renewal to small businesses, even controlling for observable characteristics of the borrower (leverage, profitability, size, and age). The decision to deny credit to small borrowers is not attributable to the fact that these borrowers are less profitable or more leveraged.

These results are consistent with two hypotheses. According to Stein (2000), if loan officers change after consolidation, the soft information they have collected can be lost. The new loan officers of large banks might have less incentive to invest in soft information and so may cut small-business lending. It is also possible that the hierarchical structure of large banks (agency costs) imposes a loan technology that is based mainly on hard information. If loan criteria change after a merger, small business loans are cut off even if the loan officers of the consolidated banks do not change. The loan officers may remain the same, but they can no longer make loans based on soft information. Unfortunately, my data do not allow me to distinguish between these two alternative explanations. I do not have information on whether the loan officers remained the same after consolidation.

In Columns 4 and 5, I split the sample by relative size of merging banks. Column 4 of Table VII reports the estimates of the basic model when the target bank is small or medium-sized (gross total assets less than 1 billion dollars) and the consolidated bank is large (gross total assets greater than 1 billion dollars). The coefficient of  $MERGER_{k,t}$  indicates that when targets are much smaller than the consolidated banks, mergers have a substantial impact on the probability of severing previous relationships with the target banks. For firms that are borrowers of target banks, the probability of losing their credit lines increases by 12 percent after the merger. Furthermore, the size effect for this type of merger is particularly strong, which confirms that banks of different sizes have divergent lending focuses. A one-standard-deviation decrease in the logarithm of sales increases the probability of being severed after the merger by 3.1 percent. This change corresponds to a 92 percent increase in the sample average probability of credit denial.

Column 5 of Table VII estimates the same basic regression for the borrowers of large target banks. The coefficients show that the effect is weaker, which supports the size effect in lending hypothesis. The magnitude of the size effect in lending is greater for small borrowers of small banks that were acquired by large banks. These findings support those of Peek and Rosengren (1998) and Berger et al. (1998). These studies find that when the consolidated bank is larger than the target, the small-business share of the consolidated bank lending portfolio declines after the merger.

The difference between the coefficients of the firm-related variables in Columns 4 and 5 of Table VII are interesting. Because I select the observa-

tions in the control groups by matching banks' characteristics, the subsample in Column 4 contains smaller banks than the subsample in Column 5. The coefficient of  $SIZE_{i,t-1}$  in Column 4 is larger than the same coefficient in Column 5. The difference is statistically significant at the one percent level. This result suggests that smaller banks have more stable relations with small firms than larger banks. Also, in Column 4, the coefficients on leverage and profitability suggest that these factors are not important in determining the probability of losing the relationship with the bank.

To identify the short- and long-term effects of mergers on the probability of losing a credit line, I modify the basic model by including three indicator variables accounting for the effect of mergers at different times. As I did in the previous analysis, I include  $MERGER_{k,t=0,or-1}$ ,  $MERGER_{k,t=-2,or-3}$ , and  $MERGER_{k,t<-4}$  to measure the effect of mergers in the first two quarters, in the subsequent two, and in all the subsequent periods, respectively. I interact this indicator variable with the size of the firm to confirm the existence of a size effect in lending.

Column 1 in Table VIII reports the results for borrowers of small target banks, and Column 3 reports the results for borrowers of large target banks. The results confirm that previous borrowers of target banks are more likely to lose their credit line when the merged institution is substantially larger than the target bank. The coefficient of  $MERGER_{k,t<-4} * SIZE_{i,t}$  measures the permanent effect. This is the only effect that is economically and statistically significant, suggesting that it takes longer (9 to 12 months) for merged banks to decide to drop a borrower than it does for them to change loan rates. One possible explanation for results that are different from Section IV is that the changes in interest rates are determined by lower operating costs (efficiency) or market power. Thus, these changes can be applied to all borrowers and do not require an evaluation of individual borrower. Alternatively, the decision to drop a borrower requires a case-by-case valuation that can take considerable time.

The existence of a size effect in lending does not imply that bank consolidation has negative consequences on small borrowers. The outcome depends crucially on whether small borrowers can switch lenders and what the costs are for switching banks. Berger et al. (1998) find that even if merging banks reduce their small-business lending, the supply of small-business credit by other banks offsets much of the negative effects of mergers. Thus, there is no change in the overall supply of loans to small business. Unfortunately, they are not able to see whether prices or other contract terms change. For example, it is possible that borrowers who are dropped by consolidating banks and picked up by other lenders might have to pay higher rates or face harsher contract terms. This is a subject for future research.

### B. Robustness

Thus far, I have interpreted the results presented in the previous section as evidence that bank consolidation induces large consolidated banks to reduce loans to small businesses. However, alternative explanations for this result are also possible.

**Table VIII**  
**Determinants of Dropped Borrowers:**  
**Borrowers of the Target Banks**

The dependent variable in each regression is one if in the calendar quarter  $t$ , the firm  $i$  loses the credit line with bank  $k$ ; it equals zero otherwise. The reported coefficients are probit estimates of a marginal change in the corresponding regressor on the probability of losing the banking relationship, computed at the sample mean of the independent variables. The estimation method is maximum likelihood probit. In Columns 1 and 2, the sample is restricted to borrowers of target banks with gross total assets less than 1 billion dollars acquired by a consolidated bank with gross total assets larger than 1 billion dollars. In Columns 3 and 4, the sample is restricted to borrowers of all the other target banks. I use borrowers of matching banks as a control group.  $MERGER_{k,t}$  is a dummy variable equal to one if at time  $t$ , bank  $k$  is a consolidated bank; it equals zero otherwise.  $MERGER_{k,t=0,or-1}$  is an indicator variable that takes the value of one if the bank was involved in a merger in the past two quarters; it equals zero otherwise.  $MERGER_{k,t=-2,or-3}$  is an indicator variable that takes the value of one if the bank was involved in a merger three or four quarters ago; it equals zero otherwise.  $MERGER_{k,t<-4}$  is an indicator variable that takes the value of one if the bank was involved in a merger more than four quarters ago; it equals zero otherwise.  $SIZE_{i,t-1}$  is the logarithm of sales.  $LEVERAGE_{i,t-1}$  is book value of short- plus long-term debt divided by book value of short- plus long-term debt plus book value of equity.  $ROS_{i,t-1}$  is EBITDA over sales.  $AGE_{i,t}$  is the age of the company. The regression also includes a constant term and calendar year dummies (not reported).  $t$ -statistics based on heteroskedastic-robust standard errors are reported in brackets. Pseudo  $R^2$  is defined as one minus the log-likelihood ratio test. Chi-squared is the  $p$ -value for the likelihood ratio test that all the coefficients are simultaneously equal to zero. The symbol \*\*\* indicates the coefficient is significantly different from zero at the 1 percent level or less; \*\* at 5 percent or less; \* at 15 percent or less.

Variable	Small Target Banks		Large Target Banks	
	(1)	(2)	(3)	(4)
$MERGER_{k,t<0}$		0.081*** (2.65)		0.040*** (3.15)
$MERGER_{k,t=0,or=-1}$	0.030 (.62)		0.031 (1.495)	
$MERGER_{k,t=-2,or=-3}$	0.090 (1.12)		0.061** (2.07)	
$MERGER_{k,t\leq-4}$	0.333*** (4.21)		0.070** (2.60)	
$MERGER_{k,t<0} * SIZE_{i,t}$		-0.006*** (-3.29)		-0.002*** (-2.60)
$MERGER_{k,t=0,or=-1} * SIZE_{i,t}$	-0.003 (-1.00)		-0.002 (-1.48)	
$MERGER_{k,t=-2,or=-3} * SIZE_{i,t}$	-0.005 (-1.18)		-0.004** (-2.29)	
$MERGER_{k,t\leq-4} * SIZE_{i,t}$	-0.011*** (-4.31)		-0.003** (-2.31)	
$SIZE_{i,t}$	0.006*** (9.58)	0.005*** (7.95)	0.003*** (4.71)	0.002*** (3.28)
$LEVERAGE_{i,t}$	0.002 (0.28)	0.001 (0.142)	0.013*** (3.41)	0.014*** (3.64)
$ROS_{i,t}$	-0.005 (-0.39)	-0.002 (-0.18)	-0.023*** (-2.35)	-0.022*** (-2.38)
$AGE_{i,t}$	0.0001*** (2.62)	0.0001** (2.17)	-0.000 (-1.07)	-0.000 (-1.18)
$ROA_{k,t}$		-0.014*** (-9.79)		-0.004*** (-5.98)
$BADLOANS_{k,t}$		0.000 (0.20)		0.001*** (5.27)
$COSTEFFICIENCY_{k,t}$		-0.003*** (-2.78)		-0.011*** (-8.33)
N obs.	19,379	19,375	51,762	51,761
Pseudo-R	0.40	0.55	0.11	0.213
Chi-squared	0.0001	0.0001	0.0001	0.0001

First, mergers are endogenous. Factors that induce a bank to merge might be correlated with the decision to reduce credit to some class of borrowers. It is possible that consolidated banks are more profitable, less risky, and more efficient than other banks. Profitable banks could be more apt to reduce lending to small businesses because they can engage in alternative activities that are more productive. In other words, it is possible that the merger dummy in the estimated model is correlated with banks' specific characteristics.

To examine this possibility, I reestimate the model including some banks' characteristics as controls. The new specification contains banks' profitability measured as the return on assets, banks' riskiness measured by the ratio of nonperforming loans to total loans, and banks' efficiency measured by the ratio of operating costs to total assets. My results, reported in Columns 2 and 4 of Table VIII, confirm my previous findings. Even after I control for banks' characteristics, previous borrowers of target banks still show a higher probability of an interrupted relationship with the consolidated bank than otherwise identical firms that borrow from banks that do not merge. Also, to make sure that different characteristics of the borrowers are not driving the results, I have also interacted the merger dummy with several proxies for firms' quality. Results (not reported) show that the coefficients are economically and statistically not significant.

Another interpretation of the previous results is that a bank's decision to drop some borrowers might be based on unobservable characteristics of the quality of the firms that are not captured in the regression. I cannot completely rule out this possibility, but to partially address this issue, I estimate a linear probability model with firm-specific effects. The introduction of fixed-effects partially mitigates the problem, because it allows me to compare the same firm borrowing from banks that merge and banks that do not merge. The results (not reported) confirm my previous findings. Of course, this argument is convincing only as long as I select the control group of banks properly.

Another potential problem is that the control group of banks in the regressions reported in Column 4 of Table VII are small banks. If some regulatory distortions persist in the control group of banks, then the results could be interpreted as evidence that the consolidated banks drop negative NPV loans. This argument relies on the assumption that all small banks are inefficient. In principle, if the inefficiency was caused by regulation, then recent changes in regulation should affect all banks in the same way. Control banks and merged institutions should both face the same competitive pressures.

Finally, the interpretation of these results relies on the assumption that severing a banking relationship reflects the bank's choice. To draw the conclusions, I assume that the borrower's choice of severing its bank relationship is not affected by consolidation. Because unused credit lines are free for the borrowers in Italy, firms do not have a strong reason for severing credit lines with their banks. They can maintain them and leave them unused. However, there could be other costs of maintaining unused credit lines (for example, managing the relationship with the bank). If it becomes costlier to

maintain a relationship with the bank after consolidation, then the coefficients overestimate the size effect in lending. I cannot fully rule out this possibility.

## VI. Conclusions

This paper analyzes the effect of bank consolidation on individual business borrowers. It identifies several new facts that have important policy implications, and it raises some questions for future research.

First, I find that mergers involving the acquisition of small-market-share banks always generate efficiency gains that are beneficial to borrowers. If the merger is between banks previously operating in the same province (in-market mergers), the interest rates charged to borrowers of the consolidated bank decrease substantially. If the merger is between banks previously operating in different provinces (out-of-market mergers), then the decrease in interest rates is not as significant. These results support the view that in-market mergers generate higher efficiency than do out-of-market mergers.

Second, I find that when in-market mergers involve the acquisition of a large-local-market-share bank (above 6.15 percent), the efficiency effect is offset by monopoly power. In these cases, borrowers suffer from an increase in interest rates of up to 80 basis points. This result supports the view that mergers between banks that have a significant market overlap increase both local market concentration and interest rates. Rival banks behave similarly to consolidated banks. They increase interest rates when the size of the merger is large.

Third, I find that bank consolidation affects borrowers differently, depending on how many banking relationships they have. Borrowers with many banking relationships have more external sources of finance and thus do not suffer from an increase in market power. Even after a very large merger of their lending institutions, these borrowers see their loan rates fall by 43 basis points. The market power effect is also very small for continuing borrowers of the consolidated bank who have few banking relationships. These borrowers do not suffer from an increase of market power, because consolidation does not significantly change the bank's relative market power over small borrowers. Consolidated banks extract most of their market power from borrowers with three to eight loan relationships. If the local market share of the target bank was greater than 3.75 percent, interest rates generally increase following consolidations. These results support the theoretical finding that market competition in banking does not depend only on the number of market participants. Asymmetric information that banks possess about borrowers affects the state of competition. Because information is not easily transferred to other potential lenders, the current bank acquires information-based market power over the borrowers who suffer most from asymmetric information.

Fourth, I find that small borrowers of target banks are less likely to borrow money in the future from the merged bank. This result reinforces pre-

vious findings that following a merger, banks reduce lending to small borrowers. The decision to deny credit to small businesses seems unrelated to the observable characteristics of the borrowers. This evidence supports the view that large and small banks have different organizational structures and loan strategies.

My analysis raises two questions. First, what are the long-term consequences of severing credit relationships with small borrowers? Because other institutions can replace many of these loans, it is possible that discontinued borrowers can find alternative sources of financing. Are these alternative sources of finances more expensive? To answer this question, we can test whether the reduction in bank credit caused by bank consolidation influences the investment behavior of those discontinued borrowers. The second question regards the consolidated banks' policy for acquiring new borrowers. These two questions are the focus of future research.

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