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ABSTRACT

SMEs and Bank Lending Relationships: The Impact of Mergers*

This paper studies the impact of bank mergers on firm-bank lending relationships using information from individual loan contracts in Belgium. We analyse the effects of bank mergers on the probability of borrowers maintaining their lending relationships and on their ability to continue tapping bank credit. The Belgian financial environment reflects a number of interesting features: high banking sector concentration; 'in-market' mergers with large target banks; importance of large banks in providing external finance to SMEs; and low numbers of bank lending relationships maintained by SMEs.

We find that bank mergers generate short-term and longer-term effects on borrowers' probability of losing a lending relationship and on credit availability. Mergers also have heterogeneous impacts across borrower types, including borrowers of acquiring and target banks, borrowers of differing size, borrowers with single versus multiple relationships, and borrowers with differing relationship intensities. Firms borrowing from acquiring banks are less likely to lose their lending relationship, while target bank borrowers are more likely to lose their relationship or see their credit availability harmed. Overlap borrowers – borrowing from two of the merging banks – are less likely to lose their relationship than firms borrowing from only one of the merging banks or firms borrowing from non-merging banks.

JEL Classification: G21 and G32

Keywords: bank lending relationships, bank mergers and SME loans

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I. Introduction

The impact of bank mergers on firm borrowers has been a topic of interest for researchers and policy makers for a number of years. Two questions of general concern have been raised: Do bank mergers harm or benefit bank borrowers? Do bank mergers result in less credit for small firms? (For an overview see Berger et al., 1999.) In many countries banks are the most important providers of external finance to firms. Banks are especially important for small and medium size firms, as they represent these firms' principal source of external finance.

Consolidation in banking sectors in countries around the world has further motivated the recent focus on the impacts of bank mergers. Belgium is no exception in this regard. A wave of bank mergers during the past decade has decreased the total number of banks operating in Belgium and has increased banking sector concentration. In this paper we use data on firm-bank loan contracts from the Belgian credit register to analyse the impact of bank mergers on the bank lending relationships of small and medium size firms (SMEs). Although the literature on the impact of bank mergers on borrowers is growing, very few studies to date have made use of firm-level data.

Investigations that have relied on firm-level data to study the effects of bank mergers have been undertaken for three other countries: Italy (see Bonaccorsi di Patti and Gobbi, 2003; Chionsini et al, 2004; Sapienza, 2002; Panetta et al, 2004), Norway (Karceski et al, 2004), and the U.S. (Carow et al, 2004).¹ Like ours, the Italian studies use credit register data and focus on SMEs.² In contrast, Karceski et al. (2004) and Carow et al. (2004) use firms' stock market returns to study the effects of bank mergers on borrowers; therefore, their focus is mainly on large, listed firms.

The context of our analysis also differs in a number of ways from the settings of the existing studies. First, concentration in the Belgian banking sector has increased significantly and is now very high as a result of a number of major "in-market" bank

¹ Scott and Dunkelberg (2003) address bank mergers in the U.S. also using firm-level data.

² Banks must report to the Belgian credit register information relating to total exposures to individual firms above €25.000. The reporting requirement for the Italian credit register is about €75.000.

mergers. Second, unlike Italian SMEs, Belgian SMEs generally maintain low numbers of bank lending relationships, which actually appears to be more typical of SMEs in other countries than the mean number of nine lending relationships reported by Sapienza (2002) for Italian SMEs. Third, large banks are very important in lending to SMEs in Belgium. Finally, the mergers that we study all involve large target banks, as well as the more typical feature of large acquiring banks.

We tackle new questions, in addition to investigating questions that other authors have addressed. Among the questions that have been studied in other papers are the following. Is the probability of losing a bank lending relationship higher for borrowers of merging banks than for borrowers of nonmerging banks? Are particular borrowers affected more by mergers than others (e.g., small vs. large firms; borrowers of acquiring vs. target banks)? How are merger effects spread out over time? Do mergers affect the interest rates offered to continuing borrowers?³

New questions that we address include: Are overlap borrowers – i.e., borrowers of both merging banks – affected differently by mergers than borrowers of only one of the merging banks? Are borrowers with single bank relationships affected differently than borrowers with multiple relationships? Are borrowers with greater or lesser relationship intensities affected differently by mergers? Informational gains from combining the assessments of two banks may imply that overlap borrowers are affected differently by mergers than borrowers of only one of the merging banks. The Belgian context may help to identify this effect, as the number of lending relationships maintained by firms is low. Firms with single relationships can be expected to have lower bargaining power (or higher switching costs) than firms with multiple relationships; therefore, single-relationship borrowers of merging banks may benefit less from (or be harmed more by) bank mergers. Stronger bank relationships may yield a certain degree of market power to the bank (see e.g. Sharpe (1990) and Rajan (1992)). Firms with strong relationships then are expected to be tied up with this bank when soft information is not easily transferable.

³ Although we are not able to address this question directly, we use data on changes in loan volumes to make some inferences about interest rates.

Mergers may produce efficiency gains but also increase market power (for an overview on bank mergers, see Focarelli et al, 2002). Can we expect that market power effects are more important than efficiency gains? Sapienza's (2002) results on loan rates for firms continuing to borrow from the merged bank after the merger suggest that market power effects may dominate for "in-market" mergers. The question remains as to whether the same conclusion holds with respect to termination of bank lending relationships and loan volumes.

Previous studies have found that bank mergers have heterogeneous impacts on borrowers with differing characteristics. In particular, small firm borrowers of merging banks appear to face additional difficulties in tapping credit in the short run following a merger. Also, borrowers of target banks (especially small target banks when the acquiring bank is large) seem to be harmed more by mergers. These results suggest the importance of supply effects. Karceski et al (2004), however, argue they may also highlight demand effects as they suggest that target bank borrowers with lower switching costs are less harmed than those with higher switching costs.

The structure of the Belgian banking market, where large banks were important in granting loans to small firms even before the mergers, might suggest that other studies' findings of stronger merger effects for small firms than for large firms will not hold for our analysis. In addition, the fact that the target banks are large may suggest less of a difference in the effects of bank mergers on borrowers of acquiring vs. target banks. On the other hand, the low number of bank lending relationships maintained by Belgian firms and the high proportion of firms with single lending relationships suggest that bank mergers might be expected to have stronger effects in Belgium than in countries where firms maintain many bank lending relationships.

Our main results can be summarized as follows. First, when we distinguish between borrower relationships with merging banks and with banks not involved in a merger, we find that bank mergers have short-run effects, in that firms borrowing from merging banks are significantly less likely to see their lending relationship terminated than otherwise similar borrowers. Longer-term effects, however, suggest that single relationship firms borrowing from one of the merging banks are more likely to lose their lending relationship, although overlap firms are still less likely to have the

relationship terminated in the longer term. Second, when we differentiate borrowers of target and acquiring banks, we find that borrowers at target banks are more likely to lose their relationship, whereas borrowers from acquiring banks are less likely to terminate their relationship following a merger. In addition, the differences between target and acquiring bank borrowers begin to appear immediately following the merger, and they become more robust in the longer run. These results are similar to results reported in previous empirical research; however, one difference is that our result relating to borrowers of acquiring banks appears to be stronger than findings reported elsewhere.

A third result is that the effects of mergers differ for small and large firms and also vary for large firms borrowing from acquiring banks compared with large firms borrowing from target banks. Results also differ for target bank borrowers with single versus multiple lending relationships. Fourth, overlap borrowers are less likely to lose their relationship with the consolidated bank than are firms borrowing from only one merging bank or firms borrowing from nonmerging banks.

Next, relationship intensity matters. For multiple relationship borrowers in general, the higher the proportion of total loans borrowed from a given bank (i.e., the higher the relationship "intensity"), the lower the probability of relationship termination. However, when merger effects are differentiated according to relationship intensity, borrowers of acquiring banks with very low relationship intensity are found to be less likely than nonmerging borrowers to have their relationship terminated. On the other hand, borrowers of target banks with high relationship intensity are more likely than similar nonmerging borrowers to have their relationship terminated.

Finally, single relationships firms borrowing from the target bank and continuing at the merged bank see their loan volumes negatively affected, suggesting that target borrowers that are kept on after the merger may face higher interest rates. Multiple relationship firms borrowing from merging banks do not exhibit significant differences in loan volume changes than otherwise similar firms.

The remainder of the paper is organized as follows. Section II reviews the literature and formulates hypotheses concerning the effects of bank mergers. Section III

describes the banking environment and discusses sources of data. Section IV presents the results of regressions testing the impact of mergers on the probability of losing a relationship, while Section V deals with credit availability. Section VI concludes.

II. Effects of bank mergers: literature review and hypotheses

Bank mergers can lead to efficiency gains that are potentially passed on to borrowers. Lower loan rates at the merging banks imply that borrowers are more likely to continue borrowing and to increase their loan volumes from the consolidated bank. On the other hand, mergers also often increase market power, which may result in borrowers decreasing their loan volumes or in termination of relationships. Hypothesis 1 pertains to this tradeoff:

Hypothesis 1: *When efficiency gains outweigh the effects of increased market power, firm-bank lending relationships are less likely to be terminated and loan volumes increase. Conversely, when market power outweighs efficiency gains, firm-bank relationships are more likely to be terminated and loan volumes decrease.*

Sapienza (2002), who uses data from the Italian credit register to study the effects of Italian bank mergers on borrowers' credit lines, provides evidence relating to Hypothesis 1.⁴ She finds that interest rates on credit lines decrease after bank mergers, suggesting evidence for an efficiency effect. However, this efficiency effect is offset by a market power effect when the market share of the acquiring bank is substantial.⁵

As suggested above, the effects of bank mergers need not be the same for all firms. Hypothesis 2 identifies a number of expected heterogeneous impacts of bank mergers on borrowers.

Hypothesis 2: *After mergers, relationships are more likely to be terminated and loan volumes more likely to decrease:*

- a) at target banks than at acquiring banks,*
- b) for small firms than for large firms,*

⁴ Sapienza chooses credit lines because these are nonsecured lines, which enables her to compare interest rates across borrowers without having to take into account collateral.

⁵Chionsini, Foglia and Marullo-Reedtz (2004) also rely on the Italian credit register to study bank mergers and find that borrowers that are kept on at merged banks have a lower probability of default than other borrowers in the population.

c) *by firms with lower switching costs than by other firms*

d) *for firms borrowing from only one merging bank, rather than overlap borrowers*

Part a) refers to differences between borrowers at *acquiring versus target banks*, suggesting that borrowers at target banks are more likely to see their relationship negatively affected. Borrowers of target banks will be harmed when: (1) the target bank before the merger was granting below-cost loans, or (2) the merged bank adopts the strategic focus and the organizational structure of the acquiring bank (Peek and Rosengren, 1996; Houston et al, 2001). In addition, soft information available at the target bank may be lost when key employees leave the merged bank or move within the new organization.

Part b) is related to the “*size effect of lending*” (see e.g. Stein (2002)). Mergers increase bank size, and larger banks typically have a more hierarchical organizational structure than small banks. Large banks may concentrate on larger firms, and reduce the amount of lending to small businesses (see also Strahan and Weston, 1998, and Peek and Rosengren, 1996). This may be driven by the fact that: (1) servicing large versus small firms is entirely different (transactional lending versus relationship lending; also see Petersen and Rajan (1994, 1995)); or (2) small banks have a better technology for servicing small firms (see also Cole et al, 2004, and Udell, 1989).

Part c) focuses on demand side effects that relate to the magnitude of “*borrower switching costs*”, which determine how advantageous it is for firms to switch banks versus being locked-in (see e.g. Bouckaert and Degryse, 2004; Degryse and Ongena, 2004; or Kim et al, 2003; Klemperer (1995) provides a review of switching costs).⁶ Whereas firms with low switching costs could more easily leave the merged bank if interest rates rise as a result of the merger or if other banks start to actively poach borrowers from merged banks, firms with high switching costs may have to continue with the consolidated bank. We expect that larger and more profitable firms, and firms

⁶ Firms face different kinds of switching costs. “Informational” switching costs stem from the fact that an inside bank possesses an informational advantage vis-à-vis outside banks. Firms willing to switch banks might be perceived of lower quality and therefore pay a higher loan rate. “Transactional” switching costs refer to higher costs that are incurred in visiting another bank. Examples of the latter are differences in geographical convenience, paperwork, different standards at banks etc.

with multiple relationships have fewer problems in credibly communicating their value to other financiers.

Part d) states that *overlap borrowers* are less likely to lose their relationship and have their loan volumes decreased than firms borrowing from only one merging bank. Several arguments may be cited in support of this conjecture. First, the number of firm-bank relationships “mechanically” decreases for firms borrowing from at least two of the merging banks. Firms facing such a “drop in number of relationships” may face incentives to increase this number again, and may be less inclined to drop their relationship at the consolidated bank (see e.g. Carletti (2004) and Detragiache et al. (2000) on the optimal number of relationships).⁷ This force is absent for firms borrowing from only one of the merging banks.⁸ Second, mergers may also improve a bank’s information about borrowers. Panetta et al. (2004) argue that the consolidated bank should be able to better tailor interest rates of firms borrowing from several merging banks to the firm's riskiness, either as a result of improved informational abilities in distinguishing borrower quality or the pooling of information by the merging banks. Finally, an effect which could work in the opposite direction of Hypothesis 2 is that outside banks bidding for borrowers having loans with two of the merging banks now face an increased winner’s-curse effect, which yields the consolidated bank additional market power (see e.g. Hauswald and Marquez, 2003; or von Thadden, 2004).

Several papers provide evidence relating to the effects suggested by Hypothesis 2. Most empirical studies rely on aggregate bank balance sheet data to infer the impact of bank mergers, and their main findings are that merged banks seem to turn more towards larger borrowers and drop small borrowers; however, other external providers of finance seem to “fill the gap” over time by offering loans to small firms.⁹ Among papers using individual firm-bank level data, Sapienza (2002) finds that mergers increase the probability of termination but that target banks in mergers are more likely

⁷ Admittedly, in a world without frictions, firms could simply choose to substitute the two merging banks with two other banks.

⁸ Also the consolidated bank has incentives to revisit the position of the firms. For example, it may force out very large firms as the entire exposure to the firm may exceed certain limits. As our focus is on SMEs, we expect that this argument is not at play.

⁹ Examples are Berger and Udell (1996), Peek and Rosengren (1996), and Strahan and Weston (1998). A review is provided in Berger, Demsetz and Strahan (1999).

to terminate lending relationships than are acquiring banks. The effects of mergers on the termination rates of lending relationships for acquiring bank borrowers appear to be very small. Also, the effect on target banks' borrowers is stronger for small than for large target banks. Finally, small borrowers tend to be more strongly affected by the increased probability of termination due to mergers than are larger borrowers.¹⁰

Among papers that use market data, Carow et al. (2004) examine the ten largest domestic US bank mergers over the period 1991-2001 and find that target borrowers are hurt when considerable geographical overlap between the merging banks exists. Small target borrowers are hit when the merger announcement indicates that managers of the target bank are not going to be treated as equal partners.¹¹ Karceski, Ongena and Smith (2004) use data on publicly listed Norwegian companies to investigate the impact of bank mergers on borrowers' stock prices and on termination rates of relationships. They find that smaller borrowers of target banks are hurt by mergers. They also find that bank mergers increase the relationship termination rates of borrowers at target banks but not at acquiring banks.

Panetta, Schivardi and Shum (2004) examine loan pricing after Italian bank mergers and find that after a merger, the relation between the default probability of a firm and its loan rate becomes steeper, suggesting that mergers improve information. They also find that the informational gains do not appear to be driven by the explicit pooling of information about the same firm, as the increase in the slope of the relationships between risk and interest rates is the same for firms borrowing from one merging bank only and for those that were borrowing from both of the merging banks.

III. Banking environment and description of data

In this section we describe the Belgian banking environment, the number of bank lending relationships maintained by Belgian SMEs, and the data sources for our analysis. We document an increase in banking sector concentration arising from bank

¹⁰ Note, however, that termination of a lending relationship in this context represents the more narrow concept of a drop of a credit line.

¹¹ Scott and Dunkelberg (2003) investigate for the US, using the 1995 National Federation of Independent Business data, the effect of bank mergers on a firm's attempt to obtaining financing. They find that the incidence of a merger raises the frequency of searching for a new bank.

mergers, the importance of large banks in lending to small firms in Belgium, the low number of bank lending relationships maintained by Belgian SMEs, and a decline in the number of lending relationships over time. We also provide summary statistics for the firms and banks in our sample.

III.1 Banking environment and bank-firm lending relationships

Concentration in the Belgian banking sector has steadily increased over the past decade and is currently quite high. A small number of large banks now accounts for a high percentage of banking sector assets, deposits, and loans. Indeed, every large bank currently operating in the Belgian banking sector has been involved in some type of merger or acquisition in the past ten years.

Table 1 shows the Herfindahl index and the four-bank concentration ratios for loans to firms reported in the credit register in 1997 and 2003, where the market shares are reported separately for different size categories as defined in the Basel II accord (corporates, corporate SMEs and retail SMEs), as well as for all firms taken together.¹² The increase in the Herfindahl index between 1997 and 2003 reflects the effects of the mergers that we analyze in this paper. Banks accounting for roughly 58 percent of 1997 banking sector assets were involved in mergers between 1997 and 2002.¹³ The share of large banks in loans to firms has increased across all size categories, including the smallest firms.¹⁴

¹² Corporates are defined in the Basel II accord as firms with greater than 50 million Euro in annual sales; SMEs have sales below 50 million Euro. (Subject to national discretion, the Basel Committee allows substituting the value of assets for sales when the latter is unavailable.) In addition, retail SMEs are those SMEs for which the total exposure of any single banking group to the firm is less than 1 million Euro.

¹³ Our empirical analysis focuses on the three major banking mergers that occurred during this period. Although there were thirteen other banking mergers among small banks where at least one of the banks involved reported a credit to the credit register, all of these mergers involved only a few firms. In particular, the average number of borrowers involved per merger was only 124 and the maximum number of borrowers in any merger was 362.

¹⁴ Cetorelli and Gambera (2001) report the three-bank concentration ratios in different countries over the period 1989-1996. They find that the three largest banks account for 49 percent of total assets in Belgium, 15 percent in the US, 24 percent in Italy, 27 percent in Germany, and 50 percent in the United Kingdom. Of course, in countries like the US or Italy, banks concentrate their activities in specific geographic areas, implying that some local markets are also highly concentrated in these countries. Nevertheless, the evidence by Cetorelli and Gambera (2001) illustrates that the Belgian market was already quite concentrated before the starting date of our sample.

Table 1: Herfindahl index and four-bank concentration ratios in loan exposures to firms by Basel II firm size category

	Dec-97	Dec-03
Herfindahl index	0,12	0,22
Concentration ratios		
<i>All firms</i>	58,0	88,5
<i>Corporate</i>	49,9	77,7
<i>Corporate SME</i>	54,4	85,9
<i>Retail SME</i>	71,4	91,0

Source: Credit register.

Table 2 presents summary statistics on the number of bank lending relationships maintained by Belgian firms in 1997 and in 2003, again broken down by Basel II size category. This table shows that the average number of bank lending relationships for all firms taken together is low, although the number of lending relationships increases with firm size.¹⁵ The average number of bank lending relationships for firms in each size category has declined over time.¹⁶

¹⁵ A relationship is defined when firms are “currently” lending from a bank. This relationship measure may be narrower than the ones used in other studies looking at the number of relationships in Belgium, where also “past” lending or other services may be taken into account (see e.g. Ongena and Smith (2000), or de Bodt, Lobeze and Statnik (2002)). However, Belgium seems not an exception in having a low number of bank relationships. For example, results for France indicate that about 60% of firms having sales of less than € 2.5 million have one bank lending relationship (Dietsch and Golitin-Boubakari, 2002, credit register data for 2000). In Portugal, about 57% of the firms has a unique relationship (Farinha and Santos, 2000, credit register data for 1995).

¹⁶ Although we present data for only the first and last years of our period, data for the intermediate years confirm a steady decline in the average number of lending relationships across all size categories of firms. For example, the average number of lending relationships for all firms in each of the years 1998-2002, respectively, are: 1,28; 1,26; 1,25; 1,23; 1,22. In previous work (see Degryse et al, 2004), we have investigated the determinants of the number of firm-bank relationships for the years 1997 and 2002. The determinants were quite stable over time, suggesting that other structural changes in the financial sector may explain the drop in the number of relationships over time.

Table 2: Numbers of firms and numbers of bank relationships by Basel size category

	N	Mean	Median	Min	Max	Std. dev.
1997						
Total	100 432	1,30	1	1	16	0,70
Corporate	904	3,31	3	1	15	2,44
Corporate SME	5 397	2,02	2	1	16	1,29
Retail SME	94 131	1,24	1	1	7	0,54
2003						
Total	122 904	1,21	1	1	9	0,53
Corporate	997	2,30	2	1	9	1,42
Corporate SME	6011	1,72	1	1	9	0,95
Retail SME	115 896	1,17	1	1	5	0,45

Source: Credit register

III.2 Data sources and summary statistics

We rely on three sources of data for our analysis:

- (1) Data from the *credit register*, which contains information on loans to Belgian firms granted by banks operating in Belgium. Our data cover the period 1997-2003 and contain both authorised and utilised volumes by type of loan by bank. The banks represented in the data include all foreign and domestic banks operating in Belgium which either authorised or had outstanding loans during the period to non-financial firms. Loans to Belgian firms that were extended by foreign banks or branches outside of Belgium are not included in the data set. Also, the credit register contains no data on interest rates or collateral. Banks obtain aggregate information about its own borrowers or loan applicants. In 2003, 70 banks were reporting to the credit register.
- (2) *Firm balance sheets*. These data come from firms' annual balance sheet filings during the period 1994-2002. Small and medium-size firms in Belgium are allowed to file a short balance sheet form, which is less complete than the long form required for large firms. Hence, certain data such as sales and number of employees (for which reporting is voluntary on the short form) are not available for all firms. As a result, we rely on the book value of assets as a measure of firm size, rather than number of employees or sales.

- (3) *Bank balance sheets*. These contain annual balance sheet data, which banks are required to report under the Supervisory Reporting Scheme (Schema A). These data are available from 1992-2003.

While the credit register data offer a unique source of information relating to firms' bank lending relationships and loan volumes, the limitations of these data suggest some restrictions and caveats for our analysis. Most importantly, because the credit register data include only banks operating on Belgian territory and thus exclude loans to Belgian firms from foreign banks operating outside of Belgium, it is possible that the number of bank relationships for large firms is understated in these data. This suggests restricting our attention to small and medium-size firms. In all of the analysis that follows, we have excluded all firms meeting the Basel II classification of "corporate" (i.e., with sales exceeding 50 million €), as well as all firms with assets exceeding 500 million €¹⁷

The credit register data include information on authorised loan volumes and on actual borrowing (utilised loan volumes). We rely on utilised volumes for our analysis, on the assumption that bank lending relationships are more likely to be valuable to firms and to banks to the extent that lending actually occurs. In addition, firms with utilised loan volumes equal to zero are included in the credit register data; hence, including these firms is similar to using authorised loans.¹⁸

We construct a panel consisting of observations of firm-bank lending relationships in December of each of the years 1997-2003. Like Sapienza (2002), we focus on "continuing" firms – that is, firms that had at least one bank lending relationship at the beginning of the panel; i.e., in December, 1997. These firms are included for every year of the panel (unless the relation is terminated, in which case the observation disappears). Because we are interested in observing the effects of mergers on firms that were borrowing from merging banks prior to the merger (and comparing them

¹⁷ The Belgian economy has a large number of coordination centers. These are generally subsidiaries of international firms that have been established in Belgium to benefit from tax advantages. They carry out activities for other group entities such as centralization of accounting, administration, and financial transactions. Because coordination centers do not behave like typical firms, they have also been excluded from our regression analysis.

¹⁸ To test robustness of our results, we have also run the regressions reported below excluding firms with zero utilized loan volumes, and the results are similar.

with firms borrowing from nonmerging banks prior to the merger), it would bias our results to include newly entering firms into the panel during the year of a merger.

Table 3 presents summary statistics for the firms and in our panel.

Table 3. Panel summary statistics: firm characteristics

Summary statistics for firms are based upon all firm-year observations included in the panel data analysis, which consists of yearly observations from Dec., 1997-Dec., 2003. Assets are in thousands of €(2002 values). All variables definitions are provided in the Appendix.

	N	Mean	Median	Std. Dev.
<i>All firms</i>				
AGE	472.109	11,65	11,96	10,27
ASSETF	472.109	1 752	498	8 954
ROAF (*)	472.109	5,97%	5,37%	10,86%
LEVERAGE(**)	472.109	75,12%	74,85%	38,67%
<i>Firms borrowing from acquiring bank in year prior to merger</i>				
AGE	47 244	10,59	10,56	10,11
ASSETF	47 244	1588	504	7825
ROAF (*)	47 244	5,75%	5,26%	10,80%
LEVERAGE(**)	47 244	75,03%	75,21%	37,40%
<i>Firms borrowing from target bank in year prior to merger</i>				
AGE	12 737	8,40	9,00	9,35
ASSETF	12 737	1638	339	10 006
ROAF (*)	12 737	5,79%	5,46%	11,51%
LEVERAGE(**)	12 737	78,13%	77,59%	41,28%
<i>Overlap firms (borrowing from both target and acquiring banks) in year prior to merger</i>				
AGE	1588	14,36	13,98	13,81
ASSETF	1588	6691	1347	21 523
ROAF (*)	1588	6,10%	5,21%	8,27%
LEVERAGE(**)	1588	72,80%	74,78%	24,12%

(*) Firms with ROA > 99 % and < - 99% are excluded.

(**) Firms with Debt/Equity > 1000 % are excluded.

Table 3 shows that the median firm has an age of about 12 years; 498.000 € of total assets in 2002 €; a return on assets of about 5.4%; and leverage – defined as the book value of debt over assets – of 75 percent. Table 3 also reports summary statistics on firm characteristics for different groups of firm-bank relationships: firms borrowing from an acquiring bank in a merger (but no other bank involved in the merger); firms borrowing from a target bank in a merger (but no other bank involved in the merger); firms borrowing from both the acquiring and a target bank in a merger (“overlap”

borrowers). This table indicates few differences in the characteristics across groups. Firms borrowing from target banks are slightly younger than other firms. Also, overlap borrowers are older and larger than other firms; however, their profitability (ROAF) and leverage (LEVERAGE) are similar to the values for firms in other groups.

Table 4 reports bank characteristics for all banks and for the acquiring and target banks at the time of the merger. We observe that acquiring and target banks are on average larger than other banks in the sample. They also have slightly higher returns on assets, operating cost ratios, and ratios of liquid assets to total assets. These statistics suggest that the mergers we analyze were not motivated by underperformance of the target banks.

Table 4 Summary statistics for banks

Bank summary statistics are based upon all bank-year observations included in the panel. Asset values are in thousands of €(2002 values). All variables definitions are provided in the Appendix. Acquiring and target bank statistics are at the time of the merger.

	N	Mean	Std. Dev.
<i>All banks</i>			
ASSETB	500	8 808 294	30 219 522
ROAB	500	0,16%	1,51%
BADLOANSB	500	1,95%	3,21%
OPCOSTB	500	8,77%	6,78%
LIQB	500	10,83%	39,07%
<i>Acquiring banks</i>			
ASSETB	3	95 670 164	188 000
ROAB	3	0,27%	0,14%
BADLOANSB	3	1,29%	1,06%
OPCOSTB	3	9,28%	7,52%
LIQB	3	15,11%	3,52%
<i>Target banks</i>			
ASSETB	5	34 037 556	216 000
ROAB	5	0,29%	0,22%
BADLOANSB	5	1,33%	1,15%
OPCOSTB	5	9,19%	5,69%
LIQB	5	17,66%	16,99%

IV. Empirical Analysis for Belgium

In this section we test the hypotheses developed in Section II. The general question is whether firms borrowing from merging banks are affected by the merger. In essence, this question asks: (1) whether borrowers of merging banks are treated differently

from borrowers of banks not involved in mergers and also (2) whether borrowers of merging banks are treated differently by the consolidated bank than they were by the individual (merging) banks prior to the merger, in the short run or the longer run.

As described in Section II, we analyze the three major bank mergers that occurred during from 1997-2003. Each of these mergers involved at least two large banks. We take the date of the merger as that on which the banks involved began providing unified credit statistics to the credit register, which is the date of the legal merger. Our classification of whether a bank is an acquirer or target is based on the classification provided by the Belgian Banking and Finance Commission (CBFA) in their annual reports.

We perform a panel regression analysis to investigate merger effects. This allows us to identify “combined” effects of the mergers, to control for time effects, to control for merging bank behavior prior to the merger, and to differentiate short-term versus longer-term merger effects.¹⁹

IV.1 Regression specification

Our specification is a logit-regression, where the dependent variable *DROPPED* is a dummy variable, which takes the value 1 if the firm loses its relationship with the bank during the twelve-month period following the time of the observation.

We estimate the following logit specification:

$$\ln \left[\frac{p(\text{DROPPED}_{ikt} = 1)}{1 - p(\text{DROPPED}_{ikt} = 1)} \right] = \alpha_0 + \alpha_1 \text{MERG1}_{kt} + \alpha_2 \text{MERG2}_{kt} + \alpha_3 \text{MERG1}_{kt-1} + \alpha_4 \text{MERG2}_{kt-1} + \beta(\text{firmcontrols})_{it-1} + \gamma(\text{bankcontrols})_{kt-1} + \varepsilon_{ikt},$$

where each observation represents a firm-bank relation and where *DROPPED*_{ikt} equals one if during the twelve months following time *t* firm *i* lost its relationship with bank *k*. The variables *MERG1*_{kt} and *MERG2*_{kt} are dummy variables that allow us to identify firms that were borrowing from banks involved in a merger. *MERG1*_{kt} is a dummy variable which equals one if bank *k* was involved in a merger in the twelve

¹⁹ We also ran regressions for each merger individual in order to identify heterogeneity across mergers. Most of the merger results were also present for all individual mergers.

months following time t and if firm i was not borrowing from any of the other banks involved in the merger. $MERG2_{kt}$ is a dummy variable equal to one if bank k was involved in a merger in the twelve months following time t and firm i was an overlap borrower. That is the firm was borrowing from, in addition to bank k , at least one of the other banks involved in the merger. These two variables allow us to distinguish the effects of mergers for firms borrowing from only one of the merging banks versus overlap firms.

Because each of the three mergers covered by our panel occurred roughly in the middle of a year, using observations in December in each year for the panel allows us to measure the “short term” merger effects as those occurring in a twelve-month period around the merger, including six months following the merger. That is, if a merger occurred in June, 1998, the value of $MERG1_{kt}$ (together with DROPPED) for t =December, 1997 indicates whether the firm borrowing from one bank involved in the merger lost its relationship or not with the merged bank in the six months following the merger.

To investigate “longer-term” effects of mergers, we introduce the dummy variables $MERG1_{kt-1}$ and $MERG2_{kt-1}$, which are defined similarly to the short run merger variables but which equal one when firm i was borrowing from one or two merging banks at time $t-1$ (and when the merger occurred between time $t-1$ and t), respectively.²⁰ These dummy variables capture the effects of mergers during the period of six months to eighteen months following the merger, which we from now on call longer-term effects.²¹

We include firm and bank control variables in the logit regression, as well as industry and year dummies. As firm controls we include measures of firm age, size, profitability, leverage, and year of most recent filing of balance sheet. The motivation for these control variables comes from previous merger literature and the literature on the determinants of number of relationships (see e.g. Farinha and Santos, 2002;

²⁰ For the example of the June, 1998 merger the variable $MERG1_{kt-1}$ would equal one for the observation t = Dec., 1998 for firms that had been borrowing from the merging bank in Dec., 1997.

²¹ The short duration of our panel, combined with the large proportion of banking assets involved in mergers, prevents us from estimating the effects of mergers over a longer period following the merger.

Detragiache et al, 2000; Ongena and Smith, 2000), as well as our own estimates with Belgian data (see Degryse et al, 2004). Older, larger and more profitable firms may have lower switching costs in that more public information is available about them. Leverage is introduced to control for certain demand factors. We expect that more levered firms are less likely to lose a lending relationship. However, firms that are too highly levered (e.g., financially distressed firms) may be more likely to lose a relationship. In the same spirit we introduce the year of most recent balance sheet filing. We suspect that halting the filing of balance sheets is one of the steps on the way to a firm's exit, either through bankruptcy or voluntary liquidation.

We also include bank control variables in our specification, to capture the fact that losing a firm-bank relationship may also be related to bank specific characteristics. Bank controls include measures of size, profitability, cost efficiency, bad loans, and liquidity (all variable definitions are provided in the Appendix). For example, Detragiache et al (2000) argue that bank liquidity is important for the continuation of firm-bank relationships. Berger et al (2004) find that large US banks tend to have shorter relationships. Year and industry dummies are introduced to control for business cycle effects and industry effects, respectively.²²

The results are displayed in Table 5. We report regressions separately for different samples: all firms, firms with a single bank relationship (single rel.), and firms with multiple bank relationships (multiple rel.).²³ The motivation for looking at the two subsamples – single relationships and multiple relationships – stems from potential differences in switching costs and availability of alternative sources of finance.

²² Our time dummies may also control for changes in the competitive environment over time.

²³ The reader may notice that our sample splits (single relationships and multiple relationships) allow firms to move from one sample to another sample due to merger related effects. If a firm was borrowing from only two banks, both of which were involved in a merger, then the firm automatically has a single relationship after the merger (if its lending relationship is not severed). We control for this effect by classifying firms according to the number of lending relationships prior to the merger.

Table 5: Panel regressions: impact of mergers on lending relationships

The dependent variable in each regression equals one if during the following year firm *i* loses its relationship with bank *k*. The reported coefficients are logit estimates of a marginal change in the independent variable on the probability of losing the lending relationship. All regressions include a constant term, firm industry dummies, and year dummies (not reported). Definitions of the variables are provided in Section III. *, **, *** denotes significance at the 10, 5, and 1%-level, respectively (based on heteroskedastic-robust standard errors).

PANEL	A			B		
	Without merging bank fixed effects			With merging bank fixed effects		
	Sample			Sample		
	All	Single rel.	Multiple rels.	All	Single rel.	Multiple rels.
Firm controls						
ln(AGEF)	-0,002***	0,003***	-0,012***	-0,002***	0,002***	-0,011***
ln(ASSETF)	-0,022***	-0,028***	-0,020***	-0,022***	-0,029***	-0,020***
ROAF	-0,084***	-0,076***	-0,086***	-0,083***	-0,076***	-0,086***
LEVERAGE	-0,062***	-0,075***	-0,035***	-0,062***	-0,075***	-0,035***
LEVERAGE*NEGEQ	0,056***	0,063***	0,044***	0,056***	0,063***	0,044***
RECBALANCE	-0,041***	-0,056***	-0,036***	-0,041***	-0,056***	-0,036***
YOUNG	0,015***	0,023***	0,007	0,016***	0,022***	0,006
CONC	-0,195***	-	-0,196***	-0,196***	-	-0,195***
Merger variables						
MERG1t	-0,006***	-0,001	-0,014***	-0,002***	0,003*	-0,008***
MERG2t	-0,101***	-	-0,104***	-0,104***	-	-0,102***
MERG1t-1	0,008*	0,005**	-0,001	-0,010*	0,011***	0,006
MERG2t-1	-0,074***	-	-0,065***	-0,078***	-	-0,076***
Bank controls						
ln(ASSETB)	-0,021***	-0,015***	-0,026***	-0,021***	-0,015***	-0,025***
ROAB	0,604***	1,137***	0,440**	0,397***	0,673***	0,410***
BADLOANSB	0,901***	1,278***	0,631***	0,692***	0,555***	0,964***
OPCOSTB	0,289***	0,287***	0,219**	0,248***	0,312***	0,193***
LIQB	-0,034***	0,003**	-0,041***	-0,030***	0,012	-0,043***
Merging Bank dummies	No	No	No	Yes	Yes	Yes
Other variables						
Single rel dummy	-0,042***	-	-	-0,043***	-	-
DROPPED = 1	77 026	44 669	32 357	77 026	44 669	32 357
DROPPED = 0	534 485	318 655	215 830	534 485	318 655	215 830
Pseudo R ²	5,71%	5,27%	8,04%	5,83%	5,49%	7,83%
Chi-Square	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001

Panel A of Table 5 presents the results excluding merging bank fixed effects; Panel B includes merging bank fixed effects.²⁴ Results are broadly consistent across these two specifications. All reported coefficients are the marginal effects, computed on the

²⁴ Each of these specifications involves some bias. The regression without merging bank fixed effects does not control directly for a change in behaviour of the merging banks pre and post-merger. On the other hand, the regression with merging bank fixed effects can only control for the fixed effects for two of the three mergers, as one of the mergers occurred too close to the beginning of our panel to allow us to control for the pre-merger behavior of the merging banks.

basis of the regression coefficients, on the probability of losing the lending relationship – in short, the “drop rate”. The drop rate of bank lending relationships in our sample is on average 12.6 percent.²⁵ For comparison, the drop rate in Karceski et al (2004) is 6.9 percent and only 3 percent in Sapienza (2002). However, Chionsini et al (2004), who also use Italian data, report a drop rate of around 11 percent. We discuss first the results for firm and bank control variables, then we turn to the merger variables.

Firm controls. For convenience, we base our discussion on the "All" regression with merging bank fixed effects of Panel B, Table 5; however, results for the other regressions are similar. Where there are differences with respect to the other samples, we point them out. All of the firm control variables are statistically significant, and all of these variables are economically significant with the exception of firm age ($\ln(\text{AGEF})$), whose sign also differs for firms with single and multiple relationships. The drop rate decreases with firm size (ASSETF), profitability (ROAF), and leverage (LEVERAGE). An increase in the log of firm assets by one standard deviation from its mean causes the probability of losing a lending relationship to decrease 3.0 percentage points below the average drop rate in the sample of 12.6%. This result contrasts with results obtained by Sapienza (2002) but is in line with Karceski et al. (2004). Our results thus indicate that smaller firms tend to have less stable relationships with their banks than do large firms.

As expected, higher firm profitability (ROAF) reduces the likelihood of termination of the lending relationship. An increase of ROAF by one standard deviation from its mean lowers the probability of dropping the relationship by 0.9 percentage points. However, firms that are too highly levered (those with negative equity) are more likely to lose their relationship. The marginal increase in the drop rate for firms having a value of NEGEQ equal to one is 5.6%. This implies that financially distressed firms have a higher probability of having their lending relationship terminated. Similarly, firms which have not yet filed a full-year balance sheet ($\text{YOUNG}=1$) and firms which have halted filing balance sheets ($\text{RECBALANCE} = 0$)

²⁵ In line with this rate, Degryse and Van Cayseele (2000) report a mean duration of the lending relationship for Belgian firms of 7.87 years. A 12.6 percent drop translates into a duration of the lending relationship in between 5 to 6 years, when assuming constant duration dependence.

both have higher drop rates. In sum, these results clearly indicate that firm variables are important in explaining termination of lending relationships.

We use the variable CONC to measure the intensity of a relationship. The CONC variable for a relationship between firm i and bank k is defined as the proportion of total utilized loans by firm i accounted for by bank k . Support for the use of this variable is provided by Elsas (2005), who finds that the degree of concentration of a firm's loans with a given bank is an important measure of the intensity of a relationship. For the multiple relationship firms in our panel, the variable CONC has a mean of 0.44 and standard deviation equal to 0.33.²⁶ The results in Table 5 indicate that greater relationship intensity significantly reduces the drop rate. For example, for the multiple relationships sample of Panel B, a one-standard deviation increase in CONC above the mean causes the drop rate to fall by 6.4 percentage points.

Bank controls. All bank control variables are statistically significant in the regressions reported in Table 5. The coefficient on $\ln(\text{ASSETB})$ indicates that lending relationships tend to have a lower drop rate for larger banks than for smaller banks. An increase of $\ln(\text{ASSETB})$ by one standard deviation from its mean lowers the probability of dropping the relationship by 3.2 percentage points. This result contrasts with the findings of Berger et al (2004), who report that in the U.S. larger banks tend to have shorter relationships with borrowers than do smaller banks. How can these different findings be reconciled? Berger et al (2004) interpret their findings as evidence of small banks being better able to handle soft information. Soft information binds a borrower to its bank over time and leads to longer relationships and lower drop rates. Since large banks in our sample appear to have lower drop rates, our evidence suggests that large banks in Belgium also appear able to deal with soft information. This is also consistent with our earlier observation that large Belgian banks are important in lending to SMEs.

The return on assets of banks (ROAB) appears in Table 5 with a (counterintuitive) positive coefficient, but its economic impact on the drop rate is low. Bank liquidity (LIQB) appears in the different regressions with different signs and also is not

²⁶ By definition, CONC is equal to 1 for single relationship firms.

economically significant. The remaining two bank characteristics, BADLOANSB and OPCOSTB, indicate that firms borrowing from banks having relatively higher proportions of non-performing loans over total loans and larger operating costs over total assets have larger drop rates. Our findings on BADLOANSB are consistent with the theory presented in Detragiache et al (2000) who argue that lending relationships are more likely to be terminated when borrowing from banks that are likely to be hit by a liquidity shock. Our results are also similar to those reported by Sapienza (2002).²⁷

Merger variables. Table 5 suggests that mergers have significant effects on the drop rate of lending relationships. The coefficients on the "short-run" effects MERG1t and MERG2t are generally negative and significant, although the result for MERG1t is slightly less consistent across regressions. So for example, in the "All" sample with merging bank fixed effects (Panel B), firms borrowing from only one merging bank have a drop rate in the six months following the merger that is lower by 0.2% than for firms borrowing from nonmerging banks, and overlap borrowers have a drop rate that is 10.4% lower than nonmerging bank borrowers.

These results contrast with those obtained by other studies (e.g., Sapienza, 2002), where mergers do not appear to have significant effects in the short run. However, our results indicate that firms borrowing from banks involved in mergers (at least for the large mergers under consideration) were *less* likely than firms borrowing from nonmerging banks to lose their lending relationship. This result might suggest that the mergers under investigation were beneficial to firm borrowers (e.g., because efficiency effects of mergers dominated market power effects).

Support for the interpretation that merger effects occur over time is given by the longer run merger effects (those occurring between six and eighteen months following the merger), which are reflected by the coefficients on MERG1t-1 and MERG2t-1. The coefficient on MERG1t-1 is positive and significant for firms with single lending relationships (the single relationship sample). The sign of the coefficient on MERG1t-1 for the entire sample ("All") depends on whether we control for merging bank fixed

²⁷ Detragiache et al (2000) use as empirical proxy the degree of bad loans and liquid assets. They find

effects. On the other hand, the coefficient on $MERG2_{t-1}$ is negative and significant for all regressions. These results again suggest that mergers have effects, but the effects may differ for borrowers that were borrowing from only one of the merging banks versus overlap borrowers (consistent with Hypothesis 2d). Firms with single relationships borrowing from only one of the merging banks have greater drop rates following the merger; however, overlap firms have significantly lower drop rates than firms borrowing from nonmerging banks, and this effect is very strong.

As a point of comparison, Sapienza (2002) also finds significant merger effects; firms borrowing from merging banks have a probability of losing their relationship that is higher by 1.3% than for nonmerging bank borrowers. Most of this effect, however, seems to occur about four quarters after the merger. Sapienza does not distinguish between firms borrowing from only one versus two or more of the banks involved in a merger.

IV.2 Target versus acquiring bank borrowers

Table 6 reports the results of the regressions addressing the question of potentially different merger effects of borrowers or target and acquiring banks (Hypothesis 2a). We have replaced the merger variable $MERG1_t$ from the earlier regressions with two variables $ACQUIRE_t$ and $TARGET_t$, representing the short run merger effects for firms borrowing only from an acquirer bank and not a target bank involved in a merger and vice versa. Instead of the variable $MERG2_t$, we now include the variable $ACQTARGET_t$, which represents firms that were borrowing from both the acquiring bank and at least one target bank. Similar variables, with $t-1$ subscripts, are defined to capture the longer run effects. Because the coefficients for the firm and bank controls are similar to those reported in Table 5, we report here and in all subsequent tables only the marginal effects for the merger variables.

that firms borrowing from “less liquid” banks maintain more firm-bank relationships.

Table 6: Panel regressions: target versus acquirer banks

The dependent variable in each regression equals one if during the following year firm i loses its relationship with bank k . The reported coefficients are logit estimates of a marginal change in the independent variable on the probability of losing the lending relationship. All regressions include a constant term, firm industry dummies, and year dummies (not reported). Definitions of the variables are provided in Section III. *, **, *** denotes significance at the 10, 5, and 1%-level, respectively (based on heteroskedastic-robust standard errors).

PANEL	A Without merging bank fixed effects			B With merging bank fixed effects		
	Sample			Sample		
	All	Single rel.	Multiple rels.	All	Single rel.	Multiple rels.
ACQUIRE _t	-0,014***	-0,007***	-0,025***	-0,010***	-0,005**	-0,017***
TARGET _t	0,017***	0,018***	0,022***	0,016***	0,023***	0,012
ACQTARG _t	-0,105***		-0,110***	-0,104***	-	-0,103***
ACQUIRE _{t-1}	-0,025***	-0,024***	-0,029***	-0,020***	-0,020***	-0,018***
TARGET _{t-1}	0,075***	0,066***	0,077***	0,075***	0,075***	0,068***
ACQTARG _{t-1}	-0,084***	-	-0,073***	-0,073***	-	-0,065***
Firm controls included	yes	yes	Yes	yes	yes	yes
Bank controls included	yes	yes	Yes	yes	yes	yes

We again base our discussion on Panel B, which includes merging bank fixed effects. In terms of the short-run merger effects, an interesting heterogeneity between borrowers from acquiring and target banks now appears. For example, the results for the “All” sample indicate that borrowers of acquiring banks have a lower drop rate (-1.0 %) than borrowers of nonmerging banks, while borrowers of target banks have a greater drop rate (+1.6%) (an exception to the latter result is the multiple-relationship regression in the panel B sample where the coefficient is not significant). Firms borrowing from both the acquiring and a target bank have a lower drop rate (-10.4%) than firms borrowing from nonmerging banks.

The longer run marginal effects of mergers provide further support for these results and appear to be more robust. Firms borrowing from an acquiring bank have a lower probability (-2.0%) of losing their relationship during the six to eighteen months following mergers than borrowers of nonmerging banks. Firms borrowing from a target bank have a higher drop rate (+7.5%) than otherwise identical firms not borrowing from the target bank.

These results are consistent with findings of Sapienza (2002) and Karceski et al (2004), who report that borrowers from target banks in Italy and Norway, respectively, are more likely to lose their relationship. In contrast, however, neither of

these studies find the rate of termination of bank lending relationships for borrowers of acquiring banks to be much different from the rate for borrowers of nonmerging banks. In addition, both Sapienza (2002) and Karceski et al (2004) find the effects of mergers on target bank borrowers to be stronger for small than for large target banks. Although all of our mergers involve large acquiring and target banks, we nevertheless observe strong effects of mergers on borrowers of target banks, as well as heterogeneous effects between acquiring and target banks. We also find that mergers have immediate effects, although the effects are more robust in the longer run.

Finally, neither of the above studies treats separately firms borrowing from both the acquiring and target bank in a merger. Our results suggest that borrowing from both banks prior to a merger (overlap borrowers) results in a significantly lower drop rates than borrowing from a single merging bank, in line with Hypothesis 2d.

IV.3 Mergers and firm size

Are small borrowers affected differently than large borrowers by bank mergers? We address this combination of Hypotheses 2a,b and c in Table 7, which reports the results of the interactions of firm size with the merger variables separately for target and acquiring bank borrowers.²⁸

²⁸ We have also run similar regression interacting the merger variables with firm profitability; however, we obtained no significant results.

Table 7: Panel regressions: interaction with firm size for acquirer and target banks

The dependent variable in each regression equals one if during the following year firm *i* loses its relationship with bank *k*. The reported coefficients are logit estimates of a marginal change in the independent variable on the probability of losing the lending relationship. All regressions include a constant term, firm industry dummies, and year dummies (not reported). Definitions of the variables are provided in Section III. *, **, *** denotes significance at the 10, 5, and 1%-level, respectively (based on heteroskedastic-robust standard errors).

	With merging bank fixed effects		
	Sample		
	All	Single rel.	Multiple rels
ACQUIRE _t	0,122***	0,043*	0,056*
TARGET _t	-0,126***	-0,186**	-0,135***
ACQTARGET _t	-0,428***	-	-0,365***
ACQUIRE _{t-1}	0,127***	0,032	0,180***
TARGET _{t-1}	0,102	-0,135***	0,162***
ACQTARGET _{t-1}	-0,312***	-0,216	-0,376**
ACQUIRE _t * ln(ASSETF)	-0,009***	-0,004**	-0,004**
TARGET _t * ln(ASSETF)	0,011***	0,017***	0,008***
ACQTARGET _t * ln(ASSETF)	0,021***	-	0,017***
ACQUIRE _{t-1} * ln(ASSETF)	-0,010***	-0,004*	-0,013**
TARGET _{t-1} * ln(ASSETF)	0,002*	0,017***	-0,007***
ACQTARGET _{t-1} * ln(ASSETF)	0,020**	0,011	0,020
Firm controls	yes	yes	yes
Bank controls	yes	yes	yes
Bank dummies	yes	yes	yes

The differing relative effects of mergers on firms of differing sizes are reflected by the interaction of the merger variables with ACQUIRE*ASSETF. Interestingly, however, the sign of the total merger effect, as given by the sum of the merger variable and the interaction term (e.g., ACQUIRE + ACQUIRE*ASSETF), now differs in certain regressions for small and large firms.²⁹ Because results differ according to the time period following the merger and according to the number of relationships (single vs. multiple) maintained by borrowers, we differentiate these cases in the discussion.

Acquiring banks and firm size. The interaction terms ACQUIRE_t*ASSETF for the short run indicate that large firms with single and multiple relationships are favoured by acquiring banks: large firms borrowing from the acquiring bank have a lower probability than small firms of having their lending relationships terminated. The long run interaction of size and the acquiring bank variable is in line with the short run

²⁹ The coefficients on the noninteracted merger variables must now be interpreted as reflecting the effect of a merger for a firm with a zero value of assets. Despite the fact that some of the coefficients on these merger variables have changed signs relative to the regressions reported in Table 6, the estimated total marginal effects of mergers (as reflected by e.g., ACQUIRE + ACQUIRE*ASSETF) are the same as those implied by the coefficients in Table 8.

effects. In terms of the total merger effect for acquiring borrowers (given by $ACQUIRE + ACQUIRE*ASSETF$), in the short run small firms borrowing from acquiring banks have a higher drop rate than nonmerging bank borrowers, while firms that are large enough have a lower drop rate. In the long run, smaller firms with multiple relationships borrowing from acquiring banks have a higher drop rate than nonmerging borrowers of losing their relationship, and large firms have a lower drop rate.

Target banks and firm size. In the short run, large borrowers of target banks have a higher drop rate with the merged bank than small borrowers. This difference also holds in the long run for single relationship firms; however, for firms with multiple relationships, smaller borrowers of target banks are more likely than large borrowers to lose their relationship with the merged bank than larger borrowers at target banks.

The result that larger borrowers are more likely to maintain their relationships at acquiring banks is consistent with the hypothesis that mergers gives banks a greater comparative advantage in lending to large firms. However, the results for target bank borrowers are not consistent with this hypothesis. Namely, in the short run large borrowers of target banks have a higher probability than small borrowers of losing their relationship. One possible interpretation of the results for target borrowers is that larger firms and firms with multiple relationships have more alternative sources of finance than smaller, single relationship firms and, hence, lower switching costs. In the short run, borrowers of target banks with the lowest switching costs switch from the target bank (which may be required to adopt the credit policies of the acquirer) to other sources of finance. Borrower-initiated switching may be an important factor behind the higher relationship drop rate for borrowers of target banks in the short run, whereas bank-initiated terminations may become the driving force in the longer run. Indeed, Karceski et al (2004) report results that suggest that borrowers of target banks with lower estimated switching costs suffer less of a negative abnormal return from mergers than borrowers with higher switching costs. Larger firms and firms with multiple relationships are considered by Karceski et al. to have lower switching costs.

IV.4 Mergers and Relationship intensity

How do merger effects hinge upon the intensity of the relationship of a borrower with the merging bank? The previous tables show that higher CONC lowers the drop rate with a bank. To the extent that the "additional" impact of a merger is to increase the probability of a drop (which holds in our case for target borrowers), this impact might be expected to be stronger for those borrowers which would have otherwise had been expected to have a low probability of being dropped; namely, for those borrowers with high loan concentrations. To the extent that the "additional" impact of a merger is to decrease the probability of a drop (which holds in our case for acquiring and overlap borrowers), then this impact might be stronger for those borrowers who would have otherwise been expected to be dropped; namely for borrowers with low loan concentrations.

In order to test these conjectures, we construct four dummy variables, corresponding to four intervals of the CONC variable: 0-15%; 16-45%; 46-75%; 76-100% (labeled as CONC0-15, CONC16-45, CONC46-75, CONC76-100, respectively). These intervals capture roughly the quartiles of the distribution of CONC across multiple relationship firms. Table 8 displays the results of a regression which includes three CONC dummies (CONC0-15 is the base case) and the interactions of each of these dummies with our merger dummies.³⁰

This table shows that for acquiring borrowers, the drop rate is significantly less than the drop rate for nonmerging borrowers for only the lowest interval of CONC, as can be inferred from the ACQUIRExCONC0-15 coefficient. For all other ranges of the CONC variable the drop rate of acquiring borrowers does not differ significantly from nonmerging borrowers with similar levels of CONC. Thus, the effect of the merger for acquiring borrowers is to lower the drop rate for the group of borrowers with the least intense relationships. For target borrowers, the drop rate is significantly higher than for nonmerging borrowers for the two highest intervals of concentration CONC46-75 and CONC76-100. Thus, the effect of the merger on target borrowers is to raise the drop rate for the borrowers which would have been expected to be the

³⁰ Since we included interactions of the merger dummies with all four intervals of the CONC dummies, we excluded the individual merger dummies. Thus, the interaction terms capture all of the effects of the mergers.

mostly likely to be maintained by the merged bank, all else equal. For overlap borrowers, the probability of termination is lower than that for nonmerging borrowers for all intervals of the CONC variable.

Table 8: Panel regression: mergers and relationship intensity

The dependent variable in each regression equals one if during the following year firm i loses its relationship with bank k . The reported coefficients are logit estimates of a marginal change in the independent variable on the probability of losing the lending relationship. All regressions include a constant term, firm industry dummies, and year dummies (not reported). Definitions of the variables are provided in Section III. *, **, *** denotes significance at the 10, 5, and 1%-level, respectively (based on heteroskedastic-robust standard errors).

	With merging bank fixed effects
	Multiple rels
CONC16-45	-0,076***
CONC46-75	-0,138***
CONC76-100	-0,158***
ACQUIRExCONC0-15	-0,030***
ACQUIRExCONC16-45	-0,004
ACQUIRExCONC46-75	0,002
ACQUIRExCONC76-100	-0,001
TARGETxCONC0-15	-0,009
TARGETxCONC16-45	-0,007
TARGETxCONC46-75	0,029***
TARGETxCONC76-100	0,035***
ACQTARxCONC0-15	-0,224***
ACQTARxCONC16-45	-0,193***
ACQTARxCONC46-75	-0,115***
ACQTARxCONC76-100	-0,066***
Firm controls	yes
Bank controls	yes
Bank dummies	yes

IV.5 Robustness

We have subjected our analysis to some additional robustness checks. First, our definition of a lending relationship is based on utilised exposures and includes firms with zero utilised exposures but which are nevertheless reported by the bank in the credit register. Because firms with zero utilised exposures might be expected to be more likely to “exit” the data set and have their relationship dropped, and to make sure that these firms are not driving our results we reran our panel regressions excluding all firms with zero utilised exposures. The results remain very similar and are therefore not reported.

Second, we have also re-run the regression by creating consolidated bank control variables for the entire 1997-2003 period (as in Focarelli et al (2002)).³¹ While some of the bank control variables turn insignificant, most importantly the results for our merger variables of interest remain unaffected.

In order to further test our results relating to overlap borrowers, and to ensure that this result is not purely reflecting the differences in characteristics of these and other borrowers, we have rerun the merger regressions including in the sample only firms of similar size to that of overlap borrowers. Our merger results continue to hold in these regressions.

V. Loan Volumes

Is the availability of credit affected by bank mergers? We address this issue by analyzing changes in firms' loan volumes as a percentage of total assets. Our sample consists of the continuing firms used in our previous panel regressions, but now excluding firms which switch banks, add or drop a relationship. These types of events would likely confound our results on the effects of mergers on loan volumes of firms that "continue at the same bank". We report below only the results for the regression with single-relationship firms, as the effects of mergers on loan volume changes for multiple relationship firms are statistically insignificant.

The dependent variable in our regression is the change in a firm's loan volume between t and $t+j$ (with $j=1,2$) as a proportion of the firm's assets at $t-1$. Explanatory variables include dummies indicating whether or not firms were borrowing at t from an acquiring or target bank involved in a merger between t and $t+1$, as well as firm and bank characteristics. The regression specification is:

$$\frac{\text{loan volume}_{t+j} - \text{loan volume}_t}{\text{ASSET}_{t-1}} = \alpha_0 + \alpha_1 \text{ACQUIRE}_t + \alpha_2 \text{TARGET}_t + \beta(\text{firmcontrols})_{t-1} + \gamma(\text{bankcontrols})_{t-1} + \varepsilon_{t+j}$$

The regressions for $j = 1$ aim at identifying the "short run" effects of mergers, whereas $j = 2$ deals with "longer-run" effects. The sample of firms to address the short

³¹ I.e., we treat the pre-merging banks as if they have already been merged.

run and long run effects is identical to enhance the comparability of results.³² Table 9 reports the results of these regressions.

Table 9: Mergers and credit availability: single relationship firms continuing at the same bank

The dependent variable is the % change in loan volume in between t and t+j over firm assets at t-1. All regressions include a constant term, industry dummies, and year dummies (not reported). Definitions of the variables are provided in Section III. *, **, *** denotes significance at the 10, 5, and 1%-level, respectively (based on heteroskedastic-robust standard errors).

	Short run (j=1)	Longer-run (j=2)
Firm controls		
ln(AGEF)	-0,55	-0,92
ln(ASSETF)	-10,23***	-12,16***
ROAF	3,75***	4,56***
LEVERAGE	-8,98***	-10,28***
LEVERAGE*NEGEQ	0,61	0,47
RECBALANCE	1,12***	0,39*
YOUNG	-0,48	0,37
Merger variables		
ACQUIRE _t	-0,48	0,15
TARGET _t	-1,06***	-1,10***
Bank controls		
ln(ASSETB)	-0,71***	-0,72***
ROAB	72,45***	236,25***
BADLOANSB	-31,72	-2,10
OPCOSTB	14,83***	0,95
LIQB	-2,73**	-3,09***
Merging Bank dummies	Yes	Yes
Observations	204589	204589
Adjusted R ²	0,22	0,24

These results are broadly in line with the findings reported in the previous section. Firms borrowing from target banks have a 1.1% lower change in loan volumes (as a percentage of assets) than otherwise similar firms borrowing from non-merging banks. These results suggest that not only are single-relationship borrowers from target banks more likely to see their relationship dropped, but also target borrowers continuing the relationship with the consolidated are harmed, as their changes in loan volumes are lower. This effect appears in the short run and seems to persist in the long run. Interestingly, the coefficient on ACQUIRE is not statistically significant,

³² The sample consists of all firms that continued borrowing for at least 2 years at the same bank. The implication is that we exclude observations from the last year of our sample. Inclusion of these firms to address short run effects leaves our main results unaffected (but with a lower adjusted R²).

suggesting that borrowers of acquiring banks that stay on with the consolidated bank do not face higher interest rates. Furthermore, in unreported regressions, we find no significant merger effects when only including a merger dummy and not making a distinction between target and acquiring bank.

Firm variables are included in the regressions in Table 9 to control for demand factors. The results indicate that smaller, more profitable, and more indebted firms tend to have larger changes in loan volumes. The bank control variables may capture supply factors. They suggest that firms borrowing from smaller, more profitable, and less liquid banks have higher increases in loan volume.

As already noted, we have run similar regressions for multiple relationship firms. In contrast to the single relationship regressions, the coefficients on ACQUIRE and TARGET are not statistically significant, although the coefficients have similar signs. We conjecture that multiple relationship firms continuing on with target banks following a merger may have the ability to compensate for less favorable loan terms by relying more heavily on their nonmerging bank lenders.

Our results, at least for single relationship firms, are in line with Hypothesis 2a, but contrast with Bonaccorsi di Patti and Gobbi (2003) who reject the hypothesis that bank mergers are associated with adverse effects on loan volumes of Italian corporate borrowers.

VI. Conclusion

This paper studies the impact of bank consolidation on bank lending relationships of small and medium-size firms, using information from individual loan contracts in Belgium. We estimate the effect of bank mergers on borrowers' ability to maintain their bank relationships and to continue to tap bank credit. The paper represents one of a very small number of papers relying on firm-level loan contract data to study the effects of bank mergers. In addition, it considers mergers in an environment where firms maintain relatively few relationships and banking markets are highly concentrated: features that have not been present in other studies but which are typical for a number of countries.

Our results indicate that mergers have effects in the short run as well as the longer run. When we distinguish between firms borrowing from merging banks and those borrowing from nonmerging banks, we find that merging bank borrowers are significantly less likely to see their lending relationship terminated than nonmerging bank borrowers following a merger. When we distinguish between borrowers of acquiring and target banks, however, we find that borrowers at target banks are more likely to see their relationship terminated, whereas borrowers of acquiring banks are less likely to have their relationship dropped following a merger. These differential effects begin appearing even in the short run, but they become more robust in the longer run. In addition, our results on acquiring bank borrowers appear to be stronger than those reported in empirical work for other countries.

We also find that the intensity of the relationship reduces the probability of relationship termination. The greater the concentration of a multiple relationship borrower's loans with a given bank, the lower the probability that the relationship will be terminated. In addition, borrowers of an acquiring bank with low levels of concentration are less likely than similar nonmerging borrowers to lose their relationship. Borrowers of target banks with high levels of concentration are more likely than their nonmerging borrower counterparts to lose their relationship.

Similar to other studies, we find heterogeneous effects of bank mergers for large versus small firms. The effects, however, also differ for large firms borrowing from acquiring banks compared with large firms borrowing from target banks, and for target bank borrowers with single versus multiple lending relationships. Whereas large borrowers are favored by acquiring banks, large borrowers of target banks are more likely in the short run to have their lending relationship severed.

One possible interpretation of the results for target borrowers is that borrowers of target banks with low switching costs, including some large borrowers with multiple lending relationships, may voluntarily switch banks immediately following the merger. Borrowers with high switching costs are forced to stay with the merging bank.

Because switching costs are likely to be higher for borrowers with single relationships than for borrowers with multiple relationships, we run separate regressions for firms with single and with multiple relationships, in addition to running regressions for all firms taken together. Although results for these two groups are similar, a few differences appear, such as those for target borrowers noted above. Another difference emerges in the effect of firm age on the probability of dropping a lending relationship. Younger firms with single relationships have more stable lending relationships than older firms, whereas younger firms with multiple relationships have less stable lending relationships than older firms. Finally, at the level of merging bank versus nonmerging bank borrowers, single relationship borrowers of merging banks have a higher probability in the longer run of losing their relationships with the merged bank than do borrowers of nonmerging banks. In contrast, multiple relationship borrowers have a lower probability of losing their relationship with the merged bank.

Firms borrowing from two of the merging banks are substantially less likely to lose their relationship with the consolidated bank than other borrowers. One might ask whether this result simply reflects the relationship with the acquiring bank, which also would imply that the firm has a lower probability of losing the relationship. The effect for these overlap borrowers, however, is much stronger than that for acquiring bank borrowers only. This suggests that informational gains arise from the pooling of information of the merging banks that may not appear when only one of the merging banks was previously lending to the firm.

Finally, we find that single-relationship borrowers from the target bank and continuing on with the consolidated bank are harmed by the merger: changes in their loan volumes are lower than for otherwise similar borrowers. Changes in loan volumes of multiple relationship borrowers, including the target bank, and who continue on with the consolidated bank are not significantly different from those of otherwise similar borrowers.

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Appendix A

Variable definitions

<i>Firm control variables</i>	
AGEF	Age of the firm in years
ASSETF	Total book value of assets of the firm, expressed in 2002 €
ROAF	EBIT over assets
LEVERAGE	Book value of debt over assets
NEGEQ	Dummy that takes value 1 if firm has negative equity
RECBALANCE	Dummy that takes value 1 for firms with balance sheet available in at least one of the two years prior to year in which credit was granted
YOUNG	Dummy that takes value 1 for firms younger than 3 years and whose balance sheet covers less than 12 months of data
<i>Bank control variables</i>	
ASSETB	Total assets of the bank, expressed in 2002€
ROAB	Total return on assets
BADLOANSB	Non-performing loans over total loans
OPCOSTB	Operating costs over total assets
LIQB	(Cash + net position in the interbank market + short term securities' portfolio + government bonds) over assets
<i>Merger variables</i>	
MERG1 _{kt}	Dummy = 1 if firm borrowing from bank <i>k</i> which was involved in a merger occurring during 12 months following time <i>t</i> and if firm not borrowing from any of the other merging banks
MERG2 _{kt}	Dummy = 1 if firm borrowing from bank <i>k</i> which was involved in a merger occurring during 12 months following time <i>t</i> and if firm borrowing from at least one of the other merging banks
ACQUIRE _{kt}	Dummy = 1 if firm borrowing from bank <i>k</i> which was the acquiring bank in a merger occurring during 12 months following time <i>t</i> and if firm not borrowing from any of the other merging banks
TARGET _{kt}	Dummy = 1 if firm borrowing from bank <i>k</i> which was a target bank in a merger occurring during 12 months following time <i>t</i> and if firm not borrowing from any of the other merging banks
ACQTARG _{kt}	Dummy = 1 if firm borrowing from bank <i>k</i> which was involved in a merger occurring during 12 months following time <i>t</i> and if firm was borrowing from the acquiring and a target bank
MERG1 _{k,t-1}	Dummy = 1 if firm borrowing from bank <i>k</i> which was involved in a merger occurring between time <i>t-1</i> and <i>t</i> and if firm not borrowing from any of the other merging banks
MERG2 _{k,t-1}	Dummy = 1 if firm borrowing from bank <i>k</i> which involved in a merger occurring between time <i>t-1</i> and <i>t</i> and if firm was borrowing from at least one of the other merging banks
ACQUIRE _{k,t-1}	Dummy = 1 if firm borrowing from bank <i>k</i> which was the acquiring bank in a merger occurring between time <i>t-1</i> and <i>t</i>

	and if firm not borrowing from any of the other merging banks
TARGET _{k,t-1}	Dummy =1 if firm borrowing from bank <i>k</i> and bank <i>k</i> was a target bank in a merger occurring between time <i>t-1</i> and <i>t</i> and if firm was not borrowing from any of the other merging banks
ACQTARG _{t-1}	Dummy =1 if firm borrowing from bank <i>k</i> which was involved in a merger occurring between time <i>t-1</i> and <i>t</i> and if firm was borrowing from both the acquirer and a target bank
<i>Other variables</i>	
UR	Dummy that takes value 1 if firm has a single lending relationship
CONC	Proportion of multiple-relationship firm <i>i</i> 's utilised loans accounted for by bank <i>k</i>