



Débats économiques et financiers

N° 18

The Competitive Effects of a Bank Megamerger on Access to Credit

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SECRÉTARIAT GENERAL DE L'AUTORITÉ DE CONTRÔLE PRUDENTIEL
ET DE RÉOLUTION

DIRECTION DES ÉTUDES

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October 2015

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Abstract: This paper examines how the merger between two megabanks affects bank concentration and firms' access to credit. We find that in local markets in which the merger leads to a large increase in bank concentration, the merged bank decreases the supply of credit both to existing firms and to new firms. This reduction in credit supply is offset by non-merging banks which expand lending in markets in which the merging banks reduce lending. In some specifications, the substitution effect is strong enough to make the overall effect on credit supply statistically insignificant. Moreover, the substitution effect is at work even for small borrowers, risky borrowers, and new entrants.

Keywords: Competition, Bank Lending

JEL Classification: L40, G21

Les effets d'une mégafusion sur l'accès au crédit

Résumé : Cette étude examine comment la fusion entre deux grandes banques influence la distribution du crédit aux entreprises. Elle illustre empiriquement que dans les zones géographiques où la fusion a conduit à une concentration plus importante du marché bancaire, les banques fusionnées ont réduit leur offre de crédit à la fois aux entreprises déjà en activité et aux nouvelles entreprises. Certaines spécifications économétriques conduisent à conclure que cette réduction a été totalement compensée par un octroi de crédit des autres banques. L'effet de substitution est plus prononcé pour les petites entreprises, les entreprises les plus risquées et les nouvelles entreprises.

Keywords: Concurrence, Offre de crédit

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Abstract

This paper examines how the merger between two megabanks affects bank concentration and firms' access to credit. We find that in local markets in which the merger leads to a large increase in bank concentration, the merged bank decreases the supply of credit both to existing firms and to new firms. This reduction in credit supply is offset by non-merging banks which expand lending in markets in which the merging banks reduce lending. In some specifications, the substitution effect is strong enough to make the overall effect on credit supply statistically insignificant. Moreover, the substitution effect is at work even for small borrowers, risky borrowers, and new entrants.

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1 Introduction

Modern banking markets are dominated by megabanks. The preeminence of megabanks is the result of several decades of mergers and acquisitions in the banking industry, spurred by deregulation and technological developments. High concentration of banking markets was achieved through mergers among small banks and acquisitions of small banks by larger banks. As a result of these highly concentrated banking markets, mergers among megabanks become common. While the effects of traditional mergers among small banks and between small and large banks are well-understood (see, e.g., the surveys by Berger et al. (1999) and Amel et al. (2004) and the more recent literature discussed below), much less is known about bank megamergers.

Previous studies of traditional bank mergers suggest that the effects of bank megamergers might be different. The literature has identified three main effects of traditional mergers: efficiency gains, change in market power, and change in lending technology. While efficiency gains can in principle be at work for both traditional mergers and megamerger, the market power and lending technology effects are likely to play out differently in the case of megamergers. First, while even traditional mergers have the potential to increase market power and harm competition (Sapienza (2002), Erel (2011)), these adverse effects are likely to be amplified in the case of megamergers which lead to very high level of market concentration. Second, while traditional mergers involving small banks can lead to changes in lending technology, mergers among already large banks are unlikely to modify lending technologies. Because small banks rely more on relationship lending whereas large banks rely more on arm's length lending (Stein (2002), Berger and Udell (2002)), the consolidation of small banks into larger ones can change their lending practices, for instance if large banks shy away from small business lending (Berger et al. (1998), Peek and Rosengren (1998)). In contrast, mergers among already large banks are less likely to modify lending practices.

In this paper, we study the competitive effects of a bank megamerger on firms' access to credit. We consider the merger between two European banks –Bank A and Bank B hereafter, which combined in the 2000s to form a new banking group. Before the merger, Bank A and Bank B represent 20.2% and 32.3% of annual domestic GDP. As a matter of comparison, both banks had higher total assets relative to domestic GDP than the largest US bank (11.5% for JPMorgan Chase in 2009).

Regarding firm lending, these banks were the fourth and sixth largest banks of the country, with market shares of 10.2% and 5.1%. With a total market share of 15.3%, the merged bank became the second largest bank for firm lending. The merger increased the average local Herfindahl-Hirschman Index (HHI) from 1,900 to 2,100.

To identify the effect of the merger-induced increase in bank concentration on firm lending, we compare local markets in which the merger leads to a large increase in bank concentration to local markets in which the merger leads to a small increase in bank concentration. This empirical approach allows us to absorb bank-level shocks such as changes in lending policies and other potential changes due to the merger and thus to isolate the market power effects of the merger. We measure firm lending using loan- and firm-level data from a credit national register. The data provide us with bank credit at the firm-bank level. The granularity of the data allows us to include firm fixed effects and estimate how the amount of credit extended by different banks to the same firm changes after the merger. We are thus able to isolate the effect of the merger on credit supply holding fixed firm-specific credit demand.

Our first set of results show that the merging banks reduce credit supply both to existing firms and to new firms. On the sample of firms that already have some bank debt before the merger, the amount of credit extended by the merging banks in local markets in which the merger leads to a large increase in concentration decreases relative to local markets in which the merger leads to a small increase in concentration. In the average market, the merging banks reduce credit supply by 5.3% relative to non-merging banks. The decomposition of this effect into the intensive and extensive margins reveal that the reduction in credit supply mainly comes from the merging banks being less likely to initiate new relationships.

We then turn to the effect on firm entry, which we define as the first occurrence of a firm in the credit registry. Our definition of entry thus includes startups as well as firms that obtain bank credit for the first time. Given that firms that have no lending relationships with a bank are likely to be very small firms or self-employed individuals, our measure of entry is a reasonable proxy for firm entry. We find that the number of entrants that obtain credit from the merging banks decrease after the merger in local markets in which the merger leads to a large increase in concentration relative to local markets in which the merger leads to a small increase in concentration. In the

average market, the number of entrants financed by the merging banks decline by 10.7%.

Our second set of results is that the reduction in credit supply by merging banks is offset by an increase in credit supply by non-merging banks. When we sum loan amounts over banks up to the firm level, we find that the amount of credit obtained by firms in local markets in which the merger leads to a large increase in concentration decreases relative to local markets in which the merger leads to a small increase in concentration, but the reduction is smaller than the reduction by the merging banks alone, suggesting that firms are able to substitute credit from the merging banks with credit from non-merging banks. In some specifications, the substitution effect is strong enough to make the effect on total credit supply statistically insignificant, that is, we cannot reject that the increase in lending by non-merging banks fully offsets the decrease in lending by the merging banks. Moreover, this substitution effect is at work even for small firms and firms with a low rating.

Regarding the effect on entry, we estimate the substitution effect by focusing on the total number of entrants. We find that total entry growth is not significantly different in local markets with a large and with a small merger-induced increase in bank concentration. The drop in financing of entrants by the merging banks is thus fully offset by a corresponding increase in lending by the other banks, even when we focus on the small entrants.

Our paper contributes to the large literature on bank mergers surveyed by Berger et al. (1999) and Amel et al. (2004). The early literature has focused on the consolidation of the U.S. banking industry and the effect on small business lending due to the increase in bank size and the resulting shift in lending technology (see, e.g., Berger and Udell (1996), Peek and Rosengren (1996, 1998), Strahan and Weston (1998), Berger et al. (1998)). Karceski, Ongena and Smith (2005) find, on a sample of bank mergers from Norway, that borrowers of target banks suffer from mergers while borrowers of acquiring banks benefit, suggesting a strategic focus at the merged bank at the expenses of target borrowers. Degryse, Masschelein and Mitchell (2011) show, on a sample of bank mergers from Belgium, that single-relationship borrowers are more likely to be dropped by target banks. This line of literature demonstrates that the technological, organizational, and strategic changes at target banks can disrupt credit supply for borrowers of target banks, especially when target banks are small.

More related to us are papers that study more precisely the competitive effects of bank mergers.

Sapienza (2002) study bank mergers in Italy during the early 1990s and find that, while on average loan rates decrease post merger, the result is reversed in local markets in which the merging banks' market shares overlap. Specifically, in local markets in which the target bank operates, mergers lead to an increase in the loan rate when the market share of the acquirer exceeds 6%. As a matter of comparison, the pre-merger market shares of Bank A and Bank B were respectively 10.2% and 5.1%. Erel (2011) studies bank mergers in the U.S. between 1990 and 2000 and find that loan rates decrease post merger except in the case of mega-acquirers, which are defined as banks with total assets above \$10 billion. Bank A and Bank B had total assets of several hundreds of billions well-above that threshold. Erel (2001) also shows that loan rates increase when the merging banks' market shares have significant market overlap.

A smaller strand of literature studies the competitive effects of bank megamergers. Carow, Kane and Narayanan (2006) study the ten largest domestic U.S. bank mergers between 1991 and 2001 and Fraser et al. (2011) consider the six largest U.S. mergers between 1992 and 2006. These papers find that firms borrowing from banks involved in megamergers experience a negative stock price reaction when the merging banks have substantial geographic overlap, suggesting that megabanks are able to exercise market power and extract rents from borrowers. The megabanks considered in these papers are of similar size as Bank A and Bank B.

The rest of the paper is organized as follows. We describe the merger in Section 2, the data in Section 3, the empirical strategy in Section 4, and the results in Section 5. Section 6 concludes.

2 The Merger

Bank A and Bank B were universal banks providing a wide range of financial products and services. In the mid 2000s, the corporate and investment banking, asset management and financial services businesses of the two banks merged to form a single entity. While there was no public plan for further integration of their commercial banking businesses, large losses in investment banking led Bank A and Bank B to consolidate their commercial banking activities 3 years later. The fact that the merger was motivated by losses in investment banking suggests that the banks' decision to merge was not correlated with the performance of their portfolios of corporate loans or with their

lending opportunities. This fact supports our identifying assumption that the merger is exogenous to individual bank-firm relationships.

The merger was noticed to the national competition authority and cleared in 2 months. The only remedy imposed by the competition authority relates to a small oversea local market, where the banks committed to keep independent their branch networks and legal structures in order to prevent coordination. We will drop this small local market from our sample. For the rest of the domestic market, Bank A and Bank B's central bodies merged three months after the initial notification. The merged entity retained the two separate retail banking brands and branch networks. Although the two merging banks have a partially decentralized governance structure, a central committee defines strategic orientations, including pricing, at the national level. The fact that lending operations were not integrated or fully reorganized implies that soft information about borrowers accumulated within each of the merging banks was probably not lost in the merging process. Since loss of information and change in practices were limited, we can therefore better isolate the competitive effects of the merger.

3 Data

We use two main sources of data from the national central bank. We obtain loan-level data from the credit registry. The credit registry contains information from all banks on individual borrowers operating in the country with bank debt above €25,000. At the end of each quarter, we observe the amount and type of loan extended by each bank to each firm. The data also contains the location, industry, and an annual turnover bracket of the firm. We complement loan-level data with firm-level accounting, rating, and employment data. The data covers firms with annual turnover above €750,000.

We construct two samples of firms: (a) continuing firms that borrow from banks both in the pre-merger period and in the post-merger period; (b) entrants that borrow for the first time in either the pre-merger period or the post-merger period. Since the merger was announced and completed in year Y during the 2000s, we exclude the year Y from the sample period and define the pre-merger period as $(Y - 3)Q1 - (Y - 1)Q4$ and the post-merger period as $(Y + 1)Q1 - (Y + 2)Q4$.

To create the sample of continuing firms, we start from the loan data and keep firms that can be matched with firm-level information. The sample of continuing firms is therefore restricted to firms with annual turnover above €750,000. We exclude state-owned companies and firms controlled by local or regional governments. For each firm f and each bank b to which the firm borrows during the sample period, we compute the average loan amount extended by bank b to firm f over the pre-merger period and over the post-reform period. In the pre-merger period, we pool together the loans made by the two merging banks as if they were already merged. We also pool together the loans made by all the banks outside the top eight banks. Our final sample of continuing firms is a balanced panel of 244,070 firms, eight banks (the merged bank, six other large banks, and the set of other banks), and two periods (pre-merger and post-merger). Since we select all firm-bank pairs such that there is nonzero exposure in at least one quarter over the entire period, a given firm-bank pair can have zero exposure in the pre-merger period or in the post-merger period, but not both. We normalize firm-bank-level loan amount by firm total liabilities measured as the average over the pre-merger period. We also compute firm-level bank debt by summing up firm-bank-level loans over all the banks to which the firm borrows. Table 1, Panel A reports summary statistics for the sample of continuing firms at the firm-bank level and at the firm level. Over the sample period, 38% of firms have a lending relationship with only one bank, 28% have lending relationships with two banks (although not necessarily at the same time), 16% with three banks, 9% with four banks, and 9% with five banks or more. The average firm has total bank debt equal to 18.9% of total liabilities.

[INSERT TABLE 1 ABOUT HERE]

To create the sample of entrants, we retrieve loan data and firm data starting two years before the beginning of the sample period. During the sample period, we define entrants as firms that appear for the first time in the loan data, i.e. that enter in the credit market irrespective of the lending bank(s). For each entrant, we then identify the bank(s) from which it obtains credit on the year of entry. We measure entry at the local market-bank level as the number of entrants in each local market that borrow from each bank. Entry at the market level is the total number of

entrants in each market.¹ We compute entry in the pre-merger period, in the post-merger period, and pre-post entry growth.²

Given that firms appear in the credit registry when their bank debt exceeds €25,000, our definition of entry excludes some very small firms and self-employed individuals. Since these firms contribute to a small fraction of aggregate value creation, the focus on non-tiny firms makes economic sense. Table 1, Panel B reports summary statistics on the sample of entrants. In the average local banking market, the average bank extends credit to 932 entrants in the pre-merger period and to 792 entrants in the post-merger period. At the market level, the average entry rate declines by 18% after the merger, which reflects the poor economic conditions in the year Y . Our difference-in-difference empirical approach, which we present in the next section, allows us to control for this aggregate shock.

4 Empirical Strategy

4.1 Market Overlap

Identifying the effect of the merger on lending activity requires to control for aggregate and bank-specific shocks. For instance, the merging banks may increase lending after the merger to earn political goodwill. To isolate more precisely the effects of the change in the concentration of local banking markets induced by the merger, we compare markets in which the merging banks' market shares overlap to markets in which their market shares do not overlap. Following the competition authority we define as local markets the local jurisdictions that are about the same size as Metropolitan Statistical Areas (MSAs) in the US. The average local area has about 700,000 inhabitants, the same as the average MSA in the US. In the US, antitrust and academic studies define local banking markets as MSAs (see for instance Erel (2009)). To measure the extent of overlap between the merging banks in each market, we compute the product of their pre-merger market shares. This

¹Market-bank-level entry does not exactly add up to market-level entry because one entrant that borrows from several banks for the first time is counted several times at the market-bank level.

²We exclude the starting year of the sample period for the analysis of entry because of a change in data coverage in the first quarter of this year. Before this date, the data cover firm-bank relations with a total loan amount above €76,000. This threshold is lowered to €25,000 which triggers a lot of entry in the data that does not reflect actual entry. Since the threshold is constant from $(Y - 3)Q2$ to $(Y + 2)Q4$, our measure of entry over $(Y - 2)$ – $(Y + 2)$ is free from such change in data coverage.

measure of market overlap capture the increase in concentration induced the merger. Indeed, the merger-induced change in HHI in local banking market m is equal to:

$$\Delta HHI_m = \left((s_{A,m} + s_{B,m})^2 + \sum_{b \neq Bank_A, Bank_B} s_{b,m}^2 \right) - \left(s_{A,m}^2 + s_{B,m}^2 + \sum_{b \neq Bank_A, Bank_B} s_{b,m}^2 \right) = 2 \times s_{A,m} \times s_{B,m} \quad (1)$$

where $s_{b,m}$ is the pre-merger market share of bank b in market m . The change in HHI is thus twice the product of the pre-merger market shares of the merging banks. Therefore, the merger triggers a larger increase in HHI in markets in which the merging banks' market shares overlap more. In the following, we denote $\Delta HHI_m = s_{A,m} \times s_{B,m}$ the product of the merging banks' market shares.³

The sample average of ΔHHI is 0.0056. Our empirical strategy consists in comparing banking markets with a large ΔHHI to markets with a low ΔHHI . Therefore, for our tests to have some statistical power, we need that there is enough variation in ΔHHI across local markets. ΔHHI ranges from 0.0011 to 0.0142 with a standard deviation of 0.0027. This variation in the data will enable us to estimate the effect of the merger with a reasonable level of precision.

The competition policy argues in its decision that the merger would not hurt competition on the ground that the merged bank would have a market share in the 20%–30% range. The merging banks further argued that their lending activities do not overlap because they target different segments of the market, with $Bank_A$ lending to SMEs and $Bank_B$ focusing on loans to households and to the public sector. The data, however, reveals a somewhat different picture. Both banks have significant market shares for corporate loans. To further check that the merging banks do not target different sub-segments of the lending market to SMEs, Table 2 compares their respective market shares across firm size categories and across broad industries. Panel B shows that both banks' loan portfolios are spread over the entire spectrum of borrower size, with a tilt towards small and medium-sized borrowers (with annual turnover below €30 million). Therefore, the merging banks appear to compete head-to-head on the firm lending market. In terms of industries, Panel C shows that $Bank_A$ is well diversified across sectors while $Bank_B$ has a more pronounced tilt towards real

³With a slight abuse of notation, since ΔHHI is in fact equal to twice the merger-induced change in local HHI.

estate, health care and education. Overall, the two banks are present on all the segments of the lending market.

[INSERT TABLE 2 ABOUT HERE]

4.2 Econometric Specifications

Our analysis relies on two different specifications that allow us to identify different economic effects. The first specification is at the firm-bank level (for the analysis of continuing firms) or at the market-bank level (for the analysis of entry). It estimates the effect of the merger on credit supply by the merging banks relative to the non-merging banks. To separate credit supply from credit demand effects in the analysis of continuing firms, we consider firms that borrow from several banks and compare the change in loan amount extended by the merging banks relative to the non-merging banks holding fixed the identity of the borrower (i.e., including borrower fixed effects). Holding fixed the identity of the borrower allows us to hold credit demand constant. Therefore, any change in the loan amount made by the merging banks can be interpreted as a shift in the credit supply of the merging banks relative to the other banks. Under the assumption that credit supply of non-merging banks is not affected by the merger, this approach allows us to identify the causal effect of the merger on the merging banks' credit supply. The regression at the firm-bank level is:

$$\Delta Loans_{f,b,m} = \alpha_f + \delta_b + \beta \Delta HHI_m \times MergedBank_b + \varepsilon_{f,b,m}, \quad (2)$$

where $\Delta Loans_{f,b,m}$ is the change in loans extended by bank b to firm f that is located in market m normalized by the total liabilities in the pre-merger period, ΔHHI_m is the change in HHI in the firm's local market, and $MergedBank_b$ is a dummy equal to one if b is the merged bank.⁴ Firm fixed effects (α_f) control for firm-level credit demand shocks that may be correlated with ΔHHI . If, for instance, the merging banks have lending relationships with fast growing borrowers in markets with a high ΔHHI , this unobserved heterogeneity would lead to an upward bias in the estimate of β in a specification with no firm fixed effects. Firm fixed effects absorb such spurious correlation.

⁴Loans from the two merging banks are pooled together. Note also that we do not include the non-interacted variables ΔHHI and $MergedBank$ because they are collinear with the firm fixed effects and the bank fixed effects, respectively.

Similarly, the specification for the analysis of entry at the market-bank level is:

$$EntryGrowth_{b,m} = \alpha_m + \delta_b + \beta \Delta HHI_m \times MergedBank_b + \eta_{b,m}. \quad (3)$$

where $EntryGrowth_{b,m}$ is the change in the log of the number of entry with bank b in the market m . Market fixed effects control for credit demand effects and allow us to identify the shift in the supply of credit to entrants from the merging banks relative to the non-merging banks.

The second specification is at the firm level (for continuing firms) or at the market level (for entrants). The regressions for continuing firms is:

$$\Delta Loans_{f,m} = \alpha + \delta_b + \beta \Delta HHI_m + Controls_{f,m} + \zeta_{f,m}, \quad (4)$$

and the regression for entrants is:

$$EntryGrowth_m = \alpha + \delta_b + \beta \Delta HHI_m + Controls_m + \xi_m. \quad (5)$$

Here, δ_b is a dummy taking the value of one if the firm f has the bank b among its lenders. These regressions estimate the overall effect of the merger on access to credit taking into account the reaction of non-merging banks. For instance, if the merging banks reduce credit supply but this reduction is fully offset by an increase in credit supply from the other banks, then β will be negative in (2) and (3) and zero in (4) and (5). In all the specifications (2) to (5), the standard errors are clustered by local banking market.

5 Results

5.1 Merging Banks' Credit Supply

5.1.1 Continuing Borrowers

We first estimate the firm-bank-level specification on continuing borrowers. We ask whether the merging banks extend more or less credit relative to the other banks in markets in which the merger leads to a large increase in HHI relative to markets in which the merger leads a small increase in

HHI. Results are reported in Table 3.

[INSERT TABLE 3 ABOUT HERE]

On the sample of continuing firms, borrowing from the merging banks decreases relative to the non-merging banks in local banking markets in which the increase in market power is expected to be stronger (columns (1) to (3)). The drop in loan amount is significant at the 5% level. This level of significance might appear small given the large number (538,060) of firm-bank observations. The reason is that ΔHHI is defined at the market level and we compute the standard errors by allowing error terms to be correlated at the market level. This conservative choice of standard error clustering implies that our specification has as much statistical power as a regression at the market level. Given that there are 95 local banking markets, a 5% significance level is reasonable.

To gauge the economic significance of our point estimate, we compute the effect of the merger for a firm at the sample change of ΔHHI equal to 0.0056. For the average firm, the merger leads to a decline in borrowing from the merging banks equal to $0.806 \times 0.0056 = 0.45\%$ of total liabilities. Given that the average loan from the merging banks is equal to 8.45% of total liabilities, our point estimate implies an average 5.3% decline in borrowing from the merging banks relative to non-merging banks.

The comparison between columns (2) and (3) reveals that borrower fixed effects have a very limited impact. The addition of borrower fixed effects reduces the point estimate by less than 10% and the difference between the point estimates with and without the borrower fixed effects is statistically insignificant. This suggests that unobserved firm-specific credit demand shocks are not correlated with the merger-induced changes in local market HHI. This fact will be important for the validity of the firm-level specification without fixed effects in Section 5.2.

This decline in lending can come from the intensive and extensive margins. At the intensive margin, the merging banks may reduce the loan amount to firms to which they extend credit both before and after the merger. At the extensive margin, the merging banks may extend less credit through newly initiated relationships or they may cut credit by terminating relationships. To capture the change in lending along these different margins, we decompose the change in loan amount into three components: the change in loan amount for continued relationships (defined as positive

loan amounts both pre- and post-merger), the change in loan amount for terminated relationships (positive loan amount pre-merger and zero loan amount post-merger), and the change in loan amount for newly initiated relationships (zero loan amount pre-merger and positive loan amount post-merger). We find that while lending declines along all three margins, only lending through newly initiated relationships is significant and account for half of the total effect (columns (4) to (6)).

[INSERT TABLE 4 ABOUT HERE]

We then investigate whether the effect depends on firm size and firm rating. The literature on traditional bank mergers finds that small banks reduce lending to small borrowers when they are absorbed into a larger banking group (see, e.g., Berger et al. (1998)), which is consistent with the view that small banks have a comparative advantage in lending to small firms (Stein (2002), Berger and Udell (2002)). However, in the case of mergers between already large banks like the *Bank_A/Bank_B* merger, we do not expect the merging banks to reduce disproportionately lending to the smallest borrowers. We measure firm size as the log of pre-merger total liabilities and interact it with the merged bank dummy and with the merged bank dummy interacted with ΔHHI .⁵ In Table 4, we find that the effect of the merger does not vary significantly with firm size (column (1)), even when we focus on the different margins of adjustment (columns (2) to (4)).

We also ask whether the merging banks' risk-taking behavior is affected by the intensity of competition. We study how the change in lending depends on borrowers' riskiness. We measure riskiness using the rating computed by the national central Bank. The rating takes 12 different values. We transform the rating into a numerical variable between 1 and 12, where higher values indicate more creditworthy borrowers and we then average this rating over the pre-merger period. Columns (5) to (8) show that the effect of the merger does not depend on borrower rating. Therefore, bank risk-taking does not seem to be affected by market power.

⁵We do not need to include the interaction between firm size and ΔHHI since this variable would be absorbed by firm fixed effects.

5.1.2 Entrants

Results in the previous section show that the merging banks reduce credit supply. This effect comes mostly from a reduction in the amount of credit extended through new relationships with firms that were already active in the pre-merger period. In this section, we study whether the merging banks also reduce lending to entrants.

[INSERT TABLE 5 ABOUT HERE]

We regress the growth rate of entrants financed by each bank in each market on bank fixed effects, market fixed effects, and the interaction between the merging banks dummy and ΔHHI . Results are reported in Table 5. The coefficient on the interaction term is negative and statistically significant at the 5% level (column (1)). The point estimate implies that, in the average market, the number of entrants financed by the merging banks decreases by $19.1 \times 0.0056 = 10.7\%$ relative to non-merging banks. This result is consistent with our finding that the reduction in credit supply operates at the extensive margin. The merging banks extend less credit through lending relationships, both to firms that already borrow from other banks and to firms with no prior bank financing.

We then investigate whether the reduction in the financing of entrants is concentrated on certain firm size categories.⁶ Since firms usually do not report accounting data in their first years, we measure the size of entrants as total borrowing in the first year the firm appears in the loan data. Entrants are then classified into four size categories: total loans below €38,500; in the range €38,500–€79,600; in the range €79,600–€180,000; and above €180,000, where the cut-offs are the ones that define the entrant size quartiles in the pre-merger period. Finally, we compute the growth rate in the number of entrants financed by each bank in each market in each of the four size categories.

Columns (2) to (5) show that the change in the financing of entrants by the merging banks is negative for all four size quartiles and monotonically increasing in firm size, that is, the reduction in credit supply is stronger for small entrants. In the average market, the number of entrants financed by the merging banks decreases by a significant 12.2% in the first size quartile and 14.1% in the

⁶We cannot study how the effect depends on firm rating because firms typically have no rating in their first year.

second size quartile relative to non-merging banks. In the third and fourth quartiles, the effect is not only much lower in magnitude but it is also insignificantly different from zero.

5.2 Total Credit Supply

5.2.1 Continuing Borrowers

The previous section establishes that, in local markets in which the merger leads to a large increase in banking concentration, lending by the merging banks declines relative to the non-merging banks. There are two possible interpretations of this result. The first one is that the merging banks reduce lending supply while the other banks do not change lending. Borrowers thus receive less bank credit in total. The alternative interpretation is that the merging banks reduce lending while the other banks increase lending. In this case, the amount of bank credit received by borrowers decreases by less than the reduction in lending by the merging banks because borrowers substitute credit from the merging banks by credit from the non-merging banks. If the substitution effect is complete, bank credit does not decrease.

To determine which interpretation is correct, we focus on the change in bank loans at the firm level, that is, we sum the loan amounts over all the banks from which the firm receives credit. We then regress the change in firm-level bank credit on ΔHHI . Because we now work at the firm level, it is no longer possible to include firm fixed effects to control for credit demand. There is however one piece of evidence that suggests that demand effects might not bias the analysis. The analysis at the firm-bank level in Table 3 reveals that the estimated effects of the merger are almost identical whether firm fixed effects are included (column (2)) or not (columns (1)). This similarity suggests that omitting firm fixed effects does not lead to a systematic bias in the estimated effect of the merger on credit supply. We can nevertheless control for market-level characteristics in level and/or in change to further control for unobserved heterogeneity. We thus include industry fixed effects (88 categories), size fixed effects (15 categories) and we also control for the change in the unemployment rate at the market level. Results are reported in Table 6.

[INSERT TABLE 6 ABOUT HERE]

When we do not include any control, the coefficient on ΔHHI is negative and statistically signif-

icant at the 5% level (column (1)). The point estimate indicates that the average firm experiences a merger-induced decline in bank credit of $1.0 \times 0.0056 = 0.56\%$ of total liabilities. Given that average bank credit is 18.9% of total liabilities, this reduction amounts to a 3.0% decrease in bank credit. However, the size and statistical significance of the effect decrease when we include controls in the regression. When we include indicator variables for firm size categories, the coefficient decreases slightly and remain significant (column (2)). When industry fixed effects are also added to the regression, the size of the coefficient is halved and become insignificant (column (3)). When we further control for state-level change in unemployment rate, the coefficient remains insignificant (column (4)). Therefore, it seems that the reduction in lending by the merging banks is offset by an increase in lending by the non-merging banks such that the overall change in credit supply is negative but insignificant.

We then study how the effect at the firm level depends on firm size and firm rating. The analysis at the firm-bank level revealed that the merging banks cut lending to small firms and risky firms by as much as they cut lending to large firms and creditworthy firms. If, however, small firms and risky firms are less able to substitute loans from the merging banks by loans from the other banks, then these firms may well end up being more hurt by the merger than large and creditworthy firms. To test whether this is the case, we interact ΔHHI with firm size and firm rating in our firm-level specification. We find that the coefficient on the interaction term between ΔHHI and firm size is not significantly different from zero (columns (5) and (6)). The substitution effect is thus at work both for large firms and for small firms. When we consider how the substitution effect depends on firm rating, we also find a statistically insignificant effect (columns (7) and (8)). Non-merging banks increase credit supply to offset the decline negative effect of the merger both for firms with a high rating and for firms with a low rating.

5.2.2 Entrants

[INSERT TABLE 7 ABOUT HERE]

Finally, we study the net effect of the merger on entry taking into account the substitution effect from non-merging banks. To this aim, we regress total entry growth in each local market on

ΔHHI . Results are reported in Table 7. We find that the merger has no significant effect on entry growth (column (1)). Credit from non-merging banks thus fully offset the decline in the financing of entrants by the merging banks. As a result, the merger does not affect total entry growth. When we decompose entry by entrant size, we find that there is no significant change in entry growth across all four size quartiles (columns (2) to (5)). Therefore, consistent with results in the previous section, the substitution effect seems to be equally at work for large entrants and for small entrants.

6 Conclusion

We study the competitive effects of the megamerger between two European banks in the 2000s. We isolate the market power effect of the merger by comparing local markets in which the merger leads to a large increase in bank concentration relative to local markets in which the merger leads to a small increase in bank concentration. We find that the merged bank decreases the supply of credit to both existing firms and new firms. In the average market, continuing borrowers face a 5.3% decline in credit supply from the merging banks relative to other banks and new entrants experience a 10.7% relative decline. Non-merging bank react by extending more loans, which offsets the cut in lending from the merged bank. In some specifications, the offsetting effect is large and we cannot reject that the merger has a zero net effect on access to credit. One interpretation for this lack of statistical significance is that bank competition is at work and the substitution effect is strong enough to offset the decline in lending by the merging banks. Another interpretation is that the lack of statistical significance conceals an heterogeneous effect. We have investigated this possibility and have found no evidence that the substitution effect vanishes for some categories of borrowers. In particular, the substitution effect is at work even for small firms, for firms with a low rating, and for new entrants.

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Table 1: Summary Statistics

| | Mean | Sd. Dev. | p25 | Median | p75 | N |
|-----------------------------------|-------|----------|-------|--------|-------|-----------|
| <i>Panel A : Continuing firms</i> | | | | | | |
| <i>Firm-Bank level</i> | | | | | | |
| Loans/Total Liabilities | 0.08 | 0.13 | 0.00 | 0.03 | 0.11 | 1,076,120 |
| No. of bank relations | 3.14 | 1.70 | 2.00 | 3.00 | 4.00 | 1,076,120 |
| <i>Firm level</i> | | | | | | |
| Total Loans/Total Liabilities | 0.19 | 0.21 | 0.02 | 0.12 | 0.29 | 492,202 |
| <i>Panel B : Entrants</i> | | | | | | |
| <i>Market-bank level</i> | | | | | | |
| Pre-merger number of entrants | 932 | 1,071 | 151 | 540 | 1,348 | 570 |
| Post-merger number of entrants | 792 | 929 | 134 | 465 | 1,108 | 570 |
| Entry growth rate (%) | -0.11 | 0.33 | -0.26 | -0.14 | -0.01 | 569 |
| <i>Market level</i> | | | | | | |
| Pre-merger number of entrants | 5,841 | 4 638 | 2,841 | 4,938 | 7,304 | 95 |
| Post-merger number of entrants | 4,885 | 4,168 | 2,169 | 3,656 | 6,205 | 95 |
| Entry growth rate (%) | -0.18 | 0.08 | -0.23 | -0.19 | -0.14 | 95 |

Table 2: Merging Banks' Market Shares

| | Market shares (%) | | No. of firms |
|--|-------------------|--------|--------------|
| | Bank A | Bank B | |
| <i>Panel A: All firms</i> | | | |
| | 5.1 | 10.2 | 261 357 |
| <i>Panel B: By turnover (million €/year)</i> | | | |
| >750 | 10.1 | 2.8 | 603 |
| 150–750 | 8.7 | 5.4 | 2,410 |
| 50–150 | 7.5 | 5.7 | 5,748 |
| 30–50 | 7.4 | 5.9 | 5,933 |
| 15–30 | 9.1 | 7.1 | 12,154 |
| 7.5–15 | 11.9 | 6.4 | 20,380 |
| 1.5–7.5 | 14.7 | 7.4 | 103,696 |
| 0.75–1.5 | 15.3 | 6.5 | 66,705 |
| 0.50–0.75 | 13.0 | 10.8 | 11,112 |
| 0.25–0.50 | 17.9 | 9.1 | 3,350 |
| 0.10–0.25 | 18.5 | 9.0 | 2,276 |
| <0.10 | 16.4 | 8.4 | 2,578 |
| <i>Panel C: By industry</i> | | | |
| Agriculture and Fishing | 12,1 | 2,2 | 3,837 |
| Manufacturing and Mining | 11,7 | 3,1 | |
| Construction | 18.6 | 5.7 | 36,703 |
| Retail and Wholesale Trade | 12.2 | 3.7 | 76,129 |
| Transportation | 11.6 | 3.1 | 10,903 |
| Accommodation and Food Services | 15.7 | 8.8 | 11,135 |
| Information | 9.7 | 3.9 | 5,450 |
| Finance and Insurance | 13.1 | 2.9 | 13,935 |
| Real Estate | 4.7 | 11.0 | 20,048 |
| Professional, Scientific, Technical Services | 11.7 | 1.4 | 12,307 |
| Administrative and Support Services | 10.2 | 3.1 | 8,317 |
| Health Care and Education | 11.8 | 17.6 | |
| Other Services | 6.2 | 7.0 | |

Table 3: Merging Banks' Credit Supply to Continuing Borrowers

| | Change in loan amount | | | | | |
|--|-----------------------|-----------|-------------------------|--------------------------|-------------------------|-----------|
| | Total | | Continued relationships | Terminated relationships | Initiated relationships | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| ΔHHI | 0.226 | | | | | |
| | (0.159) | | | | | |
| $\Delta\text{HHI} \times \text{Merged bank}$ | -0.901*** | -0.873*** | -0.806** | -0.254 | -0.187 | -0.365*** |
| | (0.323) | (0.323) | (0.382) | (0.276) | (0.157) | (0.107) |
| Observations | 538,060 | 538,060 | 538,060 | 538,060 | 538,060 | 538,060 |
| Adjusted R-squared | 0.002 | 0.003 | 0.397 | 0.293 | 0.602 | 0.200 |
| Bank FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Dpt FE | No | Yes | – | – | – | – |
| Firm FE | No | No | Yes | Yes | Yes | Yes |

Standard errors clustered by local market. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Merging Banks' Credit Supply to Continuing Borrowers: By Firm Size and Firm Rating

| | Change in loan amount | | | | | | | |
|---|-----------------------|-------------------|-------------------|--------------------|-------------------|-------------------|-------------------|-------------------|
| | Total | Continued | Terminated | Initiated | Total | Continued | Terminated | Initiated |
| | | relationships | relationships | relationships | | relationships | relationships | relationships |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $\Delta\text{HHI} \times \text{Merged bank}$ | -0.158 (1.193) | 0.822 (1.111) | -0.019 (0.887) | -0.961 (0.639) | -2.142 (1.308) | -0.915 (0.999) | -1.084 (0.698) | -0.142 (0.446) |
| Merged bank \times Size | -0.001 (0.001) | -0.000 (0.001) | 0.001 (0.001) | -0.001* (0.000) | | | | |
| $\Delta\text{HHI} \times \text{Merged bank}$ \times Size | -0.088 (0.132) | -0.144 (0.136) | -0.020 (0.100) | 0.076 (0.072) | | | | |
| Merged bank \times Rating | | | | | 0.001 (0.001) | 0.000 (0.001) | 0.001 (0.001) | 0.000 (0.000) |
| $\Delta\text{HHI} \times \text{Merged bank}$ \times Rating | | | | | 0.153 (0.153) | 0.074 (0.119) | 0.105 (0.071) | -0.026 (0.051) |
| Observations | 538,060 | 538,060 | 538,060 | 538,060 | 471,947 | 471,947 | 471,947 | 471,947 |
| Adjusted R-squared | 0.397 | 0.293 | 0.602 | 0.200 | 0.346 | 0.255 | 0.589 | -0.052 |
| Bank FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Standard errors clustered by local market. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5: Merging Banks' Credit Supply to Entrants

| | Entry growth | | | | |
|--|----------------------|---------------------------|-----------------------|--------------------|-------------------|
| | All | Entrants in size quartile | | | |
| | entrants | Q1 | Q2 | Q3 | Q4 |
| | (1) | (2) | (3) | (4) | (5) |
| $\Delta\text{HHI} \times \text{Merged bank}$ | -19.143** (7.712) | -21.864** (10.811) | -25.300** (11.388) | -12.383 (9.224) | -4.679 (7.817) |
| Observations | 570 | 570 | 570 | 570 | 570 |
| Adjusted R-squared | 0.195 | 0.109 | 0.145 | 0.129 | 0.170 |
| Dpt FE | Yes | Yes | Yes | Yes | Yes |
| Bank FE | Yes | Yes | Yes | Yes | Yes |

Standard errors clustered by local market. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Total Credit Supply to Continuing Borrowers

| | Change in loan amount | | | | | | | |
|------------------------------|-----------------------|----------|---------|---------|----------|----------|----------|----------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Δ HHI | -1.011** | -0.857** | -0.487 | -0.464 | 2.001 | | 0.332 | |
| | (0.427) | (0.399) | (0.394) | (0.405) | (1.591) | | (1.257) | |
| Size | | | | | 0.006*** | 0.009*** | | |
| | | | | | (0.001) | (0.001) | | |
| Δ HHI \times Size | | | | | -0.248 | -0.166 | | |
| | | | | | (0.193) | (0.176) | | |
| Rating | | | | | | | 0.026*** | 0.020*** |
| | | | | | | | (0.001) | (0.001) |
| Δ HHI \times Rating | | | | | | | -0.010 | -0.007 |
| | | | | | | | (0.126) | (0.139) |
| Observations | 246,101 | 246,099 | 243,109 | 243,108 | 246,101 | 243,111 | 203,930 | 201,364 |
| Adjusted R-squared | 0.003 | 0.033 | 0.092 | 0.092 | 0.002 | 0.072 | 0.056 | 0.124 |
| Dpt FE | No | No | No | No | No | Yes | No | Yes |
| Region FE | Yes | Yes | Yes | Yes | No | – | No | – |
| Bank FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Size FE | No | Yes | Yes | Yes | No | No | No | Yes |
| Industry FE | No | No | Yes | Yes | No | Yes | No | Yes |
| Controls | No | No | No | Yes | No | No | No | No |

Standard errors clustered by local market. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Total Credit Supply to Entrants

| | Entry growth | | | | |
|--------------------|------------------|---------------------------|------------------|------------------|-------------------|
| | All | Entrants in size quartile | | | |
| | entrants | Q1 | Q2 | Q3 | Q4 |
| | (1) | (2) | (3) | (4) | (5) |
| Δ HHI | 1.742 (4.038) | 0.305 (4.623) | 2.879 (5.334) | 7.255 (4.735) | -8.955 (6.003) |
| Observations | 95 | 95 | 95 | 95 | 95 |
| Adjusted R-squared | 0.525 | 0.489 | 0.458 | 0.446 | 0.414 |
| Region FE | Yes | Yes | Yes | Yes | Yes |

Robust standard errors. *** p<0.01, ** p<0.05, * p<0.1

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