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**The effects of bank mergers on credit availability:  
evidence from corporate data**

by E. Bonaccorsi di Patti and G. Gobbi



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# THE EFFECTS OF BANK MERGERS AND ACQUISITIONS ON CREDIT AVAILABILITY: EVIDENCE FROM CORPORATE DATA

by Emilia Bonaccorsi di Patti and Giorgio Gobbi\*

## Abstract

A large literature on the effects of bank consolidation focuses on direct efficiency gains for participating banks and market power effects. The special nature of credit markets suggests that indirect informational effects for borrowers may be generated by bank consolidation. In particular, borrowers that depend on relationship-based lending may face a reduction in credit availability because soft information gets lost if their lenders are involved in a merger. In this study we investigate the full effect of bank mergers on the availability of credit for corporate borrowers by examining a large sample of privately owned firms. We analyze the impact of bank mergers and acquisitions over time on the volume of credit and credit lines, controlling for firms characteristics. Following the literature on investment and financing constraints, we also test whether banking consolidation affects the investment-cash flow sensitivity of firms. We examine in detail the effects of bank mergers and acquisitions on firms that are small, rely on few banks, and have a high credit risk.

JEL classification: G21, G34.

Keywords: commercial banks, mergers and acquisitions, business lending, investment, financing constraints.

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## **1. Introduction**

The wave of mergers that overtook the banking industries of many countries in the 1990s has spurred a large literature on the effects of consolidation on the industry and consumers (see G10, 2001). Most studies of the effects of bank consolidation have focused on efficiency gains. Others have also taken into account potential effects of increased market power. The special nature of bank credit suggests that bank mergers may have more complex effects on bank borrowers in addition to the standard efficiency and market power effects. The functioning of loan markets is substantially different from that of markets for relatively homogeneous goods and services because of the greater importance of collecting, preserving and transmitting information through the establishment of lending relationships.

The theoretical literature on financial intermediation shows that banks that develop close relationships with borrowers overcome asymmetric information problems (see Boot, 2000 and Ongena and Smith, 2000 for reviews). Because of banks' comparative advantage in monitoring and screening, relationship lending is superior to other forms of financing for a large class of relatively opaque borrowers. On the other hand, borrowers may become vulnerable to shocks that affect banks if the information generated by the bank-firm relationship cannot be fully transferred to other intermediaries.

The existing evidence is consistent, to some extent, with this view. Banks involved in mergers tend to reduce their portfolio share of small business loans (Berger and Udell, 1998; Berger, Demsetz and Strahan, 1999). One explanation could be that changes in management and restructuring can lead to a loss of soft information on borrowers, especially on small and opaque firms, which are those that depend more heavily on relationship banking. However, credit markets may function smoothly enough that other banks compensate over time for reductions in credit to these borrowers by merged banks (Berger, Saunders, Scalise and Udell, 1998).

In addition, other forms of integration that preserve the franchise value of the banks involved may have no effect or even benefit the borrowers of the participating banks, as documented by Houston and James (1998). Gains from diversification at the bank holding company level can increase the lending capacity of affiliated banks, both to small and large

firms, eclipsing diseconomies due to increased organizational complexity (Strahan and Weston, 1998).

One limit of the available evidence on the effects of bank mergers and acquisitions on lending is the lack of information on the consequences for individual borrowers. The majority of existing studies are based on bank level (or bank holding company level) data or on market level data (see Berger, Demsetz and Strahan 1999). Results from microeconomic data on individual bank-firm relationships in Sapienza (2002) support the view that consolidation disrupts credit relationships, particularly those of small businesses. The conclusion based on the finding that a credit relationship is more likely to be severed after a merger, and that this probability is relatively greater for smaller firms. This negative impact of mergers on credit relationships is not sufficient to infer that borrowers will face a reduction in their total credit availability after their lenders have been involved in mergers. To the extent that borrowers are able to insure *ex ante* against shocks affecting their lenders (including bank mergers) by having multiple banking relationships, or can find other lenders *ex post*, the availability credit to them will not change. Other lenders may step in and compensate for the reduction in credit provided by the consolidating banks, as suggested by some empirical studies (e.g. Berger, Saunders, Scalise and Udell, 1998).

In order to assess the total impact of consolidation on corporate borrowers we resort to a detailed data set on Italian firms and their lenders. The Italian data are unique in many respects. We observe for each firm the amount of credit provided by each bank in the system, classified into credit lines granted and total outstanding credit. This information is matched with balance sheet data to control for differences in the demand for credit. The richness of the data is such that we can exploit many dimensions of heterogeneity across firms and analyze the effect of consolidation on specific classes of borrowers, as explained below.

Our analysis improves on the existing empirical literature in four ways. First, we estimate directly the total effect of bank consolidation on credit availability to firms. We relate the credit history of borrowers to bank consolidation variables, controlling for firm characteristics and for the structure of the banking industry in the geographical area where the firm operates. Second, following the literature on investment and financing constraints initiated by Fazzari, Hubbard and Petersen (1988), we test whether bank consolidation increases the investment cash-flow sensitivity of firms. Changes in the investment-cash flow

sensitivity of borrowers from merged banks could help detect changes in the opportunity cost of investing. A firm may be more constrained in its expansion even if there is no reduction in current credit volumes. Hence, it may need to resort to a greater extent to internally generated funds to finance investment. A third contribution of our analysis is that we distinguish between mergers and acquisitions. Mergers include all the cases in which two or more entities form a new bank; acquisitions include cases in which a holding company or another bank takes over the acquired institution but the acquirer and the acquired remain separate entities. Banks often acquire other banks and maintain the charter of the acquired banks as a way to enter a market while preserving existing relationships. We expect these two types of consolidation to have different effects on credit relationships. In particular, mergers tend to imply more extensive reorganization within the new bank, and hence a greater likelihood of loss of soft information. Acquisitions, instead, tend to be followed by the replacement of top and middle management but preserve local knowledge.

Fourth, we differentiate firms based on proxies of their dependence on relationship-based lending or, more generally, the extent to which they face barriers in accessing credit markets. In particular, we consider size, number of relationships and credit-worthiness. The breakdown by size is motivated by the ongoing debate on the impact of bank consolidation and small-business lending. The second dimension, i.e. the number of lenders, is motivated by the view that multiple relationships are maintained as a buffer that protects firms from bank shocks (Detragiache, Garella and Guiso, 2000). If firms establish relationships with many banks to stabilize their credit sources, those with a large number of lenders should be insulated from any adverse effect of consolidation, whereas those depending on a small number of lenders might not. The focus on borrowers of different quality is motivated by the conjecture that banks do reassess their portfolios and cut credit, but only to borrowers of negative net present value.<sup>1</sup> If this is the case, the reduction in credit following mergers would not necessarily reduce welfare. As explained below, we measure the credit-worthiness of firms using scores based on discriminant analysis (Altman, 1968).

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<sup>1</sup> This point was suggested by Berger, Kashyap and Scalise (1995). Evidence consistent with this view is found in Focarelli, Panetta and Salleo (2002) and Bonaccorsi di Patti and Gobbi (2001). To our knowledge no US study tests this hypothesis directly.

Our results show that bank consolidation has no negative impact on outstanding credit and does not raise the investment-cash flow sensitivity of firms. On the contrary, we find that borrowers of acquired banks tend to experience an expansion of credit at least in the first two years after one or more of their lenders was acquired. We detect a modest reduction in credit lines but the effect is limited to firms that tend to have credit capacity in excess of their needs. Finally, bank consolidation does not have adverse effects even for smaller firms, those that depend on fewer banks and those that are riskier; however, no expansionary effect of acquisitions is found for these borrowers, suggesting that banks transfer part of the efficiency gains on their safer and larger corporate customers.

The paper is organized as follows. Section 2 briefly discusses the existing literature on bank shocks and credit availability, with focus on bank mergers. Section 3 illustrates the empirical strategy and Section 4 describes the data and variables. Section 5 discusses the results of the main regression and Section 6 reports those of a number of robustness tests. Section 7 concludes.

## **2. Previous literature**

Most of the benefits generated by a relationship with a bank arise from the information collected by the lender because of repeated interaction with the borrower. That information gives the bank an advantage over other external investors in assessing the current conditions and future prospects of the firm. Relationship-based lending is most important for small or young firms because they face greater difficulties in conveying credible information about their current and future profitability to the market (Berger and Udell, 1998; Petersen and Rajan, 1995). Nevertheless, bank relationships also appear to be valuable to large and less opaque borrowers. Stock prices of listed firms tend to react positively to bank loan announcements (James, 1987; Lummer and McConnell, 1989; Slovin, Johnson and Glascock 1992) or to bank-backed commercial paper issues (Slovin, Sushka and Hudson, 1988). Bank relationships are shown to reduce financing constraints. In particular, Hoshi, Kashyap and Scharfstein (1991) find that large Japanese firms that are part of *keiretsu* are less liquidity-constrained than non-members.

The dark side of relationship banking is that shocks that adversely affect banks can have negative consequences on the ability of borrowers to raise external finance thereafter,

since the information accumulated over the lending relationship cannot be entirely transmitted to other intermediaries. If the financial situation of the firm is already fragile, a temporary shock may be disruptive.

The existing literature examines two types of shocks to banks: financial distress and consolidation.<sup>2</sup> The general conclusion is that shocks to banks tend to get translated into shocks to borrowers, particularly those that are more dependent on relationship-based lending. Slovin, Sushka and Polonchek (1993) find that the stock prices of large firms borrowing from Continental Illinois experienced abnormal negative returns at the time of the bank's impending insolvency and a subsequent upsurge in the FDIC rescue. Gibson (1995, 1997) finds that in Japan corporate investment is highly sensitive to the financial health of their main banks. Koo and Stultz (2000) find that firms listed on the Tokyo Stock Exchange with a high share of bank debt experienced an above average drop in stock prices and a decline in their investment levels at the beginning of the Japanese banking crisis. Similar results from the 1997-98 Korean banking crises are found in Bae, Kang and Lim (2002).<sup>3</sup>

Bank mergers and acquisitions tend to generate a shock on borrowers because consolidation is usually followed by an extensive reorganization, which may lead to a loss of soft information about established borrowers and the destruction of franchise value for the acquired bank. If some borrowers face a reduction in credit granted by the consolidating banks and if adverse selection problems are not negligible, these borrowers could face a reduction in total credit availability, at least for some time. On the other hand, firms may resort to multiple banking precisely to insure against idiosyncratic shocks to banks (Detragiache, Garella and Guiso, 2000). Houston and James (2001) find that the sensitivity of investment to internally generated funds is higher for firms that rely on one lender and lower for firms that have multiple credit relationships.

A large empirical literature addresses this issue by focusing on small borrowers, under the assumption that they are more dependent on relationship-based lending. The most common finding is that consolidation tends to substantially change the lending patterns of the involved institutions, in many cases at the expense of small businesses (see Berger,

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<sup>2</sup> Other studies focus on macroeconomic shocks or other aggregate shocks, such as changes in regulation, but we focus exclusively on shocks that affect individual banks.

<sup>3</sup> Somewhat different results were obtained by Ongena, Smith and Michalsen (2000).

Demsetz and Strahan, 1999; Berger and Udell, 1998). In a recent study, Sapienza (2002) finds that bank mergers increase the likelihood of a relationship being severed. In addition, relationship-intensive borrowers, again identified according to size, are adversely affected by bank consolidation because they have a greater probability of having their relationship severed when the bank merges.

Other empirical studies have found different results. Houston and James (1998) document that loan growth among banks that are affiliated with a multi-bank holding company is less sensitive to the financial conditions of the lending bank, and more responsive to local economic conditions. The reason could be that banking groups develop internal capital markets that improve the allocation of capital among the subsidiaries, alleviating idiosyncratic constraints to the expansion of credit. Strahan and Weston (1998) argue that the increase in bank size following consolidation allows a better diversification of lending among different categories of borrowers. They find evidence that the benefits from diversification enhance consolidating banks' lending capacity.

Two issues remain largely unexplored in the literature. The first is the quality of borrowers who may be adversely affected by banking consolidation. Banks' portfolios could be newly targeted towards lower quality borrowers or negative net present value loans (Focarelli, Panetta and Salleo, 2002; Bonaccorsi di Patti and Gobbi, 2001). The second is the assessment of the net impact of consolidation on the availability of credit to relationship-intensive borrowers, once quality is appropriately controlled for. Even if some relationships are severed due to a loss of soft information, borrowers may be able to find other sources of credit. Evidence that other banks pick up the loans dropped by banks involved in consolidation is found in Berger, Saunders, Scalise and Udell (1998).

In what follows we first present a simple empirical model where a measure of credit availability is related to bank merger and acquisition variables. Second, we analyze the impact of bank mergers and acquisitions on investment-cash flow sensitivity. Finally, we focus on potentially more fragile borrowers, i.e. those facing higher barriers when accessing credit markets and greater adverse selection problems.

### 3. The Empirical analysis

#### 3.1 The basic model

Our empirical analysis focuses on the effect of bank mergers and acquisitions on firm-level credit availability. The first test is to specify a regression model where total credit for firm  $i$  at time  $t$  is a function of the merger activity of the firm's lenders, firm characteristics and local market controls. As explained below, we construct separate variables for mergers and acquisitions to account for potential differences in their impact on borrowers. The specification is of the form:

$$\begin{aligned}
 CREDIT_{it} = & \alpha + \sum_k \beta_k (L_{t-k}) BANK\ MERGERS_i \\
 & + \sum_k \phi_k (L_{t-k}) BANK\ ACQUISITIONS_i \\
 & + \gamma FIRM\ CONTROLS_{it-1} + \delta MARKET\ CONTROLS_{it-1} \\
 & + x_i + z_t + e_{it}
 \end{aligned} \tag{1}$$

Our model is a reduced form resulting from firm-level demand for credit and credit supply conditions. To control for demand factors we include firm characteristics and firm fixed effects. In equation (1) the operator  $(L_{t-k})$  indicates that the merger and acquisition variables enter the regression with a number of lags. We include lags from  $k = 0$  to  $k = 5$  to assess the existence of permanent effects, since the literature on bank mergers shows that post-consolidation adjustment usually takes up to three years (Berger, Scalise, Saunders and Udell, 1998; Focarelli and Panetta, 2002).

The firm-level characteristics include: firm size, leverage, a measure of internally generated funds (cash flow), fixed assets, and the share of liquid assets. Firm individual effects  $x_i$  capture any fixed characteristic, such as sector and type of activity, and other features that are stable over time. Since local credit market conditions are likely to affect the availability of credit to firms in that market, especially those for which reputation and local soft information matters, we include in the regression a measure of concentration and a measure of entry by outside banks in the province where the firm has its headquarters.

### 3.2 *Investment-cash flow sensitivity*

Our second test focuses on the impact of bank mergers and acquisitions on the sensitivity of investment to cash flow. Bank mergers and acquisitions might not have a direct impact on credit volumes but could affect the reliance of firms on their cheapest source of funds, i.e. internally generated funds, because they affect the relative cost of alternative sources of financing. Even if bank mergers and acquisitions are not a reduction in the availability credit for firms, they may alter the cost at which additional funds for new projects are made available. In a pecking order perspective, firms that are more constrained would resort more to internally generated funds to finance investment. We modify equation (1) by replacing credit with the investment rate (investment flow divided by previous-year total assets) and adding a vector of interaction terms between the merger and acquisition variables and a proxy of cash flow. If bank mergers or acquisition modify credit availability through changes in the cost of credit compared with other sources of finance for new projects, the coefficients of the interaction terms should be statistically different from zero.

The test is motivated by the large number of studies relating investment decisions to financing constraints under the assumption that internally generated funds are cheaper than external funds and, among the latter, that bank credit is cheaper than other sources (Fazzari, Hubbard and Petersen, 1988). Our approach is symmetric to that in Houston and James (2001) and Hoshi, Kashyap and Scharfstein (1991). These studies examine the benefits of relationship banking in terms of reduced sensitivity of investment to liquidity, whereas we investigate the negative effects of changes in relationships as increased sensitivity.

Our equation is similar to an investment function where the sensitivity of investment to cash flow can differ between firms that have faced bank consolidation and those that have not. If bank mergers and acquisitions reduce the availability of credit, the investment-cash flow sensitivity should be greater for firms whose banks merged than for those whose banks did not.<sup>4</sup> An opposite result would indicate that consolidation reduces constraints. We estimate the model:

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<sup>4</sup> We recognize that the sensitivity of investment to cash flow cannot be unequivocally interpreted as a measure of financing constraint, as suggested by Kaplan and Zingales (1997). One way to verify if financing constraint increase could be to see if borrowers of merging banks tend to have more cash flow.

$$\begin{aligned}
INVESTMENT\ RATE_{it} = & \alpha + \sum_k \beta_k (L_{t-k}) BANK\ MERGERS_t + \sum_k \phi_k (L_{t-k}) BANK\ ACQUISITIONS_i \\
& + \sum_k \varphi_k [(L_{t-k}) BANK\ MERGERS_i * CASH\ FLOW_{it-1}] \\
& + \sum_k \psi_k [(L_{t-k}) BANK\ ACQUISITIONS_i * CASH\ FLOW_{it-1}] \\
& + \theta CASH\ FLOW_{it-1} \\
& + \gamma FIRMS\ CONTROLS_{it-1} + \delta MARKET\ CONTROLS_{it-1} \\
& + x_i + z_t + e_{it}
\end{aligned} \tag{2}$$

We test hypotheses about the vectors  $\varphi_k$  and  $\psi_k$ . Equation (2) is consistent with previously estimated accelerator models of investment although it is not strictly an investment function<sup>5</sup> (see Fazzari, 1988; Gaiotti and Generale, 2001 for Italian data). The investment equation is estimated using within-group fixed effects as in Houston and James (2001) and time dummy variables that allow us to exclude the user cost of capital under the assumption that it is the same for all firms.

### 3.3 Focusing on borrowers facing credit markets barriers

Theory suggests that shocks to banks should have heterogeneous effects on borrowers facing different degrees of barriers when accessing credit from banks that do not have relationships with them, i.e. those that are more dependent on relationship-based loans. These barriers are generated either by adverse selection problems due to opaqueness or by other firm characteristics that limit their mobility across banks.

We estimate equation (1) and equation (2) employing three sub-samples of the data that include firms which should face higher barriers when accessing credit markets. We focus on small firms, firms that depend on few lenders, low quality firms. Small firms should be relatively more constrained, all else being equal, in the sense that they should rely more on relationship-based lending and hence be more vulnerable to bank shocks. We define small firms as those with total assets of less than 2.5 million euros in the first year they appear in the sample, in order to avoid endogeneity of the sample split.

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<sup>5</sup> We estimate the model with a more complicated lag structure of the firm characteristics but the results are unchanged so we do not report them.

The second proxy of barrier is the number of banks providing credit. Compared with the US, Italian firms tend to rely on a very large number of banks (Detragiache, Garella and Guiso, 2000). The median number of lenders for the firms in our sample is 7. For this reason, we classify firms on the basis of the number of lenders rather than distinguish between single and multiple lenders. We consider firms with less than 5 lenders in the first year they appear in the sample as being relatively more constrained.<sup>6</sup>

The last dimension of investigation is the quality of borrowers. Although the perceived credit-worthiness of firms is not a measure of a barrier generated by asymmetric information problems, it is a factor that limits the ability of firms to find alternative sources of credit. We measure firm credit-worthiness by a z-score computed and available in the Company Accounts database employed in the analysis. The z-score (Altman, 1968 and 1993) is an indicator of the probability of default obtained from estimating a discriminant function on balance sheet data. We define low quality firms as those below the 75<sup>th</sup> percentile of the descending z-score distribution of our sample. Again, to avoid endogeneity with respect to consolidation, the z-score is measured in the first year the firm appears in the full data set.

The sample split by credit-worthiness can shed light on the hypothesis that firms facing a reduction in credit after bank mergers and acquisitions are low quality borrowers, as suggested by Berger, Kashyap and Scalise (1998).

#### **4. Data and variables**

We employ data referring to a large sample of non-financial firms in the period 1989-1998. We match information on loans from the Central Credit Registry (CR) with information on non-financial firms contained in the Centrale dei Bilanci sample (CB). The CR is a public credit reporting system, managed by the Bank of Italy, that collects from the banking system individual information on borrowers with bank debt of at least ITL 150 million.<sup>7</sup>

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<sup>6</sup> For robustness purposes we restrict the sub-sample to firms with three lenders. We also compare the results for the four quartiles of the distribution of the number of banks. Results are consistent with what is reported below.

<sup>7</sup> Before 1995 the reporting threshold was ITL 80 billion. See Bonaccorsi di Patti and Gobbi (2001).

The CB sample is a very large panel of non-financial firms containing balance sheets and income statements plus additional indicators, including ratings computed with credit scoring methodologies (z-score). The CB collects information from participating intermediaries and returns it to the banking system as a tool for evaluating the financial conditions of corporate borrowers. By combining the CR and the CB we obtain detailed information on each credit relationship and its counterparts.

We impose two conditions when selecting firms from the set for which both information on balance sheets (CB) and credit (CR) are available. We keep firms that have been in the database for at least four years in order to have some continuity of balance sheet information;<sup>8</sup> we exclude a small number of very large firms with sales of more than 50 million euros because they are likely to get a large share of their funding from international capital markets.

In our basic regression we require the existence of five lags on merger and acquisition variables for all firms in the sample. Imposing this condition implies that the data on credit and investment refer to the years 1994-98 and the information on mergers and acquisitions goes back to 1989. The resulting unbalanced panel refers to more than 16,600 firms and contains more than 48,700 observations. For robustness purposes we limit the number of lags to three and use a larger sample, as reported below. As shown in Table 1, merger activity was more intense between 1990 and 1995, whereas acquisitions were more numerous after 1994. The average total assets of firms in our sample is 6.3 million euros. The average ratio of investment to total assets is 6.2 per cent.

Our main measure of credit is defined as the natural logarithm of total outstanding credit (LN CREDIT), which includes all types of loans extended to the firm (mortgages, commercial, etc.). Investment is measured as the ratio of gross investment to total assets at the end of the previous year (RINVEST). For robustness purposes we use a narrower definition of credit that includes only credit lines available (LNCLINES). Total outstanding credit may respond slowly to changes in supply conditions owing the medium and long term

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<sup>8</sup> The CB does not report the balance sheets of firms under liquidation or subject to bankruptcy procedures. For this reason, most corporate borrowers with bad debts are not included. In a small number of cases, a firm with bad debts remains temporarily in the CB if one lender has not yet classified it as insolvent, although other banks have done so. We drop these cases because the outstanding credit volume of these firms is determined by

component. On the contrary, banks can quickly renegotiate terms and conditions of credit lines. All credit variables are measured as end of year volumes.

The key explanatory variables are the variables that measure the consolidation activity of the banks that lend to each firm. We first classify consolidation into two types: “Mergers” and “Acquisitions”. The class “Mergers” includes i) mergers among equals, where two or more banks form a new entity, and ii) acquisitions of one bank by another, followed by a merger (the acquired bank disappears). In the class “Acquisitions” we include iii) acquisitions where a bank acquires control over another bank but both entities survive, and iv) the creation of a banking group from existing banks or existing bank holding companies.<sup>9</sup> Mergers are attributed to the first year in which the banks involved produce unified credit statistics.

For each borrower we rank all the lenders by the share of outstanding credit they provide to the firm and consider the first ten lenders to keep the data tractable. The first ten banks provide on average almost 99 per cent of total credit to the firms in our sample (Table 2). We construct the dummy DMERGED equal to 1 if one or more of the first ten lenders is involved in a merger, 0 otherwise. Similarly, we define the dummy variable DACQUIRED equal to 1 if at least one of the first ten lenders is acquired by another bank. For robustness purposes we construct two weighted dummy variables WMERGED and WACQUIRED as follows. For each observation (firm-year) we multiply the share of credit of bank  $b$  by a dummy equal to 1 if bank  $b$  has been involved in a merger, 0 otherwise. We then sum these products for the first ten banks to obtain the variable WMERGED. For acquisitions we multiply the shares of each bank by a dummy that is equal to 1 if that bank has been acquired, 0 otherwise. We sum these products to obtain WACQUIRED. In some of the specifications we employ a more compact lag structure. We construct the variables DMERGED\_3+, DACQUIRED\_3+, WMERGED\_3+ and WACQUIRED\_3+ as the sum of

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exogenous factors such as debt restructuring, legal procedures etc., and is not related to bank consolidation and to the normal functioning of credit markets, which are the issues studied in this paper.

<sup>9</sup> Focarelli, Panetta and Salleo (2002) find that the motives for mergers and acquisitions tend to differ. Mergers appear to be driven by the objective of expanding revenues from service while acquisitions are fostered by the opportunities of improving the quality of the acquired bank’s loan portfolio.

each of the third, fourth and fifth lags of the corresponding variables. The coefficients of these variables measure the average effect of mergers and acquisitions after 3 years.<sup>10</sup>

The firm-level controls are computed as follows. Firm size is measured by the natural log of total assets (SIZE). Leverage is the ratio of total financial debt to equity plus total financial debt (LEVERAGE); internally generated funds are defined as operating margin divided by total assets (CASHFLOW). The degree of liquidity of assets is defined as liquid assets divided by total assets (LIQUIDITY). Leverage is included because firms could target leverage ratios around short-term fluctuations (Myers, 1977), limiting the growth of bank credit if their leverage ratio is already high.

We expect negative signs for CASHFLOW and LIQUIDITY because firms that are more profitable are less likely to demand credit from banks since, according to the pecking order hypothesis, they will first use internally generated funds to grow. Firms that have cumulated liquid assets will be less likely to demand credit, particularly short-term credit, because they are less liquidity constrained. As a measure of growth we include the rate of growth of sales (SALESGROWTH). Given that collateral is relevant in determining the credit capacity of a firm, we include the share of fixed assets to total assets (FIXEDASSETS). All these variables enter the regression as end-of-previous-year values.

The z-score employed in the regressions (ZSCORE) is obtained from the CB. The CB has set up a method to compute the scores and provides them to participating banks as a tool for the assessment of the credit risk of firms in the sample. The method applied is based on Altman (1968, 1993) and is structured as follows. A linear discriminant analysis is applied to data on firms in the sample, except the very large ones. The system of classification is based on estimating two models. The first model is a linear function of 9 indicators obtained from balance sheet data and distinguishes between “normal” and “not normal” firms. The second function is applied to all firms that are declared insolvent, are under bankruptcy procedures (judicial and otherwise) or are partially non-performing on their bank debt. A second discriminant function of 10 indicators is then employed to improve the accuracy of the classification procedure for the class of “not normal” (poorly performing) firms. The numerical scores obtained are classified into 9 qualitative risk classes. Altman, Marco and

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<sup>10</sup> We keep in the sample only firms for which 5 lags exist.

Varetto (1994) provide the details of the CB method and assess its performance in predicting distress in the Italian case.

General credit supply conditions are likely to be affected by the local credit market structure, particularly for smaller opaque borrowers. In addition, mergers may increase concentration and reduce competition, causing a general reduction in credit supply according to the standard competitive paradigm. To control for the structure of the local banking industry we include a measure of concentration and one of entry. Concentration is measured by the Herfindahl Index of loans, based on the residence of the borrower (HERFMKT). Entry is measured as the share of branches in each province that are held by banks that were not present in that province in the previous year (ENTRY). The share is computed removing the component of entry due to mergers or acquisitions. We define local markets as provinces and refer to the province where the firm has its legal headquarters (Italy had 95 provinces until 1995, 103 thereafter). We expect significant effects of these variables only for firms that face high barriers and are tied to local geographical markets. The definitions of variables and descriptive statistics are reported in Table 2.

## 5. Results

Table 3 reports the results of equation (1). We specify a 5-lag structure for the merger and acquisition variables (column 1). Alternatively, we employ a more compact structure replacing the third, fourth and fifth lag with the variables DMERGED\_3+ and DACQUIRED\_3+ (column 2). The general finding is that mergers do not affect credit, whereas acquisitions tend to be an increase in credit. Such an expansionary effect tends to be quite persistent.

The coefficients of most of the firm characteristics are statistically significant and have the predicted signs. Firms whose sales grow faster tend to have increasing credit needs, whereas those that have relatively more liquid assets have less bank credit. The availability of collateral and past profitability are positively associated with the use of bank credit, as shown by the positive coefficients of FIXEDASSETS and CASHFLOW. The z-score has a negative coefficient, most likely because the degree of past indebtedness is persistent and is an important determinant of credit scores.

As shown in column 2 (Table 1), the results are robust to different lag structures of the merger and acquisition variables. A Wald test on the equality of coefficients of the third, fourth and fifth lags does not reject the null hypothesis so we employ the more compact structure with `DMERGED_3+` and `DACQUIRED_3+` in the other regressions. The coefficients of these variables measure the average effect of the shock after two years. The average long-term effect of acquisition is an increase of 7 per cent in credit with respect to the mean.

Table 4 reports the results from equation (2). Consistent with the findings in the literature, investment is positively affected by the availability of internally generated funds, as shown by the positive and statistically significant coefficient of `CASHFLOW`. The magnitude of the coefficient is 3.8 per cent and is similar to the finding of Houston and James (2001) in the case of firms borrowing from multiple banks. More important, the data reject the hypothesis of a difference in the investment-cash flow sensitivity of firms whose lenders have merged or been acquired from the others. None of the coefficients of the interaction terms between `CASHFLOW` and the consolidation variables is significant.

The other findings are consistent with the previous literature. Investment is positively related to the expansion of sales, as expected. Firms that are relatively larger, with higher leverage and a larger share of fixed assets, tend to invest less, most likely because they are more mature and have fewer unexploited investment opportunities.

In addition to the basic results, Tables 3 and 4 report the estimates of various sample splits focusing on the categories of borrowers that should be more affected by consolidation. In particular, we show the estimates obtained with the following sub-samples: firms that have total assets of less than 2.5 million euros (*small firms*); firms that have less than 5 lenders in the first year (*firms with few lenders*); firms that are below the 75<sup>th</sup> percentile of the z-score distribution (*low quality firms*). The selection criteria are applied to the first year in which each firm appears in the dataset to eliminate endogeneity problems between lenders' consolidation and firm characteristics.<sup>11</sup>

As shown in Table 3 (columns 3, 4 and 5), in all three sub-samples bank mergers and acquisitions have no statistically significant effect on credit. The expansionary effect of

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<sup>11</sup> For robustness purposes (not shown) we apply the criteria year by year and the results are unchanged.

acquisition does not affect these borrowers. The signs and magnitudes of the coefficients of firm characteristics are comparable to those obtained with the main regression.

Similarly, there is no effect of bank mergers and acquisitions on investment sensitivity to cash-flow (Table 4, columns 2, 3 and 4). An important finding is that the sensitivity of firms with fewer lenders (less than 5 banks) is greater than for the full sample, consistent with the interpretation that the coefficient of CASHFLOW is related to financing constraints, as in Houston and James (2001).<sup>12</sup>

## 6. Robustness tests

We conduct a number of robustness tests to ensure the stability of our results across definitions of the merger and acquisition shock, definitions of credit and time-periods studied. The results of the first test are reported in Table 5. In place of the merger and acquisition dummy variables, we employ the weighted variables WMERGED and WACQUIRED, described in Section 4, and their respective lags. These regressions confirm our previous results. Mergers do not appear to affect credit volumes or financing constraints. The positive effect of acquisitions becomes weaker and fades out over time, suggesting that the expansion in credit is attributable mainly to minor lenders and not to shocks that affect the main banks. This explanation is consistent with the findings of Strahan and Weston (1998) because minor lenders are likely to be relatively small banks that benefit in terms of lending capacity from becoming part of a banking group.

The second test employs a narrower definition of credit: the total volume of credit lines granted to the firm, whether utilized or not. The latter is usually believed to be more supply-driven than total credit because a bank can revise credit lines at any time, whereas long-term loans issued prior to the merger cannot be discontinued. The results are reported in Table 6. As shown in column 1, mergers are associated with a temporary increase in credit lines and to a relatively persistent reduction after the second year. The long-term reduction in credit lines is around 2 per cent. On the contrary, acquisitions are associated with an increase in

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<sup>12</sup> Such coefficient decreases for firms with a large number of lenders, as expected, and becomes not statistically significant suggesting that those firms do not rely on internally generated funds to finance investment (not shown).

credit lines. While the effect of acquisitions is no longer significant when we employ the weighted measures, the negative effect of mergers remains so (column 3).

This finding is apparently in contrast with the absence of effects on total credit. We conduct further exploration by splitting the sample according to the ratio of credit withdrawn to credit lines available, which is generally believed to be an indicator of how credit-constrained is a firm. The reason is that a large share of the firms in our sample hold unused credit lines, so that a reduction in credit lines for these firms would not, in practice, affect their credit availability in practice. The average ratio of credit lines used to credit lines available is 41 per cent; the mean is 31.7 and the 25<sup>th</sup> percentile 3.5 per cent. Hence, we estimate the model excluding the observations where the ratio is less than 20 per cent at the end of the previous year. As shown in columns 2 and 4 (Table 6) the negative effect of mergers is not robust. This finding also holds when the model is estimated with WMERGED and WACQUIRED.

The last series of regressions employs different samples. These tests are motivated by the following argument. In the main regression we impose the existence of a firm in the dataset for at least six years since the goal is to detect persistent effects of bank consolidation, if present. The exclusion of firms that are present for less than six years could bias our results if there is some correlation between mergers and acquisitions and exits from the CB. Hence, we restrict the sample to firms that are present for at least four years.

As shown in Table 7, the results appear to be quite sensitive to the choice of the sample. In particular, the variable DMERGED and its first and second lagged values are now statistically significant. The longer sample includes a larger number of mergers, improving the precision of the estimated temporary effect (Table 1). On the contrary, the coefficients of the acquisition variables are no longer significant, suggesting that the positive effect previously found is driven by the years after 1994. In order to verify this hypothesis, we estimate the model employing data for the period 1994-98 imposing the weaker restriction that firms appear for at least four years in the sample. As shown in column 2 (Table 7), the effect of mergers is not significantly different from zero and that of acquisitions is positive and statistically significant.

## 7. Conclusion

The empirical analysis described in this paper focuses on the effects of bank mergers and acquisitions on firm-level credit and the sensitivity of investment to cash-flow by examining a large panel of corporate borrowers. Our main finding is that corporate borrowers not only do not appear to be negatively affected by the involvement of their lenders in mergers or acquisitions but they experience an increase in the availability of credit after their lenders are acquired. Our data reject the hypothesis that bank mergers and acquisitions are associated with an increase in financing constraints, measured by the effect of cash-flow on investment. These results also hold for borrowers that tend to face higher barriers when accessing credit markets, specifically small firms, firms that rely on less than 5 banks, and firms with a low credit score.

Our evidence shows that acquisitions that preserve the charter of the target bank have expansionary effects on the credit extended to the corporate customers of the target institution. In particular, this occurs if the acquired bank is a marginal lender of the firm, if the firm is not small and does not belong to a high risk class. The expansion of credit is consistent with the hypothesis that benefits in terms of increased lending capacity for the target are partly passed on to the bank's customers.

Finally, our findings of no adverse effect of mergers on credit availability for corporate borrowers should not be viewed as inconsistent with the previous literature, particularly with the result in Sapienza (2002) that borrowers of merging or acquired banks have are more likely to have their credit line severed. Even if consolidating banks reorganize their financing policies, firms appear able to cope with the severance of a credit relationship or with the reduction of credit from one source. In addition, our data show a reduction of credit lines available, but it is limited to firms that have excess credit availability with respect to their needs. This suggests that banks do not reallocate their portfolios to the disadvantage of borrowers that are already credit constrained. Rather, that reallocation could be an efficient response following the merger or the change in control of the acquired bank.

## Tables

**Table 1: Number of mergers and acquisitions in Italy**

Mergers and acquisitions do not include deals involving foreign subsidiaries. Asset shares are computed taking into account only the acquired banks and in cases of “mergers among equals” all the banks involved. Both asset and loan shares are of the year before the deal.

Year	Number of Banks	Mergers			Acquisitions		
		<i>Number of banks merged</i>	<i>Share of domestic loans</i>	<i>Share of bank Assets</i>	<i>Number of banks acquired</i>	<i>Share of domestic loans</i>	<i>Share of bank assets</i>
1989	1196	30	1.16	1.08	1	0.36	0.38
1990	1156	46	1.26	1.44	4	0.36	0.38
1991	1108	40	7.00	7.24	6	0.33	0.34
1992	1073	52	1.60	1.33	0	0	0
1993	1037	45	3.11	3.37	11	3.96	2.78
1994	994	63	4.52	3.28	10	1.30	1.68
1995	970	54	4.91	3.44	31	4.86	5.27
1996	937	17	0.30	0.24	17	0.90	1.04
1997	935	31	4.29	2.55	21	4.01	3.31
1998	921	5	0.27	0.29	41	11.06	11.04

**Table 2: Variable definitions and descriptive statistics**

Variable		Mean	S. Dev.	Min	Max
<b>Dependent variables</b>					
<b>LNCREEDIT</b>	Natural log of total outstanding credit (end-of-year values)	7.902	1.919	0	11.505
<b>RINVEST</b>	Investment divided by previous year total assets	0.062	0.092	0	1.829
<b>LNCLINES</b>	Natural log of total credit lines available (end-of-year values)	7.161	1.162	0	10.923
<b>Explanatory variables</b>					
<b>DMERGED</b>	Equal to 1 if at least one of the first 10 lending banks is involved in a merger	0.097	0.295	0	1
<b>DMERGED_1</b>	First lag of DMERGED	0.162	0.368	0	1
<b>DMERGED_2</b>	Second lag of DMERGED	0.145	0.352	0	1
<b>DMERGED_3+</b>	Sum of the third, fourth and fifth lag of DMERGED	0.674	0.707	0	3
<b>WMERGED</b>	Sum of the shares of lending banks that have been involved in a merger (first 10 banks)	0.017	0.083	0	1
<b>WMERGED_1</b>	First lag of WMERGED	0.029	0.106	0	1
<b>WMERGED_2</b>	Second lag of WMERGED	0.024	0.091	0	1
<b>WMERGED_3+</b>	Sum of the third, fourth and fifth lag of WMERGED	0.102	0.181	0	2
<b>DACQUIRED</b>	Equal to 1 if at least one of the first 10 lending banks is acquired by another bank	0.263	0.440	0	1
<b>DACQUIRED_1</b>	First lag of DACQUIRED	0.197	0.397	0	1
<b>DACQUIRED_2</b>	Second lag of DACQUIRED	0.131	0.338	0	1
<b>DACQUIRED_3+</b>	Sum of the third, fourth and fifth lag of DACQUIRED	0.184	0.443	0	3
<b>WACQUIRED</b>	Sum of the shares of lending banks that have been acquired (first 10 banks)	0.049	0.137	0	1
<b>WACQUIRED_1</b>	First lag of WACQUIRED	0.037	0.122	0	1
<b>WACQUIRED_2</b>	Second lag of WACQUIRED	0.023	0.095	0	1
<b>WACQUIRED_3+</b>	Sum of the third, fourth and fifth lag of WACQUIRED	0.037	0.127	0	1.561

<b>SIZE</b>	Natural log of total assets	8.828	0.882	4.812	11.736
<b>SALESGROWTH</b>	Rate of growth of sales	0.089	0.357	-0.999	16.158
<b>LEVERAGE</b>	Total debt divided by total debt plus equity	0.324	0.181	0	0.991
<b>FIXEDASSETS</b>	Fixed assets divided by total assets	0.214	0.151	0	0.968
<b>CASHFLOW</b>	Operating margin divided by total assets	0.119	0.092	-2.742	1.124
<b>LIQUIDITY</b>	Liquidity divided by total assets	0.059	0.089	0	0.839
<b>ZSCORE</b>	Firm score for insolvency risk based on discriminant analysis published by CB	0.590	2.428	-13.98	18.4
<b>MKTENTRY</b>	Number of branches of banks not present in the market in year t-1 divided by the total number of branches in year t	0.006	0.013	0	0.407
<b>MKTHERF</b>	Market Herfindahl Index of loans by location of the borrower	0.068	0.029	0.031	0.269
	Ratio of credit lines used to total credit lines	0.415	0.400	0	2
	Number of lenders in the first year	7.909	4.280	1	50
	Total assets in million euro in the first year	6305.1	6283.7	83	157917
	Share of credit issued by the first ten lenders	0.986	0.043	0	0.521
N° of observations	51905				

**Table 3: Credit, all firms and sub-samples**

The sample period includes the years 1994-1998. Firm and year fixed effects are included in each regression (coefficients are not shown). Robust standard errors are reported below coefficients.

	Full sample	Full sample	Small firms	Few lenders	Low quality
Dependent variable:	LNCRECREDIT	LNCRECREDIT	LNCRECREDIT	LNCRECREDIT	LNCRECREDIT
CONSTANT	0.713 <i>0.511</i>	0.591 <i>0.532</i>	1.053 <i>0.975</i>	0.952 <i>1.501</i>	1.519 <i>0.925</i>
DMERGED	0.007 <i>0.025</i>	0.005 <i>0.025</i>	0.023 <i>0.074</i>	-0.033 <i>0.093</i>	0.004 <i>0.034</i>
DMERGED_1	0.008 <i>0.025</i>	0.004 <i>0.024</i>	0.023 <i>0.069</i>	0.033 <i>0.098</i>	-0.003 <i>0.031</i>
DMERGED_2	0.014 <i>0.027</i>	0.010 <i>0.025</i>	0.064 <i>0.072</i>	0.023 <i>0.098</i>	0.001 <i>0.031</i>
DMERGED_3	0.003 <i>0.024</i>	-	-	-	-
DMERGED_4	-0.010 <i>0.022</i>	-	-	-	-
DMERGED_5	-0.012 <i>0.019</i>	-	-	-	-
DMERGED_3+	-	-0.008 <i>0.018</i>	0.029 <i>0.052</i>	0.001 <i>0.082</i>	0.006 <i>0.021</i>
DACQUIRED	0.055 *** <i>0.018</i>	0.055 *** <i>0.017</i>	0.030 <i>0.045</i>	0.081 <i>0.064</i>	0.035 <i>0.024</i>
DACQUIRED_1	0.071 ** <i>0.022</i>	0.070 *** <i>0.022</i>	0.018 <i>0.058</i>	0.059 <i>0.084</i>	0.045 <i>0.031</i>
DACQUIRED_2	0.053 * <i>0.027</i>	0.053 * <i>0.027</i>	0.019 <i>0.075</i>	0.043 <i>0.105</i>	0.016 <i>0.040</i>
DACQUIRED_3	0.065 ** <i>0.032</i>	-	-	-	-
DACQUIRED_4	0.079 ** <i>0.040</i>	-	-	-	-
DACQUIRED_5	0.069 <i>0.051</i>	-	-	-	-
DACQUIRED_3+	-	0.071 ** <i>0.031</i>	0.010 <i>0.093</i>	0.004 <i>0.119</i>	0.058 <i>0.041</i>
SIZE	0.764 *** <i>0.058</i>	0.764 *** <i>0.058</i>	0.699 *** <i>0.129</i>	0.651 *** <i>0.176</i>	0.743 *** <i>0.102</i>
SALESGROWTH	0.131 *** <i>0.025</i>	0.131 *** <i>0.025</i>	0.260 *** <i>0.084</i>	0.099 *** <i>0.042</i>	0.116 ** <i>0.048</i>
LEVERAGE	0.474 *** <i>0.099</i>	0.474 *** <i>0.099</i>	0.329 <i>0.203</i>	0.613 ** <i>0.256</i>	0.477 *** <i>0.165</i>
FIXEDASSETS	1.192 *** <i>0.185</i>	1.193 *** <i>0.185</i>	1.668 *** <i>0.468</i>	1.468 ** <i>0.575</i>	0.798 ** <i>0.381</i>
CASHFLOW	0.412 * <i>0.237</i>	0.414 * <i>0.237</i>	0.250 <i>0.403</i>	0.076 <i>0.541</i>	0.337 <i>0.311</i>
LIQUIDITY	-0.948 *** <i>0.225</i>	-0.948 *** <i>0.225</i>	-0.375 <i>0.571</i>	-1.360 * <i>0.714</i>	-0.749 *** <i>0.337</i>
Z-SCORE	-0.073 *** <i>0.013</i>	-0.073 *** <i>0.013</i>	-0.045 <i>0.037</i>	-0.024 <i>0.034</i>	-0.059 ** <i>0.025</i>
MKTENTRY	-0.139 <i>0.460</i>	-0.134 <i>0.462</i>	0.311 <i>1.363</i>	0.819 <i>1.642</i>	0.915 * <i>0.494</i>
MKOTHERF	0.585 <i>0.856</i>	0.652 <i>0.853</i>	-0.534 <i>2.611</i>	1.976 <i>2.593</i>	-1.597 <i>1.359</i>
<i>Number of obs.</i>	48973	48973	11798	10310	11860
<i>Number of firms</i>	16697	16697	6049	4693	4741
<i>Adj. R-squared:</i>	0.769	0.769	0.725	0.712	0.802

Note: Statistically different from zero, respectively, at: \*\*\* 99%, \*\*95% and \*90% significance level.

**Table 4: Investment, all firms and sub-samples**

The sample period includes the years 1994-1998. Firm and year fixed effects are included in each regression (coefficients are not shown). Robust standard errors are reported below coefficients.

Dependent variable:	Full sample	Small firms	Few lenders	Low quality
	RINVEST	RINVEST	RINVEST	RINVEST
CONSTANT	0.877 *** <i>0.053</i>	0.991 *** <i>0.115</i>	0.936 *** <i>0.108</i>	*** <i>2.721</i>
DMERGED	0.008 <i>0.009</i>	0.005 <i>0.013</i>	0.013 <i>0.012</i>	0.045 <i>0.041</i>
DMERGED_1	0.004 <i>0.003</i>	0.003 <i>0.009</i>	0.001 <i>0.007</i>	0.010 <i>0.007</i>
DMERGED_2	-0.003 <i>0.003</i>	-0.009 <i>0.010</i>	-0.011 <i>0.007</i>	0.005 <i>0.006</i>
DMERGED_3+	0.001 <i>0.002</i>	-0.002 <i>0.005</i>	-0.001 <i>0.005</i>	-0.000 <i>0.006</i>
DACQUIRED	0.003 <i>0.003</i>	-0.001 <i>0.007</i>	0.004 <i>0.005</i>	0.010 <i>0.011</i>
DACQUIRED_1	0.003 <i>0.003</i>	0.014 <i>0.010</i>	0.004 <i>0.007</i>	0.005 <i>0.009</i>
DACQUIRED_2	0.004 <i>0.003</i>	0.021 <i>0.012</i>	0.007 <i>0.009</i>	0.003 <i>0.007</i>
DACQUIRED_3+	0.004 <i>0.003</i>	0.017 * <i>0.009</i>	0.004 <i>0.009</i>	0.005 <i>0.006</i>
CASHFLOW*DMG	-0.035 <i>0.058</i>	-0.010 <i>0.075</i>	-0.078 <i>0.084</i>	-0.271 <i>0.291</i>
CASHFLOW*DMG_1	-0.024 <i>0.018</i>	-0.043 <i>0.047</i>	-0.012 <i>0.050</i>	-0.027 <i>0.043</i>
CASHFLOW*DMG_2	0.026 <i>0.018</i>	0.005 <i>0.056</i>	0.037 <i>0.054</i>	-0.038 <i>0.037</i>
CASHFLOW*DMG_3+	-0.004 <i>0.010</i>	-0.017 <i>0.029</i>	0.014 <i>0.033</i>	0.010 <i>0.029</i>
CASHFLOW*DAC	0.012 <i>0.019</i>	0.042 <i>0.037</i>	-0.002 <i>0.032</i>	-0.056 <i>0.079</i>
CASHFLOW*DAC_1	0.009 <i>0.018</i>	-0.007 <i>0.052</i>	-0.032 <i>0.041</i>	0.024 <i>0.062</i>
CASHFLOW*DAC_2	0.005 <i>0.018</i>	-0.049 <i>0.066</i>	-0.015 <i>0.055</i>	0.037 <i>0.053</i>
CASHFLOW*DAC_3+	0.002 <i>0.016</i>	-0.021 <i>0.052</i>	-0.027 <i>0.055</i>	0.027 <i>0.042</i>
SIZE	-0.085 *** <i>0.006</i>	-0.107 *** <i>0.014</i>	-0.096 *** <i>0.013</i>	-0.083 *** <i>0.018</i>
SALESGROWTH	0.011 *** <i>0.003</i>	0.021 * <i>0.011</i>	0.008 <i>0.006</i>	0.006 <i>0.009</i>
LEVERAGE	-0.046 *** <i>0.008</i>	-0.010 <i>0.019</i>	-0.042 ** <i>0.017</i>	-0.027 <i>0.017</i>
FIXEDASSETS	-0.320 *** <i>0.021</i>	-0.359 *** <i>0.043</i>	-0.356 *** <i>0.039</i>	-0.230 *** <i>0.054</i>
CASHFLOW	0.038 ** <i>0.017</i>	0.053 <i>0.045</i>	0.068 * <i>0.035</i>	0.045 <i>0.045</i>
LIQUIDITY	0.008 <i>0.019</i>	-0.005 <i>0.033</i>	0.011 <i>0.026</i>	0.055 <i>0.077</i>
Z-SCORE	-0.001 <i>0.001</i>	-0.000 <i>0.002</i>	-0.001 <i>0.002</i>	-0.003 <i>0.004</i>
<i>Number of observations</i>	50910	12623	10930	12556
<i>Number of firms</i>	17348	6267	4786	4653
<i>Adj. R-squared:</i>	0.496	0.523	0.558	0.356

Note: Statistically different from zero, respectively, at: \*\*\* 99%, \*\*95% and \*90% significance level.

**Table 5: Robustness on M&A definition**

The sample period includes the years 1994-1998. Firm and year fixed effects are included in each regression (coefficients are not shown). Robust standard errors are reported below coefficients.

Dependent variable:	LNCREDIT	LNCREDIT
CONSTANT	0.565 <i>0.532</i>	0.560 <i>0.532</i>
WMERGED	0.110 <i>0.110</i>	0.111 <i>0.109</i>
WMERGED_1	0.061 <i>0.122</i>	0.064 <i>0.115</i>
WMERGED_2	0.015 <i>0.122</i>	0.016 <i>0.108</i>
WMERGED_3	-0.008 <i>0.113</i>	- -
WMERGED_4	0.019 <i>0.104</i>	- -
WMERGED_5	0.019 <i>0.090</i>	- -
WMERGED_3+	- -	0.011 <i>0.086</i>
WACQUIRED	0.222 *** <i>0.062</i>	0.226 *** <i>0.062</i>
WACQUIRED_1	0.177 * <i>0.091</i>	0.172 * <i>0.090</i>
WACQUIRED_2	0.026 <i>0.122</i>	0.023 * <i>0.123</i>
WACQUIRED_3	0.065 <i>0.151</i>	- -
WACQUIRED_4	0.160 ** <i>0.170</i>	- -
WACQUIRED_5	-0.016 <i>0.225</i>	- -
WACQUIRED_3+	- -	0.076 <i>0.143</i>
SIZE	0.772 *** <i>0.058</i>	0.772 *** <i>0.058</i>
SALESGROWTH	0.132 *** <i>0.025</i>	0.132 *** <i>0.025</i>
LEVERAGE	0.475 *** <i>0.099</i>	0.475 *** <i>0.099</i>
FIXEDASSETS	1.186 *** <i>0.185</i>	1.187 *** <i>0.185</i>
CASHFLOW	0.414 * <i>0.236</i>	0.413 * <i>0.236</i>
LIQUIDITY	-0.954 *** <i>0.225</i>	-0.954 *** <i>0.225</i>
Z-SCORE	-0.073 *** <i>0.013</i>	-0.073 *** <i>0.013</i>
MKTENTRY	-0.148 <i>0.463</i>	-0.154 <i>0.463</i>
MKTHERF	0.867 <i>0.862</i>	0.872 <i>0.853</i>
<i>Number of observations</i>	48973	48973
<i>Number of firms</i>	16697	16697
<i>Adj. R-squared:</i>	0.769	0.770

Note: Statistically different from zero, respectively, at: \*\*\* 99%, \*\*95% and \*90% significance level.

**Table 6: Robustness on the definition of credit**

The sample period includes the years 1994-1998. Firm and year fixed effects are included in each regression (coefficients are not shown). Robust standard errors are reported below coefficients.

Dependent variable:	Full sample	>0.20		Full sample	>0.20
	LNCLINES	LNCLINES		LNCLINES	LNCLINES
CONSTANT	3.452 *** <i>0.217</i>	3.145 *** <i>0.297</i>	CONSTANT	3.441 *** <i>0.217</i>	3.198 *** <i>0.310</i>
DMERGED	-0.001 <i>0.013</i>	-0.012 <i>0.018</i>	WMERGED	-0.012 <i>0.053</i>	-0.043 <i>0.094</i>
DMERGED_1	0.028 ** <i>0.012</i>	0.014 <i>0.017</i>	WMERGED_1	0.061 <i>0.057</i>	0.123 <i>0.089</i>
DMERGED_2	-0.004 <i>0.012</i>	0.008 <i>0.016</i>	WMERGED_2	-0.050 <i>0.055</i>	0.056 <i>0.081</i>
DMERGED_3+	-0.022 ** <i>0.009</i>	-0.015 <i>0.012</i>	WMERGED_3+	-0.104 ** <i>0.041</i>	-0.042 <i>0.062</i>
DACQUIRED	0.031 *** <i>0.008</i>	0.054 *** <i>0.012</i>	WACQUIRED	0.034 <i>0.026</i>	-0.008 <i>0.048</i>
DACQUIRED_1	0.019 * <i>0.011</i>	0.031 ** <i>0.015</i>	WACQUIRED_1	-0.013 <i>0.039</i>	-0.012 <i>0.071</i>
DACQUIRED_2	0.010 <i>0.013</i>	0.032 * <i>0.018</i>	WACQUIRED_2	0.010 <i>0.049</i>	-0.029 <i>0.084</i>
DACQUIRED_3+	0.037 ** <i>0.015</i>	0.027 <i>0.021</i>	WACQUIRED_3+	0.038 <i>0.057</i>	-0.085 <i>0.106</i>
SIZE	0.408 *** <i>0.025</i>	0.466 *** <i>0.034</i>	SIZE	0.411 *** <i>0.025</i>	0.471 *** <i>0.034</i>
SALESGROWTH	0.040 *** <i>0.012</i>	0.043 *** <i>0.014</i>	SALESGROWTH	0.041 *** <i>0.012</i>	0.044 *** <i>0.013</i>
LEVERAGE	0.056 <i>0.047</i>	0.106 <i>0.066</i>	LEVERAGE	0.055 <i>0.047</i>	0.105 <i>0.067</i>
FIXEDASSETS	0.190 ** <i>0.082</i>	0.241 * <i>0.124</i>	FIXEDASSETS	0.188 ** <i>0.082</i>	0.234 * <i>0.124</i>
CASHFLOW	-0.015 <i>0.083</i>	-0.022 <i>0.117</i>	CASHFLOW	-0.011 <i>0.083</i>	-0.016 <i>0.117</i>
LIQUIDITY	-0.431 *** <i>0.079</i>	-0.242 * <i>0.139</i>	LIQUIDITY	-0.431 *** <i>0.079</i>	-0.242 * <i>0.139</i>
Z-SCORE	0.013 *** <i>0.005</i>	0.030 *** <i>0.007</i>	Z-SCORE	0.014 *** <i>0.005</i>	0.030 *** <i>0.008</i>
MKTENTRY	-0.481 ** <i>0.233</i>	-0.715 ** <i>0.290</i>	MKTENTRY	-0.441 * <i>0.233</i>	-0.686 ** <i>0.289</i>
MKOTHERF	0.310 <i>0.440</i>	-0.036 <i>0.537</i>	MKOTHERF	0.256 <i>0.436</i>	-0.066 <i>0.537</i>
<i>N. of observations</i>	48717	28508	<i>N. of observations</i>	48717	28508
<i>Number of firms</i>	16621	12445	<i>Number of firms</i>	16621	12445
<i>Adj. R-squared:</i>	0.866	0.881	<i>Adj. R-squared:</i>	0.866	0.881

Note: Statistically different from zero, respectively, at: \*\*\* 99%, \*\*95% and \*90% significance level.

**Table 7: Robustness with other time periods**

The sample period includes the years 1994-1998. Firm and year fixed effects are included in each regression (coefficients are not shown). Robust standard errors are reported below coefficients. The only condition imposed is that at least three lags of the consolidation variables exist, hence DMERGED\_3+ and DACQUIRED\_3+ are constructed from a minimum of 1 to a maximum of 3 observations. The sample 1994-1998 excludes the 1992-1993 recession but is different from the sample in Table 3 because only three lags are required.

	1992-1998	1994-1998
Dependent variable:	LNCRECREDIT	LNCRECREDIT
CONSTANT	0.837 *** <i>0.329</i>	0.900 * <i>0.476</i>
DMERGED	0.044 *** <i>0.013</i>	0.007 <i>0.021</i>
DMERGED_1	0.041 *** <i>0.014</i>	-0.005 <i>0.019</i>
DMERGED_2	0.027 * <i>0.014</i>	0.005 <i>0.019</i>
DMERGED_3+	0.003 <i>0.017</i>	-0.013 <i>0.022</i>
DACQUIRED	0.044 *** <i>0.012</i>	0.055 *** <i>0.015</i>
DACQUIRED_1	0.025 <i>0.015</i>	0.065 *** <i>0.019</i>
DACQUIRED_2	0.010 <i>0.019</i>	0.058 ** <i>0.023</i>
DACQUIRED_3+	0.005 <i>0.026</i>	0.071 ** <i>0.030</i>
SIZE	0.737 *** <i>0.035</i>	0.751 *** <i>0.053</i>
SALESGROWTH	0.077 *** <i>0.017</i>	0.100 *** <i>0.032</i>
LEVERAGE	0.610 *** <i>0.055</i>	0.475 *** <i>0.088</i>
FIXEDASSETS	1.129 *** <i>0.110</i>	1.055 *** <i>0.168</i>
CASHFLOW	0.388 *** <i>0.125</i>	0.409 * <i>0.215</i>
LIQUIDITY	-0.896 *** <i>0.134</i>	-0.904 *** <i>0.205</i>
Z-SCORE	-0.070 *** <i>0.007</i>	-0.072 *** <i>0.012</i>
MKTENTRY	-0.309 <i>0.361</i>	-0.110 <i>0.407</i>
MKOTHERF	0.315 <i>0.645</i>	0.694 <i>0.744</i>
<i>Number of observations</i>	90949	56584
<i>Number of firms</i>	22461	19264
<i>Adj. R-squared:</i>	0.777	0.770

Note: Statistically different from zero, respectively, at: \*\*\* 99%, \*\*95% and \*90% significance level.

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