BANCA D'ITALIA

EUROSISTEMA

Temi di Discussione

(Working Papers)

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September 2010

Number 772

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RELATIONSHIP LENDING IN A FINANCIAL TURMOIL

by Stefania De Mitri*, Giorgio Gobbi* and Enrico Sette*

Abstract

We investigate whether the shape of relations between banks and firms has had a detectable effect in mitigating the credit contraction that followed Lehman's default in September 2008. Using micro data on a large sample of Italian firms, we analyze the relation between firms' debt concentration and credit availability. We show that firms borrowing from a higher number of banks suffered on average a larger contraction in bank credit and a higher probability of experiencing a reduction in outstanding bank debt. The same results hold for firms diversifying their borrowing, concentrating a smaller proportion with the main bank. The stability of the bank-firm relationship, measured by its duration, also appears to have been of some value in mitigating the credit restriction. Our results also suggest the existence of a different regime in credit supply towards firms experiencing a reduction in outstanding bank debt. If there is a contraction in credit, the decrease is limited if relations are more intense i.e. a lower number of financial institutions from which the firm borrows, more concentrated lending and relations of greater duration. The opposite is true for firms with positive credit growth.

JEL Classification: G21, G30.
Keywords: relationship lending, financial crisis.

Contents

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1 Introduction[1]

Bank borrowing is a major source of business firms' finance overall the world. According to Financial Accounts, bank debt represents more than one third of non financial firms' total liabilities in Europe and Japan, and about one fifth in the US. Bank lending is particularly important for small and medium-sized enterprises (SMEs) which face specific constraints in raising external finance as opposed to large firms. Investors bear higher costs to gather information about these borrowers, since most of it is not publicly verifiable, while financial intermediaries can exploit scale economies in the collection and processing of information. The consensus view surfacing from a vast literature that in the past 20 years investigated, both theoretically and empirically, the structure of bank lending to SMEs, is that in several circumstances borrowers and lenders benefit from establishing long lasting close relationships. Relationship lending is a sort of implicit contract that ensures to the firm the availability of finance in the early stage of an investment project and allows the bank to partake in the returns. Boot (2000) and Ongena and Smith (2000) review the first wave of research in this area, Berger and Udell (2006) discuss the role of relationship banking on the background of the far reaching transformations experienced by the financial industry in more recent years.

Banks have been in the fire line in the 2007-08 financial crisis and their lending capacity has been impaired also in countries where there have not been major events of distress in the financial system. In this paper we investigate whether the shape of relations between banks and firms have had a detectable effect in mitigating the credit contraction that followed Lehman's default in September 2008 using Italian micro data. The case of Italy is an excellent laboratory for several reasons. First, although Italian banks have been affected by the financial crisis, systemic stability has not been endangered and government intervention has been negligible in comparison to other countries (Panetta et. Al., 2009). Second, the crisis had a different impact on different categories of banks, with the top five banking groups suffering relatively more from the drying of wholesale funding markets than smaller intermediaries. Third and most importantly, in Italy SMEs - highly bank dependent for their funding - account for a larger share of output than in most comparable countries.

Relationship lending has been documented to be an important feature of firm financing in bank oriented financial systems such as Japan (Aoki and Patrick, 1994), Germany (Harhoff and Körting,1998) and Italy (Angelini et al.,1998) as well in more market ori-

[1]We wish to thank Andrea Generale, Domenico Marchetti, Paolo Pinotti, and seminar participants at the Bank of Italy and ESWC2010 for helpful comments. The views expressed in this paper are solely of the authors and do not necessarily reflect the views of the Bank of Italy.

ented ones as the U.S. (Petersen and Rajan, 1994; Berger and Udell, 1995). Empirical findings suggest that firms that borrow from a small number of banks, or concentrate the bulk of their funding in one relation with an intermediary, and preserve their relation for a relatively long period, face lower financial constraints and experience better credit terms and conditions (Elsas, 2005). On the other hand, the stability and the efficiency of relationship lending appear vulnerable to several factors. First, as long as the relation provides the bank with soft information about the firm's creditworthiness it also increases switching costs of both parties. For the firm it may be costly to interrupt the relation and find new sources of finance. For instance, Bonaccorsi di Patti and Gobbi (2007) estimate that it takes up to three years to a firm to restore the reduction in lending induced by the severance of a credit line. Firms may have incentive to trade off the benefits of close relationships with those of a broader diversification of their funding among several banks. For the bank, relationship lending may lead to a sub-optimal portfolio diversification and lock in the investment in case of firm distress. This seems to have been the case in Japan in the 1990s when banks delayed the restructuring of the corporation with which they had close relationships (Caballero et al., 2008). Second, the establishing of relationship lending requires that banks can extract ex-post rents from the firms in order to make profitable the ex-ante investment in collecting and processing soft information (Petersen and Rajan, 1995). Competition in credit markets tends therefore to curb the incentives for banks to engage in close relationships. Third, the efficiency in collecting and processing soft information depends on the internal organization of banks with small banks usually having a comparative advantage over larger ones (Berger and Udell, 2002; Berger et al., 2005). Finally, the relevance of soft information for firm financing varies in time and across countries, according to lending technology (Berger and Udell, 2006), protection of property rights and other institutional factors (Beck et al. 2008). The degree of cushioning provided to firms by relationship lending in a downturn is therefore an empirical issue. This has been investigated by two recent papers. Bodenhorn (2003) using data from a US bank in mid 19th century shows that borrowers with longer relations were more likely to have loan terms renegotiated during the credit crunch of 1857. Jiangli et al. (2009) use survey data from four Asian countries to investigate whether the intensity of banking relationship ensured greater credit availability to firms during the 1998 Asian financial crisis. Their results show that Korean and Thai firms with looser relationships experienced a higher likelihood of being credit constrained, while the opposite occurred for Philippine firms. None of these papers has access to information on the amount of credit granted, nor it had access to complete balance sheet information of borrowing firms.

Our empirical analysis is based on information from a sample of more than 30,000 Italian corporate borrowers – mostly small and medium-sized - and their lending banks. The vast majority of the firms rely only on intermediate loans as a source of external finance and about 90 per cent of them have more than one relation. Multiple banking is a long standing characteristic of bank-firm relationships in Italy (Foglia et. al, 1998; Detragiache et al., 2000). This feature of the sample allows us to test whether a main bank stabilizes the availability of credit during a credit crunch vis-a-vis the alternative hypothesis that the diversification of funding sources offers a better protection. Our results show that firms which borrow from a larger number of banks experience lower credit growth, while firms with more concentrated credit experience higher credit growth. The effect of the length of the relation with the main bank is ambiguous. Both new and old enough relations are associated with higher credit growth, while credit contracts more for relations of intermediate length. Our results also suggests the existence of a different regime in credit supply towards firms experiencing an actual contraction in outstanding bank debt. Conditional on credit contracting, more intense relations (lower number of financial institutions from which the firm borrows from, more concentrated lending, longer relations) limit the decrease in credit. The opposite is true for firms with positive credit growth: tighter relationship lending is associated with lower credit growth. Our results hold controlling for a large number of firm characteristics, including proxies for firm level credit demand.

The remainder of the paper is as follows. Section 2 describes the dataset, section 3 discusses the empirical methodology while Section 4 illustrates the results, robustness checks and extensions. Section 5 concludes.

2 Data

We match data from different sources. The first is the Italian Credit Register ("Centrale dei Rischi", CR). This is maintained by the Bank of Italy (the central bank) and collects from all intermediaries operating in Italy (banks, special purpose vehicles, other financial intermediaries providing credit) individual information on borrowers with credit lines and/or loans above 75000 euros with a single intermediary. All different forms of bank debt (mortgages, credit lines, etc.) are included together with information about the granting institution and the identity (tax code) of the borrower. From the Credit Register we construct the total outstanding loans of each borrower towards the banks,

financial companies, special purpose vehicles[2] in September 2008 and September 2009. The financial crisis in Italy exploded after the default of Lehman Brothers: disruptions in interbank markets precipitated and credit started decelerating at a fast pace since September 2008. Therefore, by comparing credit in September 2008 with credit in September 2009 we can investigate the effect of the crisis on credit dynamics. Loan data are aggregated at the banking group level. Therefore we considered as originated from the same bank all loans granted by banks, special purpose vehicles, financial companies belonging to the same banking group. This is important since both lending and funding policies are decided at the banking group level.

The second source of data is the Company Accounts Data Service ("Centrale dei Bilanci"), a proprietary database which includes balance sheet information of about 50000 companies, mostly privately owned. CADS is maintained by a consortium of banks with the purpose of credit risk evaluation. Balance sheet data are from December 2007. This is important since credit decisions in September 2008 are based on December 2007 balance sheet information. Moreover, importantly, balance sheet variables at December 2007 are predetermined with respect to the dynamic of credit between September 2008 and September 2009. We match data from CADS and from the Credit Register obtaining a dataset of bank loans matched with balance sheet information of the borrower.

Third, in a robustness check, we merge our data with two surveys run by the Bank of Italy. The first is the Conjunctural Survey of Firms conducted at the beginning of September of each year, in order to use information about firm level forecasts of firm's investments and financial needs. The second is the Survey of Investment Manufacturing (SIM), conducted in April of each year, from which we extract information about the extent to which firms have been asked by banks to cut outstanding credit lines and loans. Such information is available for a small subsample of the matched CR-CADS database.

Finally, in a further robustness test, we instrument the controls for relationship lending. One of the instrument is the change in the concentration of the local credit market between September 2003 and September 2008. We computed Herfindahl Indexes for each province[3] using the data on loans granted by banks as indicated in the Supervisory Reports submitted by intermediaries to the Bank of Italy.

We include in our sample firms for which we have complete balance sheet information at December 2007 and which have some debt with the financial system in September

[2] This allows to take into account the effect of securitizations: securitized loans disappear from banks' balance sheets and appear on SPVs' balance sheets. If we only considered loans from banks we would observe a decrease in outstanding loans, without knowing whether that was due to an actual reduction in credit granted, or due to the loan being securitized, thus taken off the bank's balance sheet.

[3] Provinces correspond roughly to Counties in the United States.

2008. This amounts to 38453 firms. We clean the data from outliers, cutting the top and bottom first percentile of the distribution of the dependent variable and of the distribution of the balance sheet variables we use as controls in the regression (leverage, ROE, operating margins over value added, share of short term debt, trade debit over revenues, investment ratio). After these steps our sample reduces to 33846 observations, which we use for the empirical analysis.

Table 1 contains descriptive statistics of firms in the sample. Firms have a relatively high leverage (the mean is about 60 percent), and a relatively high share of short term debt over total debt (about 70 per cent). This reflects the fact that most firms in our sample are small or medium sized. Table 1 also includes statistics on relationship banking variables. The average share of total loans with the main bank is 56%, firms have relationships with about 5 banks on average, 10.8 percent of firms have relationship with only one bank, and about 63 percent of relationships are with a top 5 bank (banking group). We have a measure of the length of the relation with the main bank. Our measure is truncated at 6 years and this is reflected in its statistics: the mean length is 4.98 years, the median is 6. We explain in further detail how this variable is constructed in the next section.

Finally, table 2 shows other descriptive statistics for firms in our sample. More than half of the firms are small or micro, the largest fraction is based in Northern Italy, the richest area of the country. According to the classification of borrowers' riskiness based on Altman's Z-score, computred by CADS, less than half of the firms are rated as "sound", more than a fifth as "risky".

3 Empirical Strategy

The crisis erupted within the global financial system, it was unexpected, at least in its size, and it can be considered as largely an exogenous shock with respect to the conditions of individual Italian borrowers and to the structure of their relationship with the banking system. Therefore we exploit this shock to investigate how indicators of relationship lending affect the decision of banks to grant credit in the presence of a large shock on the supply side of funds. Of course, the crisis also impacted on the demand side of credit. On the one hand, real activity slowed as Italy entered in recession, reducing the demand for credit. On the other hand, the decrease in revenues caused by the recession may have increased the reliance of firms on external funding. Since the Italian financial system is mostly bank based, banks represent the main, often the unique, source of external finance for most firms, especially small and medium sized. Therefore, the

impact of the crisis on the demand of bank credit is a priori ambiguous. Nevertheless, we include controls for the demand of credit by firms in our analysis.

The dramatic impact of the crisis is shown in Table 3, which contains the proportion of firms with positive credit growth during the crisis period, in 2007 and in 2006. In both 2006 and 2007, about 60 percent of the firms in the sample experienced positive credit growth. Since the onset of the crisis that fraction dropped to 40 percent. It is also interesting to notice that in both 2006 and 2007, the proportion of firms with the lowest rating which experienced positive credit growth was above the average (about 2-3 percentage points), while during the crisis it dropped below the average. It is not obvious that such firms experienced the largest drop in demand for working capital, while they clearly have a demand for credit determined by liquidity needs, and by re-financing existing debt. If this hypothesis holds, results from the table indicate the presence of a large shock from the supply side of the credit market, which led banks to cut credit to riskier borrowers. The table also reports the fraction of smaller firms experiencing a positive credit growth. This fraction was below the average in both 2006 and 2007 and above the average during the crisis period. Since smaller firms tend to bank with smaller intermediaries, this provides evidence supporting the view that it was larger banks, those more reliant on wholesale markets for funding and those bearing the largest losses from investment in toxic assets, which suffered most from the crisis, and therefore restricted credit more to their clients.

3.1 Univariate Analysis

We employ two main measures of credit growth: the first is the change in credit normalized by firms' assets. This is useful since the percentage change in credit growth has a lot of variability at the firm level: when a new mortgage is started, or a new credit line opened, credit may jump by 20 times or more[4]. The first column of Table 4 shows the distribution of normalized credit growth. Both the mean and the median are slightly negative, indicating a contraction of credit at September 2009 with respect to one year earlier. The second column of Table 4 shows the distribution of the rate of growth of credit. It can be seen that its variance is very large, mostly due to the impact of the start or the repayment of loans and credit lines. Even after cutting the top and bottom first percentile, the series indicates a growth rate of about 500 percent at the 99th percentile. For this reason we use the change in credit normalized by firms'

[4] Albertazzi and Marchetti (2009), working on the CR database, use this measure of credit growth for the same reason.

assets as our main dependent variable[5]. Finally, Table 5 shows the percentage of firms that experienced positive growth of credit, and the average credit growth normalized by assets, for different subsamples of firms. Firms with the lowest rating (more vulnerable) experienced a stronger credit contraction than the average. The same occurred to firms whose main bank belongs to the top 5 banking groups, those most affected by the crisis, both because of their higher reliance on the interbank markets for funding, and because of their largest exposure to toxic assets. Interestingly, smaller firms experienced a lower credit decrease than the average. This may seem unexpected, but it should be borne in mind that these data are univariate and do not control for the fact that smaller firms may get credit mostly from smaller banks (less affected by the turmoil).

3.2 Multivariate Analysis

3.2.1 Base model

The main equation we estimate, models the growth of credit to firm i, normalized by its total assets, between $t = 09/2009$ and $t-1 = 09/2008$, in province j as follows:

$$\begin{aligned}\frac{\Delta credit_{i,j}}{assets_{i,j,2007}} &= \alpha + \beta_1 LEV_{i,j,2007} + \beta_2 ROE_{i,j,2007} + \beta_3 OM/VA_{i,j,2007} + \\ \beta_4 SHST_{i,j,2007} &+ \beta_5 TD_{i,j,2007} + \beta_6 COLLATERAL_{i,j,2007} + \beta_7 IR_{i,j,2007} + \\ &+ \rho_1 REL\_LEND_{i,j,t-1} + \rho_2 TOP5_{i,j,t-1} + \rho_3 LONG_{i,j,t-1} + \\ &+ prov_{2007} + rating_{2007} + size_{2007} + industry_{2007} + \varepsilon_{i,j} \qquad (1)\end{aligned}$$

Firm level variables control for firm characteristics that affect credit decisions. We expect leverage (LEV) to have a negative effect, ROE to have a positive effect since we control for the ratio between operating margins and value added (OM/VA) which is a measure of self financing ability of the firm. The share of short term debt (SHST) is expected to have a negative effect, since it may be considered a measure of financial fragility. Trade debit (TD, the ratio of trade debit over revenues) has, a priori, an ambiguous effect. On the one hand it may be seen as a substitute for bank credit. On the other hand, it may be seen as a signal that the firm needs funding to finance its working capital. Moreover, a higher fraction of trade debit may be associated with a higher fraction of trade credit, which is often used as collateral by smaller firms to obtain bank credit

[5] We also performed the empirical analysis using the percentage change in credit and results about the controls for relationship lending hold. However, some of the other controls have the wrong sign, and in general the model is estimated less precisely.

(Omiccioli 2005). We include a dummy variable (COLLATERAL) which takes the value one if the firm had some credit assisted by collateral at September 2008. This variable may capture the riskiness of the firm, but it may also capture the fact that firms have assets which can be offered as collateral to banks. Thus, the sign of this coefficient is a priori ambiguous. Finally, we control for investment ratio (IR, investment over value added). This, together with trade debit, aims at capturing demand for credit at the firm level: firms that invest a higher fraction of their value added require more funding. In a robustness exercise, we include a direct measure of firm level demand, which is available for a subsample of firms.

Our main interest is on relationship banking variables. First, we include variables describing the structure of firms' relations with the financial system (REL_LEND). We investigate the effect of the number of banking relationships (# OF BANKS) and of the share of total credit held by the main banking group (SHARE MAIN BANK). We include either the number of banking relationships, or the share of the main bank as a measure of the concentration of the relations, but not both at the same time since the two measures have a high correlation. As argued in the introduction, more concentrated relations have, in theory, an ambiguous effect on credit growth in a period of crisis. On the one hand, the implicit contract embedded in relationship lending should ensure firms obtain adequate credit in times of troubles. Banks obtain rents over time from a closer relation with a firm, and they may not want to dissipate them. On the other hand, the crisis decreased banks' ability to bear losses and they may not want to be too much exposed to a single firm, deciding to cut credit more to firms in which they have a larger share of credit. Therefore, the effect of the concentration of lending on credit growth must be verified empirically.

Second, we control for the duration of a firm's relation with its main bank, adding the number of years in which the main bank at September 2008 has been among the first three banks providing funds to the firm (LENGTH). In theory, the effect of the duration of the relation with the main bank is a priori ambiguous since banks may decide to keep lending to borrowers with whom they have a longer relation, as the informational capital embedded in the relation increases switching costs to both parties. On the other hand, if a bank is hit by a shock, it may want to improve the quality of its portfolio by selecting safer new borrowers while restructuring the existing portfolio of loans. Moreover, the longer the relation, the easier it may be for a bank to hold the firm up, reducing credit without loosing the client, since firms with a longer relation have higher switching costs. The distribution of credit growth conditional on the length of the relationship with the main bank is shown in Table 6. Our measure is truncated at 6 years, since we do not

have information about credit relations prior to 2002.[6] The table shows that credit growth is higher for firms that recently initiated a new relation with their main bank. Then, it decreases until the 5th year, and then it increases for firms whose relation with their main bank is older than 6 years. This pattern is even more evident if attention is limited to the growth in revolving credit lines. We perform a further check by estimating the model including a quadratic term for the length of the relation, in order to capture possible nonlinearity that seem to emerge from the data shown in Table 6.

As a last control of relationship lending, we include a dummy variable for whether the main banking group is among the 5 major groups in Italy (TOP5). This is expected to have a negative effect on credit growth, since larger banks are those that were most affected by the crisis. As a robustness check, we also include main bank fixed effects, and fixed effects for the combination of the first three banks, i.e., we include a fixed effects if a firm has bank A as main bank, then bank B and bank C as second and third banks, in terms of share of total credit, and a different fixed effect if a firm has bank B as main bank, bank A and C as second and third banks, and so on (we also take care of cases in which firms have only one or two banks). This allows to control for unobserved heterogeneity in the main banks which may be correlated with relationship lending variables.

All regressions include a set of industry fixed effects (defined at the 2 digit NACE level, yielding a set of 55 industry dummies), 103 province fixed effects for the province in which the firm has its head office, fixed effects for the 4 size classes listed in Table 2 (this classification is based on the number of employees, or on assets when the number of employees is not available), and fixed effects for the rating classes listed in Table 2. Table 7 shows pairwise correlations among regressors.

3.2.2 Causality

We aim at investigating whether the presence of tighter relations with banks helped firm weathering the shock to credit supply caused by the financial crisis. Hence, we aim at identifying a causal effect of relationship lending on credit growth. However, our measures of relationship lending may capture some firm's unobserved characteristics which determine both the structure of a firm's relation with banks, and the extent to which the firm obtains credit. The first issue is that controls for relationship lending may be affected by firm's riskiness or quality: for example, banks may be more willing to hold a higher share of a firm's total credit outstanding (hence, the bank is less diversified

[6] We may be able to extend our information beyond that date, thus getting a more precise measure of the length of the relation with the main bank.

towards that firm), if they believe the firm is less risky, and less risky firms may be more likely to experience higher credit growth. To account for this possibility, we control for profitability, leverage, maturity of outstanding debt, firm size and rating using firms' balance sheet information. Such variables are key determinants of the decision of banks to grant credit to firms, and also of the quantity of credit granted. We also control for the presence of collateralized debts at September 2008, since this is a measure of firm's riskiness (although its sign is ambiguous: firms required to post collateral may be riskier, but at the same time, firms which are able to post collateral may be less risky). Furthermore, we estimate the model on a number of subsamples of firms, notably, firms which have more than one bank (we exclude single banked firms), firms with the lowest rating, smaller firms. In these cases, firms are more homogeneous; in particular, firms are more similar in terms of riskiness, opaqueness, quality. Hence, the variability in the structure of relationship lending should not be affected by firm's quality or riskiness, since these are roughly the same for all firms within the subsample. We believe that all the control variables we include and the robustness exercises we perform are sufficient to control for unobservable firm quality, or riskiness which may jointly influence credit growth, and the strength of a firm's relationship with the banking system.

The second issue is that the structure of the relationship we observe at September 2008 may also reflect the past growth of the firm, previous investments, or other factors related to the past history of the firm, which may also influence the extent to which the firm obtains (or demands) credit during the crisis period. We use different strategies to deal with this potential omitted variable problem. First, we proxy for firm level demand for credit in our estimates, and we also use a direct measure of firm level demand for credit for a subsample of firms. Second, we estimate the model including measures of credit growth in 2006 (December 2006 over December 2005) and 2007 (December 2007 over December 2006). These controls should capture most of the factors that contributed to determine the structure of relationship lending that we observe at September 2008. Third, we estimate the model using as a dependent variable the growth rate of revolving credit lines only. Revolving credit lines can be cut with little notice by banks, so that they are less affected by past firm's history. Hence, balance sheet data at December 2007 are sufficient to capture the determinants of granted credit lines, together with controls for firm demand for credit.

Finally, in order to tackle possible biases due either to unobservable firm quality, or to past firm's development history, we instrument the variables capturing the concentration of the relationship and its duration using the size of the firm at December 2005[7] and

[7] Using size at December 2005 seems to be a good compromise between ensuring sufficient strength

the change in the concentration of local credit markets by computing the rate of the change in the Herfindahl index of loans computed at the province level. On the one hand, the size of the firm is arguably not a determinant of credit growth at September 2008, once balance sheet data at December 2007 are controlled for. Moreover, it is likely not a measure of firm's quality at September 2008. On the other hand, it is correlated with the structure of relationship lending we observe at September 2008, since this may depend on existing relationships, which are likely to be determined by firm size. The change in the Herfindahl index captures the change in the possibility that borrowers switch to a different main bank. This is arguably not correlated with a single firm's riskiness or quality since it is computed at the province level.

A last concern relates to the fact that the relationship lending variables may also capture unobserved bank characteristics. Different banks may have a different policy about the maximal accepted exposure towards the same borrower. This policy may also be related to the capitalization of the bank and to the extent to which the bank has been affected by the crisis. We address these potential concerns by estimating the model including main bank, and "combination of banks" fixed effects, as described in section 3.2.1.

Overall, we believe that our identification strategy and the robustness checks we perform provide support to the hypothesis that we are estimating a causal effect of relationship lending on credit growth.

4 Results

4.1 Base regressions

Equation 1 is our main model. This is estimated by OLS, and results are displayed in Table 8. We investigate the effect of different measures of relationship lending. In the first column, we include the (log of) number of banks the firm is getting credit from, and the length of the relation with the main bank as controls for relationship lending. Results show that getting credit from more bank reduces credit growth. The effect is both statistically and economically significant: a one standard deviation increase in the number of banks the firm has a relation with, determines a lower credit growth of about 0.42 percentage points. This is relatively large, when compared to a mean credit growth of -1.87. A longer relation appears to negatively affect credit growth. Finally, whether

of the instrument and ensuring it is reasonably exogenous. Results still hold if size at December 2004 is used, but they become weaker if size in previous years is used instead.

the main bank belongs to a top 5 group has a negative, and significant (at the 5% level) effect on credit growth. This indicates there is some difference between the behavior of larger banks and that of smaller ones. Column 2 shows results from the same model in which the share of credit held by the main bank is included in place of the number of bank relationships. All results are similar. Firms whose main bank has a larger share experience higher credit growth. In particular, one standard deviation increase in the share of the main bank raises credit growth by about 0.6 percentage points. That, again, is a large effect, as it represents about a third of average credit growth. Finally, column 3 shows results from the same model estimated on the subsample of firms which have relations with more than one intermediary (hence, single banked firms are excluded). Results are essentially unchanged.

Balance sheet variables have the expected sign in all regressions. Firms with higher leverage, lower return on equity, higher share of short term debt experienced a lower credit growth. A higher share of trade debit over revenues is associated instead with higher credit growth. As argued above, trade debit may capture both demand for credit, and the simultaneous presence of trade credit, which is often used as collateral for bank credit. The dummy for the presence of collateralized debt is negative, significant only in the regression controlling for the share of the main bank. Finally, the investment ratio is positive and significant. This is consistent with the hypothesis that the investment ratio proxies for the demand for credit at the firm level.

4.2 Banks' unobserved characteristics

As argued above, the measures of relationship lending may be correlated with banks' unobserved characteristics which also affect the willingness to extend credit to firms. Regressions shown in Table 9 address this concern.

In columns 1 and 2 we include fixed effects for the main bank. Results for the measure of relationship lending hold. Interestingly, the dummy for collateralized debt is still negative, but now significant in all regressions, indicating that credit grows less (contracts more) for firms which posted some collateral for their bank debt.

In columns 3 and 4 we perform a much more demanding exercise: we include a fixed effect for every combination of the three main banks (and of course a different fixed effect if there is only one or two banks). For example, we include a fixed effect if the firm has relations with bank A, a different fixed effect if it has relations with bank A as main bank and bank B as second bank, a further different fixed effect if the firm has bank B as main bank and bank A as second bank, and so on. This amounts to including about

13500 dummies which allow to control for strategic interactions among banks: being the main bank for a firm may depend on what are the other banks, and this may be related to the strategy and the capital strength of the bank, which also affect the willingness to extend credit to the firm during the crisis. Remarkably, the main results hold: having relations with more banks is associated with lower credit growth, while a higher share of credit held by the main bank is associated with higher credit growth. All regressors behave essentially as in the base model.

In the remaining robustness checks and extensions we do not include main bank fixed effects in order to be able to estimate the dummy for the main bank belonging to one of the major 5 groups. However, all results shown from now on hold when main bank fixed effects are included.[8]

4.3 Sample splits

As a further step we perform a series of sample splits to investigate the effect of our relationship lending variables on specific classes of firms. The first results are displayed in Table 10. Columns 1 and 2 show estimates for the subsample of micro and small firms. The main results are unchanged: having more relationships has a negative effect on credit growth, while a higher concentration of credit within the main bank is positively associated with credit growth. A longer relationship with the same main bank has a negative effect. Interestingly, now, the coefficient for the dummy main bank belongs to a top 5 group is about -0.4 percentage points, sensibly larger, in absolute value, than that estimated on the whole sample. Balance sheet variables behave broadly as in the whole sample. Columns 3 and 4 display results for the subsample of manufacturing firms (NACE codes between 15 and 36), and results are very similar.

Table 11 shows results from two further sample splits. Columns 1 and 2 contain estimates from the subsample of firms whose main bank does not belong to a top 5 group. Results on the concentration of the relationship keep holding. On the contrary, the measure for the duration of the relation with the same main bank is now not significant. Finally, columns 3 and 4 show results from the subsample including firms with the lowest rating. Results are very similar. More concentrated relationships are associated with higher credit growth; the duration of the relation has a small and not significant effect. Interestingly, the dummy for the main bank belonging to a top 5 group is negative and highly significant, and large in size. It indicates that firms in the lowest rating class,

[8] Comparing Tables 7 and 8, it can be noticed that the size of the coefficients for the concentration of lending change vary little when bank fixed effects are included. This indicates that the correlation between banks unobserved characteristics and the concentration of lending is small.

whose main bank belongs to a top 5 group experience a lower credit growth of about 0.9 percentage points. This suggests that larger banks, which have stronger need to recapitalize, have been more aggressive in cutting lending to worse borrowers.

In general, the size of the coefficients for the measures of concentration of relationship lending is larger than in the whole sample. This may indicate a larger effect of concentration of firm's borrowing on credit growth, for these important subsets of firms. This was expected, since in theory, firms which are more likely to experience difficulties to raise finance during a crisis, such as smaller and riskier firms, should benefit more from stronger relationships with banks.

4.4 A different measure of firm level demand for credit

We also extend our analysis using a direct measure of firm's demand for credit. The Conjunctural Survey run by the Bank of Italy in September of every year asks firms how much they plan to cover their funding needs using debt. We use the answers to this question in the Survey run in September 2008 to control for firm level demand, as an alternative to the investment ratio. This has the advantage of being a more precise measure of demand for credit. The drawback is that the sample of firms for which this information is available is much smaller, and, importantly, it is more biased towards better firms: 16 percent of firms have the lowest rating and 50 percent the highest, compared to, respectively, 21.8 percent and 42.4 percent in the whole sample. Results are displayed in Table 12 and are broadly similar to those from the main model (columns 3 and 4 include main bank fixed effects): a larger number of banks decreases credit growth, while a higher share of the main bank is positively associated with credit growth. The duration of the relation with the main bank does not have a significant effect.

4.5 Distinguishing positive and negative credit growth

As an extension to the analysis, we estimate a Probit model for the probability that credit increased, using the same control as in the main regression. This analysis provides complementary information to that given by the regression of the change in the quantity of credit. This model indicates what variables are positively associated to an increase in credit during the financial turmoil. Results (marginal effects) are displayed in Table 13 and show important differences with the base model. Firstly, firms with more bank relationships have a higher probability of experiencing positive credit growth, although the coefficient is significant only at the 10 percent level. Secondly, the share of the

main bank is not significant[9]. Third, longer relations have a non-linear effect on the probability the firm experiences positive credit growth.

This suggests that relationship lending has a different effect on the decision to grant more credit, than on the decision of how much more credit to grant. Hence it may be informative to investigate firms which experienced positive credit growth separately from firms which experienced a contraction in credit. We do this by estimating a Tobit II model which allows to model separately the decision to increase or contract credit from the amount of the expansion/contraction. We estimate the model using the Heckman two step procedure, which imposes little structure on the distribution of error terms. In the estimation of the probability that credit grows, we use a dummy for whether firms were drawing credit above the maximal amount agreed at September 2008 as an excluded variable (OVERDRAFT). This is arguably negatively related to the probability that credit grows, but it should not determine the amount by which credit changes, since it is just an indicator variable, not capturing the size of the over-draft[10]. Estimates from this analysis are shown in Tables 14 and 15.

When we investigate firms for which credit increased, having relations with more banks has a positive effect both on the probability that credit increases, and on the amount by which it raises. Similarly a higher share of the main bank does not affect the probability credit increases, but it reduces the amount by which it raises. Hence firms which receive most part of their credit from their main bank experience a slower credit growth. In both cases, a longer relation has a negative effect both on the likelihood credit increases and on quantity. In the equation for the probability that credit increases, the dummy for having an overdraft is significant and negative, as expected, so that firms with an overdraft in September 2008 are less likely to experience positive credit growth between September 2008 and September 2009.

The analysis of firms that experienced a decrease in credit yields very interesting results, too. These are displayed in Table 15. Having relations with a larger number of banks decreases the chances that credit contracts (this is obvious since it is the same result as in Table 14), but a larger number of banks increases the amount of the contraction in credit. The share of the main bank has a similar effect: although it has no influence on the probability that credit contracts, a larger share of credit within the

[9] This occurs also when the analysis is restricted to the subsample of firms with more than one relationship, displayed in column 3.

[10] Alternatively, we estimated the model using a dummy for whether the firm was classified as a non performing borrower at June 2008. This is clearly negatively correlated with the probability that credit grows, but not related to the quantity of the credit change. Results are very similar if we use this alternative strategy. However, the fraction of firms classified as non performing borrowers was very small (0.2% of the firms in the sample).

main bank leads to a much more moderate contraction in credit. Now the duration of the relationship with the main bank has a different effect: credit contraction is limited, the longer the duration. Interestingly, the dummy for the presence of collateral is positive and significant. This indicates that, conditional on credit contracting, the presence of collateralized debt is associated with a lower contraction in credit. This may capture a lower perceived riskiness among the group of firms experiencing a contraction in credit: those which have valuable collateral manage to limit the contraction in credit since part of their debt is secured.

Overall, these results suggest that relationship lending acts as a sort of "parachute" for firms experiencing a contraction in credit. A tighter (more concentrated) relation leads to a milder drop in credit. However, tighter relations limit the growth in credit for firms experiencing an expansion in credit: those with weaker relations are more likely to experience a larger growth in credit, conditional on credit growing. These results are consistent with the theory. On the one hand, relationship lending is useful in difficult times: firms experiencing a contraction in credit are more protected if they have tighter relations. On the other hand, banks which are less diversified are less willing to increase their exposure to the same firm, especially in times of crisis, so that firms with tighter relations are partly held-up when they try to increase credit. These results hold, conditional on controls for firm riskiness, profitability and demand for credit.

4.6 The duration of relations with the main bank

We investigate in further depth the results concerning the duration of the relation with the main bank. Descriptive statistics indicate that there might be a non-linear relation between the duration of the relation with the main bank and credit growth. In this section we explore regressions including a quadratic term for the duration of the relation to capture the possibility that both short and long relations are associated with higher credit growth. Table 16 show results. It can be seen that the linear term is negative, while the quadratic term is positive. This indicates that as the length of the relation with the main bank increases, credit first contracts, then starts raising. The results imply that the latter occurs for relations longer than 5.6 years.[11] This is consistent with the idea that banks face a trade-off between building or keeping a relation, and breaking it. First, in order to build relations with new borrowers, banks grant more credit: the value of building a relation is high. As the relation gets more mature, the benefit from keeping it may not be very large: the relation has been built, but the relational capital

[11] This is obtainted by taking the derivative of the equation with respect to LENGTH and setting it to zero. This gives -1.122+0.101*LENGTH, which yields LENGTH=5.6 years.

it embeds is not very high. As the relation gets sufficiently long, tough, the bank has significantly invested in the relation and breaking it would be too costly. Therefore, if the bank needs to choose where to cut credit, it will likely do so to firms with which the value of keeping the relation is not that high, which occurs for intermediate durations of the relationship.

4.7 Credit rationing

We further extend the analysis investigating the effect of relationship lending on the probability of being credit constrained. To this aim, we use information from the Survey on Investment of Manufacturing firms (SIM), run by the Bank of Italy in April of every year. The April 2009 survey included questions about the impact of the crisis and in particular whether the firm had a credit line called or cut by one of its banks. In theory, we should expect firms with tighter relations with their banks to be less likely to be asked to cut their borrowing. Results are displayed in Table 17 (the table shows marginal effects). Firms with more relations are more likely to be asked to cut their borrowing. Increasing the number of banks raises the chances of being asked to cut borrowing by about 2.5 per cent, when computed at the average number of banks per firm. Similarly, firms whose main bank has a higher share of total credit have a lower probability of being asked to cut credit. An increase in the share of credit held by the main bank, computed at the average share (56.22), reduces the probability the firm is asked to reduce its borrowing by about 0.2 percent. The duration of the relation seems to have no effect on the probability the firm is required to cut credit lines or loans. Interestingly, firms whose main bank is a top 5 group are less likely to be required to cut borrowing, although this effect is significant only at the 10 percent level and only when the number of relations is included. This can be reconciled to previous results by noting that firms surveyed in SIM are larger and less likely to have the lowest rating than the average firm in the sample. Said differently, smaller and riskier firms are under-represented in SIM, and these are the firms for which the dummy TOP5 had a significant, and negative, effect. Then, now, the dummy TOP5 is suggesting that larger banks are less likely to cut credit to firms that are on average larger and safer. This can be consistent with the evidence that such banks are those most affected by the crisis, since if these banks are struggling to restructure their portfolios of loans, they are especially keen on keeping good relations with their best clients.

Balance sheet variables behave as expected: less profitable firms, firms with a larger share of short term debt and firms with collateralized debt, experience a higher proba-

bility of being cut credit lines.

4.8 A further look into causality

Finally, we further test the robustness of our results, controlling for the possibility that the past history of the firm jointly affects both the structure of the relationship between the firm and banks, and credit growth. This is important to understand whether the effect of relationship lending can be given a causal interpretation.

As a first check, we include credit growth in 2007 and 2006 (normalized by total assets) among the regressors. These variables capture the dynamics of credit in the past, and thus the history of the relations of the firm with the banking system. Hence, they may capture unobserved effects that may have influenced the build-up of the structure of the relation with banks. If such factors are also relevant for the current decision to grant credit, then we would be solving a possible omitted variable bias affecting our estimates. Results are shown in columns 1 and 2 of Table 18, and are very similar to the base model. In particular, the size of the coefficients of the controls for relationship lending are remarkably similar to those in the base model, indicating very little correlation with past credit growth.

As a second step we investigate the growth of revolving credit lines only. Credit lines can be easily terminated by banks (or by firms) and they are less likely to be influenced by factors that may affect the structure of banking relations, once the latest available balance sheet data are controlled for. Results, shown in columns 3 and 4 of Table 18, indicate that more relations lead to lower growth of credit lines, more credit concentrated into the main bank leads to higher growth of revolving credit lines, keeping the same main bank for a longer period has no effect on the growth of revolving credit lines. Coefficients for concentration of the relationship are larger in absolute value than in the base model, indicating a stronger effect on the growth of credit lines, than on the overall growth of credit. The effect of the length of the relation is similar to the base model.[12]

Finally, we instrument the measures of concentration of lending and of the duration of the relationship with the main bank. We use two instruments. The first is a dummy variable taking the value 1 if the firm was in the micro or small category at December 2005. On the one hand, this is arguably not a determinant of credit growth at September 2008, once balance sheet data at December 2007 are controlled for. Moreover, it is likely not a measure of firm's quality or riskiness at September 2008. On the other hand, it

[12] We also run regressions adding a quadratic term for the length of the relation with the main bank. In this case, when revolving credit lines are considered, both measures of length are not significant.

is correlated with the structure of relationship lending we observe at September 2008, since this may depend on existing relationships, which are likely to be determined by firm size. The second is the change in the Herfindahl index on loans by banks computed at the province level. This captures the change in the possibility that firms have to switch to a different borrower. This is arguably not correlated with each firm's specific quality or riskiness, since the index is computed at the province level.[13]

Results are shown in Table 19. Columns 1 and 4 show 2SLS estimates, while columns 2, 3 and 4, 5 show the first stage. It can be seen that results hold and are qualitatively the same as in the base model. The instruments are significant and have the expected sign: smaller firms in December 2005 are less likely to have more relations, and have a larger share of credit held by the main bank. An increase in the concentration of the local credit market increases the length of the relationship with the main bank. The F-statistic are well above the threshold of 10, indicating that estimates do not suffer from weak instrument problems. Results indicate that the measures of the concentration of lending have a significant effect on credit growth: the more concentrated the relationship the higher credit growth (the smaller the credit conctraction). On the contrary, the length of the relationship with the main bank is not significant.

4.9 Disentangling the behavior of the main bank

So far, we have investigated the effect of relationship lending on the total credit a firm gets from the system, without measuring the amount of credit obtained from different banks. The evidence we found suggests that more concentrated and less diversified borrowing dampened the contraction in credit. However, this could be driven by the behavior of other banks than the main bank. Hence, a natural and interesting question to ask is what has the behavior of the main bank been. In other words: did the main bank expand/contract credit more/less than the other banks? In order to answer this question we disaggregate total loans from the banking system, distinguishing between loans from the main bank and loans from other banks, and we estimate the following model:

$$\frac{\Delta credit_{i,j}}{assets_i} = \alpha + \beta main\_bank_j + \gamma_i + \varepsilon_{i,j}$$

where the dependent variable is the growth in credit to firm i from bank j between September 2008 and September 2009, normalized by firm's assets; $main\_bank_j$ is a

[13] For this reason, we do not include province fixed effects in the IV-regressions. We include dummies for the three macro areas (North, Center, South), instead. A table with descriptive statistics of the change in the Herfindahl index is available upon request.

dummy taking the value equal to one if bank j is the main bank and γ_i is a firm fixed effect. This captures all unobservable and observable firm-specific characteristics, including firm's quality and firm's demand for credit. Hence, for all firms we have two observations, credit from the main bank, and credit from all the other banks. Results[14] are shown in Table 20. The first row shows the base regression: the coefficient for the dummy main bank is positive but not significant, indicating no difference in the behavior of the main bank with respect to the other banks. Rows 2 shows estimates including fixed effects for the main bank and for the bank with second highest share of credit. The coefficient for the dummy main bank is still positive but it is now significant at the 5 percent level, indicating that the main bank tends to increase credit more (contract credit less) than other banks. Rows 3 and 4 show results from the subsamples of firms with positive and with negative total credit growth[15], respectively. It can be seen that the dummy main bank is negative in the former case, indicating that the main bank increases credit less (or even decreases it) for firms experiencing positive credit growth. On the contrary, the coefficient for the dummy main bank is positive in the subsample of firms experiencing a credit contraction, indicating that the main bank decreases credit less than the other banks, or even increases it. This result is in line with what we found in subsection 4.6, confirming the idea that the main bank tends to act as a parachute for firms experiencing a contraction in credit. Rows 5 and 6 investigate the behavior of the main bank in the subsample of firms with lowest and medium-high rating, respectively. The coefficient for the dummy main bank is positive in the former case and negative in the latter. Hence, the main bank tends to increase credit more (decrease credit less) to more vulnerable firms, than non-main banks do. Finally, we investigate the behavior of the main bank as a function of whether it belongs to the 5 largest groups. Results in rows 7 and 8 indicate that the main bank tends to increase credit, or to dampen the credit contraction if it is does not belong to the 5 largest group, consistent with the evidence provided in the rest of the paper and with the anecdotal evidence indicating that the 5 largest groups where most affected by the crisis.

Overall, results in this subsection are consistent with our previous findings. The analysis on loan level data including firm fixed effects has the advantage of controlling for such firms' characteristics as unobservable quality, riskiness, demand for credit. The

[14] We cut observations below the 1st and above the 99th percentiles of the distribution of credit growth (normalized by assets). We also exclude firms excluded from the sample in the rest of the paper because of very high (above the 99th percentile) or very low (below the 1st percentile) balance sheet variables. We also exclude firms borrowing from a single bank.

[15] This means positive or negative credit growth from all banks. There may well be cases of positive overall credit growth and negative credit growth from the main bank, positive credit growth and negative credit growth from banks other than the main bank, and so on.

disadvantage is that we can only estimate a dummy for main banks and we cannot estimate the effect of the concentration of borrowing. However, results point in the same direction: the main bank provides more credit to firms experiencing a credit contraction and firms with the lowest rating. Moreover, main banks belonging to one of the 5 largest groups extend less credit to firms.

5 Conclusion

In this paper we investigate whether characteristics of bank-firm relationships, widely studied in the banking literature, have had a sizeable effect in mitigating the credit contraction that followed Lehman's default in September 2008. Specifically, using micro data on a large sample of Italian firms, we looked at the relation between firms' bank debt concentration and credit availability. Our results lend support to the view that firms that borrow from a small number of banks are more insulated from supply shocks in credit markets. We show that firms borrowing from more banks suffered on average a larger contraction in the availability of bank credit and a higher probability of experiencing a reduction in outstanding bank debt. The same results hold for firms which diversify their borrowing, concentrating a smaller fraction of it with the main bank. The stability of the bank-firm relationship, measured by its duration, appears to have had a less clear-cut effect in dampening the credit restriction: the downturn seems to have prompted banks to preserve older customers only if the relationship was in place for long enough.

Our results also suggest the existence of a different regime in credit supply towards firms experiencing an actual contraction in outstanding bank debt. Conditional on credit contracting, more intense relations (smaller number of financial institutions from which the firm borrows from, and more concentrated lending) limit the decrease in credit. The opposite is true for firms with positive credit growth: tighter relationship lending is associated with lower credit growth, while the duration of the relation has little effect. This evidence is consistent with the view that banks tend to support firms which have a higher stake, once they get under stress. We also show that more concentrated relations reduce the likelihood firms are asked by banks to cut their outstanding loans. Our results hold in a variety of robustness checks. In particular, they hold on subsamples of smaller and riskier firms. Our identification strategy and our robustness checks suggests that the effect of relationship lending on the availability of credit has a causal nature. Finally, we also provide some evidence that concentration in local credit markets has a negative effect on credit growth.

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Tables

Table 1: Descriptive Statistics

VARIABLES	**Mean**	**Median**
Firms' Balance Sheet		
Leverage (LEV)	59.50	65.6
Roe	5.02	5.34
Operating margins / Value added (OM/VA)	34.99	36.47
Share of short term debt over total (SHST)	71.50	79.79
Trade debit / Revenues (TD)	26.86	23.80
Investment ratio (IR)	3.64	-0.278
Total assets (Euros)	19931840	9308000
Firms' relation with the credit market		
Total credit at september 2008 (Euros)	6622676	2870504
Total credit at september 2009 (Euros)	6245171	2637312
Share of main bank (SHARE MAIN BANK)	55.92	50.47
Number of banks (# BANKS)	5.16	5
Share of single banked firms	10.8	
Length of relation with main bank (years)	4.98	6
Share of firms whose main bank is a top 5 group (TOP5)	63.46	
Share of firms whose relation with main bank $\geq$ 6 years	61.49	
Number of firms	33846	

Table 2: Descriptive Statistics: composition of the sample

SIZE		SECTOR	
Micro	4.01	Industry	49.1
Small	46.25	Service	34.7
Medium	40.70	Construction	7.3
Large	9.04	Other	8.9
LOCATION		**RATING**	
North	68.3	Sound	42.3
Center	18.1	Vulnerable	35.9
South	13.5	Risky	21.8

Table 3: Share of firms with positve credit growth

	Credit>0 (%)		
	Whole sample	smaller firms	lowest rating
September 09/September 08	38.65	39.25	35.06
December 07/December 06	59.39	58.40	61.78
December 06/December 05	60.97	60.61	62.56

Table 4: Descriptive Statistics: normalized credit growth

	ΔCREDIT/ASSETS (%)	RATE OF GROWTH OF CREDIT (%)
	(1)	(2)
Mean	-1.87	7.25
Median	-1.60	-8.33
p25	-7.30	-29.94
p75	3.33	11.68
Variance	133.05	17657.02
Skewness	-0.04	9.06

Table 5: Share of firms with positve credit growth and average credit growth

	Credit>0 (%)	**Δ**CREDIT/ASSETS (mean)
Whole Sample	38.65	-1.87
Smaller firms	39.25	-1.66
Lowest Rating	35.06	-3.83
Main bank is top 5	38.42	-2.06
Single banked	38.02	0.21

Table 6: Average growth of credit as a function of length of relation with main bank

	ΔCREDIT/ASSETS (mean)	number
Duration (years)		
Less than 1 year	0.36	952
1	-0.82	1490
2	-1.14	1640
3	-1.87	1971
4	-1.90	2032
5	-2.50	5018
6	-1.94	20813

Table 7: Correlation matrix of regressors

	LEV	ROE	OM/VA	SHST	TD	COLL.	IR	TOP5	#BANKS	SH_MAIN	LENG.
LEV	1.00										
ROE	-0.18	1.00									
OM/VA	-0.08	0.30	1.00								
SHST	0.02	0.00	-0.04	1.00							
TD	0.08	-0.05	-0.05	-0.05	1.00						
COLLAT.	0.33	-0.07	0.02	-0.31	0.08	1.00					
IR	0.07	0.01	0.02	-0.08	0.05	0.09	1.00				
TOP5	0.17	-0.04	0.01	-0.03	0.02	0.12	0.02	1.00			
#BANKS	0.47	-0.06	0.01	0.03	0.05	0.29	0.06	0.08	1.00		
SH_MAIN	-0.43	0.05	-0.01	-0.09	-0.02	-0.18	-0.03	-0.05	-0.85	1.00	
LENGTH	-0.02	-0.01	0.01	-0.01	-0.05	0.02	-0.05	0.02	0.03	-0.03	1.00

Table 8: Main regression

VARIABLES	(1) $\frac{\Delta CREDIT}{ASSETS}$	(2) $\frac{\Delta CREDIT}{ASSETS}$	(3) $\frac{\Delta CREDIT}{ASSETS}$
LEVERAGE	-0.030***	-0.030***	-0.032***
	(0.003)	(0.003)	(0.004)
ROE	0.018***	0.018***	0.020***
	(0.002)	(0.002)	(0.002)
OP MARGIN/VALUE ADDED	-0.001	-0.001	0.000
	(0.002)	(0.002)	(0.002)
SHARE OF SHORT TERM DEBT	-0.012***	-0.011***	-0.013***
	(0.002)	(0.002)	(0.003)
TRADE DEBIT	0.013***	0.013***	0.013***
	(0.003)	(0.003)	(0.004)
COLLATERAL	-0.211	-0.296**	-0.242
	(0.147)	(0.146)	(0.155)
INVESTMENT RATIO	0.006***	0.006**	0.005**
	(0.002)	(0.002)	(0.002)
MAIN BANK IS TOP 5	-0.224*	-0.248*	-0.231
	(0.133)	(0.133)	(0.145)
# OF BANKS	-0.810***		
	(0.102)		
SHARE MAIN BANK		0.025***	0.024***
		(0.003)	(0.003)
Length	-0.186***	-0.185***	-0.191***
	(0.041)	(0.041)	(0.045)
Observations	33846	33846	30190
R^2	0.047	0.047	0.048

Robust standard errors in parentheses

All regressions include industry, province, size and rating fixed effects

*** p<0.01, ** p<0.05, * p<0.1

Table 9: Banks fixed effects

VARIABLES	(1) $\frac{\Delta CREDIT}{ASSETS}$	(2) $\frac{\Delta CREDIT}{ASSETS}$	(3) $\frac{\Delta CREDIT}{ASSETS}$	$\frac{\Delta CREDIT}{ASSETS}$
LEVERAGE	-0.032***	-0.031***	-0.031***	-0.030***
	(0.004)	(0.004)	(0.004)	(0.004)
ROE	0.018***	0.018***	0.020***	0.020***
	(0.002)	(0.002)	(0.002)	(0.002)
OP MARGIN/VALUE ADDED	-0.001	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.003)	(0.003)
SHARE OF SHORT TERM DEBT	-0.011***	-0.010***	-0.014***	-0.013***
	(0.002)	(0.002)	(0.003)	(0.003)
TRADE DEBIT	0.013***	0.012***	0.016***	0.015***
	(0.004)	(0.004)	(0.005)	(0.005)
COLLATERAL	-0.268*	-0.347**	-0.398**	-0.467**
	(0.145)	(0.144)	(0.183)	(0.182)
INVESTMENT RATIO	0.006***	0.006***	0.008***	0.008***
	(0.002)	(0.002)	(0.003)	(0.003)
# OF BANKS	-0.770***		-0.613***	
	(0.107)		(0.233)	
SHARE MAIN BANK		0.024***		0.022***
		(0.003)		(0.005)
LENGTH	-0.213***	-0.213***	-0.248***	-0.246***
	(0.039)	(0.039)	(0.051)	(0.051)
Observations	33846	33846	33846	33846
Number of banks	524	524		
Combinations of first 3 banks			13489	13489
R^2	0.046	0.047	0.041	0.041

Robust standard errors, clustered at the province level, in parentheses

All regressions include industry, province, size and rating fixed effects

Columns 1 and 2 include main bank fixed effects.

Columns 3 and 4 include fixed effects for combinations of the main three banks

*** p<0.01, ** p<0.05, * p<0.1

Table 10: Sample splits 1

	Small firms		Manufacturing	
	(1)	(2)	(3)	(4)
VARIABLES	$\frac{\Delta CREDIT}{ASSETS}$	$\frac{\Delta CREDIT}{ASSETS}$	$\frac{\Delta CREDIT}{ASSETS}$	$\frac{\Delta CREDIT}{ASSETS}$
LEVERAGE	-0.020***	-0.019***	-0.027***	-0.026***
	(0.005)	(0.005)	(0.005)	(0.005)
ROE	0.016***	0.016***	0.023***	0.023***
	(0.003)	(0.003)	(0.004)	(0.004)
OP MARGIN/VALUE ADDED	0.002	0.002	0.004	0.004
	(0.003)	(0.003)	(0.004)	(0.004)
SHARE OF SHORT TERM DEBT	-0.008**	-0.007**	-0.016***	-0.015***
	(0.003)	(0.003)	(0.003)	(0.003)
TRADE DEBIT	0.004	0.004	0.038***	0.038***
	(0.005)	(0.005)	(0.006)	(0.006)
COLLATERAL	-0.140	-0.232	-0.589***	-0.695***
	(0.215)	(0.213)	(0.209)	(0.207)
INVESTMENT RATIO	0.004	0.003	0.000	-0.000
	(0.003)	(0.003)	(0.003)	(0.003)
MAIN BANK IS TOP 5	-0.415**	-0.432**	-0.363*	-0.387**
	(0.193)	(0.192)	(0.190)	(0.190)
# OF BANKS	-0.896***		-0.906***	
	(0.154)		(0.148)	
SHARE MAIN BANK		0.028***		0.029***
		(0.004)		(0.004)
LENGTH	-0.190***	-0.189***	-0.234***	-0.230***
	(0.057)	(0.057)	(0.064)	(0.064)
Observations	17011	17011	16103	16103
R^2	0.040	0.040	0.056	0.057

Robust standard errors in parentheses

All regressions include industry, province, size and rating fixed effects

*** p<0.01, ** p<0.05, * p<0.1

Table 11: Sample splits 2

	main bank not top5		lowest rating	
	(1)	(2)	(3)	(4)
VARIABLES	$\frac{\Delta CREDIT}{ASSETS}$	$\frac{\Delta CREDIT}{ASSETS}$	$\frac{\Delta CREDIT}{ASSETS}$	$\frac{\Delta CREDIT}{ASSETS}$
LEVERAGE	-0.019**	-0.019**	-0.053***	-0.055***
	(0.008)	(0.008)	(0.009)	(0.009)
ROE	0.007	0.007	0.013***	0.013***
	(0.006)	(0.006)	(0.003)	(0.003)
OP MARGIN/VALUE ADDED	-0.004	-0.004	0.012***	0.012***
	(0.006)	(0.006)	(0.004)	(0.004)
SHARE OF SHORT TERM DEBT	-0.002	-0.002	-0.014**	-0.013**
	(0.005)	(0.005)	(0.006)	(0.006)
TRADE DEBIT	0.011	0.011	0.011*	0.011*
	(0.009)	(0.009)	(0.006)	(0.006)
COLLATERAL	0.071	0.001	-0.810**	-1.025***
	(0.433)	(0.431)	(0.335)	(0.331)
INVESTMENT RATIO	-0.004	-0.004	0.006	0.006
	(0.005)	(0.005)	(0.004)	(0.004)
MAIN BANK IS TOP 5			-0.974***	-1.046***
			(0.315)	(0.315)
# OF BANKS	-1.066***		-1.377***	
	(0.253)		(0.248)	
SHARE MAIN BANK		0.033***		0.030***
		(0.007)		(0.007)
LENGTH	-0.079	-0.077	-0.009	-0.016
	(0.100)	(0.100)	(0.089)	(0.089)
Observations	3925	3925	7387	7387
R^2	0.064	0.065	0.071	0.070

Robust standard errors in parentheses

All regressions include industry, province, size and rating fixed effects

*** p<0.01, ** p<0.05, * p<0.1

Table 12: Subsample with information on firm level forecast of demand for credit

VARIABLES	(1) $\frac{\Delta CREDIT}{ASSETS}$	(2) $\frac{\Delta CREDIT}{ASSETS}$	(3) $\frac{\Delta CREDIT}{ASSETS}$	(4) $\frac{\Delta CREDIT}{ASSETS}$
LEVERAGE	-0.042***	-0.041***	-0.050***	-0.049***
	(0.010)	(0.010)	(0.011)	(0.011)
ROE	0.031**	0.031**	0.029***	0.029***
	(0.013)	(0.013)	(0.009)	(0.009)
OP MARGIN/VALUE ADDED	0.000	0.001	-0.003	-0.002
	(0.008)	(0.008)	(0.008)	(0.008)
SHARE OF SHORT TERM DEBT	-0.007	-0.007	-0.010	-0.009
	(0.007)	(0.007)	(0.008)	(0.008)
TRADE DEBIT	0.005	0.003	-0.000	-0.002
	(0.013)	(0.013)	(0.015)	(0.015)
COLLATERAL	-0.205	-0.266	-0.225	-0.277
	(0.526)	(0.525)	(0.518)	(0.512)
FIRM LEVEL FORECAST OF CREDIT DEMAND	0.017***	0.017***	0.015**	0.015**
	(0.006)	(0.006)	(0.007)	(0.007)
MAIN BANK IS TOP 5	0.153	0.120		
	(0.469)	(0.467)		
# OF BANKS	-0.625*		-0.573	
	(0.361)		(0.387)	
SHARE MAIN BANK		0.021**		0.021**
		(0.010)		(0.011)
LENGTH	-0.101	-0.100	-0.094	-0.091
	(0.144)	(0.144)	(0.150)	(0.150)
Observations	2084	2084	2084	2084
Number of banks			169	169
R^2	0.121	0.122	0.130	0.131

Robust standard errors in parentheses

All regressions include industry, province, size and rating fixed effects

Columns 3 and 4 also include main bank fixed effects

*** p<0.01, ** p<0.05, * p<0.1

Table 13: Probability of positive credit growth

	(1)	(2)	(3)
LABELS	Pr(Credit>0)	Pr(Credit>0)	Pr(Credit>0)
LEVERAGE	-0.000***	-0.000**	-0.001***
	(0.000)	(0.000)	(0.000)
ROE	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
OP MARGIN/VALUE ADDED	-0.000**	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)
SHARE OF SHORT TERM DEBT	0.000	0.000*	-0.000
	(0.000)	(0.000)	(0.000)
TRADE DEBIT	0.000*	0.000**	0.000*
	(0.000)	(0.000)	(0.000)
COLLATERAL	-0.019***	-0.016**	-0.012*
	(0.006)	(0.006)	(0.006)
INVESTMENT RATIO	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
# OF BANKS	0.014***		
	(0.005)		
SHARE MAIN BANK		-0.000	0.000
		(0.000)	(0.000)
MAIN BANK IS TOP 5	-0.001	-0.001	-0.002
	(0.006)	(0.006)	(0.006)
LENGTH	-0.007***	-0.007***	-0.007***
	(0.002)	(0.002)	(0.002)
Observations	33840	33840	30184
Log Pseudo-likelihood	-22147.007	-22151.486	-19713.759

Robust standard errors, clustered at the province level, in parentheses
All regressions include industry, region, size and rating fixed effects
The table shows marginal effects.
*** p<0.01, ** p<0.05, * p<0.1

Table 14: Positive credit growth: Heckman 2 Step

VARIABLES	(1) $\frac{\Delta CREDIT}{ASSETS} > 0$	(2) Pr(CREDIT>0)	(3) $\frac{\Delta CREDIT}{ASSETS} > 0$	(4) Pr(CREDIT>0)
LEVERAGE	0.019***	-0.001***	0.021***	-0.001*
	(0.005)	(0.000)	(0.005)	(0.000)
ROE	0.002	0.002***	0.002	0.002***
	(0.004)	(0.000)	(0.004)	(0.000)
OP MARGIN/VALUE ADDED	0.013***	-0.000**	0.013***	-0.000*
	(0.003)	(0.000)	(0.003)	(0.000)
SHARE OF SHORT TERM DEBT	-0.000	0.000	-0.001	0.000*
	(0.003)	(0.000)	(0.003)	(0.000)
TRADE DEBIT	-0.039***	0.001**	-0.039***	0.001**
	(0.005)	(0.000)	(0.005)	(0.000)
COLLATERAL	-0.210	-0.045***	-0.085	-0.038**
	(0.194)	(0.016)	(0.190)	(0.016)
INVESTMENT RATIO	0.005*	0.000	0.005*	0.000
	(0.003)	(0.000)	(0.003)	(0.000)
MAIN BANK IS TOP 5	-0.208	-0.004	-0.181	-0.003
	(0.165)	(0.015)	(0.166)	(0.015)
# OF BANKS	0.795***	0.031***		
	(0.141)	(0.012)		
SHARE MAIN BANK			-0.017***	-0.000
			(0.004)	(0.000)
LENGTH	-0.150***	-0.020***	-0.143***	-0.020***
	(0.054)	(0.004)	(0.054)	(0.004)
OVERDRAFT		-0.387***		-0.393***
		(0.048)		(0.048)
MILL'S RATIO		-6.056***		-6.431***
		(2.100)		(2.085)
Observations	13082	33846	13082	33846

Robust standard errors in parentheses

All regressions include industry, province, size and rating fixed effects

*** p<0.01, ** p<0.05, * p<0.1

Table 15: Negative credit growth: Heckman 2 Step

VARIABLES	(1) $\frac{\Delta CREDIT}{ASSETS} < 0$	(2) Pr(CREDIT<0)	(4) $\frac{\Delta CREDIT}{ASSETS} < 0$	(5) Pr(CREDIT<0)
LEVERAGE	-0.038***	0.001***	-0.045***	0.001*
	(0.006)	(0.000)	(0.005)	(0.000)
ROE	-0.008**	-0.002***	-0.007**	-0.002***
	(0.004)	(0.000)	(0.004)	(0.000)
OP MARGIN/VALUE ADDED	0.001	0.000**	-0.001	0.000*
	(0.003)	(0.000)	(0.003)	(0.000)
SHARE OF SHORT TERM DEBT	-0.025***	-0.000	-0.024***	-0.000*
	(0.004)	(0.000)	(0.003)	(0.000)
TRADE DEBIT	0.033***	-0.001**	0.031***	-0.001**
	(0.006)	(0.000)	(0.006)	(0.000)
COLLATERAL	0.756***	0.045***	0.388*	0.038**
	(0.232)	(0.016)	(0.212)	(0.016)
INVESTMENT RATIO	0.003	-0.000	0.002	-0.000
	(0.003)	(0.000)	(0.003)	(0.000)
MAIN BANK IS TOP 5	-0.117	0.004	-0.192	0.003
	(0.203)	(0.015)	(0.190)	(0.015)
# OF BANKS	-2.509***	-0.031***		
	(0.171)	(0.012)		
SHARE MAIN BANK			0.052***	0.000
			(0.004)	(0.000)
LENGTH	0.223***	0.020***	0.211***	0.020***
	(0.067)	(0.004)	(0.063)	(0.004)
OVERDRAFT		0.387***		0.393***
		(0.048)		(0.048)
MILL'S RATIO		15.49***		14.571***
		(2.803)		(2.594)
Observations	20764	33846	20764	33846

Robust standard errors in parentheses

All regressions include industry, province, size and rating fixed effects

*** p<0.01, ** p<0.05, * p<0.1

Table 16: Non linear effects of the duration of the relationship with the main bank

VARIABLES	(1) $\frac{\Delta CREDIT}{ASSETS}$	(2) $\frac{\Delta CREDIT}{ASSETS}$
LEVERAGE	-0.030***	-0.029***
	(0.003)	(0.003)
ROE	0.018***	0.018***
	(0.002)	(0.002)
OP MARGIN/VALUE ADDED	-0.000	-0.001
	(0.002)	(0.002)
SHARE OF SHORT TERM DEBT	-0.012***	-0.011***
	(0.002)	(0.002)
TRADE CREDIT	0.013***	0.013***
	(0.003)	(0.003)
COLLATERAL	-0.224	-0.309**
	(0.147)	(0.146)
CAPITAL INTENSITY	0.006***	0.006**
	(0.002)	(0.002)
MAIN BANK IS TOP 5	-0.198	-0.222*
	(0.133)	(0.133)
# OF BANKS	-0.816***	
	(0.102)	
SHARE MAIN BANK		0.025***
		(0.003)
LENGTH	-1.122***	-1.120***
	(0.252)	(0.252)
LENGHT SQUARE	0.101***	0.101***
	(0.026)	(0.026)
Observations	33846	33846
R^2	0.047	0.048

Robust standard errors in parentheses

All regressions include industry, province, size and rating fixed effects

*** p<0.01, ** p<0.05, * p<0.1

Table 17: Credit Rationing - Probability a firm is asked to cut lending by one of its banks

	(1)	(2)
LABELS	Prob(Rationed)	Prob(Rationed)
LEVERAGE	0.001	0.002
	(0.001)	(0.001)
ROE	-0.002**	-0.001*
	(0.001)	(0.001)
OP MARGIN/VALUE ADDED	0.000	0.000
	(0.001)	(0.001)
SHARE OF SHORT TERM DEBT	0.003***	0.002***
	(0.001)	(0.001)
TRADE CREDIT	0.000	0.000
	(0.001)	(0.001)
COLLATERAL	0.096**	0.099**
	(0.045)	(0.045)
FIRM LEVEL DEMAND FOR CREDIT	0.177***	0.181***
	(0.061)	(0.061)
MAIN BANK IS TOP 5	-0.100**	-0.096**
	(0.049)	(0.049)
# OF BANKS	0.156***	
	(0.045)	
SHARE MAIN BANK		-0.003***
		(0.001)
LENGTH	-0.001	0.001
	(0.013)	(0.013)
Observations	751	751
Log Pseudo-likelihood	-418.99468	-422.83146

Robust standard errors in parentheses

All regressions include industry, province, size and rating fixed effects

The table shows marginal effects.

*** p<0.01, ** p<0.05, * p<0.1

Table 18: Robustness

VARIABLES	(1) $\frac{\Delta CREDIT}{ASSETS}$	(2) $\frac{\Delta CREDIT}{ASSETS}$	(3) $\frac{\Delta CR\_LINES}{ASSETS}$	(4) $\frac{\Delta CR\_LINES}{ASSETS}$
LEVERAGE	-0.028***	-0.030***	-0.023***	-0.023***
	(0.004)	(0.003)	(0.002)	(0.002)
ROE	0.019***	0.018***	0.003**	0.003**
	(0.002)	(0.002)	(0.001)	(0.001)
OP MARGIN/VALUE ADDED	-0.001	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.001)	(0.001)
SHARE OF SHORT TERM DEBT	-0.012***	-0.011***	-0.022***	-0.021***
	(0.002)	(0.002)	(0.001)	(0.001)
TRADE CREDIT	0.012***	0.013***	0.006***	0.006**
	(0.004)	(0.004)	(0.002)	(0.002)
COLLATERAL	-0.114	-0.241	0.130	0.024
	(0.149)	(0.147)	(0.099)	(0.099)
INVESTMENT RATIO	0.007***	0.006**	-0.001	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)
ΔCREDIT/ASSETS 2007	-0.004	-0.001		
	(0.007)	(0.005)		
ΔCREDIT/ASSETS 2006	-0.033***	-0.000		
	(0.007)	(0.000)		
MAIN BANK IS TOP 5	-0.253*	-0.263*	-0.132	-0.161*
	(0.136)	(0.135)	(0.091)	(0.091)
# OF BANKS	-0.725***		-0.981***	
	(0.105)		(0.068)	
SHARE MAIN BANK		0.024***		0.029***
		(0.003)		(0.002)
LENGTH	-0.210***	-0.193***	-0.106***	-0.105***
	(0.043)	(0.043)	(0.027)	(0.027)
Observations	31782	33007	33846	33846
R^2	0.049	0.048	0.061	0.063

Robust standard errors, clustered at the province level, in parentheses
All regressions include industry, province, size and rating fixed effects
*** p<0.01, ** p<0.05, * p<0.1

Table 19: Instrumenting the concentration of relationships

VARIABLES	(1) $\frac{\Delta CREDIT}{ASSETS}$ 2SLS	(2) #BANKS 1STAGE	(3) LENGTH 1STAGE	(4) $\frac{\Delta CREDIT}{ASSETS}$ 2SLS	(5) SH MAIN 1STAGE	(6) LENGTH 1STAGE
LEVERAGE	0.047	0.098***	0.0025***	0.049	-0.3347***	0.0025***
	(0.042)	(0.0002)	(0.0005)	(0.043)	(0.0071)	(0.0005)
ROE	0.022***	0.0004***	-0.0011***	0.020***	-0.0106**	-0.0011***
	(0.004)	(0.0001)	(0.0003)	(0.003)	(0.0043)	(0.0003)
OP MARGIN/VA	0.006	0.0010***	-0.0002	0.004	-0.0254***	-0.0002
	(0.005)	(0.0001)	(0.0003)	(0.004)	(0.0045)	(0.0003)
SHARE OF SH.TERM D.	0.001	0.0016***	0.0004	0.009	-0.0862***	0.0004
	(0.007)	(0.0001)	(0.0003)	(0.012)	(0.0047)	(0.0003)
TRADE CREDIT	0.018***	0.0004*	-0.0018***	0.010**	0.0086	-0.0018***
	(0.006)	(0.0002)	(0.0006)	(0.004)	(0.0081)	(0.0006)
COLLATERAL	1.482*	0.2105***	0.1020***	0.612	-3.4751***	0.1020***
	(0.867)	(0.0074)	(0.0203)	(0.439)	(0.2703)	(0.0203)
INVESTMENT RATIO	0.012*	0.0004**	-0.0028***	0.005	0.0009	-0.0028***
	(0.006)	(0.0001)	(0.0004)	(0.004)	(0.0043)	(0.0004)
MAIN BANK IS TOP 5	-0.191	0.0202***	0.0704***	-0.328*	0.1492	0.0704***
	(0.156)	(.0069)	(0.0189)	(0.169)	(0.255)	(0.0189)
# OF BANKS	-8.994*					
	(4.627)					
SHARE MAIN BANK				0.260*		
				(0.133)		
LENGTH	0.879			-0.302		
	(1.480)			(1.019)		
SMALL SIZE DEC05		-0.0944***	-0.2770***		2.0069***	-0.2770***
		(0.0111)	(0.0323)		(0.4095)	(0.0323)
ΔHERFINDAHL		-0.0237	0.1668***		1.579***	0.1668***
		(0.0158)	(0.0447)		(0.5855)	(0.0447)
F-test		37.24	43.5		15.41	43.5
Observations	33320	33320	33320	33320	33320	33320

Robust standard errors in parentheses.

All regressions include industry, macro-area, size and rating fixed effects

*** p<0.01, ** p<0.05, * p<0.1

Table 20: Loan level data - dummy main bank

	Dummy Main Bank	Observations
1) BASE	0.362	59757
	(0.529)	
2) WITH BANKS FIXED EFFECTS	0.110**	59757
	(0.054)	
3) POSITIVE CREDIT GROWTH	-1.796***	23423
	(0.093)	
4) NEGATIVE CREDIT GROWTH	1.211***	36334
	(0.062)	
5) LOWEST RATING	0.642***	13772
	(0.117)	
6) MEDIUM AND HIGH RATING	-0.143**	45985
	(0.059)	
7) MAIN BANK IS TOP 5	-0.284***	38196
	(0.067)	
8) MAIN BANK IS NOT TOP 5	0.606***	21561
	(0.087)	

Robust standard errors in parentheses
All regressions include firm fixed effects
*** p<0.01, ** p<0.05, * p<0.1

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