

# The role of relationship lending and lender-borrower distance during financial crisis.

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The purpose of this paper is to assess whether relationship lending was beneficial to borrowers during the 2007-2009 financial crisis. Using a proprietary firm-level database of around 18,000 loans relating to four medium-sized Italian banks, we observed that where there were intense relationships between banks and firms, borrowers enjoyed better and more permanent credit access conditions, even under circumstances of generalized credit access constraints. These findings are wholly in line with the literature, which recognizes how loans based on high quality information can produce benefits in terms of services offered and reduce credit rationing. By using confidential data this study has also made possible an investigation into the role which the physical distance between decision-making bodies internal to the bank plays in the credit process in conditions of market distress. Our findings highlight how the distance between the branches making the loans and the headquarters where lending decisions are made is in an inverse ratio to credit availability.

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*EFM Codes: 510, 130*

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The issue of relationship lending has been the subject of ample study, and a series of benefits and limitations have come to the fore, some of which are fully acknowledged – such as *i*) the reduction of information gaps between lenders and borrowers, and *ii*) the potential risk of “hold up” – while others have been examined rather less. One of these issues is the ongoing benefits of relationship banking during the financial crisis, which constitutes the subject of this paper.

This study aims to assess the ability of relationship banking to mitigate or even halt the consequences for firms of the widespread shock affecting credit access.

In other words, the question is whether, in conditions of market stress, credit supply models based on high intensity relations can reduce the effects on firms of the credit access crisis.

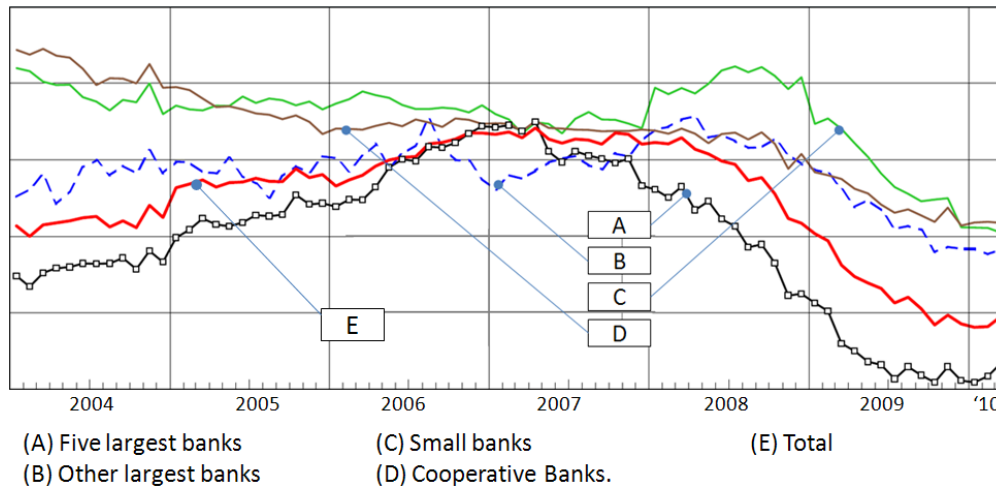
From this point of view, the recent global financial crisis, which began in late 2007 and came to a head in September 2008 (with the bankruptcy of the Lehman Brothers Holding) is an ideal testing ground for this type of inquiry.

Fig. 1. Growth in Italy's domestic lending distinguished by bank size (*twelve-month percentage changes*)

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Source: Bank of Italy, Annual Report (2010)

In many countries, the weakening of the bank system caused by a shortage of liquidity, huge losses on loans, problems of under-capitalisation and interest rates at an all-time low, have shown how critical the organisational and operative models of banks used up to the start of the crisis were.

In Italy, the collapse of the Lehman Brothers investment bank marked a turning-point for banks, as in other countries. In the first nine months of 2008, Italian banks had been only moderately affected by the turmoil, thanks to their low exposure to structured financial products, their specialization in traditional banking activities and the prudence of the regulatory and supervisory framework.

From the fourth quarter of 2008, Italian banking group responses indicate that from then on they tightened their credit standards. Developments in domestic lending reflected both demand factors, in relation to the slump in economic activity, the fall in investment and the decline in transactions on the property, as well as supply factors. Tightening did not end until the fourth quarter of 2009 (Figure 1).

As is well known, the substitution of the traditional “originate to hold” model (OTH) – whereby banks held loans on their books – by the new “originate to distribute” (OTD) banking model – where the loans originated were securitised on the financial market – represents the main reason for the crisis. The technical evolution of securitization had spread the misconception that risk could be segmented and traded and, therefore, that the waiver to a strong bank-firm relationship could be more than adequately compensated for in terms of profitability. As suggested by Coco and Ferri (2010), this approach neglected the problem that the fragmentation of complex financial relationships into segmented contracts among various counterparts reduced the intermediaries’ ability to assess and govern the overall dimension of that risk, thus amplifying systemic risk. Incidentally, one beneficial effect of a crisis might well also be a rethinking of the importance attributed to “hard” and “soft” information, which would have consequences on the strategies and organization of a bank.

Generally speaking, “soft” information can be defined as information that cannot be directly verified other than by the agent who produces it, and is difficult to communicate in a verifiable manner even within an organization. As a result, soft information (examples of which are the entrepreneur’s competence, honesty and diligent approach to management, and employee morale), is considered to be accessible exclusively to a primary incumbent lender and cannot be unambiguously documented in a report that the loan officer can pass on to his superiors.

If it is true that after the introduction of Basel II, hard information has become increasingly important, it is equally true that the soft information, especially during a period of crisis, is an

essential aid to credit decisions. A tendency to harden soft information could in fact be a way to further reduce the information asymmetry between banks and firms, making it easier to handle widespread economic distress and avoid indiscriminate tightening of credit conditions.

In order to examine these issues, we have analyzed information taken from a unique database of around 22,000 loans from four medium and small Italian banks.

For each credit relationship, nine qualitative and quantitative variables were collected to describe the type of relationship between lenders and borrowers. The values for each variable refer to December 2007 (start of the crisis), and December 2009 (during the crisis).

The features of the database available and the extraordinary circumstances experienced during that time make it possible to carry out an empirical examination of the role of relationship lending, in order to contribute to the discussion highlighted in the literature addressing the issue of the current crisis ( Ferri *et al.*, 2009, De Mitri *et al.*, 2010, Ivashina, Scharfstein, 2010) or crises at other times and in different contexts (cf. Ferri *et al.*, 2001, Shrieves and Dahl, 1995).

The outcome shows how intense bank-firm relationships offer better and more stable credit access conditions for borrowers also when the bank system is under strain. Our analysis also considers the impact of physical distance on credit conditions. From the purpose-built databases, the study shows the role that the physical distance between the firm and the branch that makes the decision has in the lending process under credit shock conditions. The conjecture tested but later partially confirmed is that, as there is a negative relationship between the contribution of soft information to the credit decision and the physical distance between loan offices and decision-making headquarters, it follows that in a period of credit shock, firms funded by banks with a strong vertical hierarchy structure obtain fewer benefits from a relationship banking model. This conjecture is consistent with the theory, which predicts that organizations where there is a narrower gap between allocation and control are more efficient providers of relationship-based small business loans (Cerqueiro *et al.*, 2007, Berger *et al.*, 1999).

## 1. THEORETICAL CONSIDERATIONS

The widely studied field of relationship lending raises numerous issues on the effect of the intensity of the relationship on the availability and quality of corporate credit. This section examines the literature concerning only two aspects of the subject, i.e., *i*) the link between the intensity of the bank-firm relationships and credit access under crisis conditions, and *ii*) the impact of hierarchical distance on the policies of loan centralisation/decentralisation during a credit tightening .

As for the first aspect, one of the first elements to be analyzed refers to the way it is possible to measure the degree of intensity of a bank-firm relationship. The measures used most for this purpose are the degree of creditor concentration and the number of bank lenders. From an analysis of the literature on this subject, at least three important phenomena emerge: 1) the negative link between the size of the information gap and the number of banks (*inter alia*, Elsas and Krahenen, 1998); 2) the ability of firms which have developed relationships of the *Hausbank* type to benefit from greater credit availability (*inter alia*, Petersen and Rajan, 1994, 1995); and 3) less likelihood that firms having a one-bank relationship will have to provide collateral (Harhoff and Körting, 1998).

A high level of intensity, especially if long term, leads to negative consequences such as lender hold-up. The information monopoly of the hausbank can, in fact, cause opportunistic behaviour on the part of the bank, such as tougher credit conditions and inefficient credit negotiation procedures. Degryse and Van Cayseele (2000) show how a sample of Belgian firms demonstrate a positive relationship between interest rates on loans and the duration of the bank-firm relationship. Angelini *et al.* (1998) reach largely similar conclusions analyzing the pricing policies of a sample of 90 cooperative credit banks in Italy and show, among their various results, the “hold up” banks have over the customer through longer-term loans. To contain hold-up problem, various proposals have

been formulated. Some suggest the introduction of more flexible contract terms, especially for longer-term funding (see Von Thadden, 1995), other supporting the superiority of multiple banking model, recognizing some benefits to non-relationship loans (see Howorth, Peel and Wilson, 2003, Farinha and Santos, 2002) although the risk of adverse selection procured by the lower availability of information of new lenders, cannot be neglected in this case (see Detragiache, Garella and Guiso, 2000).

On the persistence of the benefits of relationship lending during a period of financial crisis, some evidence (Ferri *et al.*, 2001) seem to show the ability of this type of relationship to mitigate the effects (on firms) deriving from the credit crunch; however, the structure and the health of the banking system in each country during the crisis can lead to different results (Jiangli *et al.* 2008).

Another focus of this study is the implications that the organizational structure of a bank can have on credit availability for firms in conditions of market stress. The degree of territorial entrenchment of a bank can be expressed on two scales: operative distance and hierarchical distance. The first, referring to the physical distance that separates a borrower from a lender has been examined in a number of studies and it emerges that it does have a major influence on the credit strategies of banks (Petersen, Rajan, 2002).

The hierarchical distance on the other hand, is the distance between the loan office which manages the credit relationship and the headquarters that approve the loan (Alessandrini *et al.*, 2005 and Alessandrini *et al.*, 2009, call this functional distance). As the bank (all the more so if large) has various decision-making centres, each one with a certain degree of autonomy, the physical space between the central and outlying offices can have a strong influence on the results of the loan process and so on credit management. In particular, the centre-periphery distance can influence loan policy in at least three ways:

- 1) by increasing the likelihood of dissipation of the soft information collected by the periphery when they communicate with their central hierarchy;
- 2) by increasing the monitoring costs of the activities of the local manager, which becomes necessary in order to reduce the risk of opportunistic behaviour in the periphery;
- 3) by hindering the timely and efficacious transfer from the centre to the periphery of *best practices* focusing on efficiency (see Berger and De Young, 2001).

Of these, the relationship between hierarchical distance and the result of the loan process identified in 1) appears the most interesting and most difficult to get round by the intense use of a remote communication platform that can on the other hand, reduce, if not eliminate, the distortion caused by the increased spatial gap between the centre and the periphery in cases of sub 2 and 3 (see Felici and Pagnini, 2007).

Since soft information is gathered by branch managers and is difficult to report on to other organisational layers, the likelihood of spreading is proportional to the degree of flattening of the bank organisation. Given that in a decentralized bank, loan officers have more autonomy over lending decisions, they will invest more energy *ex ante* in processing the 'soft information' gathered from their clients.

On the contrary, credit officers in centralized banks, relying more heavily on 'hard information' such as credit scoring models, tend to consider the gathering of soft information as costly and under-invest in these actions to avoid the bank headquarters reducing the resources allocated to their branch (Stein, 2002).

As a result, it is more advantageous for banks with decentralized lending to lend to young and small businesses with greater opaqueness of information (Canales and Randa, 2008).

## 2. THE DATA

The data are confidential and were supplied by four medium-sized Italian banks. The extract comes from the credit portfolios of the individual institutions through access to micro-data information, some of which related to the relationships they have with client firms.

Three of the four banks operate in the centre-north area and one is in the centre-south of Italy. Ranked by total assets as per their Financial Statements (at 31/12/2009), the first three (Bank1, Bank2 and Bank3) belong to the class of medium sized cooperative banks, the fourth is a smaller mutual savings bank (Table 1).

Table 1.  
The sizes of the Banks in this study.

	<i>Bank 1</i>	<i>Bank 2</i>	<i>Bank 3</i>	<i>Bank 4</i>
<i>Size index*</i>	18.4	6.9	3.0	1.0
<i>Branches**</i>	226	187	123	41

\*Ratio between the assets (2009) of the bank in the column with the assets (2009) of the smaller bank (Bank 4)

\*\*Branches for which data is available.

The raw data sample consisted of 37,456 loans each of which related to a singular firm; for each loan there is a set of nine variables measured at two different times: December 2007 and September 2009. The nine quali-quantitative variables, allow a reasonably good approximation of the features of the relationship of each firm with the individual banks in the sample.

Table 2.  
Number and type of borrower firms: first sample (descriptive analysis)

	<i>LARGE CORPORATE</i>	<i>SME CORPORATE</i>	<i>SME RETAIL</i>	<i>SMALL BUSINESS *</i>	<i>SMALL OTHER**</i>	<i>TOT.</i>
<i>Bank 1</i>	86	862	1,041	2,422	13	4,424
<i>Bank 2</i>	221	2,235	3,965	1,669	77	8,167
<i>Bank 3</i>	65	1,042	1,321	74	0	2,502
<i>Bank 4</i>	94	991	1,334	464	0	2,883
						17,976

\* Family businesses and sole traders

\*\* Self-employed professionals

The analysis consists of two distinct empirical assessments, one of which is hugely simplified and the other more complete, for which two different sets of data were produced. In the first case, we used data for *i*) volume of credit granted by each bank to the firms on the two dates when the data were collected (Dec. 2007 and Sept. 2009), and *ii*) the number of lenders per firm on the starting date of the study (December 2007).

With regard to the first analysis, after eliminating records with empty fields, we cleared the data of outliers, cutting the bottom and top first percentile of the credit granted variable<sup>1</sup> so, the number of observations was reduced to 17,976 loans for the same number of firms (Table 2). In the second case, analyzing a higher number of variables, the data set revealed a further drop due to significant missing data (especially for Financial Statements) which, with the elimination of the 5th and 95th percentiles of credit growth variable, reduced the size of the sample to 8,153 as shown in Table 3.

Table 3.  
Number and type of borrower firms: second sample (multivariate analysis)

<sup>1</sup> Credit granted is the amount of credit that has been authorized and granted, net of past repayments (if any).

	<i>LARGE CORPORATE</i>	<i>SME CORPORATE</i>	<i>SME RETAIL</i>	<i>SMALL BUSINESS *</i>	<i>SMALL OTHER**</i>	<i>TOT.</i>
<i>Bank 1</i>	42	442	388	1,142	3	2,017
<i>Bank 2</i>	67	796	1402	452	28	2,745
<i>Bank 3</i>	38	494	627	57	0	1,216
<i>Bank 4</i>	39	832	985	319	0	2,175
						8,153

\* Family businesses and sole traders

\*\* Self-employed professionals

The variables used in the second part of the empirical assessment represent: *i*) the credit granted; *ii*) the number of lenders; *iii*) the length of the relationship; *iv*) the collateral offered; *v*) the sales growth over the period of interest of each firm; *vi*) hierarchical distance; *vii*) firm size.

### 3. THE HYPOTHESES.

Two testable hypotheses are examined in this paper. The first, of a more general nature, focuses on understanding the role of relationship lending when the market is suffering from a generalized credit shortage. Specifically, the question is whether the accumulation of soft information affects, and if so, positively or negatively, the credit available to a firm. If, under conditions of equilibrium, the positive contribution of relationship lending to credit availability is fairly easy to recognize (and empirically shown), it is rather more difficult to establish the persistence of this advantage when there is an imbalance in the credit supply.

The first research hypothesis examines the extent of this advantage. The underlying idea is that, also under conditions of credit tightening, banks are able to contain exposure to credit risk, maintaining a certain degree of differentiation among borrowers on the basis of the type of relationships. Formally, the hypothesis can be formulated as follows:

*HP<sub>1</sub>: under adverse credit crisis conditions, banking models based on the lending relationship have a positive effect on the credit available to a firm.*

The occurrence of a financial crisis is probably characterised by banks adopting a defensive management policy oriented to a fast and drastic containment of the level of exposure to credit risk. In a similar context, it is reasonable to expect an increase of the magnitude of hierarchical distance inside the bank due to greater centralization of decision-making, with hard information playing a greater role in the credit decision, to the detriment of soft information. And this may happen despite some soft information, e.g. changes at executive level, the efficiency and reliability of the management or the existence of agreements in progress for a strategic joint venture, continuing to be fundamental also, and above all, in a period of crisis.

As discussed above, the intensity of soft information gathering depend on the flattening of bank organisation in so far as, in a centralized bank, loan officers have less incentives to collect this type of information.

The level of centralization of decision making in the bank's organization depends on the distance between the organisational layers of the credit management process. The headquarters of the bank will be less familiar with the local economic and social environment. Greater physical and cultural distance makes it difficult to gather and consequently report soft information to those higher up in the management chain and monitor local managers (Degryse and Ongena, 2005; Alessandrini, *et al.*, 2009). As a consequence, the allocation of decision-making power to these officers tends to decrease with distance (Mocetti *et al.*, 2010). Given these premises, one might expect a negative relationship between the credit growth and the distance between the centre and the periphery of the bank, which could becomes more marked during a systemic credit tightening. In other words, the

positive contribution of relationship lending can, under crisis conditions, be adversely conditioned by the organizational model adopted by the bank, in so far as the contribution of soft information gradually reduces as the geographical distance between the centre and the periphery increases. Thus, formally, the second hypothesis can be described as follows:

*HP2: during a widespread financial crisis, the hierarchical distance has a negative influence on credit availability.*

#### 4. NUMBER OF LENDERS AND CREDIT GROWTH.

In an attempt to provide some answers able to support or disprove the first hypothesis, two analyses were designed: one is descriptive, the other multivariate.

The first case has mere descriptive statistics to summarize the behaviour of the banks in the sample between December 2007 and September 2009. The statistics shown in Table 4 are related to two sub-samples of firms differentiated according to the number of lending banks: firms with one bank relationship (bilateral relationship), where the number of banks is equal to 1 and firms with a multiple banking relationship, where the number of banks is  $\geq 2$ .

Table 4. Credit growth (%) to firms (2007-2009)*: bilateral vs multiple banking relationships				
WHOLE SAMPLE (ONE+ MULTIPLE BANKING RELATIONSHIP FIRMS)				
	<b>Bank 1</b>	<b>Bank 2</b>	<b>Bank 3</b>	<b>Bank 4</b>
<b>Nr of Observations (firms)</b>	4,424	8,167	2,502	2,883
<b>Average (%)</b>	-41.87	-19.94	-38.73	-21.95
<b>Median</b>	-.6340	-.3211	-.5555	-.1434
<b>25<sup>or</sup> Perc.</b>	-.8540	-.6832	-.8191	-.5224
<b>75<sup>or</sup> Perc</b>	-.2389	-.0390	-.1769	.0062
<b>Standard dev.</b>	1,828	2,001	1,130	.4196
<b>Asymmetry</b>	25.46	48.46	14.75784	.0827
FIRMS WITH ONE BANK RELATIONSHIP				
	<b>Bank 1</b>	<b>Bank 2</b>	<b>Bank 3</b>	<b>Bank 4</b>
<b>Nr Observations</b>	1.640	4.021	911	1.029
<b>Average (%)</b>	-13.92	-1.42	-13.10	-15.58
<b>Median</b>	-.2311	-.1220	-.1752	-.0826
<b>Standard dev.</b>	2,318	1,277	.9585	.3463
<b>Asymmetry</b>	23.33	17.6	11.28	-.1838
MULTIPLE BANKING RELATIONSHIP FIRMS				
	<b>Bank 1</b>	<b>Bank 2</b>	<b>Bank 3</b>	<b>Bank 4</b>
<b>Nr Observations</b>	2.784	4.146	1.591	1.854
<b>Average (%)</b>	-58.33	-37.91	-53.40	-31.44
<b>Median</b>	-.7595	-.6124	-.7252	-.3657
<b>Standard Dev.</b>	1,439	2,499	1,193	.4950
<b>Asymmetry</b>	24.92	46.93	16.50	.5172

NOTES:  $Credit\ Growth\ (\%) = (Credit\ Granted_{SEPT-2009} / Credit\ Granted_{DEC-2007}) - 1$ . Credit granted is the amount of credit that has been authorized and granted, net of past repayments (if any).

Table 4 shows the data for the rate of growth in bank lending for firms with one bank relationship and firms with multiple banking relationships (i.e., funded by several banks, one of which belongs, alternatively, to Bank 1, 2, 3, or 4, and the others to the system). The percentage growth in lending between December 2007 and September 2009 by an individual bank in the

sample to the firms in its portfolio, indicates an overall reduction in volume of credit available. However a comparison of the reduction affecting firms with one bank relationship with those with more than one lender (Tab. 4) would seem to support the idea that the former have been affected rather less by the credit crunch. The results shown in Table 4 show how the firms with one bank relationship have, on average, reduced the credit available by around 64% less than the average total and around 75% less compared with the average for firms with multiple banking relationships.

It may also be useful to underline how no firm (singly or multiply funded) showed signs of bad or non-performing loans at the beginning and end of the period of interest. The difference emerging between the two samples, then, is not due to the existence of different risk conditions at either the starting or end date of the study.

The tendency of firms with bilateral bank relationship to contain the trend to reduce credit can be examined not only numerically, but also graphically.

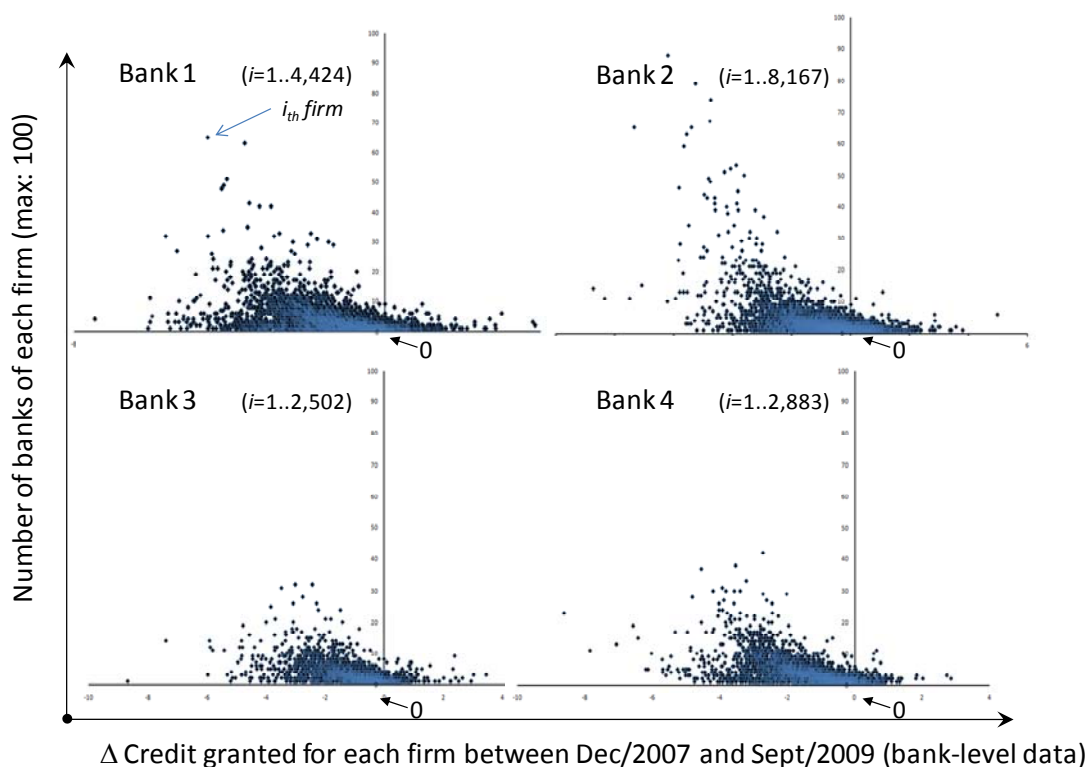


FIG. 2. Credit growth and number of banks of each firm.

Figure 2 illustrates the relationship between the (logarithmic) credit growth and the number of banks financing each firm in the sample. The distribution of the data would seem to confirm that there is a negative relationship between the number of lending banks and the sign/size of the credit growth availability to firms. From our data, it is possible to note how those firms that enjoyed a credit increase are financed by a limited number of banks. From the data shown, it emerges that 2,912 firms (around 16% of the sample) saw an increase in financing: of these, 2,062 borrow from one bank, 564 borrow from two banks, 185 from no bank, and the rest (101 firms) from more than three banks.

These early findings suggest preliminary answers about the way bank size affects credit allocation, at least for the sample investigated. In normal conditions, small firms need lenders willing to go deeper and acquire soft information. In this case we would expect those forced to go to large banks to be particularly credit constrained.



Considering that the four banks have been sorted by size (bank 1 is the largest, see Table 1), from Table 3 we can observe how the credit growth for firms with a one bank relationship follows a non-linear trend: the bank showing the smallest average restriction is Bank 2, not Bank 4. This unexpected result may be explained by some factor which it is not possible to observe from our data, including a different exposure of each portfolio loan to cyclical or counter-cyclical industries, the different geographical distribution and/or lending (and capital adequacy) policies of each bank. Combining these factors, it seems plausible to imagine, for example, that the smallest bank (# 4) has experienced a strong reduction of credit because it covers a very restricted geographical area characterized by (small) enterprises belonging to one or a few of the sectors that have been more affected by the current crisis.

## 5. MULTIVARIATE ANALYSIS

These preliminary and partial findings appear to give some support to the positive role played by *relationship lending*, even though the limited number of variables considered (credit growth and number of banks) and the lack of tools able to produce meaningful results able to show the intensity of the relationship, other than the sign, invites caution and begs further study.

This time a variety of variables were taken into account for each firm: some express the intensity of the relationship while others are control variables. Because of the missing data, the increase in the number of variables meant a significant reduction in the number of bank-firm relationships examined, from the original 17,976 to 8,153 (see par. 2).

### 5.1 Model and Description of the Variables

The contribution of relationship lending to the credit growth during the crisis was measured using the following two cross-section data models:

$$\begin{aligned} \Delta CREDIT_i = & Constant + \alpha \cdot NumBANK_i + \beta \cdot YEARS_i \\ & + \phi \cdot COLLATERAL + \gamma \cdot DISTANCE \\ & + \lambda \cdot GPROFIT + \varepsilon \end{aligned} \quad [1]$$

$$\begin{aligned} \Delta CREDIT_i = & Constant + \alpha \cdot NumBANK_i + \beta \cdot YEARS_i \\ & + \phi \cdot COLLATERAL + \gamma \cdot DISTANCE \\ & + \lambda \cdot GPROFIT + \sum_k \theta \cdot SIZE_k + \varepsilon \end{aligned} \quad [2]$$

The credit growth, expressed by the  $\Delta CREDIT_i$  variable, is calculated as a logarithmic change in the credit granted by a  $j_{th}$  bank in the sample ( $j=1, \dots, 4$ ) to the  $i_{th}$  firm in the period of interest (December 2007 - September 2009). This variable can be interpreted as a *proxy* of the degree of increase or decrease of the credit granted to a firm  $i_{th}$  by a bank  $j_{th}$  during the crisis:

$$\Delta CREDIT_{ji} = \ln(\text{Credit}_{ji/\text{Sept-2009}}) - \ln(\text{Credit}_{ji/\text{Dec-2007}}) \quad [3]$$

In other studies (De Mitri *et al.* 2010, Albertazzi and Marchetti, 2010), the volume of credit granted to the  $i_{th}$  firm is normalized by relating it to the firm's total assets in order to neutralize excessive data variation. In our case, not having this information, a solution to the problem was sought by eliminating the values making up the 5th and 95th percentiles of the variable  $\Delta CREDIT_i$ . However, this procedure is not capable of definitively excluding the risk of overestimating credit growth.

The  $NumBANK_i$  variable represents the logarithm of the number of banks financing the firm  $i_{th}$ . It is an indirect index of the degree of relationship banking. For each firm, the number of banks at December 2007 (starting date) coincides with the number recorded at September 2009 (ending date). While for firms with a bilateral relationship the identification of the lender is sure (alternatively: Bank 1, 2, 3, or 4), for firms with multilateral relationships, we cannot exclude the possibility that one or more banks will take the place of another during the time period observed. In any case, this information gap does not alter our findings at all, since we analyzed the credit change of one bank (1, 2, 3 or 4) rather than the whole system.

The most frequent hypothesis is that the intensity of the relationship is inversely proportional to the number of lending banks, so that it is at its maximum when there is only one lender (bilateral relationship). There is much empirical evidence to support this hypothesis (among others see Petersen and Rajan, 1994), even though it is undeniable that the intensity of a relationship is also influenced by a multiplicity of factors including, for example, the restructuring costs (see, for example, Guiso and Minetti, 2004).

The effect on credit availability deriving from the number of banks involved in the relationships is difficult to foresee. Normally, it may seem that a greater concentration of lender/borrower relationships can have a positive influence on credit availability through, for example, a system of efficient renegotiation of contracts, with reference to the information transparency perceived by the bank (Elsas, 2005 and Ongena and Smith, 2001). Under crisis conditions, however, the banks can adopt different stances either because of risk containment strategies or the effects of the crisis on the costs of loans (monetary policy intervention). Therefore, the effect of the intensity of a relationship on credit availability needs to be analyzed empirically.

The  $YEARS_i$  variable is calculated as a logarithm of the duration (in years) of the credit relationship between the bank and the firm  $i_{th}$ . Also this variable, like the previous one, represents an indirect indicator of the intensity of the relationship. The duration of the relationship is supposed to be directly connected to the intensity of the relationship, because of the accumulation of information over time on the part of the bank. This is the position emerging from various empirical investigations (Berger and Udell, 1995; Petersen and Rajan, 1994) including Boot (2000), who shows the positive effects also from the point of view of the collateral required and interest rates applied. This hypothesis, however, is not without uncertainties. In the event of a lengthy relationship, negative hold-up phenomena can materialize (for example, see Rajan and Raghuram, 1992). Furthermore, since the accumulation of information is not linear over time and the benefits increase in a way which is less than proportional to time (Diamond, 1991), it is not possible to exclude the possibility, in long-term relationships, that the borrower may be tempted to abandon them (Ongena and Smith, 2001). This also seems to be confirmed by Degryse and Van Cayseele (2000) who show a deterioration of the contractual conditions applied to the debt as the duration of the relationship increases.

During a credit crisis, the impact of this variable on credit availability can be interpreted in different ways. On one side, the policies of containing the risk could encourage the banks to greater severity in granting credit, favouring the best and the better known ones (flight to quality). On the other hand, pressure on the performance of the bank caused by credit turbulence could lead banks to assume opportunistic behaviour patterns towards the long term borrowers, applying worse prices with a reduction in the amount, without however, risking customer abandonment, since firms with a longer relationship have higher switching costs (De Mitri *et al.*, 2010).

The  $COLLAT_i$  variable is a *dummy* that has the value 1 if the firm  $i_{th}$  has collateral (at December 2007). The expected sign of the relationship is indeterminate since the underlying motivation of the borrower's incentive to supply collateral is unknown. In fact, firms spontaneously provide collateral to reduce the cost; however, the role of  $COLLAT_i$  is different if the pledging of collateral is required by the bank to reduce information gap with the borrowers (see, for example, the empirical evidence reported in Berger *et al.*, 2011).

Further, as it is not possible to distinguish between inside collateral and outside collateral, it is not possible to express judgment regarding the phenomena of moral hazard and adverse selection documented in, among others, Rajan and Winton (1995), or Besanko and Thakor (1987).

In order to reduce uncertainty about the expected sign of this *dummy*, it is necessary to take into consideration the connection that, at least in theory, should link it to the number of bank lenders (*NumBANK*). Fewer incentives for the lender to grant new credit (Thakor, 1996) have been observed for a firm having multiple relationships with other banks. From the intuitive point of view, such incentives could however, reappear for collateral, producing a positive relationship between the tendency of a bank to require guarantees and the number of lenders. On this basis, a rectified dummy variable was created, where 1 represents firms with multiple banking relationships. Using  $M_{NumBANK}$  to indicate the median of the *NumBANK* variable, the rule of construction of the *COLLAT* variable is:

a) with collateral at December 2007: if  $NumBANK_i > M_{NumBANK}$  then  $COLLAT_i = 1$ , otherwise  $COLLAT_i = 0$ ;

b) with no collateral at December 2007:  $COLLAT_i = 0$ .

Here, the *dummy* takes on the role of proxy for the riskiness of the firm (presumably it is the bank that requires collateral and not the firm that offers it) and it is expected to be negative. The median value is, for each of the four banks, a value able to minimize the phenomenon of collinearity (with *NumBANK*), which is potentially intrinsic to the method of construction of the  $COLLAT_i^2$ .

Hierarchical distance ( $DISTANCES_i$ ) is measured using confidential information on the degree of autonomy in decision-making at the various hierarchical levels within each bank.

The data in our possession make it possible to distinguish the hierarchical levels depending on their decision-making power and geographical position. For each bank,  $m$  hierarchical levels have been found. The hierarchical levels are distinguished by the amount of credit granted to the firm (for example, a loan officer can be responsible for loans up to  $\theta$  euros, while for loans up to  $\xi$  euros, where  $\xi > \theta$ , the decision maker belongs to a higher level in the bank's hierarchy).

Combining this confidential information with the geographical position of each loan office where the relationship began, it is possible to construct a measurement for the physical hierarchical distance between the levels of responsibility within the bank. Generally speaking, indicating the location of the loan office as A and the geographical position of the credit department responsible in firm  $i_{th}$  (with  $i = 1.. 8,153$ ) as B, we can calculate the distance between A and B for each firm (where  $A \leq B$ ).

In more formal terms, the following *proxy* of hierarchical distance valid for the  $i_{th}$  firm was used:

$$DISTANCE_i = \ln(1 + KM_{im}) \quad [4]$$

where  $KM$  is the distance in km between the loan office of the  $i_{th}$  firm and the  $m_{th}$  level in the organisational hierarchy with  $m = 0..z$ , where  $z$  shows the number of hierarchy levels for each bank ( $0 = \text{loan office}$ ,  $z = \text{Headquarter}$ ). If the loan is prepared and approved by the loan officer ( $m = 0$ ), the variable  $KM$  is 0. In other cases the distance (in *km*) was calculated from the physical position of the

<sup>2</sup> The intrinsic link between *COLLAT* and *NumBANK* could lead to a risk of collinearity between the variables which, however, is non-existent as far as these two studies are concerned. The first involved the simulation, for each of the four banks, of two different specifications of the model (1) because of the *COLLAT variable*: in the first specification, the *COLLAT* variable took the form described above, while in the second it was 1 when there were guarantees and 0 when they were lacking. In the shift from the first specification to the second, no multi-collinearity was noted regarding: the coefficients of bivariate correlation, the statistical significance of the regressors and the modularity of their signs. The second method of exploring collinearity concerned, on the other hand, the analysis of the correlation matrix and subjecting the variables to a VIF test, the results of which are shown in Tables A2 and A3 in the Appendix.

relationship and the place where the decision-maker was situated<sup>3</sup>. From an examination of the data in our possession, and in line with bank size (Bank 1 is the largest, see Table 1) the following number of hierarchical macro-levels ( $m_z$ ) emerged: 3, 3, 2, 1, respectively for Bank 1, Bank 2, Bank 3 and Bank 4.

In terms of the expected sign of the variable  $DISTANCE_i$ , in the case of larger banks, perhaps involved in M&A activities with other and smaller banks, resorting to extraordinary portfolio risk containment strategies would make a negative sign likely. Since the banks belonging to our sample have a somewhat reduced average hierarchical distance (Table A1 in Appendix) and in three out of four cases their activities are strictly limited to a part of the local area, it would be unwise to draw conclusions without empirical tests.

The last of the three variables used in the model is  $SALES_i$ , which represents the rate of growth (log values) of the turnover of the  $i_{th}$  firm between December 2007 and September 2009 (balance sheet 2007 and 2008) and has a control function as it expresses the contribution of the profitability profile of the firm to the credit growth. In any case, omitting it could bring about the over/under estimation of the contribution of the relationship lending variables. It is to be expected that the sign of  $SALES_i$  is positive.

To conclude the study, and for model [2] only, a series of  $K=4$  dummy control variables ( $SIZE_K$ ) were used to show the size of the firm. Each variable corresponds to a segment of the classification of the borrowers of each of the four banks. Specifically, the *SMALL-BIZ* variable is 1 if the firm is part of the *small business* class of the internal classification grid for each bank<sup>4</sup>; *RETAIL* is assigned a value of 1 if the firm is part of the *small and medium enterprises class*, *CORP* is 1 if the firm is part of the *corporate* class and, lastly, *Large CORP* assigns a value of 1 to the firms classified as *large corporate*. Largely speaking, we can say that family firms, self-employed and professionals fall into the *SMALL-BIZ* segment. Legally more complex firms (joint stock companies) and those with a turnover of between 1.0 and 2.5 million euros fall into the Retail category. Firms with a turnover of between 2.5 and 50 million euros are in the corporate segment, while those with over 50 million come under 'large corporate'.

## 6. EMPIRICAL RESULTS

The results obtained from model [1] using our unique cross section data (Table 5), show clear evidence for the positive effect of a "close bank-firm relationship" even during a crisis.

Concerning the relationship-oriented variables (*NumBANK* and *YEARS*), the *NumBANK* variable (the number of lending banks) is negative, wholly as expected. Considering its high statistical significance, this variable seems to have a determining role in the choice of lending patterns of the banks analyzed. These findings are in line with those of the descriptive analysis illustrated previously (par. 4).

The results for the *YEARS* variable do not appear univocal because the signs of the coefficient in the various banks in the sample alternate. From the point of statistical significance, the contribution of the variable also appears uncertain. The only acceptable value is for Bank 1, which, being positive, it might seem to confirm the positive effect of a long-term relationship on the availability of credit in particularly negative situations.

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<sup>3</sup> The distance was calculated with the aid of toponymic databases readily available on line. The distance value therefore expresses the "road" distance between the loan office and the decision-making centre. Other studies (Albaretto *et al.*, 2008) however refer to longitudinal and latitudinal measurements (*great circle*).

<sup>4</sup> To limit an excess of regressors, the *SMALL-BIZ<sub>i</sub>* variable constitutes, in fact, a synthesis of four classes of inside classification within the banks. Specifically, *SMALL-BIZ<sub>i</sub>* is 1 if the  $i_{th}$  firm belongs to one of the following classes of firms : *i*) small business; *ii*) family businesses and sole traders *iii*) private professionals. See Tables 1 and 2 for further details.

Table 5. Determining factors in the variations in granting loans (OLS, dependent variable:  $\Delta CREDIT$ )

<i>Indep. Var.</i>	<b>BANK 1</b>		<b>BANK 2</b>		<b>BANK 3</b>		<b>BANK 4</b>	
<b>Constant</b>	-1,713***	(.458)	-.138***	(.057)	-.096	(.192)	-.117	(.023)
<b>NumBANK</b>	-.757***	(.025)	-.792***	(.023)	-.845***	(.032)	-.936***	(.024)
<b>YEARS</b>	.559***	(.146)	-.0163	(.021)	.026	(.055)	.015	(.024)
<b>COLLAT</b>	-.254***	(.057)	-.0465	(.086)	-.191	(.220)	-.110*	(.059)
<b>DISTANCE</b>	-.124***	(.025)	.011*	(.006)	-.057**	(.028)	-.075*	(.057)
<b>SALES</b>	.106**	(.054)	.154***	(.030)	.114*	(.067)	.038***	(.038)
n° Obs.	2.017		2.745		1.216		2.175	
<i>F.-statistic</i>	259.96***	[0.000]	231.79***	[0.000]	140.47***	[0,000]	380.91***	[0.000]
$R^2$	0.3926		0.2973		0.3673		0.4566	

NOTES: Significance at the 10%, 5%, and 1% levels is denoted by \*, \*\*, and \*\*\*, respectively. In parentheses *standard errors*; in square brackets the *p-values*.

More likely, these oscillating results appear consistent with the idea that, from a bank's point of view, credit turbulence reduces the value of the duration of the bank-borrower relationship. During a crisis, the banks would neglect historical knowledge of the debtor, because what is most important for decision-making is the most current information rather than the number of years over which it was collected.

The incidence of *COLLAT* seems to have a negative effect on credit availability, even if the coefficient value is not significant for two of the banks that were studied. The sign of this dummy variable appears, however, to be in line with the choices made when the model was constructed. In fact, since *COLLAT*=1 takes not only the presence of guarantees into consideration, but also the number of lending banks, this means that the variable reflects the behaviour of the banks towards widely multi-funded firms. It is possible to argue that in cases of increasing risk, like those produced by financial turmoil, banks are encouraged to reduce the volume of credit to firms with whom their relationship is less exclusive and where the most significant credit share is held by other lenders (i.e., where the investment is potentially more risky).

As for the *DISTANCE* variable, the sign of the coefficients is, with one exception (Bank 2), negative and the significance levels appear adequate in only two cases. Consequently, with a certain degree of prudence, it may be said that an increase in banks' hierarchical distance reduces credit availability. Since our empirical study was carried out in a period of credit turbulence, it is likely that the lowering of company ratings (not observable from our data, albeit highly probable) has caused a shift in decision-making to higher hierarchical levels with a consequent increase in the weight given to quantitative information. Also, given that the hierarchical distance affects the dissipation of soft information (the greater the distance, the less soft information reaches the decision-makers), it is possible that with this increase in distance, hard information, which is procyclic, becomes more significant.

The results of the model on the impact of the turnover (*SALES*) variable, lastly, confirm the expected sign. The positive sign of the coefficients and their statistical significance shown for the four banks emphasise how also accounting information contributes to influencing a bank's decision on whether it will grant credit. The low value of the coefficients presumably depends on the fact that during a financial crisis, turnover does not represent a significant variable in banks' decisions on credit.

The results of the model [1] seem, ultimately, to confirm the validity of hypothesis I and, albeit partially, hypothesis II. It remains, however, to be seen whether the results obtained are influenced by the size of the companies in the sample. In other words, it is necessary to test whether the quality of the relationship and its ability to mitigate the effects of the crisis, are influenced or not by the size factor.

To do this, the data available were used to estimate a model [2], whose results are shown in Table 6.

As was foreseeable, the signs and intensity of the contributions made by the explanatory variables, for the interpretation of the dependent variable were confirmed. That is to say, the positive role played by the banking relationship in mitigating the reduction in credit availability due to financial disaster in the event of crisis in controlling the reduction in the credit supply (*Hypothesis I*) and the negative effects on the loan decision by an increase in hierarchical distance between the centre and the periphery of the bank's organisation (*Hypothesis II*).

As for the size variable, the study shows how the size of a company remains an important element in influencing banks' credit behaviour, also in times of crisis. In fact, the results obtained from model [2] show the positive contribution of the size of a firm in terms of credit availability, indicating higher credit rationing for the smaller firms (small and very small firms, *SMALL-BIZ*). The *large corporate* results are difficult to explain because of the small numbers of firms available in the different banks and the same is true for the *corporate* category on account of their low statistical significance, so attention will be focused on the small and medium enterprises (SMEs) i.e., on the typical client range of the banks under analysis.

Table 6.  
Determining factors in the variation of credit granted (OLS, dependent variable:  $\Delta CREDIT_i$ )

<i>Indep Var.</i>	<b>BANK 1</b>		<b>BANK 2</b>		<b>BANK 3</b>		<b>BANK 4</b>	
<b>Constant</b>	-1,075**	(.472)	-.205	(.185)	-.214	(.198)	-.354	(.219)
<b>NumBANK</b>	-853***	(.033)	-.821***	(.027)	-.771***	(.040)	-.978***	(.030)
<b>YEARS</b>	.426***	(.145)	-.034	(.021)	.031	(.055)	.013	(.023)
<b>COLLAT</b>	-.209***	(.058)	-.065	(.085)	-.206	(.220)	-.093	(.059)
<b>DISTANCE</b>	-.126***	(.025)	.012*	(.006)	-.059**	(.028)	-.065	(.057)
<b>SALES</b>	.095*	(.053)	.151***	(.029)	.127*	(.067)	.227***	(.038)
<b>SMALL BIZ</b>	-.596***	(.114)	-.090	(.178)	-.149	(.207)	<i>n.a.</i> <sup>§</sup>	
<b>RETAIL</b>	-.035	(.049)	.203	(.175)	.154*	(.084)	.324***	(.055)
<b>CORP</b>	-.022	(.087)	.165	(.172)	-.051	(.094)	.282***	(.066)
<b>LargeCORP</b>	<i>n.a.</i> <sup>§</sup>		<i>n.a.</i> <sup>§</sup>		-.388**	(.192)	.321**	(.134)
N° Obs.	2.017		2.745		1.216		2.175	
<i>F-statistic</i>	177.88***	[0,000]	153.89***	[0,000]	80.60***	[0,000]	238.33***	[0,000]
<i>R</i> <sup>2</sup>	0.4148		0.3103		0.3756		0.4682	

NOTES: \*\*\* statistically significant to 1%, \*\*statistically significant to 5%, \* statistically significant to 10%. *Standard errors* in parenthesis; *p-value* in square brackets.

<sup>§</sup> Where there is a dummy with a predominance of 0 signs, the software adopted recognizes its regression coefficient as barely significant, and does not include its results.

This finding may be intuitively explained on at least two grounds. The first is related to a numerical bias of data: since SMEs have lower initial volumes of credit (the denominator of  $\Delta CREDIT_{ji}$  variable), they are subject to a further overestimation of the variation in credit granted. The second reason is related to a perception of small and micro enterprises as being riskier in the light of the current crisis, even despite the preferential regulatory treatment for SME loans. According to the new capital adequacy framework (IRB approach), SME loans below an exposure size of €1 million can be handled in the retail portfolio. In this case, the capital requirements are lower than those for SMEs classified in the corporate portfolio, with the same level of risk. This special treatment is explained by the tendency of SMEs to be more affected by idiosyncratic shocks than by systemic factors and apparently seems to protect small firms from credit rationing. However, this tendency cannot come about during abnormally severe periods of crisis, in some countries especially. For the Italian firms, Chionsini *et al.* (2010) show, for example, that smaller firms' PDs tended to be less

cyclical than those of larger firms until the recent financial crisis, yet during the credit turbulence taking place since August 2007, all firms (both SMEs and large firms) are tending to be more cyclical and in some cases SMEs seem to be even more cyclical than larger ones.

At the same time, and without considering any regulatory implication, the results obtained can be interpreted by jointly examining the types of bank and the type of client. SMEs are a category which has been hit hard by the crisis, and which because of their limited contractual ability have seen a reduction, proportionate to their turnover, in the credit granted by the banks in the sample. The firms in the other segment (retail, corporate, large corporate), on the other hand, despite being small, are probably large enough, in their context, to be able to negotiate the management of their needs with banks so as to weaken the effects of the crisis.

## 7. CONCLUSIONS.

The research aimed to ascertain the theories on *relationship banking* during a period of deep economic and financial crisis. We have studied lending patterns during the 2007-2009 credit market turbulence to investigate the ability of relationship banking to mitigate adverse credit conditions for borrowers. Taking advantage of a unique firm-level dataset, our investigation examined the market for loans to Italian firms offered by four domestic banks.

The main hypothesis examined in this study is based on the idea that a strong bank-borrower relationship may have a positive effect on the credit made available to firms. Banks would therefore seem able, even in the midst of crisis, to take into consideration the nature of their relationship with their clients when making their financial choices, favouring more consolidated relationships over those of a more transactional nature.

Further, to the extent that bank-firm distance is negatively related to soft local information gathering, the availability of confidential data on the hierarchical levels of decision-making within each bank investigated, allow us to analyze the aptitude of bank-firm proximity to generate a lender's informational advantage.

Our main results can be summarized as follows. During the period under review (Dec 2007-Sept 2009), banks heavily reduced the amount of credit to borrowers. However, firms with exclusive (single-funded) or quasi-exclusive (few lenders) relationships were less exposed to this credit reduction. The number of banks and the length of the relationship are the main variables that explain the probability that the firm undergoes less intensely a shock in the credit markets. This result is fully consistent with the view that relationship lending helps overcome such information gaps, thus benefiting lenders while reducing credit tightening effects on borrowers. Having confidential information regarding the geographical location of the credit department responsible for the loans for each firm, it has been possible to build a measure for the physical hierarchical distance that exists within the bank. This measure is innovative because we do not limit our analysis to the traditional distance between the firm and the branch office where the loan originated from (and the soft information gathered), but we also take account the distance between the levels of responsibility within the bank. In more formal terms, indicating the location of the loan office as X and the geographical position of the credit department responsible in firm  $i_{th}$  (with  $i= 1.. 8153$ ) as Y, we can calculate the distance between X and Y for each firm (taking a value of 1 when  $X=Y$ ).

We find that distance drives a special trade-off in credit availability: the closer a firm is to its credit office, the greater the availability of credit from the bank. Since during the 2007-09 period we observed a general reduction in credit, this means that the closer a firm is to its loan office, the lower the credit tightening effect. These results are in agreement with the theoretical predictions based on the aptitude of bank-firm proximity to reduce the information gap, also when a credit market shock has occurred.

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## LITERATURE CITED

- Albertazzi U., Marchetti D. J. (2010), "Credit supply, flight to quality and evergreening: an analysis of bank-firm relationships after Lehman", Banca d'Italia, Working Paper (Temi di Discussione), n. 256.
- Alessandrini P., Presbitero A.F., Zazzaro A. (2009), "Banks, Distances and Firms' Financing Constraints", *Review of Finance*, Vol. 13, pp. 261-307.
- Alessandrini, P., Croci, M. e Zazzaro, A. (2005), "The geography of banking power: the role of functional distance", *BNL Quarterly Review*, 235, pp. 129-67.
- Angelini P., Di Salvo R., Ferri G. (1998), "Availability and cost of credit for small businesses: Customer relationships and credit cooperatives", *Journal of Banking and Finance*, 22, pp. 925-954.
- Berger A. N., Demsetz R. and Strahan P. (1999), "The Consolidation of the Financial Services Industry: Causes, Consequences, and Implications for the Future", *Journal of Banking and Finance*, 23, pp. 135-194.
- Berger A. N., DeYoung R. (2001), "The Effects of Geographic Expansion on Bank Efficiency", *Journal of Financial Services Research*, Vol. 19, pp. 163-184.
- Berger, A.N. and G. F. Udell (2006), "A more complete conceptual framework for SME finance," *Journal of Banking and Finance*, Vol. 30, n.11, 2945-2966.
- Berger, A. N., Espinosa, M.A., Frame W.S, Miller, N.H., (2011), "Why do borrowers pledge collateral? New empirical evidence on the role of asymmetric information", *Journal of Financial Intermediation*, Vol. 20, pp. 55-70.
- Besanko D., Thakor A. V. (1987), "Collateral and Rationing: Sorting Equilibria in Monopolistic and Competitive Credit Markets", *International Economic Review*, Vol. 28, pp. 671-689.
- Bongini P., Di Battista M., Nieri L. (2009), "Relationship banking: una soluzione antica contro la crisi recente?", *Bancaria*, Vol. 5.
- Boot A. W.A. (2000), "Relationship banking: what do we know?", *Journal of Financial Intermediation*, Vol. 9, pp. 7-25.
- Canales R, Nanda R., (2008), "The Dark Side of Decentralized Banks. Market Power and Credit Restraint", *Harvard Business School Working Paper* 08-101.
- Cerqueiro G., H. Degryse Ongena S., (2007), "Distance, Bank Organizational Structure and Credit", *Tilec Discussion Paper* n. 18.
- Chionsini G., Marcucci J., Quagliariello M., "The Treatment of Small and Medium Enterprises in Basel 2: So Right, So Wrong?", working paper presented at Procyclicality and Financial Regulation Conference, University of Tilburg, 11-12 march 2010.
- Coco G., Ferri G., (2010), "From shareholders to stakeholders finance: a more sustainable lending model" *International Journal of Sustainable Economy*, Vol. 2, pp. 352-364.
- De Mitri, S., G. Gobbi and E. Sette (2010), "Relationship Lending in a Financial Turmoil", Banca d'Italia, Working Paper (Temi di Discussione), n. 772.
- Degryse H., Van Cayseele P. (2000), "Relationship Lending within a Bank-Based System: evidence from European Small Business Data", *Journal of Financial Intermediation*, Vol. 9, pp. 90-109
- Degryse H., Ongena S., (2005), "Distance, Lending Relationships, and Competition", *Journal of Finance* Vol. 60, pp. 231-266.
- Detragiache E., Garella P., Guiso L. (2000), "Multiple versus Single Banking Relationships: Theory and Evidence", *Journal of Finance*, Vol. 55, pp. 1133-1161.
- Diamond D.W. (1991), "Monitoring and Reputation: the Choice between Bank Loans and Privately Placed Debt", *Journal of Political Economy*, Vol. 99, pp. 689-721.
- Elsas R. (2005), "Empirical determinants of relationship lending", *Journal of Financial Intermediation*, Vol. 14, pp. 32-57
- Elsas R., Krahen J.P. (1998), "Is Relationship Lending Special? Evidence from Credit File Data in Germany", *Journal of Banking and Finance*, Vol. 22, pp. 1283-1316.
- Farinha L. A., Santos J. A.C. (2002), "Switching from Single to Multiple Bank Lending Relationships: Determinants and Implications", *Journal of Financial Intermediation*, Vol. 11, pp. 124-151.
- Felici R., Pagnini M. (2005), "Distance, bank heterogeneity and entry in local banking markets", Banca d'Italia, Working Paper (Temi di Discussione), n. 557.
- Ferri G., Kang T.S., Kim I.J. (2001), "The Value of Relationship Banking During Financial Crises: Evidence from the Republic of Korea", *World Bank Policy Research Working Paper* No. 2553.
- Ferri, G, Riggi M.R., Rotondi Z. (2009), "Inside the crisis: the importance of the bank-firm relationship in harsh times", in Bracchi G. e Masciandaro D. (a cura di), *Quattordicesimo Rapporto sul Sistema Finanziario Italiano*, Edibank.

- Guiso L., Minetti R., (2004), “Multiple Creditors and Information Rights: Theory and Evidence from US Firms”, CEPR Discussion Paper n. 4278.
- Harhoff D., Körting T. (1998), “Lending relationships in Germany Empirical evidence from survey data”, *Journal of Banking and Finance*, Vol. 22, pp. 1317-1353
- Howorth C., Peel M. J., Wilson N. (2003), “An Examination of the Factors Associated with Bank Switching in the U.K. Small Firm Sector”, *Small Business Economics*, Vol. 20, pp. 305-17.
- Ivashina V., Scharfstein D., (2010), “Bank Lending During the Financial Crisis of 2008”, *Journal of Financial Economics* 97, 319-338.
- Jiangli W., Yom C., Unal H. (2008), “Relationship Lending, Accounting Disclosure, and Credit Availability During the Asian Financial Crisis”, *Journal of Money Credit and Banking*, Vol. 40, pp. 25-56.
- Mocetti S., Pagnini M., Sette E., (2010), “Information technology and bank organisation”, Banca d’Italia, Working Paper (Temi di Discussione), n. 752.
- Ongena S., Smith D. (2001), “What determines the number of bank relationships? Cross-country evidence”, *Journal of Financial Intermediation*, Vol. 9, pp. 26–56
- Petersen M.A., Rajan R.G. (2002), “Does distance still matter? The information revolution in small business lending”, *Journal of Finance*, Vol. 57, pp. 2533-2570.
- Petersen M.A., Rajan R.G. (1994), “The benefits of lending relationships”, *Journal of Finance*, Vol. 49, pp. 3–37.
- Petersen M.A., Rajan R.G. (1995), “The effect of credit market competition on lending relationships”, in *Quarterly Journal of Economics*, Vol. 110, pp. 407-443
- Rajan R. G. (1992), “Insiders and outsiders: The choice between informed and arm’s length debt”, *Journal of Finance*, Vol. 47, pp. 1367–1400.
- Rajan R.G., Winton A. (1995), “Covenants and Collateral as Incentives to Monitor”, *Journal of Finance*, Vol. 50, pp. 1113-1146.
- Shrieves R. E., Dahl D., (1995), “Regulation, Recession, and Bank Lending Behaviour: The 1990 Credit Crunch”, *Journal of Financial Services Research*, Vol. 9, pp. 5-30.
- Stein J. (2002), “Information Production and Capital Allocation: Decentralized versus Hierarchical Firms”, *Journal of Finance*, Vol. 57, pp. 1891-1922.
- Thakor A.V. (1996), “Capital Requirements, Monetary Policy, and Aggregate Bank Lending: Theory and Empirical Evidence”, *Journal of Finance*, Vol. 51, pp. 279-324.
- Von Thadden E.L. (1995), “Long-term contracts, short term investment and Monitoring”, *Review of Economic Studies*, Vol. 62, pp. 557-575.

APPENDIX

Table A.1  
Variables and summary statistics

<i>variables</i>		BANK 1	BANK 2	BANK 3	BANK 4
<i>ΔCREDIT<sub>i</sub></i>	Mean	-0.6357	-0.1735	-0.4413	-0.6472
	Median	-0.7647	-0.3751	-0.6494	-0.7842
	St. Deviation	0.4422	2.9006	1.2564	0.3998
	Skewness	5.849	43.3597	16.215	4.2615
<i>YEARS</i>	Mean	3.0321	2.2863	2.3859	2.0856
	Median	3.0445	2.3978	2.3978	2.0794
	St. Deviation	0.13213	0.7629	0.5210	0.7996
	Skewness	-8.201	-0.7187	-0.6023	-0.1762
<i>NumBANK<sub>i</sub></i>	Mean	1.3895	1.6971	1.1137	1.2698
	Median	1.3862	0.6931	1.0986	1.3862
	St. Deviation	0.82506	0.6858	0.8168	0.8135
	Skewness	0.02475	0.6336	0.2056	0.0534
<i>COLLAT<sub>i</sub></i>	Mean	0.15711	0.0377	0.01497	0.1161
	Median	0.0000	0.0000	0.0000	0.0000
	St. Deviation	0.36399	0.19059	0.1214	0.32042
	Skewness	1.8844	4.8517	7.9877	2.3966
<i>DISTANCE<sub>i</sub></i>	Mean	3.3068	3.4908	3.4883	2.4747
	Median	3.6375	5.1929	3.6109	2.258
	St. Deviation	0.7932	2.4633	0.9937	0.3248
	Skewness	0.1843	-0.6780	-0.8993	0.8351
<i>SALES<sub>i</sub></i>	Mean	-0.0169	0.0300	-0.0147	0.3193
	Median	-0.0090	0.02549	0.0178	0.0098
	St. Deviation	0.3563	0.5455	0.3965	2.6586
	Skewness	-4.7608	-0.1019	-1.6539	2.8192

Table A.2  
Correlation matrix

	<i>YEARS</i>	<i>NumBANK</i>	<i>COLLAT</i>	<i>DISTANCE</i>	<i>SALES</i>
<i>NumBANK</i>	0.0405 <sup>A</sup> 0.0683 <sup>B</sup> 0.1002 <sup>C</sup> 0.0594 <sup>D</sup>	1			
<i>COLLAT</i>	-0.0366 0.0362 0.0217 0.0833	0.3711 0.0701 0.0363 0.3417	1		
<i>DISTANCE</i>	-0.1237 0.0335 -0.3594 -0.2483	0.2383 -0.0279 0.0180 0.1001	0.1340 -0.0273 0.0234 0.0119	1	
<i>SALES</i>	0.0108 -0.0770 -0.0508 -0.1197	-0.1710 -0.0187 -0.1558 -0.1366	-0.0151 -0.0647 0.0381 -0.0244	-0.0287 -0.0211 0.0055 0.0351	1

<sup>A</sup> Bank 1 - <sup>B</sup> Bank 2 - <sup>C</sup> Bank 3 - <sup>D</sup> Bank 4

Table A.3  
Multicollinearity Test

Variables		Variation Inflation Factor (VIF)	Eigen values	Condition Index	R <sup>2</sup>
<i>COLLAT</i>	Bank 1	1.16	1.3686	1.0000	0.1359
	Bank 2	1.00	1.0527	1.0000	0.0028
	Bank 3	1.00	1.0411	1.0000	0.0017
	Bank 4	1.13	1.3417	1.0000	0.1167
<i>NUMBANK</i>	Bank 1	1.16	0.6314	1.4723	0.1359
	Bank 2	1.00	0.9473	1.0541	0.0028
	Bank 3	1.00	0.9589	1.0420	0.0017
	Bank 4	1.13	0.6583	1.4276	0.1167