Collateral down the Road: Test of the Lender-Based Theory of Collateral

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Abstract

In this paper we test the lender-based theory for the use of collateral in bank lending. Using the physical proximity between local banks and borrowers to capture informational advantage over borrowers and the magnitude of transactions costs associated with the use of collateral, we provide evidence that is inconsistent with the lender-based view and in line with some borrower-based explanations. Specifically, we show that collateral requirements increase with the distance between local lender and borrowers, conditional on the borrower obtaining credit from the local bank. Our results are robust to estimation approaches that endogenize the loan contract terms and allow for joint determination of collateral and interest rates.

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I. Introduction

Collateral pledged by the borrower as a guarantee to the lender is a loan contract feature that is often observed in bank lending. Theoretical research offers various explanations for the use of collateral, traditionally focused on borrower characteristics or actions (Coco, 2000). Recent theoretical advances, however, have started to shift the paradigm explaining the use of collateral in bank lending from this more established, borrower-based perspective to a lender-based view (Inderst and Mueller, 2007). While existing literature offers substantial empirical evidence on the relevance of several borrower-based explanations for the use of collateral (e.g., Berger, Frame and Ioannidou, 2011; Berger et al., 2011), insights into the lender-based view are scant and offer only limited evidence on the theoretical predictions. Therefore, in this paper we propose and design an empirical strategy that allows us to examine the unique predictions of the lender-based view of collateral. At the heart of our test is the identification of "local lenders" and their informational advantage, as distinctive features of the theory. Specifically, we rely on a unique, proprietary dataset that covers all loans made in 2004 and 2006 by a regional Italian bank to firms located in its two major geographical markets of operation (i.e., the province where our bank is headquartered and the neighboring province). Then we consider the differential impact of bank-borrower physical proximity, as a measure of local information advantage, on collateral and interest rate as predicted by the lender-based theory.

Traditional borrower-based explanations of collateral focus on actions or characteristics of the loan applicant, and predict that collateral could be used as a mechanism to mitigate ex-post incentive problems that could lead to moral hazard, a screening device that allows borrowers to signal ex-ante their private information to avoid adverse selection, or a device to mitigate difference of opinions between borrowers and lenders about project returns (Chan and Kanatas, 1985; Besanko and Thakor, 1987).

The lender-based theory (Inderst and Mueller, 2007) abstracts from such actions and characteristics and models collateral as a mechanism to minimize distortions when credit decisions are based on soft information. The key distinction in this theory is between local banks, with information advantage and superior ability to assess the value of borrowers' projects, and transaction lenders, with loan underwriting cost advantage. Competition from such lenders limits the ability of the local banks to charge high interest rates and some marginally profitable projects are consequently rejected. Collateral, by increasing the local bank's payoffs in low cash flow states, reduces this inefficiency and makes lending to some firms with marginally profitable projects feasible. Importantly, the competitive pressure by the transaction lenders is mitigated by

the information advantage of the local bank. Thus, it can offer credit at higher (lower) interest rates, but with lower (higher) collateral, to borrowers who are less (more) likely to be poached by the competing distant transaction banks, i.e. borrowers for whom the information advantage of the local lender is relatively large (small).

Our paper develops an identification strategy and conducts an empirical analysis intended to test the lender-based theory for the use of collateral in bank lending. The underlying rationale is to identify a characteristic or a factor related to the information advantage of the local banks – a key element of the lender-based view. We propose a factor, which will be discussed next, that is inversely related to the information advantage of the local banks and investigate empirically whether an increase in this factor affects negatively collateral requirements and positively interest rates, as predicted by the lender-based theory. In addition to that, our regional bank focuses its lending on few markets close to the headquarters and largely populated by competing transaction banks. Thus, by design, we capture precisely the type of lender that is the focus of the lender-based theory.

The identifying factor adopted to test the relevance of the lender-based theory of collateral is based on the physical distance between lender and borrower. Physical distance between the contracting parties could facilitate the production, collection and interpretation of soft information (e.g., Agarwal and Hauswald, 2010). Therefore, for borrowers located far from the local lender, the information advantage of this lender over transaction lenders should be lower. The lender-based view, thus, predicts that collateral requirements should increase with the distance between local lender and borrowers, conditional on the borrower obtaining credit from the local bank. The opposite should hold for interest rates.

To implement the empirical test, we use a proprietary dataset of loans granted to a large number of small and mid-sized enterprises (SMEs) in the period 2004-2006 by a regional Italian bank, simply *the bank* hereafter. This dataset offers two distinct advantages. First, as the lender-based view of collateral focuses on "local lenders", it is important to ensure that the lending bank indeed exhibits such characteristics. By its business model, strategy to serve local SMEs, and geographic reach of operations, our bank conducts local business and represents well the modeling assumptions underlying the theory. Second, the dataset offers detailed information on bank-borrower lending relationships, borrower information, and lender characteristics. As a result, it allows us to examine the explanatory power of the above-mentioned arguments, while taking into account various factors that affect the bank-borrower interaction and loan contract terms.

We start our analysis by examining the association between collateral requirements, interest rates and bank-borrower distance within a Seemingly Unrelated Regressions (SUR) framework that incorporates the joint determination of these factors. However, as argued by Brick and Palia (2007), among others, loan contract features cannot be considered in isolation. Moreover, the existing explanations for collateral identify various trade-offs with respect to interest rate and collateral in the contracting process. Therefore, we explicitly recognize that interest rates and collateral requirements are determined endogenously, i.e. within the model. To incorporate this point, we adopt a simultaneous equations approach using a 3-Stage Least Squares (3SLS) model that enhances the efficiency of our estimates.

Our analysis indicates that collateral requirements decrease with the distance between bank and borrower, i.e. when the costs associated with the use of collateral are relatively high. Specifically, borrowers located farther away from the bank's lending branch are less likely to pledge collateral as a guarantee to the lender. Consistent with the theoretical trade-offs, loan interest rates are increasing in the physical distance between the contracting parties. In addition to that, our results are robust to instrumenting for the endogenous nature of the loan features using characteristics of the bankruptcy process in Italy and specific pre-determined contractual provisions.

The results of our tests offer insights that seem inconsistent with the lender-based theory for the use of collateral in small business lending, which predicts that collateral requirements should increase with the distance from the borrower. By contrast, our results are consistent with alternative views of collateral derived from borrower-based explanations. Specifically, various studies suggest that the use of collateral entails costs to the contracting parties associated with monitoring of collateral and its eventual repossession (Chan and Kanatas, 1985; Besanko and Thakor, 1987). If these transaction costs are increasing with distance between borrower and lender (e.g., Bellucci et al., 2013; Chiappori et al., 1995; Sussman and Zeira, 1995; Almazan, 2002), collateral requirements (interest rates) should be higher (lower) in the vicinity of the lender, and lower (higher) for borrowers located farther away, similar to the pattern observed in our empirical analysis.

To the best of our knowledge, only one paper offers some insight into the importance of the lender-based theory of collateral (Jimenez et al., 2009). Using a sample of loans granted by Spanish banks, and organizational distance (i.e., the distance between borrower location and the headquarters of the lending bank[1]) as a proxy for the information gap among competing banks

[1] This distance has alternatively been labelled in the banking literature as functional distance (Alessandrini et al. 2005, 2009), hierarchical distance (Liberti and Mian, 2009), or branch-to-headquarter distance (DeYoung et al., 2004).

about local market conditions, the authors document higher incidence of collateral for loans granted by local lenders (i.e., those organizationally closer to borrowers). In addition, consistent with the lender-based theory, the study also finds that the effect of organizational distance on the incidence of collateral is lower (and even positive) for young and small firms and for new borrowers, i.e. for loans granted to borrowers characterized by lower information advantage.

Our study improves upon the existing research along two critical dimensions that allow us to provide a more focused and powerful test of the lender-based theory of collateral. First, we directly observe collateral and interest rate requirements for loans to local firms made by a local bank. As postulated by theory, this type of bank has information advantage vis-à-vis competing transaction banks, which can lend at lower cost. By contrast, Jimenez et al. (2009) use an indirect identification approach that approximates loans by local lenders with the loans granted by banks that are organizationally close to their borrowers. Under this indirect approach, loans made by large, hierarchically organized, transactional lenders to firms located nearby their headquarters could be improperly viewed as being made by local lenders. This could also lead to the former type being imprecisely ascribed a competitive advantage in handling soft information. Second, we jointly estimate collateral and interest rate requirements: The interaction between these contract terms is fundamental to the arguments advanced by the lender-based (as well as borrowed-based) theoretical model and crucial for its proper identification.

The rest of the paper is organized as follows. In the next Section, we describe in more detail our empirical strategy and identification approach. Context and data are discussed in Section III. We present our main results in Section IV. Section V concludes.

II. Testable implications and empirical strategy

The lender-based theory for the use of collateral in bank lending abstracts from borrower characteristics or actions, i.e. it describes an economic environment without moral hazard or adverse selection. Rather than focusing on borrower types, the lender-based model developed by Inderst and Mueller (2007) focuses on types of lenders: Specifically, it distinguishes between local lenders and distant transaction lenders, and discusses how the presence of a distant bank affects the characteristics of the loan contract between the local bank and the borrower.

The key feature of the local lender is superior ability to discern the quality of borrower's project when lending is based on soft information. By contrast, distant transaction lenders, who are perfectly competitive and also compete with the local bank, rely only on hard information

when making lending decisions. The competition limits the price, i.e. interest rate, the local lender can charge and, as a result, some borrowers are inefficiently denied credit as denial by the local bank implies denial by transaction lenders as well. Within this model, collateral arises as a mechanism that resolves this inefficiency by flattening the local lender's payoff function, i.e. providing (partial) recovery in adverse states of the world. Consequently, borrower's participation necessities a reduction in the interest rate, hence the local lender trades off lower loan rates in exchange for higher collateral requirements. By contrast, transaction lenders compete only along the price dimension, and as the competition by these lenders increases, the local bank faces an ever increasing pressure that prevents it from charging higher rates.

An important factor that allows the local lender to maintain advantage vis-à-vis competitors is related to its knowledge of local economic environment, among others. In the presence of soft information and local knowledge, transactions lenders cannot compete effectively. This, in turn, allows the local lender to keep a high interest rate and reduces the usefulness of collateral. As a result, the lender-based view of collateral predicts that, all else equal, loans for which the local lender's informational advantage is higher will be less susceptible to competition from the distant transactions lenders, and thus characterized by lower collateral requirements and higher interest rates.

As highlighted by the above discussion, the key factor that allows testing the lender-based explanation for the use of collateral is the local bank's information advantage. In our empirical model we capture such informational advantage by using the physical proximity between borrowers and our local bank. Indeed, the quality of information available to the lending officer is directly related to the proximity between the officer and borrower's economic and social environment (Agarwal and Hauswald 2010). Hence, if banks exploit their local monopoly and information advantage, the incidence of collateral should be lower in the vicinity of the local lending bank, i.e. for closely located borrowers who are less likely to be subject to competitive pressure from transaction banks. Importantly, the lender-based theory of collateral further implies a trade-off in terms of collateral and interest rate for the optimal contract.

In sum, as informational advantage is inversely related with distance, the lender-based model stipulates that for the local lender the relationship between distance and collateral - conditional on interest rate - is positive: As long as distance increases, the local lender increases collateral requirements and decreases the interest rate.

To examine this argument, we estimate an empirical specification, outlined in equations (1) and (2) below, that allows us to model the use of collateral in loans by the local lender and its contract price of credit:

$$Collateral_{it} = \alpha_C + \beta_C \left(Distance\right)_{it} + \gamma_C \left(Rate\right)_{it} + \sum_{k=1}^{n} \lambda_{C,k} x_{itk} + \varepsilon_{C,it} \quad (1)$$

$$Rate_{it} = \alpha_R + \beta_R \left(Distance\right)_{it} + \gamma_R \left(Collateral\right)_{it} + \sum_{k=1}^{n} \lambda_{R,k} x_{itk} + \varepsilon_{R,it} \quad (2)$$

where *Collateral* is a measure of collateralization of the credit line (we use either the percentage fraction of the credit line that is secured by collateral or an indicator for presence of collateral), while *Rate* is the interest rate charged by the local bank. Terms and coefficients indicated by a sub-script *C* (*R*) refer to our collateral (interest rate) equation. The key variable of interest is *Distance*, i.e. the physical distance between borrower and the lending branch of the local bank. A set of controls *X* is also included. Note that this set consists of various characteristics of the borrower, bank-borrower relation, and fixed effects for industry, bank branch, credit market and time.

We begin our estimation using a SUR framework that allows for lack of independence between equations (1) and (2). Specifically, the errors in both equations are allowed to exhibit form of correlation. Next, we explicitly recognize that the theoretical models predict that both contract terms, i.e. interest rate and collateral, are jointly determined within the same model. To incorporate the endogenous nature of these variables, we estimate the system presented in equations (1) and (2) using a 3-SLS. This approach improves upon the standard 2-SLS procedure by enhancing the efficiency of our estimates. Identification requires instruments for each endogenous variable, i.e. variables that appear in one equation but not in the other, which we discuss in the following section along with the data and control variables.

III. Context, data and variables

A. Italian Context

The Italian banking sector is the fourth largest in Europe, with almost 750 banks and similar to the experience of other European banking sectors, it underwent a process of substantial transformation during the last two decades. With this, the local reach of banks in Italy increased over time[2]. Importantly, similar to trends observed in other European countries, the degree of

[2] The average number of banks per province was around 28 in 2008, compared to 25 in 2000. This development has contributed to a greater competition in provincial and regional markets. In the two local credit markets we study, the average number of banks is 16 and 30, respectively, while regional branch density is 7.8 (per 10,000 people). This figure is 5.7 for Italy, which is close to the EU average.

internationalization of the Italian banking system went up over time, but the presence of foreign banks in retail banking remains limited. Despite processes of globalization and consolidation, credit intermediation towards domestic households and firms remains one of the key goals of the Italian banking system. The profitability and efficiency of the Italian banking sector is also largely comparable to the sectors of other European countries such as Germany and France (see, for instance, review by Drummond et al. 2007). Thus, the Italian banking system appears suitable for researchers to offer some insights relevant for a broader context.

Narrowing down our focus on the use of collateral, additional stylized facts about the Italian banking system and data make it a relevant setting for examining the role of collateral. For instance, a large number of bank loans granted in Italy are secured by personal guarantees and collateral required by lenders to cover losses in case of default by the borrower. This is necessary to mitigate informational problems and/or to comply with Italian regulations. As shown in Table 1, the share of unsecured loans granted to sole proprietorships between 1999 and 2005 ranges from 21% to 26%. Similarly, less than 50% of the loans extended to corporations are unsecured. These statistics imply that collateral is important and prevalent contract feature in bank lending in Italy.

Our analysis focuses on collateral pledged by non-financial corporations (firms) and sole proprietorships by means of a large proprietary dataset of loans granted by a major Italian bank to SMEs in the period 2004-2006. Previous papers that analyze the role of bank loan guarantees in the Italian economy are rare, and mainly focus on their impact on interest rates, implicitly following the borrower-based perspective. For example, Pozzolo (2004) suggests that collateral seems to be used as a signaling device to solve adverse selection problems, while Calcagnini et al. (2014) find that collateral affects the cost of credit for Italian firms by systematically reducing the interest rate of secured loans.[3]

B. Dataset

To examine the implications of the lender-based theory of collateral, we use a unique proprietary dataset of credit lines granted to SMEs by a major Italian bank (hereafter, simply *the bank*) as of

[3] Generally, there are two stylized facts in Italian data on the role of collateral that are worth exploring. First, the majority of bank loans is secured by guarantees that are required by banks to cover losses in the case of borrowers' default. This is necessary to mitigate informational problems, or to comply with Italian regulations, according to which mortgages must be collateralized. However, between 1999 and 2005 the share of firm unsecured loans was, on average, well above 40 percent of total loans, showing that collateral is not a necessary condition to obtain credit (Table 1). Second, Italian data for collateral pledged by non-financial corporations (firms), show that during the period 1999-2005 the share of collateralized loans grew from 24% in 1999 to 32% in 2005. However, unsecured loans are the most important loan category: they are almost half of firms' total loans. Consistently with the Italian data, in our dataset on average, almost 30% of borrowers provide collateral, and this share increases to 35% if we consider *Sole Proprietorships*, while for corporations it decreases to 21% (Table 2).

September 2004 and 2006. The dataset covers the bank's entire portfolio of credit lines in two Italian provinces, managed by more than 60 bank branches. The dataset cover a diverse portfolio of borrowing firms including *Sole Proprietorships* (43%), *Corporations* (33%) and *Cooperatives*, operating in more than 23 sectors of economic activity.[4] The dataset includes information on loan contract terms, aspects and nature of the lending relationship, borrower characteristics and characteristics of the local credit market and lending branch. We augment the dataset provided by the bank with information on the distance between each borrower and all branches in the local credit market. The construction of the variables is discussed below and summary statistics are provided in Table 3.

C. Dependent variables

To capture collateral requirements imposed by the bank, we construct two measures. The first measure, *Collateral*, is an indicator variable that takes the value of 1 if the credit line is secured by collateral and 0 otherwise. On average, almost 31% of our borrowers provide collateral. This share increases to 36% if we consider *Sole Proprietorships*, while it decreases to 21% for corporations. The second measure, *Percentage of Collateral,* represents the level of collateralization, expressed as percentage of the loan amount granted by the bank according to the loan contract. On average, the borrowers in our sample cover 22% of the loan amount with collateral. The share increases (decreases) to 23% (12%) if we consider *Sole Proprietorships* (Corporations). Note that the figures are consistent with the economy-wide statistics reported in Table 1. Importantly, we note that borrowers subject to collateralization are more likely to be located inside their local credit market, rather than outside (31.6% vs. 28.8%). As a result, they are closer to the lending branch. Interestingly, this preliminary insight appears to contradict the theoretical predictions derived from the lender-based view of collateral.

The second outcome variable of interest is the interest rate charged by the bank. The average *Interest Rate* for our borrowers is 7.04%. On average, the interest rate paid by firms that pledge collateral is 7.26%, while it is 6.95% for unsecured credit. Firms located in the same local market as their lending branch pay, on average, higher interest rate: 7.14% versus 7% paid by borrowers located outside the market. We recognize that extensive theory and some empirical evidence suggest that bank's decisions on loan price and amount of collateral might not be independent.

D. Informational advantage measure

[4] The sectors of economic activity are defined at the 2-digit level of the Italian National Institute of Statistics (Istat).

As discussed above, our empirical strategy rests on an identifying characteristic that captures the local knowledge and informational advantage of the bank. We use the physical distance between the bank and each borrower (*Branch-Firm Distance*) to operationalize this characteristic. More specifically, using the exact geographic location of each borrower and lending branch, we compute the metric distance that separates them. The distance is based on the shortest and fastest route obtained through Routemate.[5] The average distance between a borrower and our bank is almost 5.07 km (3.15 miles). Bank-firm distance varies considerably with firm's organizational form: The average distance is 4.57 km (2.84 miles) for sole proprietorships and 5.94 km (3.69 miles) for corporations.

E. Control variables

Collateral depends on various factors related to borrower, lender, credit market and aggregate economy. Therefore, we use in our specifications a broad set of control variables reflecting such characteristics. In addition to that, we include industry, bank branch, credit market, and year fixed effects[6].Our control variables reflect various borrower characteristics and the nature of the bank-borrower relationship. First, we use Firm size measured by borrower's total sales (*Sales*). As the bank only provides sales categories rather than exact amounts, we construct a step variable which takes the value of 1 if sales are less than €0.25M; 2 for sales between €0.25M and €0.5M; 3 for sales between €0.5M and €1.5M; 4 for sales between €1.5M and €5M; 5 for sales between €5M and €25M; 6 for sales between €25M and €50M, 7 for sales above €50M. Firms with sales below €250,000 represent 54% of the sample. The fraction of sample firms in each of the remaining categories is as follows: 10% in category 2, 14% in category 3, 11% in category 4, 8% in category 5, 2% and 1% in categories 6 and 7, respectively. In the multivariate analysis, we use separate indicators for each sales category. Specifically, we construct indicators *D(Sales i)* that take the value of 1 if the borrower's sales are in the *i*-th category, and 0 otherwise.

We use three characteristics of the lending relationship. *Relationship Length* is the number of months since the firm has first borrowed from our bank. On average, our sample firms have been clients of the bank for 113 months. This is comparable to the findings by Cole (1998), Degryse and Van Cayseele (2000) and Gambini and Zazzaro (2013) for Italy, where the average

[5] Routemate is software for optimization of transportation costs and calculation of distance. For more information about the software, please see http://en.nemsys.it/prodotti.html

[6] We cannot include borrower fixed effects because during the time period of the study, our bank did not pursue significant organizational restructuring in terms of closing existing branches or opening new ones. As a result, only 1% of the borrowers in our sample are observed to change the bank branch from which they borrow. This makes our variable of interest, *Branch-Firm Distance*, *quasi*-time-invariant, and renders the use of *within* estimators infeasible.

bank-borrower relationship is between 7, 8 and 12 years. *Multiple Lending* is a variable that takes the value of 1 if the firm borrows from multiple banks and 0 if the firm has an exclusive relationship with our bank. Consistent with the well-documented prevalence of multiple lending across Italian firms (Detragiache et al. 2002), only 3% of the firms have an exclusive lending relationship. *Other Services* is a variable that takes value of 1 if a borrower uses additional services provided by the bank, and 0 otherwise. The last two metrics are intended to capture exclusivity of the bank-borrower interaction and its scope, respectively.

We also control for the nature of the center of decision-making process within the bank's organizational structure. Specifically, we construct an indicator *Decisional Level* that takes the value of 1 if a credit line is managed at the regional headquarters and 0 if this happens at a local bank branch. The network of branches of our bank is coordinated via regional headquarters. Each branch has authority with respect to credit lines granted by its loan officers. However, as suggested by existing research (e.g., Liberti and Mian 2009) smaller and less hierarchical branches might be more efficient in producing and using certain types of information, but might be able to offer only limited services. Alternatively, the headquarters might adopt different modes of interaction with bank clients. We note that 16% of the credit lines are at the headquarters.

In addition to the measure of hierarchical level responsible for managing a credit line, we also create the variable *Portfolio* that identifies customer type from the banks' point of view. The variable takes the value of 1 if the bank considers the borrower as part of its *corporate market* and 0 if it is part of the *small business market*. Note that it is the borrower's characteristics such as business strategy and activity, and demand for services that determines the assignment and not merely its organizational form.

Selected summary statistics for all variables used in the analysis are in Table 2, while their construction is summarized in the Appendix. In Table 3 we report a correlation table for the variables of interest. As preliminary insights into the results of our empirical test, we note that the distance between our bank and its borrowers is negatively correlated with both measures of collateral, namely: *Collateral* and *Percentage of Collateral*. The correlations are significant at the 1% level. By contrast, the interest rate charged by the bank is positively correlated with the distance between the borrower and lending bank. Both findings offer some preliminary evidence that is not consistent with the lender-based view for the use of collateral in bank lending. Therefore, we next proceed to examine these correlations in a formal multivariate framework that also allows us to account for the possible interaction between various features of the loan contract.

IV. Results

A. SUR model

We begin the discussion of our results with the analysis of the impact of physical proximity between borrower and lender on the collateralization rates of the loans made by the local lender.[7] Table 4 shows estimation results of equations (1) and (2), in columns (1) and (2) respectively, using the SUR model, which allows for correlation of the error terms across both equations. The main focus is on the point estimate of the coefficient of the measure for physical proximity between borrower and our bank, i.e. *Branch-Firm Distance*.

Our analysis shows that borrowing firms located farther away from their lending branch have lower collateral requirements, relative to their counterparts located in the vicinity of the bank, as the coefficient on *Branch-Firm Distance* is negative and statistically significant (Table 4, column (1)). Consistent with the theoretical trade-offs between interest rates and collateral, borrowers located farther away from the lending branch also pay higher interest rate (Table 4, column (2)). Thus, our findings on the impact of distance on the use of collateral seem inconsistent with the lender-based view. As the quality of proprietary information is inversely related to the distance between bank and borrower, the local bank has lower informational advantage for borrowers located farther away. The local bank is thus more susceptible to competitive pressure from transaction lenders for these borrowers. As a result, according to Inderst and Mueller (2007), the local lender should increase the collateral requirements to compensate for the reduced ability to extract surplus through higher explicit price of credit, i.e. interest rates.

Meanwhile, our estimates show that the local lender reduces the collateralization rate and increases the interest rates for more distant borrowers. These findings are consistent with the signaling model developed by Chan and Kanatas (1985). Greater branch-firm distance would make pledging collateral more costly and lower collateral requirements (*Proposition 2*). Our findings are also in line with a model by Besanko and Thakor (1987), which shows that collateral requirements are inversely related to interests rates in a competitive setting (*Proposition 2*). Indeed, if the dissipative cost of collateral increases with increases in branch-firm distance, collateral will be a costly mechanism for the bank and its use will decrease with the lack of proximity between the bank and its borrowers.

B. Instrumental Variables Analysis

Although the SUR analysis is informative, it has limitations that might affect the inferences we draw and insights we are able to generate. Specifically, as both postulated by theory and argued

[7] We also verify the robustness of our findings using both measures of collateralization: 1) percentage of the loan amount secured by collateral and 2) indicator for presence of collateral.

by empirical studies (e.g., Brick and Palia (2007); Calcagnini et al. (2014)), contract terms such as interest rates and collateral requirements are simultaneously set at the time of a loan approval. Thus, to incorporate the endogenous nature of the loan contract terms, in this section we show estimation results of equations (1) and (2), in which we endogenize the interest rate and collateral and use instrumental variables (IV) accordingly. Identification requires suitable instruments for each endogenous variable. Particularly, to conduct IV estimations, we must have instrumental variables that are: (a) uncorrelated with the error term and (b) partially and sufficiently strongly correlated with the endogenous variable once the other independent variables are controlled for.

We exploit the contractual nature of the credit lines and the availability of alternative funding sources in order to find instruments for the interest rate charged by our bank in equation (1). Borrowers pay fixed rate if they use funds within a pre-specified limit; and a penalty fee or rate if they exceed the limit, and this rate is increasing in the borrowed amount. Thus, the actual interest rate depends on whether borrowers exceed the credit limit and by how much. By contrast, the loan contract does not condition collateral requirements on actual amount of credit used. Hence, our first instrument is *Overdraw-C*, a continuous variable which takes the value of 0 if the borrower uses funds within the credit limit and the natural logarithm of the actual amount of excess funds if the borrower exceeds the limit stipulated in the loan contract. The second instrument we adopt reflects the availability of alternative funding with the idea that a supply component would affect borrower's reservation rate and eventually the interest rate agreed upon by the borrower and our bank. To capture this, we use the distance between the borrower and branches of other banks in the credit market. Specifically, we operationalize *Distance Sources* by using the natural logarithm of the 25th percentile of the metric distances between the borrower and each of the banks operating in the regional credit market. First, we identify for each borrower in our sample all bank branches in the local credit market, defined as the municipality of the borrower or the postal code of the borrower if this covers several small municipalities. Then, for each borrower we calculate the distance to all competing banks operating in the local credit market. Following Degryse and Ongena (2005) and Bellucci et al. (2013), we measure a borrower's distance to alternative funding sources with the 25th percentile of these distances.[8]

As stated, the instruments must satisfy two conditions for the IV estimator to be valid. An instrumental variable must be uncorrelated with the error term and strongly correlated with the endogenous variable (after the other independent variables are controlled for). We use the over-identifying restrictions to test for instrument validity via a Sargan test (the first condition). The second condition is related to the so-called weak identification problem, which arises when the

[8] The average distance to competing banks for the borrowers in our sample is approximately 3.35 km (2.08 miles).

instruments are correlated with the endogenous regressor but only weakly so. If the instruments are weak (and thus of limited relevance) the IV estimator could be misleading.

The results of the IV analysis of equation (1) related to collateral requirements are presented in columns (1) to (3) of Table 5. Specifically, while the dependent variable in column (1) is our main dependent variable, i.e. percentage of the credit line secured by collateral, columns (2) and (3) show additional evidence in which the dependent variable is an indicator that takes the value of 1 if the credit line is collateralized, and 0 otherwise. Interest rate is instrumented with the two variables discussed above. We note that tests of the validity of our instruments offer reassuring results. Specifically, the Sargan test fails to reject the null hypothesis of overidentification, or that our instruments are uncorrelated with the residuals from the second stage of our model. This is consistent with the notion that the instruments are significantly correlated with the endogenous variable (interest rate) but not with the dependent variable (collateral). Furthermore, the first-stage statistics are sufficiently high, which suggests that our estimation is unlikely to be subject to "weak instrument" criticism from a statistical perspective. Indeed, the F-statistic calculated in the first-stage exceeds the Stock and Yogo critical value of 10. Thus, both tests suggest that our instruments are relevant and robust inferences can be drawn from our estimates.

The estimation results in columns (1) through (3) suggest that our inferences about the empirical relevance of lender-based views on the use of collateral in small business lending are unchanged, even after controlling for the endogenous nature of the interest rate. Specifically, the coefficient on *Branch-Firm Distance* remains negative and statistically significant at the 1% level. Note that once we address the endogenous nature of interest rates, our results are even stronger.

Next we turn to the analysis of the explicit price of credit, interest rate, allowing for endogenous collateral requirements. We develop two instruments to implement the IV analysis. First, we use a measure of the average costs incurred in bankruptcy proceedings, *Bankruptcy Costs*. The underlying rationale is that collateral becomes relevant in the "bad states" of the world, when borrowers cannot meet contractual obligations but the actual realization of these, vis-à-vis alternative outcomes, such as renegotiation for instance, depends on how costly the bankruptcy procedure may be. Higher costs could imply higher renegotiation chance, and thus lower collateral relevance. Our second instrument is a dummy variable (*Individual Firm*) which takes a value equal to 1 if the organizational form of the borrower is sole proprietorship and 0 otherwise.

The estimation results of equation (2) are shown in column (4) of Table 5. We observe that after we control for the endogenous nature of collateral requirements, our insights remain unchanged: Interest rates are increasing with the distance between the borrower and the local

bank, as opposed by the lender-based theory. First-stage estimates show that, consistent with the arguments for our instruments, as the costs of bankruptcy increase, collateral requirements become lower. Similarly, these requirements are higher for sole proprietorships that can be viewed as more risky that borrowers with corporate organizational form, as suggested by Berger and Udell (1998).

C. Simultaneous Equations

The last part of our empirical analysis explicitly incorporates the joint determination of contract features such as collateral requirements and interest rates. Equations (1) and (2) illustrate that collateral and interest rates are determined simultaneously, i.e. we explain interest rates with collateral but collateral is also explained by interest rates and other variables. Thus, in this section we discuss estimation results of the system of equations (1) and (2) by means of a Three Stage Least Squares (3-SLS) regression shown in Table 6. Differently from 2-SLS, 3-SLS uses the additional information that both equations could be related through their error terms. This approach enhances the efficiency of the estimation (Zellner and Theil 1962). Similar to the IV analysis, identification is achieved through variables that appear in one of the equations but not in the other. For purposes of identification, we use the instruments discussed above. Namely, the interest rate equation is identified through *Overdraw_C* and *Distance Sources*, while the collateral equation is identified through *Bankruptcy Costs* and *Individual Firm*.

Table 6 presents the results of the 3SLS estimation of equations (1) and (2) and confirms our previous findings documented in Tables 4 and 5. Specifically, in contrast to the lender-based view of collateral, *Branch-Firm Distance* is associated with lower collateral requirements and higher interest rates. To interpret, borrowers located farther away from the local lender, i.e. borrowers for whom the informational advantage of the local lender is lower but the costs of collateral are higher, face lower collateral requirements but end up paying higher interest rates.

In sum, our results for the use of collateral are more consistent with certain borrower-based views that focus on borrower characteristics or actions. One such view is that collateral can serve as a mechanism to mitigate ex-post incentive problems that arise from unobservable actions, or lack thereof, undertaken by the borrower, i.e. moral hazard. This argument, advanced by Boot et al. (1991), Boot and Thakor (1994) among others, proposes that the use of collateral is higher for observationally riskier borrowers, i.e. cases that are more likely to give raise to moral hazard issues. Similarly focused on borrowers' perspective, but on characteristics rather than actions, Chan and Kanatas (1985) develop a theoretical model for collateral in an environment of asymmetric information. They focus on the signaling role of collateral, i.e. its ability to convey

information between lender and borrower and thus mitigate adverse selection concerns. The signaling role is sustained as collateral is a costly contract feature. Various transactions costs associated with the use of collateral are related to the monitoring and insurance required for maintaining its value, administrative and legal costs, potential disposition and redeployment costs, etc. The optimal contract stipulates that in the case of asymmetric information, collateral is offered when the borrower has higher project valuation and the specific amount depends on the magnitude of the above-mentioned transaction costs associated with its use, with no collateral when these costs exceed a certain level.

D. Other controls

Overall, our findings show that several control variables are important factors relevant for the loan contract terms. Specifically, we observe that larger loans are associated with lower interest rates and higher collateral requirements. Larger firms tend to experience better credit terms as both interest rates and degree of collateralization generally decrease with borrower size. This is consistent with the notion that asymmetric information problems tend to be more severe for small-sized firms. Furthermore, larger firms traditionally show stronger bargaining power and are considered typically less risky than smaller firms (Berger and Udell, 1998). Lastly, some features of the bank-borrower lending relationship are also relevant for the outcome of the lending process. Specifically, lasting banking relationships seem to benefit the borrowers in terms of lower collateral requirements. This is in line with the argument that such relationships establish trust between borrowers and lenders, and consequently might lead to reduced moral hazard problems (Boot and Thakor, 1994, Berger and Udell, 1995). In addition to that *Multiple lending* reduces the collateralization rate, without affecting interest rate. The scope of the bank-borrower interaction also improves contract terms.

V. Conclusion

In this paper we propose an empirical strategy and test for the relevance of the lender-based theory for the use of collateral in bank lending. Using a measure that captures the informational advantage of "local banks" and an empirical setup focused on such banks – two fundamental elements of the lender-based view of collateral – we show some evidence inconsistent with the postulates of this theory.

Specifically, to operationalize local knowledge and informational advantage of the lender, we rely on the physical distance between the bank and its borrowers. We argue that this metric is

inversely related to the informational advantage of the local bank and directly related to the magnitude of transaction costs associated with the use of collateral such as costs related to monitoring and eventual repossession. The lender-based view of collateral predicts that collateral requirements (interest rates) should increase (decrease) with bank's informational advantage.

To test the theoretical predictions of the lender-based view, we examine the association between collateral requirements, interest rates and bank-borrower distance within a SUR model and 3SLS estimation of simultaneous equations approach. We find that collateral requirements decrease with the local bank-borrower distance, i.e. when the costs associated with the use of collateral are relatively high. Consistently, interest rates are increasing in the physical distance between the contracting parties. Thus, our results seem consistent with several borrower-based explanations for the use of collateral but not with the lender-based view.

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Table 1
Composition of Loans by Type of Guarantee *(percent)*

The table reports the fraction of collateralized loans for each year during the period 1999-2005.

	1999	2000	2001	2002	2003	2004	2005
				All customers			
Collateral	28.3	29.5	29.9	31.7	35.6	38.7	42.7
Personal Guarantees	20.8	20.4	19.1	18.8	17.6	17.8	15.7
Unsecured	50.9	50.1	51.0	49.4	46.8	43.5	41.6
				Consumer households			
Collateral	63.7	65.9	66.1	67.5	71.1	72.4	72.6
Personal Guarantees	9.8	8.4	7.6	7.0	6.2	5.8	5.4
Unsecured	26.4	25.8	26.3	25.6	22.6	21.8	22.0
				Sole proprietorships			
Collateral	33.7	35.6	36.2	38.2	43.1	46.1	45.4
Personal Guarantees	39.3	38.6	36.3	34.6	30.8	30.2	28.0
Unsecured	27.0	25.8	27.4	27.2	26.1	23.7	26.6
				Firms			
Collateral	24.0	24.9	24.6	26.6	29.7	32.0	32.2
Personal Guarantees	27.1	27.4	25.2	25.6	24.1	24.3	23.6
Unsecured	48.8	47.7	50.2	47.8	46.2	43.7	44.2

Source: Our calculations on Bank of Italy data.

Figure 1
Composition of local credit markets (zip code)

	Mean	Min	Max	Std. Dev.
Nr. of Banks	14,8	1	39	11,4
Nr. of Bank Branches	32.3	1	108	32,9
Nr. of Banks of Big Groups	2,4	0	6	2,2
Nr. of Branches of Big Groups	7,2	0	33	10,5
Nr. of Branches of Banks owned by Big Groups	9,6	0	37	7,8
Nr. of Branches of Regional Banks	8	0	27	6,9
Nr. of Branches of Cooperative Banks	2,6	0	10	2,3

Note: Big Groups are the first eight Italian Banking Groups for Capitalization in 2006 and International Banking Groups (e.g. BNP Paribas, Deutsche-bank, etc.). We identify local credit market with the zip-code area.

Table 2
Summary Statistics

The table presents summary statistics for the sample used in the multivariate analysis. The definition and construction of each variable is provided in the Appendix. Column (1) shows the mean value for each variable, while column (2) shows in parentheses the standard deviation for each variable. The sample consists of 14,672 observations.

	Mean (1)	St. Dev. (2)
Dependent Variables		
Collateral	0.31	(0.46)
Percentage of Collateral	0.22	(0.37)
Interest Rate	7.04	(2.43)
Informational Advantage		
Branch-Firm Distance (km)	5.065	(7,345)
Control Variables		
Individual Firm	0.43	(0.50)
Corporation	0.33	(0.47)
Sales	2.17	(1.55)
D(Sales 1)	0.54	(0.49)
D(Sales 2)	0.10	(0.31)
D(Sales 3)	0.14	(0.35)
D(Sales 4)	0.11	(0.32)
D(Sales 5)	0.08	(0.28)
D(Sales 6)	0.02	(0.16)
D(Sales 7)	0.01	(0.16)
Interest Rate	7.05	(2.47)
Credit Limit	96,391	(417,793)
Credit Used	68,701	(293,190)
Relationship Length (months)	113	(90,75)
Multiple Lending	0.97	(0.18)
Other Services	0.91	(0.28)
Portfolio	0.10	(0.29)
Decisional Level	0.16	(0.37)
Overdraw	0.22	(0.41)

Table 3
Correlation Matrix

The table reports pairwise correlation coefficients for the variables used in the analysis. * indicates statistical significance at the 1% level.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Collateral (Indicator)	(1)	1													
Collateral (Fraction)	(2)	0.900*	1												
Branch-Firm Distance	(3)	-0.025*	-0.023*	1											
Distance Sources	(4)	0.002	-0.008	0.189*	1										
Interest Rate	(5)	0.057*	0.082*	0.054*	-0.011	1									
Overdraw	(6)	0.099*	0.081*	0.046*	-0.022*	0.102*	1								
Individual Firm	(7)	0.101*	0.116*	-0.038*	0.015	0.028*	0.111*	1							
Sales	(8)	-0.132*	-0.162*	0.087*	0.037*	-0.078*	-0.109*	-0.427*	1						
Credit Limit	(9)	0.052*	0.025*	0.018	0.049*	-0.066*	-0.052*	-0.101*	0.252*	1					
Relationship Length	(10)	-0.021	-0.072*	-0.079*	0.034*	-0.047*	-0.129*	-0.003	0.114*	0.109*	1				
Multiple Lending	(11)	-0.074*	-0.068*	0.011	-0.001	0.011	0.012	0.033*	-0.049*	-0.045*	-0.046*	1			
Other Services	(12)	-0.092*	-0.153*	-0.018	0.012	-0.067*	-0.103*	-0.063*	0.117*	0.045*	0.173*	-0.011	1		
Portfolio	(13)	-0.109*	-0.111*	0.081*	0.026*	-0.081*	-0.074*	-0.262*	0.547*	0.274*	0.068*	0.001	0.059*	1	
Decisional Level	(14)	0.001	-0.031*	0.039*	0.053*	-0.073*	-0.108*	-0.267*	0.472*	0.252*	0.065*	-0.147*	0.079*	0.323*	1

Table 4
SUR Analysis of Collateral and Interest Rates

The table report results of the seemingly unrelated regressions (SUR) estimation of equations (1) and (2). Column (1) is the collateral specification and the dependent variable is the percentage of the credit line that is secured with collateral. Column (2) is the interest rate specification and the dependent variable is the interest rate on the credit line. Time, Bank Branch, Industry and Credit Market fixed effects are computed for each model. The description of the variables used in the analysis is provided in the Appendix. The table reports coefficient estimates followed by standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

	Collateral (Fraction)	Interest Rate
	(1)	(2)
Branch-Firm Distance	-0.004**	0.060***
	(0.002)	(0.015)
D(Sales 2)	-0.008	-0.187***
	(0.009)	(0.068)
D(Sales 3)	-0.061***	-0.201***
	(0.008)	(0.062)
D(Sales 4)	-0.116***	0.065
	(0.009)	(0.072)
D(Sales 5)	-0.120***	-0.108
	(0.014)	(0.250)
D(Sales 6)	-0.147***	-0.368**
	(0.023)	(0.173)
D(Sales 7)	-0.158***	-0.868***
	(0.033)	(0.033)
Multiple Lending	-0.105***	0.052
	(0.015)	(0.112)
Other Services	-0.181***	-0.373***
	(0.009)	(0.070)
Relationship Length	-0.000***	-0.001***
	(0.000)	(0.000)
Portfolio	-0.069***	-0.464***
	(0.013)	(0.104)
Decisional Level	0.109***	-0.234***
	(0.009)	(0.067)
Credit Limit	0.000***	-0.000**
	(0.000)	(0.000)
Constant	0.362***	4.688***
	(0.060)	(0.680)
Year FE	Yes	Yes
Branch FE	Yes	Yes
Market FE	Yes	Yes
Industry FE	Yes	Yes
N	14,672	14,672
R2/Pseudo R2	0.180	0.082

Table 5:
IV Analysis of Collateral and Interest Rate

The table report results of the instrumental variables (IV) estimation of equations (1) and (2). Columns (1) through (3) are the collateral specifications. The dependent variable in column (1) is the percentage of the credit line that is secured with collateral. The dependent variable in columns (2) and (3) is an indicator that takes the value of 1 if the credit line is collateralized and 0 otherwise. Column (4) is the interest rate specification and the dependent variable is the interest rate on the credit line. Time, Bank Branch, Industry and Credit Market fixed effects are computed for each model. The description of the variables used in the analysis is provided in the Appendix. The table reports coefficient estimates followed by standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

	Collateral (Fraction)	Collateral (Indicator)	Collateral (Indicator)	Interest Rate
	(1)	(2)	(3)	(4)
Interest Rate	0.183***	0.154***	0.505***	
	(0.026)	(0.028)	(0.094)	
Branch-Firm Distance	-0.012***	-0.011***	-0.035***	0.061***
	(0.004)	(0.004)	(0.013)	(0.016)
D(Sales 2)	0.014	0.031*	0.079	-0.138*
	(0.015)	(0.016)	(0.056)	(0.071)
D(Sales 3)	-0.025*	-0.022	-0.114**	-0.088
	(0.014)	(0.015)	(0.053)	(0.093)
D(Sales 4)	-0.096***	-0.116***	-0.448***	0.18
	(0.016)	(0.017)	(0.060)	(0.134)
D(Sales 5)	-0.075***	-0.122***	-0.493***	0.034
	(0.024)	(0.025)	(0.090)	(0.161)
D(Sales 6)	-0.057	-0.127***	-0.687***	-0.161
	(0.039)	(0.042)	(0.162)	(0.230)
D(Sales 7)	0.015	-0.108*	-0.519**	-0.623**
	(0.058)	(0.062)	(0.231)	(0.301)
Multiple Lending	-0.072***	-0.086***	-0.184**	0.107
	(0.024)	(0.026)	(0.086)	(0.147)
Other Services	-0.125***	-0.068***	-0.223***	-0.009
	(0.018)	(0.019)	(0.063)	(0.229)
Relationship Length	-0.000***	-0.000***	-0.001***	0.000
	(0.000)	(0.000)	(0.000)	(0.001)
Portfolio	0.014	-0.04	-0.234**	-0.344**
	(0.026)	(0.027)	(0.098)	(0.135)
Decisional Level	0.113***	0.132***	0.476***	-0.285**
	(0.015)	(0.016)	(0.056)	(0.128)
Credit Limit	0.056***	0.081***	0.293***	-0.167***
	(0.004)	(0.004)	(0.014)	(0.049)
Collateral (Fraction)				1.727
				(1.219)
Overdraw_C				0.257**
				(0.127)
Constant	-0.885***	-0.846***	-4.918***	6.424***
	(0.174)	(0.187)	(0.705)	(0.454)
Year FE	Yes	Yes	Yes	Yes
Branch FE	Yes	Yes	Yes	Yes
Market FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	14,616	14,616	14,603	14,670

Instruments				
Distance Sources	-0.049**	-0.049**	-0.048**	
	(0.020)	(0.020)	(0.020)	
Overdraw_C	0.247***	0.248***	0.248***	
	(0.032)	(0.032)	(0.032)	
Individual Firm				0.035***
				(0.006)
Bankruptcy Costs				-0.004***
				(0.001)
Diagnostics				
F-test 1st Stage	34.45	34.45		21.31
Sargan Test (p-value)	0.330	0.200		0.650

Table 6:
Simultaneous Equations Analysis of Collateral and Interest Rate

The table report results of the simultaneous equations estimation of equations (1) and (2). Column (1) is the collateral specification and the dependent variable is the percentage of the credit line that is secured with collateral. Column (2) is the interest rate specification and the dependent variable is the interest rate on the credit line. Sargan Test (p-value) of instruments is 0.604. Time, Bank Branch, Industry and Credit Market fixed effects are computed for each model. The description of the variables used in the analysis is provided in the Appendix. The table reports coefficient estimates followed by standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

	Collateral (Fraction) (1)	Interest Rate (2)
Interest Rate	0.179***	
	(0.026)	
Collateral (Fraction)		1.735
		(1.158)
Branch-Firm Distance	-0.012***	0.065***
	(0.003)	(0.015)
D(Sales 2)	0.021	-0.139**
	(0.015)	(0.071)
D(Sales 3)	-0.016	-0.084
	(0.014)	(0.092)
D(Sales 4)	-0.085***	0.175
	(0.016)	(0.131)
D(Sales 5)	-0.064***	0.041
	(0.023)	(0.157)
D(Sales 6)	-0.047	-0.158
	(0.038)	(0.226)
D(Sales 7)	0.024	-0.626**
	(0.057)	(0.298)
Multiple Lending	-0.074***	0.113
	(0.024)	(0.143)
Other Services	-0.126***	0.004
	(0.018)	(0.223)
Relationship Length	-0.000***	0.000
	(0.001)	(0.001)
Portfolio	0.015	-0.346***
	(0.025)	(0.133)
Decisional Level	0.115***	-0.292**
	(0.015)	(0.121)
Credit Limit	0.055***	-0.162***
	(0.004)	(0.047)
Constant	0.000	6.137***
	(0.001)	(0.543)
Year FE	Yes	Yes
Branch FE	Yes	Yes
Market FE	Yes	Yes
Industry FE	Yes	Yes
N	14,616	14,616

Instruments		
Individual Firm	0.025***	
	(0.009)	
Bankruptcy Cost	-0.003**	
	(0.001)	
Distance Sources		-0.024**
		(0.011)
Overdraw_C		0.174***
		(0.063)

Appendix: List of Variables

Variable	*Definition*
Collateral	An indicator variable that takes the value of 1 if the credit line is collateralized and 0 otherwise.
Percentage of Collateral	The fraction of the credit line that is secured by collateral.
Interest Rate	The interest rate charged by the bank, expressed as percentage.
Overdraw	An indicator variable that takes value of 1 if the borrower uses more than the amount granted on the credit line by the bank and 0 otherwise.
Branch-Firm Distance	The distance in kilometers between borrower and lending branch.
Distance Sources	A natural logarithm of the 25th percentile of the metric distances between the borrower and each of the competing banks operating in the local credit market.
Sales	A step variable that takes value of 1 if borrower's sales are below €0.25M; 2 for sales between €0.25M and €0.5M; 3 for sales between €0.5M and €1.5M; 4 for sales between €1.5M and €5M; 5 for sales between €5M and €25M; 6 for sales between €25M and €50M; and 7 for sales that exceed €50M.
D(Sales i)	An indicator variable that takes the value of 1 if the firm's sales fall in the *i*-th category (1 through 8) and 0 otherwise.
Multiple Lending	An indicator variable that takes the value of 1 if a borrower maintains lending relationships with multiple banks and 0 if the borrower has an exclusive lending relationship with the bank.
Other Services	An indicator variable that takes the value of 1 if the bank branch provides other services (besides the credit line) to the borrower and 0 otherwise.
Relationship Length	A continuous variable that measures the length of the bank-borrower lending relationship. Constructed as the natural logarithm of 1 + the length of the bank-borrower relationship expressed in days.
Decisional Level	An indicator variable that takes the value of 1 if the credit line is managed at the headquarters level and 0 if this happens at a local bank branch.
Portfolio	An indicator that takes the value of 1 if the bank considers the credit line as part of its small-business portfolio and 0 if it is part of the corporate portfolio.
Credit Limit	A continuous variable that measures the amount of credit granted by the bank. Constructed as the natural logarithm of the total credit line amount.
Individual Firm	An indicator variable that takes the value of 1 if the borrower is a sole proprietorship and 0 otherwise.
Corporation	An indicator variable that takes the value of 1 if the borrower has corporate organizational form and 0 otherwise.
Overdraw-C	A continuous variable which takes the value of 0 if the borrower uses funds within the credit limit and the natural logarithm of the actual amount of excess funds if the borrower exceeds the limit stipulated in the loan contract
Bankruptcy Costs	Measure of the average costs incurred in bankruptcy proceedings in the local credit market.