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Andrea Bellucci, Alexander Borisov and Alberto Zazzaro

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University of Naples Federico II



University of Salerno



Bocconi University, Milan

CSEF - Centre for Studies in Economics and Finance
DEPARTMENT OF ECONOMICS - UNIVERSITY OF NAPLES
80126 NAPLES - ITALY

Tel. and fax +39 081 675372 - e-mail: csef@unisa.it

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Andrea Bellucci^{*}, Alexander Borisov^{} and Alberto Zazzaro^{***}**

Abstract

Academic research recognizes that the organizational structure of banks could have implications for the financing of small businesses and entrepreneurial firms. In this chapter, we start by reviewing the underlying theoretical motivation and then summarize existing evidence. Overall, it is confirmed that the organization of lending institutions is important for the use and transmission of information, as well as credit availability for small businesses. Moreover, using a unique dataset of bank loans, we empirically document that loan contract characteristics such as interest rates and collateral requirements are sensitive to the hierarchical allocation of decision-making authority within the bank's organization.

Keywords: Bank organization structure, Authority allocation, Small business financing

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* Institute for Applied Economic Research (IAW), Germany and MoFiR, Italy

** University of Cincinnati, USA and MoFiR, Italy

*** University of Naples Federico II, Polytechnic University of Marche, Finance Research Group (MoFiR) and CSEF. E-mail: a.zazzaro@univpm.it.

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1. Introduction

A major source of external finance for small businesses and entrepreneurial firms in the United States is commercial banks and their importance as a funding source might be even more pronounced in an international context.¹ Existing research recognizes that institutional characteristics of banks such as size and ownership, as well as their organizational complexity, could affect the provision of credit to small and mid-sized enterprises (SMEs) (e.g., Berger et al., 1998; Strahan and Weston, 1998; DeYoung et al., 1999). The proposed explanation is that such characteristics influence the adoption, efficiency, and profitability of various lending technologies and information used by the banks. This, in turn, has consequences for the ability and willingness of banks to finance different types of borrowers and by extension, affects the shape of the offered loan contracts. In this chapter we investigate the latter argument by examining implications of bank's organizational structure for loan contract terms faced by SMEs in an international context, by drawing conclusions from the Italian experience.

We begin the first section by discussing various theoretical arguments as to why the form and organizational structure of banks could matter for SME financing. The economic motivation relates primarily to the existence of asymmetric information and agency problems within the bank organization and to communication costs and limits to information-processing capacity. These factors have significant implications for the organization of the banking activity and for the optimal allocation of decision-making rights within banks as a mechanism to incentivize production, transmission, and communication of information.

As a matter of fact, it is often the case that information collection about a prospective borrower is completed by one agent (typically the loan officer), while actual decisions on the underwriting of the loan contracts are performed by another agent at the same or different office. The interaction between these two economic agents, proper alignment of their incentives, and magnitude of communication costs are crucial for the outcome of the lending process. Extant theoretical literature, reviewed in section 1, offers various arguments for a connection between these factors, the allocation of decision-making authority and trade-off between hierarchical structures and decentralized bank organizations. We categorize this literature into two groups: (i) studies focusing on incentives and agency problems, and (ii) studies focusing on coordination costs and information-processing capacity constraints.

¹ For an overview of funding sources see, Cole et al. (1996) and Berger and Udell (2002), among others.

The second section of this chapter discusses existing evidence on the interplay between organizational structure and bank lending to small businesses. We group the studies into three broad categories based on empirical strategy and design. The first group covers works that do not explicitly recognize the internal organizational structure of the banking institution but rely on proxy characteristics such as size or presence of multi-branch banking institution. These studies are typically based on across-banks type of analysis. The second group of studies focuses explicitly on banks' organizational structure and the issues of decentralization and allocation of decision-making authority. Similar to the first group, these studies also adopt an across-institutions perspective. By contrast, the third category includes studies that look within the banking institution and incorporate into the analysis its organization and hierarchical nature and loan officer's decision-making authority. We argue that, on the balance, existing research confirms that the organizational structure of banks is an important factor for the use and transmission of soft information, as well as credit availability for small businesses. However, our knowledge into the specific mechanisms and channels underlying this importance is far more nuanced.

Then, in the last section of this chapter, we address a gap that emerges from the discussion of the existing theoretical and empirical literature, concerning the implications of banks' organizational structure for the shape of the loan contract. We investigate this question using a proprietary dataset of credit lines granted to a large number of SMEs by an Italian bank. Our focus falls on the internal organizational structure of the bank in terms of hierarchical arrangements and decision-making authority. Specifically, we examine how the hierarchical positions of the loan officers who monitor and service the credit line affect price of credit and collateral requirements imposed by the bank, controlling for various aspects of the bank-borrower lending relationship, borrower characteristics, as well as market and local economic conditions. Our analysis suggests that both pricing decisions and collateral requirements are sensitive to the position of the loan officer in the hierarchical structure, and has implications for policy initiatives related to the importance of financial institutions structure for financing of SMEs and our understanding of the relative advantage of lending institutions with different characteristics in lending to small businesses and entrepreneurial firms (see Berger and Udell, 2006).

2. Delegation and Control in Bank Organizations: Theory

A key focus of the existing economic literature on the organization of firms is the dichotomy between decentralized (or delegated) and centralized (or hierarchical) decision-making structures. When

firms are hierarchically organized, decisions are taken by an agent at a high layer of the hierarchy using information produced and transmitted by agents at lower hierarchical levels. When organizations are decentralized, by contrast, the decision-making authority rests with (is delegated to) the agents at the local level. Thus, the key question is whether to delegate authority or not.

As suggested by Mookherjee (2006), the commonly alleged advantage of decentralization pertains to the utilization of “local knowledge”, while the main disadvantages are the communication and incentive costs that arise from possible “loss of control” or “abuse of power” problems. In this view, the optimal organizational structure of an institution depends on the trade-off between information benefits and communication/incentive costs. In an ideal world without such costs, the revelation principle would be sufficient to prove that a centralized organizational structure can never be dominated by a decentralized one (Mookherjee, 2006). Hence, the importance of organizational structure and allocation of authority stands on the relaxation of such “no-cost” assumptions. In particular, we can classify the theoretical literature on the optimal authority delegation in two broad type of contributions: (i) theories that analyze delegation of authority in the context of agency and incentive problems and (ii) studies that view delegation of authority as a way to address coordination issues and constraints to capacity for collection and processing of information.

2.1 Incentives and Agency Costs

A seminal model of the allocation of decision-making authority is Aghion and Tirole (1997). Specifically, their analysis distinguishes between formal authority, that is the right to take a final decision on a matter, and real authority, that is the capacity to have an effective control over decisions. Asymmetric information between the principal and agent is crucial to understanding the importance of allocation of authority: The principals might have formal authority but would optimally choose to follow the agents’ recommendation if they are relatively uninformed. Delegation of formal authority to the agents facilitates their participation and increases initiative and incentives to collect and process information. However, delegation also leads to a costly loss of control for the principal and to severe agency problems. A key factor that makes delegation more likely is the nature of the task and required information. Delegation of authority is more valuable when decisions are “new” and less predictable. In the context of bank lending to small businesses, delegation might be hence beneficial as these businesses are often informationally opaque: Small business lending relies heavily on soft information, which is

hard to verify, difficult to quantify and transmit, and proprietary in nature (Berger and Udell, 2002; Petersen, 2004).

The importance of soft information, as distinguished from hard information, and how its production is influenced by the organizational structure of the institution, is the focus of Stein (2002).² Assuming that soft information cannot be credibly transmitted and effectively verified by anyone else but the loan officers at the local level, in Stein's model decentralization has implications for the loan officers' incentives to produce information and for the bank managers' ability to cross-subsidize units within the organization. In a decentralized organization, the agent who produces the information also has authority to act upon that information. If the bank's organization is centralized, by contrast, information production and authority are allocated to different parties. When information is predominantly soft, like in the case of small business lending, centralization might not give the right incentives since information generated by the loan officer cannot be credibly transferred to the decision-making authority. By contrast, when loan officers have authority on lending, they exert the optimal effort in the process of information production. When information is hard, the incentive concern is ruled out. Information is verifiable and the bank managers at the headquarters are able to properly assign resources to local units.

Dessein (2002) focuses on information transmission and its interaction with firm organization in terms of delegation of decisional power to local units. Rather than distinguishing between soft and hard information as Stein (2002), Dessein (2002) assumes that information is entirely soft by its very nature. The alternative to delegation of decisional power is communication of relevant information for taking decision at the headquarters. The key argument is that communication could be used strategically by local agents and that communication tends to become noisier and less informative if preferences are less aligned. Dessein (2002) shows that delegation of authority to local units is the optimal organizational structure when the divergence of incentives is limited and the information content of decisions is large. Alternatively, centralization and communication dominate delegation of authority if the uncertainty about the possible outcomes of the decision is small. Once again, this condition seems unlikely in the context of small business lending that calls for a high degree of delegation.

Another agency-based explanation for the importance of bank's organizational structure for SME financing is advanced by Berger and Udell (2002). They view bank lending as an outcome of a sequence of contracting problems. In this sequence, the contracting problem between loan officers and bank

² See also Stein (2003) for a non-technical survey of relevant literature.

management is central and heavily depends on the complexity and size of the institution. Specifically, the focus falls on relationship lending – a major lending technology for small business financing, whose crucial input is soft information. As the loan officer is the repository of soft information, this might lead to agency problems created through the banking institution and these problems could necessitate different organizational forms. In particular, Berger and Udell (2002) argue that institutions with fewer layers may have less severe contracting problems and also be able to avoid organizational diseconomies and coordination concerns that often plague large institutions with multiple layers.

Overall, existing theoretical literature has identified various incentives-based arguments for the importance of banks' organizational structure for the production, transmission, and use of information in general, and soft information in particular, in the context of SME lending.

2.2 Coordination Costs and Information Capacity Constraints

Another stream of research analyzes the importance of firms' organizational structure in the context of limited information-processing capacity and communication costs. Radner (1993) models the organization of a firm as a network of agents collecting information and transmitting it to managers with limited capacity to process this information. The focus is on decentralization of information-processing, rather than on decentralization of incentives analyzed in the literature discussed in the section above. The key question is how to organize the processing of information, e.g. in a parallel or sequential fashion, in order to maximize efficiency when various aspects of the processing are costly. The analysis suggests that simple hierarchies could achieve efficiency in terms of processing time and number of processors.

Rather than focusing on processing and transmitting information only, the analysis by Cremer et al. (2007) offers insights into the nature and characteristics of the "language" used for the generation and coding of information. Specifically, the authors analyze how adoption of specific technical languages, or "codes", and the characteristics of these codes interact with the organizational structure of the institution. The key trade-off outlined in the models is that a highly specialized code facilitates the within-unit communication, but at the same time limits the between-units communication, i.e. a trade-off of coordination vis-à-vis specialization. Thus, optimal decisions must weigh the improvement of "local efficiency" arising from the use of highly specialized codes with the possible loss of synergies that could come with integration, and use of general codes. The analysis demonstrates that when the benefit of local efficiency is high, the optimal code will be very specialized and less transferable, thus leading to

less importance of coordination. This has implications for the process of small business lending and its interaction with the bank's organizational design.

Abstracting from the notion of soft and hard information, Garicano (2000) examines how communication interacts with incentives to acquire different types of knowledge, i.e. general vs. specialized. The optimal organization appears to be one of knowledge-based hierarchy, in which lower levels acquire only relevant information, while higher levels are equipped to address more complex problems. Importantly, the scope of lower levels is reduced when it is easier to transmit knowledge and information, while cheaper acquisition of information increases discretion.

In sum, non-incentive based explanations for the importance of hierarchies and design of organizations in the process of bank lending generally focus on the costs of transmitting the information from one level to the next. With hard information, as argued by Cremer et al. (2007), "words" or "codes" can be easily transferred and communicated along a chain or within space. By contrast, the exact meanings of these "words" and "codes" are soft information that is easily interpretable in the context of personal interaction but is very, if not prohibitively so, costly to transfer along a hierarchy.

The key insight offered by these analyses, and the main driver of the benefits of delegation, is that centralized decision-making cannot access, due to communication costs, processing costs, agency problems or incentive concerns, all information that can be utilized by delegation mechanisms, as suggested by Mookherjee (2006). This might be particularly true in the context of small business lending and, in turn, makes the organizational structure and design of the lending bank central to the outcome of the lending process, especially when information is "local" and valuable.

3. Evidence on the Importance of Organizational Structure

This section provides an overview of selected research, which empirically documents the importance of bank's organizational structure for small business lending, organized along three broad lines of research design. The first category offers indirect insights by using features such as size, number of branches, and ownership, among others as proxies for differences in banks' organizational structures. In addition to that, these studies often focus on across-bank differences for identification. The second group uses similar source of variation but explicitly recognizes the role of decentralization and allocation of decision-making authority. By contrast, the third category of studies follows a within-bank approach, where the analysis is able to delve into the actual organizational structure of the bank and the

exact position of and interactions between various economic agents (e.g., loan officers, promoters, senior management, etc.) within the institution.

3.1 Across-banks Studies and Indirect Measures

A large stream of research uses bank size as a proxy for organizational structure. The argument is often that large and complex structures could lead to organizational diseconomies that may affect the cost of small business lending and supply of credit to such borrowers (Berger and Udell 1996, Strahan and Weston 1998, among others). To examine the argument, various studies have investigated the association between measures of bank size and complexity, and lending to SMEs.

A study by Berger and Udell (1996) examines the empirical association between loan price and quantity and measures of bank size and complexity using more than 900,000 loans made by a sample of US banks in the late 80s and early 90s. The analysis suggests that supply of credit to SMEs decreases with larger and more complex banks. Specifically, the authors analyze cost of credit, in terms of premium, incidence of secured credit, and allocation of capital to small-business segment. Small business borrowers are identified through the size of the loans and contract facilities as other borrower characteristics are not available. The organizational structure of the lending institution and complexity are captured through a set of measures: 3 characteristics pertaining to presence of multiple management layers (e.g., indicator if the ultimate bank-holding company (BHC) differs from the immediate BHC), 3 characteristics pertaining to existence of multiple banking units (e.g., indicator if the bank has a large number of branches), and 5 variables that capture non-banking activities (e.g., indicator if the bank has underwriting capacity). The authors also identify various size-related categories/indicators based on the total assets of the bank. The results suggest that larger banks tend to charge lower rates and demand collateral less often from small business borrowers. By contrast, complexity measures have a more nuanced effect on SME lending. Collateral requirements are smaller for more complex banks but price of credit may be higher. Similar to the size effect, complexity tends to reduce available credit.

Similar to the analysis conducted by Berger and Udell (1996), and focusing on the tension between organizational diseconomies and size-related diversification, a study by Strahan and Weston (1998) examines the relationship between the size and complexity of a banking institution and its ability/willingness to originate and hold loans to small businesses. The analysis captures an inverted U-shaped relationship between SME loans per dollar of bank assets and bank size. By contrast, the level of bank lending to SMEs increases with bank size. Complexity is measured via the following dichotomy:

single-bank vs. multi-bank BHC, with the latter further categorized into single-state vs. multi-state. Thus, organization complexity increases from the single-bank to the multi-bank, multi-state institution. Size is captured through the bank's total assets. Overall, the analysis suggests that the level of bank lending to borrowers in the small business segment is positively affected by the size of the institution, consistent with presence of size-related diversification effects that allow banks to lend more to all types of borrowers. By contrast, complexity appears to have only a secondary effect.

DeYoung et al. (1999) provide further evidence on the importance of banks' size and complexity for SME financing, while focusing on a segment of banks that often concentrate their lending on small business borrowers, namely: younger and relatively smaller, *de novo*, banks. Using a sample of banks with assets less than \$500 million and younger than 25 years of age, and their activity in the mid-90s, the authors document that for these banks, the fraction of assets allocated to the small-business segment decreases with size and with membership into a multi-bank BHC. By contrast, the number of bank branches is not directly related to SME lending.

As an indirect approach to our understanding of the effect of banks' organizational structure, size and complexity, numerous studies offer insights as a by-product of their analysis of the consolidation in the banking industry through merger and acquisition (M&A) activities. Some of the most comprehensive analyses are offered by Berger et al. (1998) who thoroughly analyze the effects of consolidation on small business lending and identify a static effect that results immediately and directly from the combination of the merging entities, and several dynamics effects associated with post-combination restructuring, refocusing of operations, and reactions of incumbent non-merging banks. The analysis suggests that larger banks tend to reduce lending to SMEs, as proportion of their total assets, as the direct effect of consolidation is largely negative and significant. Importantly, however, this adverse effect is offset by subsequent realizations of dynamic effects of restructuring and incumbent reactions. The analysis controls for the organizational complexity of the banks through variables such as BHC membership and out-of-state BHC but does not offer inferences that allow a direct interpretation of their effect.

Relatedly, Sapienza (2002) uses a sample of mergers and acquisitions of banks in Italy to show that the probability that an SME no longer obtains credit is higher when the SME is a client of a target bank than if it is a client of an acquiring or a non-merging bank. Moreover, Focarelli et al. (2002) find that merged and acquired Italian banks reduce their small business lending, while Alessandrini et al.

(2008) document that this reduction is magnified by the physical and cultural distance between the provinces where the merging banks are headquartered.

Rather than focusing on size, Keeton (1995) investigates the relationship between multi-office banking and small business lending using data from banks in the states of the 10th District in the early 90s. Branch banks, banks in multi-bank BHCs, and banks owned by out-of-state BHCs allocate smaller fractions of their assets to small business lending.

Overall, this stream of research has allowed significant insights into the interaction between SME financing and size and complexity of the lending institution. Yet, these studies often do not observe loan applications and denials by different types of banks. They also often have substantial information about the lending institution but limited data on borrower characteristics, or factors pertaining to the bank-borrower interaction and lending relationship.

Cole et al. (2004) enhance our understanding by examining how the size and complexity of the banking institution, to capture organizational structure, affect the loan approval process. The underlying rationale is that large banks tend to rely more on standard financial data, while small banks focus more on borrower's "character". Specifically, the analysis focuses on bank's decision to extend credit, versus the alternative to deny, controlling for the possibility that certain types of borrowers might be attracted to certain types of banks. Using data from the National Survey of Small Business Finances (NSSBF), the study can control for characteristics pertaining to borrower (e.g., firm size, age, capital structure), loan (e.g., amount, security), and lending relationship (e.g., length, distance, use of other services). The analysis suggests that size is an important factor as large and small banks appear to differ in their approaches to evaluating small business loan applications. Small banks use more discretionary approaches, while large banks focus more on formal financial ratios and characteristics. Importantly, the analysis offers significant insights into the approval/denial decision but remains silent on the determinants of contract terms such as interest rate or collateral.

Along the same line of research, Berger et al. (2005) examine how the nature of banking institutions affects their activities and business practices, and conclude that small banks could have a comparative advantage in collecting and utilizing soft information, central to SMEs lending. The authors establish several pieces of evidence consistent with the above claim. First, larger banks are more likely to lend to larger firms with better financial and accounting records. Larger banks also lend at a greater distance and interact with their borrowers in more impersonal ways (by phone or mail, rather than in person). Such banks also maintain shorter and less exclusive lending relationships with clients. Lastly,

this has implications for credit rationing. Using firms' reliance on expensive trade credit as a measure of rationing, and instrumenting for the endogenous nature of bank size, the authors find that larger banks are more likely to exhibit credit rationing towards their small business borrowers.

Similarly, Scott (2004) focuses on community financial institutions, or CFIs, and their importance to small businesses through their superior ability to produce soft information. The key distinguishing feature of the CFIs is their smaller size. Controlling for the matching between borrowers of certain type and banks with specific characteristics, the author observes that small firms that are clients of CFIs, i.e. small institutions, rate their banks' performance in producing soft information significantly higher. The performance metric is derived from borrowers' answers to questions related to the knowledge of their bank about: 1) borrower's business, 2) borrower's industry, 3) local market, and 4) social contact.

A recent strand of literature also focuses on the production and transmission of information by investigating whether small businesses operating in regions mainly serviced by banks headquartered at a large physical or cultural distance have lower access to credit. The underlying rationale is that distant banks, which are also often large and hierarchically organized, could have difficulties in gathering and transmitting all information about the activities and decisions of their local subsidiaries. Such banks are also more likely to exhibit home bias, especially in times of financial crises and tightening credit conditions, and thus limit the lending by their peripheral branches to soft-information-intensive borrowers. Consistently, Alessandrini et al. (2009, 2010) find that in Italy SMEs located in provinces with a large share of branches owned by banks headquartered in distant provinces, with different social and economic environment, are more likely to experience credit restrictions and also innovate less. Similarly, Popov and Udell (2012) show that in Eastern European countries SMEs located in cities, where most of the local branches are owned by foreign banks, are more likely to be credit rationed during the early stages of the 2007-2008 financial crisis, while Presbitero et al. (2014) document that the credit crunch experienced by Italian firms after the collapse of Lehman Brothers was harsher in provinces with a large share of branches owned by distantly headquartered banks. Moreover, De Haas et al. (2015) show that around the same time, the credit growth of foreign banks in Eastern Europe was significantly lower than that of domestic ones.

Several studies further expand the international perspective on the associations between SME financing and bank size and complexity. For instance, Uchida et al. (2008) adopt the approach used by Berger et al. (2005) to study effect of banks' size on their ability to process soft information and deliver

loans based on the relationship lending technology (LT) in the Japanese context. Uchida et al. (2008) observe that, similar to the experience of their US counterparts, larger Japanese firms are more likely to borrow from larger banks. The latter effect, however, is not due to large firms' better financial statements and large banks' superior ability to deliver transactions-based loans. In addition, the study documents a general parallel between banks in US and Japan in their preference for building lending relationships. The results of Uchida et al. (2008) suggest that bank size is an important factor for small business lending as smaller banks could have a unique advantage over larger banks in processing soft information and delivering relationship-based loans.

Along the same line of research of the Japanese context, Kano et al. (2011) examine how institutional characteristics such as size and complexity affect loan contract terms, rather than bank's ability to approach and serve certain borrowers, SMEs in particular. The analysis seems to suggest that the benefits and costs of more extensive and longer lending relationship, as well as interaction between bank and borrower, depend on institutional characteristics such as size and organizational complexity. In particular, a longer lending relationship with a bank reduces the price of credit in terms of loan interest rate when the lending bank is small but the effect is of modest magnitude. The likelihood of pledging collateral also increases with the length and scope of the bank-borrower lending relationship for small banks. Thus, it appears that borrowers of smaller banks might be subject to a "capture" effect but some benefits of longer relationships with smaller banks could obtain through enhanced credit availability.

Analysis that tries to focus on the micro foundations of the argument why small and large banks differ is conducted by Uchida et al. (2012). Specifically, the study concentrates on the loan officers, as key economic agents in the lending process, and their ability to produce soft information. The size of the bank and its organization are a relevant factor as loan officers at smaller banks, compared to their counterparts at larger banks, are able to produce more soft information. The focus of the study is to measure quantity of information (e.g., through an index that captures bank's knowledge of the borrower) and channels through which information is produced (e.g., frequency of meetings, mode of communication, etc.). As suggested by theory, the activities of loan officers are associated with the production of soft information. Moreover, large banks tend to produce less soft information, even though the ways in which it is produced is comparable across banks of different size.

Lastly, Berger and Udell (2014) examine how the size of the lending institution affects the comparative advantage of banks in using different LTs. This analysis questions the current paradigm that large banks specialize in lending to large firms via hard information, while small banks focus on

small firms and use of soft information. The results of the analysis suggest that small banks might indeed have a comparative advantage in relationship LT. Similarly, Bartoli et al. (2013) examine the differential use of transactional versus relationship LTs using the Survey of Italian Manufacturing Firms in 2007. The study shows that banks lend to SMEs using both technologies independent of their size but more soft information is produced when banks rely on relationship LT. Overall, this analysis suggests complementarity between lending technologies, rather than substitutability as advanced by most of the existing literature.

Although studies with an international perspective offer inferences consistent with the insights generated in the US, common threats to the approach of across-banks studies might limit our availability to draw detailed conclusions. Specifically, banks' organizational structure and complexity are often captured mainly through indicators for type (e.g., regional, large city) or a metric of size (e.g., total assets). These measures only serve as proxies for organizational structure, complexity and allocation of decision-making authority.

3.2 Across-banks Analysis and Direct Focus on Authority Allocation

A step towards a more detailed analysis of the theoretical predictions on the importance of bank organizational structure and lenders' decision-making authority is offered by Benvenuti et al. (2013). The study uses a recent survey of Italian banks conducted by the Bank of Italy. The survey offers insights into banks' organization and bank-level allocation of decision-making authority such as scope of delegation (e.g., amount to which loan officers can lend autonomously, discretion in setting rates and collateral requirements, etc.) and importance of the loan officers in the approval process. The authors establish the importance of these factors, among other bank characteristics, for small business lending by examining their association with the amount of loans granted to SMEs as a fraction of all loans held by the bank. As documented by the extant research in the US and Japan, the allocation of resources to small business lending decreases with the size of the banking institution, but interestingly, increases with the number of branches. Turning to the importance of organizational characteristics and decision-making authority, the authors observe that banks for which the loan officer is "crucial" or "very important" in the setting of loan price and approvals, are more likely to provide financing to SMEs as they allocate large fraction of their assets to funding such borrowers. Interestingly, delegation with respect to setting loan amounts has a negative impact on credit availability. The analysis allows the authors to disentangle supply factors, i.e. associated with banks' structure and complexity, from demand factors, i.e. associated

with firm characteristics and need for credit and interest in obtaining this credit from institutions of certain type. Overall, the authors conclude that the authority of branch loan officers is crucial in explaining specialization of banks towards small business lending, and further suggest that banks that delegate such authority are more willing to lend to SMEs.

Similar to the analysis performed by Benvenuti et al. (2013), Shen et al. (2009) examine the Chinese experience focusing on how bank size and discretion over credit decisions, among other factors, affect lending to small businesses. The key variables of interest to the present discussion are bank size and approval rights of the local bank, and how they are associated with the share of loans extended to Chinese SMEs. Controlling for the endogenous nature of banks' approval rights and authority through econometric techniques, the authors show that delegation of authority to the local level is positively associated with banks' allocation of funds to small business lending. Interestingly, size of the institution, measured through bank's total assets, affects banks' decision as to the allocation of decision-making authority but does not have an independent effect on banks' lending to SMEs.

A study by Canales and Nanda (2012) focuses explicitly on how organizational structure of banks affects their lending to small businesses. The study makes use of a comprehensive loan-level dataset of loans extended to SMEs in Mexico during the period 2002-2006. The analysis also utilizes direct measures of organizational structure, beyond bank size. Through a series of interviews at major banks, the authors create an index that reflects the extent to which lending decisions are made at the central office or at the branch level at each bank. The index, which ranges from 7 to 21, reflects local managers' autonomy with respect to 7 activities related to capital budgeting, loan type, interest rates, and loan amount, among others. Each activity is assigned an integer score between 1 (decision by bank's headquarters) and 3 (decision by branch manager). Banks with an index in excess of 10 are categorized as decentralized. The analysis suggests that measures of decentralization of authority are positively related to the credit availability to small businesses as the granted loan amounts increase in the index. Importantly, the positive sensitivity is stronger for small and micro firms, i.e. firms that are more likely to rely on soft information. Decentralization is also positively associated with the rates charged by the bank. Interestingly, measures of decentralization do not have predictive power towards borrowers' default and delinquency.

Qian et al. (2014) explore an exogenous shock to the Chinese banking system following China's entrance into WTO to study implications for bank lending of delegation of authority. Specifically, at the time many Chinese banks implement decentralization reforms that delegate decision-making authority to

loan officers, and thus exogenously affect incentives for information production and use. The analysis focuses on how information is used for setting loan rates, predicting default, and how quality of information varies with measures of communication costs and incentives. The key information metric is the bank's internally generated credit rating, which captures overall assessment of credit quality. The results suggest that after delegation of decision-making authority and decentralization, the bank places more emphasis on the credit rating. In addition to that, the observed sensitivity is stronger when information costs are lower. The authors interpret the results as consistent with the idea that production and use of information improves with delegation of authority and reduction in communication costs which, in turn, affects positively outcomes of the lending process.

Providing some insights from Germany, Gropp et al. (2012) examine how discretionary lending by banks affects their risk. Specifically, using a sample of more than 450 savings banks extending credit primarily to SMEs during the early 2000s, the study observes that smaller banks are more likely to use discretion in the lending practices.

Overall, studies based on empirical design that uses variation across banks robustly confirm the importance of organizational structure and allocation of decision-making authority in the context of small business financing, both within the US and internationally. In addition to that, extant literature has established a large body of knowledge on the effects of these factors on credit availability to SMEs and on the ways in which banks with different characteristics conduct business. However, the approach can offer only limited insights into the inner workings of the institutions and how these workings interact with the organizational structure and characteristics, as postulated by theory.

3.3 Studies Based on Within-institutions Analysis and Direct Focus on Authority Allocation

The theoretical literature discussed above establishes associations between the structure of an organization in terms of hierarchical design and the production, transmission and use of information, often focusing on subjective, or soft, information. Despite the prominence of this literature, empirical analyses have been limited until recently. The latter gap in the body of knowledge results mainly from lack of detailed data and difficulties in operationalization of concepts such as “soft information” or “hierarchical structure”.³

³ The focus of this discussion is on the interaction between organizational structure and hierarchical design of a bank and the incentives of branches and loan officers to produce, communicate and use different types of information, mainly focusing on soft vs. hard information. Several other relevant studies examine, for instance, how rotation policies could affect information production and reporting (e.g., Hertzberg et al. (2010)) or how ownership interacts with the granting of decision-making authority to local managers (e.g., Brickley et al. (2003)).

One of the first studies in the banking area to provide careful estimates of the use of information of different types and its interaction with the structure of the institution is offered by Liberti and Mian (2009). The authors estimate the effect of hierarchical structures on the use of information in a large Argentinian bank. Their analysis suggests that lending outcomes, in terms of credit availability, are more (less) sensitive to objective (subjective) information when the hierarchical distance between information collecting agent and loan approving officer increases. Thus, hierarchical distance makes it more difficult to rely on subjective information. To establish these arguments, the authors use data on the entire loan approval process of more than 400 loan applications at the bank during 1998, which allows them to observe all information collected by the loan officers including both objective (e.g., financial statements, ratios, etc.) and subjective (e.g., impression about borrower character and management quality, etc.) information. The loan approval process can be conducted across 5 levels and, in order to capture all information available to the bank, the authors construct an index that aggregates bank's objective information about the borrower. In a similar manner, they construct a subjective index that includes industry risk assessment, competitive position, management quality, access to capital, and risk management. The empirical analysis reveals that approved loan amounts are much more sensitive to objective information at higher levels, and much more sensitive to subjective information at lower ones. A decomposition of the index of subjective information into constituents reveals that, consistent with theory, the decline in subjective information sensitivity with high levels is more pronounced for more subjective categories.

Similarly, Agarwal and Hauswald (2010) examine the decision of bank's headquarters to exercise real authority in the loan approval process. Using a dataset of all credit decisions with respect to small businesses completed by a major U.S. bank over a 15 month period, the authors offer evidence that delegation of real authority leads to incentives for production and strategic use of soft information. Specifically, more autonomous branches produce more soft information about their borrowers and further enjoy more real authority. The authors capture the initial delegation of authority through review requests exercised by bank's headquarters, while the private subjective information about the borrower is operationalized as the residual from an orthogonalization of the bank's internal score for a borrower on public information through applicant's Experian score. The analysis documents that review requests increase with the organizational distance between local branch and headquarters. Importantly, this positive sensitivity decreases for branches that produce more soft information about the borrowers. Similarly, branches' decision to produce and provide additional information through "notes" increases in

the organizational distance between the branches and headquarters, and the sensitivity increases for branches that produce more soft information. Lastly, a branch is more likely to complete the approval process if located organizationally farther away from the headquarters, and the sensitivity increases with the production of soft information at the branch. The authors interpret these three pieces of evidence as consistent with the idea that more autonomous branches produce more information, and the more information they produce the more authority they enjoy.

While the above-mentioned studies examine how delegation of authority and the design of the organization affect loan officers' incentives to produce and use soft information, Mosk (2014) examines the implications of delegation for the manipulation of information by focusing on the organizational change in a large commercial bank in the Netherlands. The study shows that delegation of loan approval authority decreases incentives to manipulate information, i.e. communicate information strategically. As a source of identification, the study exploits a shock in October of 2010 to the organizational structure of the bank that allows local business directors at some branches to approve small business loans. To capture information manipulation, the author relies on the number of scoring trials completed by each loan officer. In the application process, the loan officer generates a score based on input parameters and decides how to proceed based on this score (e.g., abort the application, input new parameters, initiate new scoring trial, etc.). The number of scoring trials per application is used as a proxy for information manipulation. Using differences-in-differences approach, the analysis reveals that the number of scoring trials, and thus the incentive to manipulate information, decreases after allocation of authority.

In a related study, Degryse et al. (2014) examine the benefits to loan officers' discretion, measured as deviation of granted loan amount from the bank's credit scoring model, and document evidence consistent with the notion that soft information affects the use of discretion. However, beyond allowing loan officers to use soft information, discretion neither improves nor deteriorates loan outcomes. Consistently, Berg et al. (2013) also provide insights suggesting that discretion does not necessarily improve loan outcomes. Using approach similar to that used by Mosk (2014), but in a context where loans are based on hard information only, the authors show that loan officers use multiple trials to move loans over a pre-specified approval threshold, and the number of trials is positively associated with future default.

A related study by Skrastins and Vig (2014) investigates how the organizational hierarchy of a lending institution affects allocation of credit to small borrowers. To ensure identification, the authors rely on exogenous variation in incentives and ability to produce soft information introduced through a

restructuring plan implemented at an Indian bank in the period 1999-2006. Using a difference-in-differences approach, the authors examine how hierarchies affect quantity and quality of originated loans. Hierarchical position of a bank branch is captured through an indicator that ranges from 1 (least hierarchical) to 3 (most hierarchical). As an alternative, the authors introduce indicators that take the value of 1 if a branch is upgraded in terms of hierarchical position, negative 1, if it is downgraded, and 0 otherwise. The results show that an increase in the hierarchical position of the loan-originating entity leads to a decline in total new loans and average loan size. It is also associated with a reduction in the number of information-sensitive borrowers and a drop in the quality of the loans. To investigate the underlying channels, the authors study information production about the originated loans by examining the variance in the contract terms of loans originated within a given branch. Consistent with theoretical arguments about information production incentives created through decentralization and allocation of authority, the analysis reveals that increases in organizational hierarchy reduce the variance in contract terms and hence information production.

Lastly, Cotugno et al. (2013) use data from three Italian banks during the period 2007-2009 to establish that the hierarchical distance between the loan-originating branch and the level responsible for the decision has a negative impact on credit availability. Degryse et al. (2009) use data from a Belgian bank to examine how banks' organizational structure affects spatial competition and pricing of bank loans.

A key premise underlying most of the above-mentioned studies is that soft information is not transferable and verifiable and thus rests with the information-producing agent. As a result, delegation is beneficial as it allows incorporation of such information into the decision-making process. By contrast, Cambell and Loumioti (2013) argue for lasting effects and portability of soft information in a decentralized financial structure. Specifically, the study shows that the "stock" of soft information, accumulated through a monitoring system, has persistent effects on lending decisions in terms of increased credit availability, improved pricing terms, and superior ex-post outcomes. To capture soft information, the authors focus on a monitoring information system used by employees to store notes, qualification and opinions about borrowers, without converting these into numeric scores that can be easily transmitted. The notes and text are coded into words relating to "soft" and "hard" information, and the accumulated stock prior to loan origination is related to lending decisions and outcomes. The study suggests presence of both inter-temporal and cross-employee transmission of soft information and implications for loan outcomes.

Overall, existing studies that focus on within-bank analysis and explicitly recognize allocation of authority and organizational structure suggest that more complex hierarchical structures affect the use and applicability of soft information. Far less is known about the implications for loan contract terms such as price of credit and collateralization decisions. The latter is the focus of our next section.

4. Organizational Structure and Loan Outcomes

Theory and empirical analyses suggest that bank's organizational structure is crucial for the outcome of lending to small businesses and entrepreneurial firms, particularly for credit availability and use of certain types of information. However, relatively little is known about the implications of organizational structure for the shape of the loan contract. Hence, we investigate the role played by the internal organizational structure of the bank in terms of hierarchical arrangements on the price and non-price terms of the loan contract. Specifically, we examine how the hierarchical positions of the loan officers who monitor and service the credit line affect price of credit and collateral requirements.

4.1. Data and Context

To analyze the impact of bank organizational structure on loan contract shape in the context of small business lending we make use of a unique proprietary dataset that consists of more than 15,000 credit lines made to individually-owned businesses (i.e. sole proprietorships) and SMEs by a regional Italian bank, which belongs to one of the major banking groups quoted on the Milan Stock Exchange. To provide some perspective, we note that the Italian banking sector consists of almost 750 banking institutions and it is the fourth largest in Europe. It is also one of the most concentrated credit markets among the major European economies. In 2008 the average number of banks per province was around 28 compared to 25 in 2000. This development has contributed to a greater competition in provincial and regional markets. However, despite the greater concentration and low presence of foreign banks in retail markets, the Italian banking system exhibits characteristics close to EU average. Transformation processes within the Italian banking sector, similar to such forces in the US, have led to an increase in the functional distance between the decision-making centers of banks and the local economies and a reduction in the average operational distance between lenders and borrowers (Alessandrini et al., 2009).

The sample provided by our bank includes the entire bank portfolio of existing credit lines as of September 2004 and 2006 in two Italian provinces characterized by the largest concentration of individually-owned firms and SMEs. The dataset includes loan contract terms (e.g. credit limit, interest

rate, amount of collateral), along with borrower characteristics (e.g. sales, organizational form, industry specialization) and aspects of the bank-borrower relationship (e.g. length of the relationship, whether or not the borrower uses other services provided by the bank, exclusivity of the relationship). Furthermore, the dataset includes information on the centers of decision-making, i.e. decisional levels, with respect to each loan contract.

First, we examine the hierarchical position of a decisional unit within the bank's organizational structure. Each decisional layer has decision-making power with respect to the credit lines extended by its loan officers on the basis of loan value and borrower characteristics. However, higher decisional layers might have more efficient screening and monitoring procedures, which could affect the cost structure and thus ability to offer credit at a lower price. To examine the previously discussed trade-off between cost and use of local knowledge, we construct an ordered step variable, *Decisional level*, that ranges from 1 (credit line managed at local bank branch) to 7 (credit line managed at headquarters). Categories 2 to 6 reflect different decisional levels along the bank's organizational hierarchy. Approximately 75% of the credit lines in our sample are granted by local bank branches. For our empirical specifications, which are described in detail in the next section, we create indicators, *Decisional level* (d), that take the value of 1 if the credit line is managed at the d -th level, and 0 otherwise. Note that d ranges from 1 to 7 in order to reflect all possible levels.

The two outcome variables we focus on are *Interest rate* and *Collateral*. The average *Interest rate* for our borrowers is 7.04%. However, interest rates charged in the first decisional level seem to be higher relative to rates of loans managed at the upper decisional layers, 7.17% vs. 6.65%, respectively. Our second variable captures the incidence of collateralization. To this end, we construct a variable *Collateral* as an indicator that assumes the value of 1 if the credit line is secured by collateral and 0 otherwise. On average, almost 30.1% of our borrowers provide collateral. We observe that credit lines managed at lower levels have slightly lower likelihood to pledge collateral with respect to credit lines managed at bank's headquarters (29.7% vs. 31.2%). The decisional levels with the highest collateral incidence are the first and last: 35.9% and 37.6%, respectively.

The cost of credit, both in price and non-price terms, depends on various factors related to borrower and lender characteristics, as well as market and business cycle conditions. In order to ensure that our variables reflecting bank's organizational structure do not simply capture some of these factors, we use a set of control variables reflecting borrower characteristics, the nature of the bank-borrower

interaction, and measures of industry conditions, local market characteristics, and aggregate macroeconomic state.

These control variables include firm size, which is measured by borrower's total sales (*Sales*). As the bank only provides sales categories rather than exact amounts, we construct a step variable. Similar to the indicators for decisional levels, we create indicators for each sales category, *Sales* (s), where s ranges from 1 to 8. We also use different characteristics of the bank-borrower lending relationship. *Relationship Length* is the number of days since the firm has first borrowed from our bank. *Multiple Lending* captures the exclusiveness of the bank-borrower relationship. The variable takes the value of 1 if the firm borrows from multiple banks and 0 if the firm has an exclusive relationship with our bank. Lastly, *Other Services* considers the scope of bank-borrower interaction. The variable takes the value of 1 if the firm uses additional services provided by the bank, and 0 otherwise. In addition to the measure of hierarchical level responsible for a credit line, we also create the variable *Portfolio* that identifies the market segment, from bank's point of view, where a borrower falls. Specifically, the variable takes the value of 1 if the bank considers the credit line as part of its *corporate market* and 0 if it is part of the *small business market*.

4.2. Empirical Analysis

In the first part of our analysis we examine whether decisional levels have an impact on interest rate, i.e. price terms of the loan contract. To examine this argument, we estimate the following ordinary least squares (OLS) model:

$$Rate_{it} = c + \alpha(DecisionalLevel)_{it} + \sum_{k=1}^n \gamma_k x_{ik} + \sum_{s=1}^m \phi_s Industry_{is} + \sum_{b=1}^h \phi_b Branch_{ib} + \sum_{m=1}^z \eta_j Market_{im} + \tau Time_i + \varepsilon_{it} \quad (1)$$

where *Rate* is the interest rate in percentage paid by borrower i at time t . *Decisional Level* reflects the layer of decision making process and x is a vector of firm-specific controls and bank-firm relationship factors. Table 1 presents estimation results of the specification outlined in Equation (1). In column (1) we show results from a base-line model that includes only the variables that capture the decisional level that manages the credit line. In column (2) we augment this baseline specification by including a set of controls. Lastly, in column (3) we control for unobservable individual effects that could differ across

borrowers by estimating the model from column (2) using random effects estimators. In all specification we include industry, year, market, and branch fixed effects.

We note that in all specifications in Table 1, the coefficients on the variables that capture the bank organizational structure are negative and significant. In addition to that, we observe an almost monotonic reduction in interest rates with the increase in decisional level, especially once we control for the other determinants of interest rates. Thus, our analysis of the impact of bank organizational structure on the cost of credit shows that credit lines managed at upper levels tend to pay lower interest rates relative to lines managed at lower levels.

In the second step of our analysis, we examine whether bank decisional structure has an impact on collateral requirements. Specifically, we estimate the following *Probit* model:

$$\Pr(Collateral=1)_{it} = F\left(c + \alpha(Decisional_Level)_{it} + \sum_{k=1}^n \gamma_k x_{itk} + \sum_{s=1}^m \varphi_s Industry_s + \sum_{b=1}^h \phi_b Branch_b + \sum_{m=1}^z \eta_j Market_m + \tau Time_t + \varepsilon_{it}\right) \quad (2)$$

where *Collateral* is an indicator that assumes the value of 1 if the credit line is secured by collateral and 0 otherwise. $F(\cdot)$ is the cdf of the standard normal distribution. The measures of decision-making process and control variables are the same as those outlined in model (1).

Table 2 shows the estimation results of equation (2) using the Probit model. Our analysis of the use of collateral suggests that, with the exception of the highest decision-making level, the incidence of collateral increases with the hierarchical level of the decision-making, especially once we control for the other determinants of this contract term. Thus, our analysis documents that the position of the unit with decision-making authority within the bank's organizational structure is important for both loan contract terms: interest rate and collateral.

5. Conclusion

The organizational structures of banks and lending institutions have important implications for financing and provision of credit to small businesses and entrepreneurial firms. The underlying rationale relates to the existence of agency problems within the banking institutions and a trade-off between more informed decisions via the allocation of authority versus possible loss of control.

In this chapter, we first summarize existing theoretical motivations for the importance of banks' organizational structure in two board categories: Explanations based on agency considerations and incentives and explanations that abstract from these factors. We also review existing evidence on the interplay between organizational structure and bank lending to small businesses. We argue that, on the balance, existing research confirms that organizational structure is an important factor for the use and transmission of certain types of information, as well as credit availability for small businesses.

Lastly, we use a unique dataset to empirically examine the importance of organizational structure for the shape of bank loan contracts. Our analysis shows that both pricing decisions and collateral requirements are sensitive to the allocation of decision-making authority within the bank's hierarchical structure.

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Table 1 Loan Contract Terms: Interest rate

	(1)	(2)	(3)
<i>Decisional level (2)</i>	-0.329*** (0.060)	-0.245*** (0.067)	-0.223*** (0.067)
<i>Decisional level (3)</i>	-0.314*** (0.092)	-0.209** (0.098)	-0.231** (0.100)
<i>Decisional level (4)</i>	-0.569*** (0.079)	-0.379*** (0.094)	-0.334*** (0.106)
<i>Decisional level (5)</i>	-0.896*** (0.093)	-0.593*** (0.117)	-0.694*** (0.135)
<i>Decisional level (6)</i>	-1.188*** (0.192)	-0.725*** (0.225)	-0.603** (0.259)
<i>Decisional level (7)</i>	-0.567** (0.287)	-1.787*** (0.394)	-1.219** (0.622)
<i>Corporation</i>		0.283*** (0.051)	0.228*** (0.063)
<i>Sales (2)</i>		-0.216*** (0.067)	-0.221*** (0.085)
<i>Sales (3)</i>		-0.228*** (0.060)	-0.269*** (0.080)
<i>Sales (4)</i>		0.038 (0.077)	-0.021 (0.095)
<i>Sales (5)</i>		-0.131 (0.102)	-0.130 (0.137)
<i>Sales (6)</i>		-0.309** (0.144)	-0.334 (0.220)
<i>Sales (7)</i>		-0.717*** (0.181)	-0.752** (0.319)
<i>Sales (8)</i>		0.478* (0.260)	0.342 (0.347)
<i>Multiple lending</i>		0.024 (0.105)	0.067 (0.084)
<i>Other services</i>		-0.356*** (0.084)	-0.427*** (0.085)
<i>Relationship length</i>		-0.051** (0.024)	-0.038* (0.023)
<i>Portfolio</i>		-0.398*** (0.090)	-0.426*** (0.134)
<i>Credit Limit</i>		-0.000 (0.000)	-0.000 (0.000)
<i>Overdraw</i>		0.446*** (0.051)	0.256*** (0.042)
<i>Constant</i>	6.131*** (0.246)	6.728*** (0.324)	7.540*** (0.287)
Observations	15,151	14,916	14,916
R-squared	0.07	0.08	

Note: The table presents analysis of the impact of decisional levels on interest rate. All specifications include Industry, Time, Branch and Market fixed effects. Column (1) shows results of a baseline OLS regression with dependent variable the interest rate charged by the bank. Columns (2) and (3) show results of an augmented OLS regression and Random Effects model, respectively. The table reports coefficients, followed by robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01

Table 2 Loan Contract Terms: Collateral

	(1)	(2)	(3)
<i>Decisional level (2)</i>	0.236*** (0.038)	0.663*** (0.045)	0.174*** (0.013)
<i>Decisional level (3)</i>	0.170*** (0.060)	0.818*** (0.071)	0.215*** (0.020)
<i>Decisional level (4)</i>	0.038 (0.056)	0.994*** (0.073)	0.250*** (0.020)
<i>Decisional level (5)</i>	0.013 (0.066)	1.295*** (0.091)	0.291*** (0.024)
<i>Decisional level (6)</i>	-0.063 (0.134)	1.374*** (0.165)	0.266*** (0.043)
<i>Decisional level (7)</i>	-0.874*** (0.164)	-0.415** (0.205)	-0.007 (0.033)
<i>Corporation</i>		-0.485*** (0.032)	-0.141*** (0.010)
<i>Sales (2)</i>		0.104** (0.040)	0.037*** (0.014)
<i>Sales (3)</i>		-0.174*** (0.040)	-0.041*** (0.013)
<i>Sales (4)</i>		-0.541*** (0.053)	-0.135*** (0.016)
<i>Sales (5)</i>		-0.702*** (0.075)	-0.162*** (0.022)
<i>Sales (6)</i>		-0.875*** (0.138)	-0.172*** (0.035)
<i>Sales (7)</i>		-0.904*** (0.190)	-0.194*** (0.051)
<i>Sales (8)</i>		-0.745*** (0.227)	-0.163*** (0.053)
<i>Multiple Lending</i>		-0.227*** (0.065)	-0.045** (0.018)
<i>Other Services</i>		-0.354*** (0.040)	-0.121*** (0.014)
<i>Relationship Length</i>		-0.027** (0.013)	-0.002 (0.004)
<i>Portfolio</i>		-0.528*** (0.077)	-0.126*** (0.022)
<i>Constant</i>	-948.168*** (24.104)	-0.408*** (0.139)	0.319*** (0.043)
Observations	15,138	15,059	15,072
Pseudo R-squared	0.11	0.17	

Note: The table presents analysis of the impact of decisional levels on collateral. All specifications include Industry, Time, Branch and Market fixed effects. Column (1) shows results of a baseline Probit model with a dependent variable that takes the value of 1 if the credit line is collateralized and 0 otherwise. Columns (2) and (3) show results of an augmented Probit model and a Random Effects model, respectively. The table reports coefficients followed by robust standard errors in parentheses. * p<0.1, ** p<0.0