



BANCA D'ITALIA  
EUROSISTEMA

# Banks, Local Credit Markets and Credit Supply

Seminari e convegni  
Workshops and Conferences

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BANCA D'ITALIA  
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# Banks, Local Credit Markets and Credit Supply

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Workshops and Conferences

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## INTRODUCTION

*Luigi Cannari\**, *Marcello Pagnini\*\** and *Paola Rossi\*\*\**

In the past fifteen years the Italian banking system changed dramatically. Regulatory evolution, increased internationalization and the increased market concentration following M&As in the sector (including cross-border mergers) altered the characteristics of the banking industry as well as the supply of banking services. Partly in response to the spread of ICT (information and communication technologies), banks reorganized their lending activity, by changing their mode of interaction with customers and adapting the procedures they use to assess borrowers' creditworthiness and to monitor loan performance.

Internal organization is crucial to banks' activity. It has been examined in depth – including for supervisory purposes – to assess the adequacy of operational risk safeguards and, more recently, corporate governance and control. The papers presented at this conference focus on the interaction between branch managers and small and medium-sized enterprises (SMEs). This choice reflects the idea that lending relations are built through repeated interaction over time between the branch manager and the borrower. Such interaction is shaped by the type of organization the bank has adopted: the degree of decision-making centralization, modes of communication between hierarchical levels, and the adoption of statistical techniques for risk evaluation can significantly affect the behaviour of branch managers; this, in turn, may be reflected in the allocation of credit to SMEs.

The papers rely on a special survey, conducted in 2007 on more than 300 Italian banks (Albareto, Benvenuti, Mocetti, Pagnini and Rossi). The survey gathered information on factors like the distance – geographical and hierarchical – between the headquarters of the bank (i.e. the holder of the formal authority within the bank) and its branch network, the decision-making powers delegated to branch managers (proxied by the size of the loans they can grant on their own authority to small firms), their incentives and tenure in office, the adoption of credit scoring techniques, the type of data used to generate the scores, and the actual use of these procedures in the loan process (decision to grant, decision on size, pricing, etc.).

While these organizational features differ markedly from bank to bank, this heterogeneity is only partially explained by the differences in bank size. The survey also highlighted the fact that between 2003 and 2006 the autonomy of branch managers increased; this trend went hand in hand with the enhanced mobility of these managers as well as a greater use of compensation schemes linking their salaries to the performance of the local branch they managed.

During the three years considered, credit scoring and internal rating techniques, while still absent at many smaller banks, were almost universally adopted by larger ones. Although scoring techniques play a central role in larger banks' decision to grant credit, they are not frequently used to determine the terms and conditions of loans.

The papers presented at the conference address two main issues: how bank concentration and the introduction of ICT affect some organizational variables that are at least potentially relevant in

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explaining relations between banks and SMEs; and the relation between structural changes in supply and organizational variables on the one hand and lending to the business sector on the other.

Among the papers dealing with the first issue, Mocetti, Pagnini and Sette analyse whether the increasing use of ICT altered the delegation of credit power to branch managers. The new technologies can either reduce or increase the degree of decision-making centralization within a bank, depending on whether the greater capacity of the centre to monitor the branches following the introduction of these technologies, a force pushing toward decentralization, would prevail over the lower cost of communication between branch and head office, an effect that would lead to more centralization. They find that the banks relying most heavily on ICT have generally delegated more power to branch managers.

Beretta and Del Prete examine the changes in the distribution of lending power together with the turnover of branch managers subsequent to acquisitions. After a takeover, the size of the loan that branch managers or CEOs can grant on their own authority tends to increase, while the average term of office of branch managers diminishes. The increase in decision-making independence in the target bank is more pronounced when the takeover involves banks located in the same local areas as the branch network and head office.

Within the group of papers dealing with the effects of organizational variables on credit supply, Infante and Rossi investigate how the increasing presence of foreign banks in Italy affects competition among different types of borrowers (households vs. firms) and geographical areas. Competition from foreign intermediaries is stronger when products are standardized and information asymmetries less important: an increase in the activity of foreign banks leads to greater customer mobility, both for households and firms; it reduces interest rates and the collateral required from households, while no impact on interest rates and only a slight reduction in collateral are detected for firms.

Benvenuti, Casolaro, Del Prete and Mistrulli show how the branch loan officer's authority plays a key role in explaining bank specialization in small-business lending: banks that delegate more decision-making power to their branch managers, assign greater importance to soft information and have lower manager turnover are more willing to lend to small firms than other banks. As bank size increases, the propensity to lend to SMEs tends to diminish; this effect is partly offset by organizational measures heightening local loan officers' independent decision-making powers.

Banking organization also influences the decision to intervene in favour of troubled firms. Micucci and Rossi find that about one third of the firms in the sample succeed in getting their debt restructured – a maturity extension or further lending – by at least one of their lending banks. The probability of debt restructuring is higher when the bank is geographically closer to borrowing firms, relies more on soft than hard information, and adopts a decentralized structure with more power allocated to local managers. However there are important complementarities among organizational variables: the adoption of credit scoring increases the likelihood of restructuring if banks also use these techniques systematically in the monitoring process and if they adopt more decentralized structures.

The data collected in the survey as well as the entire research project referred to a time period that preceded the financial crisis and the subsequent recession that has affected the world and the Italian economy in recent years. Specific inquiries were conducted to determine what features of bank-firm relations and what organizational arrangements helped to mitigate the contraction of credit during the crisis. In terms of statistical data-gathering, new surveys of credit

demand and supply at regional level were conducted.<sup>1</sup> Further surveys have commenced recently. The additional data will make it possible to gauge the extent to which the tendency towards more decentralized decision-making may have been modified by the heightening of credit risk due to the crisis and by the need to prevent deterioration in loan asset quality. The data will also help to investigate the relations between the organization of branches and the granting of loans to SMEs during the crisis. The operation of rating systems can also be analysed in the light of the impact of recession. Some preliminary studies indicate that as the crisis worsened, “automatic” credit scoring methods became increasingly important in the lending decisions of major banking groups. However, the accounting data that constitute the input for automatic scoring systems suffer a structural lag of several months, and rarely include qualitative factors helpful in assessing a firm’s future prospects.

The main message to emerge from the studies presented today is that mergers and acquisitions in banking and more intensive use of ICT do not imply, *per se*, neglect of the needs of SMEs. These analyses indicate that the vocation for “local banking” does not necessarily depend on the bank’s size but does require suitable organizational arrangements. In particular, banks with more decentralized decision-making and with longer tenure for branch managers appear to have a greater propensity to lend to SMEs and to intervene in debt restructuring on behalf of firms in financial distress.

The use of rating and credit scoring techniques is increasingly common. Gathering and processing data is essential to the evaluation of creditworthiness. Implementing methodologies that analyse the available statistical data within a consistent framework is not incompatible with the initiative and autonomy of the local branch manager. Indeed, within some types of organization these methodologies reinforce the role of local branch managers, enabling headquarters to grant them greater authority. But especially during a period of crisis, it is essential to combine codified data (hard information) with knowledge of the customer (soft information). In the words of Governor Draghi in his address to the Italian Banking Association on 8 July 2009, “It is equally important that in deciding on loans banks use all the information available, that they supplement statistical scoring methods – which lose some of their predictive power at times of crisis – with direct knowledge of customers and their real potential for growth and profitability in the long term.”

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<sup>1</sup> *Economie regionali* 22, February 2010.





**SESSION 1**

**NEW TECHNOLOGIES AND BANKING ORGANIZATION**



# THE ORGANIZATION OF LENDING AND THE USE OF CREDIT SCORING TECHNIQUES IN ITALIAN BANKS: RESULTS OF A SAMPLE SURVEY

*Giorgio Albareto\**, *Michele Benvenuti\*\**, *Sauro Mocetti\*\*\**,  
*Marcello Pagnini\*\*\** and *Paola Rossi\*\*\*\**

## 1. Introduction and main results

During the 1990s two major factors affected the Italian banking industry: liberalization and an intensive wave of technological innovation originating in the ITC sector. As a result, the banking system underwent a consolidation process, banks expanded and entered new markets, and internal decision-making processes for granting loans were completely overhauled. The ways in which households and firms accessed credit changed. In the wake of these transformations, banks grew in size and organizational complexity, and now found themselves having to manage their presence in a number of different geographical and product markets. Large banks were not the only ones affected by this trend, as small and medium-sized banks frequently joined bigger banking groups or expanded internally, in both cases determining a leap in size that sometimes led to organizational discontinuity. The rapid advances in ICT technologies had a profound effect on the output of the entire banking industry. These transformations imply that we need to have an updated and deeper knowledge about how banks organize the several aspects of their lending activities (customer screening, the terms and conditions of lending, monitoring of the borrower's conduct etc.)

The literature on bank-firm relationships generally treats banks as unitary entities and neglects the characteristics of their internal structure. Recently, however, the literature on organization has spawned a number of papers that emphasize the importance of the strategic interaction among managers in charge of various functions within the banking organization, who have different information and who are bearers of interests that do not necessarily coincide. It has been shown – both theoretically and empirically – that the ways in which this interaction occurs can affect the effectiveness of credit allocation, especially in the case of SMEs.

One of the main consequences technological change had for credit markets was the introduction of credit scoring<sup>1</sup> techniques based on standardized data. Despite their increasing importance, including in the Italian market, there are few studies on the diffusion and use of these procedures.

To collect data useful for understanding these changes, in 2007 the Bank of Italy conducted a survey on over 300 banks, representing the universe of intermediaries of a certain minimum size and organizational complexity. This report presents the results of the survey.

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<sup>1</sup> We use this term to denote all the automated techniques for assessing creditworthiness, described later in the paper.

The analysis of banks' internal organization revealed profound differences among the Italian intermediaries from four standpoints: the geographic distance between a bank's headquarters and its branch network; the decision-making autonomy of the branch manager, proxied by the amount of small business credit he or she is authorized to extend in proportion to that which can be approved by the CEO; the length of branch managers' tenure; the use of incentives for their remuneration. Part of this heterogeneity is accounted for by the size and institutional differences of the banks surveyed. However, some heterogeneity still exists among homogenous groups of intermediaries. The results confirm how the internal structure of lending activities adapts to specific circumstances and forms a crucial component of banks' competitive strategies. An implication of these findings is that an analysis of these phenomena must employ a broader and richer taxonomy than the traditionally one, based on banks' size.

For most of the participating banks, between 2003 and 2006 the distance between their headquarters and branch network increased. Bank managers enjoyed greater mobility and autonomy in decision-making, and economic incentives were more frequently used for their remuneration. The results do not support the thesis that the advent of new technologies greatly diminished the role of bank managers, with negative repercussions for banks' direct interaction with SMEs. On the contrary, it is possible that lower communication costs favoured the greater autonomy of local managers in the periphery (branches or local decision-making centres). Increased mobility could be the result of partially exogenous events to the bank's strategy (*i.e.* mergers and acquisitions, tough competition in the local credit markets). It could also be the result of an active policy by banks to reduce the costs of opportunistic practices by local branch managers.

The survey has shown that credit scoring have spread among Italian intermediaries, with the sharp acceleration in recent years probably related to the entry into effect of the new Capital Adequacy Accords (Basel II). The diffusion process was more pronounced among large banks, in a position to exploit economies of scale. Credit scoring techniques mostly process balance sheet data, historically the most frequently used element for evaluating creditworthiness. Larger banks generally use internally developed models, and give great emphasis on the qualitative data, such as borrowers' corporate governance and organization and the project to be financed (for large firms especially).

Although scoring techniques play a central role in the decision to grant credit, they are not frequently used to determine the terms and conditions of loans. The scores generated by the application of these techniques appear more stringent for large banks than for smaller ones. Overall, the results suggest that the new techniques, which banks are still in the process of adapting to, flank but do not entirely replace the previous evaluation processes and data sources.

The report is organized as follows: section 2 surveys the literature on the internal organization of banks and the use of credit scoring; section 3 contains information on the sample of banks interviewed; section 4 analyzes the relationship between the centre and branch network in banks' internal organization and the role of bank managers; section 5 examines the diffusion and importance of credit scoring in business lending. The appendix reproduces the questionnaire distributed to the participating banks.

## **2. The organization of lending and the use of credit scoring: the main issues**

Usually banks rely on a mix of data sources to assess firms' creditworthiness. Some informations are easy to classify and transmit from a distance (*hard* information), while others are acquired through personal contacts and comprise qualitative elements that are difficult to communicate to the persons other than those who collected them (*soft* information). It is generally

thought that qualitative data play a greater role in the evaluation of start-ups and small businesses, which are prone to having more opaque information (for example owing to fewer years of experience), less reliable processed data, or in any event are subject to less strict information requirements compared with large corporations (such as accounting data).

The collection of quantitative but especially qualitative information on small firms is done through the branch manager. It is usually at this level of the bank organization that the first contact is made with the small firm, the assessment of creditworthiness activated, and the relevant information transmitted for evaluation at the higher levels of the banking structure. In some instances the decision whether or not to grant a loan and its terms and conditions is taken in complete autonomy by the branch manager.

The literature on corporate organization acknowledges that it is possible for the objectives of branch managers to diverge from those of the ultimate control holders. It also emphasizes how specialization in the gathering of data and information asymmetries between the headquarters and the branch network within a complex organization can generate the need for a two-way transfer of information along the hierarchy. The literature on banking shows how the many distinctive elements featuring internal organization (the organization chart, the extent to which decision-making is centralized or decentralized, internal control systems, procedures for communicating between the various organizational levels, etc.) have a decisive influence on the strategies of the branch managers and, through them, on the allocation of credit to small firms.

The central role played, *de facto*, by branch managers in lending to SMEs has not been given sufficient attention by the literature, in part owing to a lack of data. Some recent contributions have begun to fill this gap. Liberti (2005) and Liberti and Mian (2006) show that the higher up one goes in the hierarchy of the bank organization, and the more distant the customer is from the decision-making centre, the less qualitative elements will weigh on loan decisions. This shows how qualitative information is in fact collected and stored at the lower hierarchical levels and how its transmission costs increase with geographical and organizational distance (defined as the number of levels involved in the decision-making process).

Stein (2002), and Berger *et al.* (2005) broaden the debate to include the effects that different organizational models can have on the incentives for banks' branch managers. In particular, Stein uses a theoretical model to show how a large bank can discourage the acquisition of soft information by a branch manager where data must be communicated along multiple hierarchical layers and its transmission becomes extremely costly. This effect does not occur in the case of small banks, where there is markedly less physical and hierarchical distance between the headquarters and the branch network. As a result, the branch managers of major banks may have a greater incentive to collect hard data, which are more easily provided by large firms, while smaller intermediaries can specialize in the acquisition of qualitative information and in small business lending.

For Japan, Uchida, Udell and Yamori (2006) show how branch manager's traits are not important for the purposes of accumulating soft information and explain this result with reference to the likelihood that the strong social cohesion of Japanese society lowers the costs of transmitting qualitative information.

In an empirical analysis of Italian data, Ferri (1997) shows the positive correlation between branch manager mobility and bank size, and explains this result by reference to the greater difficulties large banks face in limiting the moral hazard stemming from the potential for collusion between branch managers and bank customers. The large physical and organizational distance between the headquarters and branches of major banks increases the costs of monitoring, driving these intermediaries to use the mobility of banking managers as a tool for limiting their opportunities to reap private benefits. By contrast, the geographical and organizational proximity

typical of small banks encourages them to maximize the benefits of the stability of local managers, while at the same time maintaining monitoring costs at reasonably low levels, given that the top managers may belong to the same local community as the branch manager. Moreover, if a large bank is specialized in lending to medium-sized and large firms capable of providing hard data (Stein, 2002), it follows that these banks will be less motivated to keep the local managers in the same branch for a long time. In these cases, mobility can represent a way of furthering local managers' careers and of warding off excessive inertia in the administration of local branches. Hertzberg, Liberti and Paravisini (2007) use data on the turnover of the local bank managers of an Argentinean bank and show that the bank utilizes mobility to persuade these managers to report information on the creditworthiness of borrowers accurately. Scott (2006) shows that for a sample of small U.S. firms the turnover of local managers increases the likelihood of credit rationing.

The literature just surveyed brings out four key themes relating to the characteristics of branch managers' activities:

*A1) Hierarchical and geographical distance between bank headquarters and branch managers.* As we have seen, distance can affect the costs for transmitting qualitative informations collected at local level and accordingly the incentive to acquire them. It can also determine the cost of monitoring branches at central level.

*A2) Decision-making autonomy of the branch manager.* This variable undoubtedly enhances the incentives for a branch manager to acquire soft information, but at the same time it increases the costs of control and coordination at central level.

*A3) Tenure of the branch manager.* Also in this case a trade-off can be generated similar to the one described earlier: the more stable a branch manager's position is, the more incentives there may be to acquire soft information, but the costs of control can also increase (due, for example, to moral hazard).

*A4) Incentives.* Economic incentives for branch managers can help reduce the problem of moral hazard by aligning the objectives of peripheral agents with the bank central management, with the danger, however, of transferring excessive risk to the branch manager.

The role played by technological innovation in the development of the procedures for granting loans adopted by banks from the 1990s onwards was recalled earlier. One of the most important consequences of ITC advances in the banking industry was the sharp reduction in data processing costs, in other words in the use of data for administrative purposes at the various organizational levels. The new regulations on minimum capital requirements also provided strong incentives for the adoption of statistical techniques for measuring credit risk: the methods vary but their distinctive feature is the ability to group customers within a finite number of categories, associating to each one a synthetic indicator that expresses the probability of default and accordingly the degree of risk. The introduction of these techniques can influence the role of branch managers in the allocation of credit in various ways. Indeed, credit scoring can represent an alternative means of assessing creditworthiness to the decision-making processes that emphasize qualitative information and the close interaction of branch managers with customers. At the same time, the adoption of scoring techniques allows, at least partly, the transformation of soft information into processed data and facilitates the control of branches. These issues, which are closely interrelated, cannot be dealt with without further exploring the specific nature of credit scoring, including its relatively recent introduction into the Italian banking system. From this perspective the analysis of credit scoring complements that of organizational variables and central-peripheral relations.

Quantitative methods include both credit scoring models, which distinguish cases of expected default from non-default using statistical techniques such as discriminant analysis or logit

and probit, and internal rating systems, which map more or less automatically individual borrowers (or, in the most sophisticated cases, the different lines of credit of each borrower) on a scale of judgments (Allen, DeLong and Saunders, 2004). These technologies can allow, even before the formulation of any final judgment, discretionary interventions by one or more persons to assess qualitative elements not explicitly considered in the model. The degree of flexibility in the use of credit scoring therefore varies, depending both on the characteristics of the procedures adopted and on their importance in lending decisions and customer relationships. In this report the term scoring refers to all these instruments indiscriminately. What follows is a brief survey of the main questions related to the adoption and use of credit scoring techniques, which will be described more fully in section 5.

*B1) Banks' characteristics and the adoption of credit scoring techniques.* In Europe the introduction of credit scoring was later and more gradual than in the United States (Degryse and Ongena, 2004). Recently, however, credit scoring has been widely adopted by Italian banks. The literature concurs in emphasizing how the adoption of credit scoring techniques is influenced both by the size of banks and by their organization. Size acts in the usual ways: bigger banks have more resources to invest in new techniques and the cost of investments is then distributed among a broader loan portfolio. Moreover, large banks report greater diseconomies owing to distance: difficulties in transmitting soft information internally, in selecting and monitoring loans, and in designing the right incentives for local managers. The adoption of credit scoring techniques lowers the costs of screening and monitoring firm activity and of controlling branch managers, mitigating the problems of monitoring from a distance (Berger, Frame and Miller, 2005).

*B2) The characteristics of the scoring techniques.* The scoring techniques can differ both in their origin (developed internally or acquired externally) and in the data set processed. The use of methods developed internally by banks implies greater control and more flexibility, in the sense that they are easier to modify if the bank no longer considers them adequate. Moreover, broad recourse by banks to externally developed techniques could lead to greater homogeneity in the criteria for assessing creditworthiness by the various intermediaries.

These techniques mostly rely on quantitative data inputs to formulate scores. As mentioned earlier, there is also concern over the possible decline in the importance of soft information in lending decisions, with the result that start-ups and smaller firms, relying more on bank credit, could be adversely affected by an intense and rigid use of these methods (Cowan and Cowan, 2006). However, the empirical evidence to date, above all concerning the United States, does not appear to justify these fears (Berger, Frame and Miller, 2005).

*B3) The importance of scoring techniques and how they are used.* Even though scoring techniques have by now been widely adopted by banks, their importance in assessing customers' creditworthiness is not a foregone conclusion. This issue is by no means secondary, since their impact on the extension of credit varies depending on whether banks use them as the main instrument for assessing creditworthiness or as a supplementary instrument along with other evaluation techniques (Berger, Frame and Miller, 2005). Based on the results of a recent survey conducted on a sample of U.S. banks, the scores for small firms are considered less important than the traditional indicators of creditworthiness, such as cash flow and available collateral (Cowan and Cowan, 2006).

In section 3 the distinction between intermediaries is based on size and institutional set-up. Given that information asymmetries, agency problems, data transmission costs and the economies of scale linked to the use of IT become more complex when we move from individual banks to groups, the survey also distinguishes between stand-alone banks and members of a group.



### 3. The survey

Our data are taken from a qualitative questionnaire, reproduced in the appendix, aimed at gathering information on the organizational aspects and scoring techniques used in the lending process.

The questions capture banks' organizational structure, meaning both their specialization by customer segment and the number of hierarchical layers involved in the decision to lend to a firm. For each hierarchical level, the survey establishes the degree of autonomy granted to approve loan applications and, possibly, to establish their terms and conditions. Finally, the existence and type of economic incentives for branch managers and the length of their tenure are also considered. In the second part of the questionnaire, the questions explore the adoption of statistical-quantitative techniques for evaluating firms, their use in setting terms and conditions of loans, as well as in the monitoring of the loans. Next, the characteristics of the models are surveyed, in particular the data used to calculate the scores and the role of quantitative and qualitative information in evaluating new loan applicants.

The questionnaire was submitted to intermediaries during 2007 through the Bank of Italy's branch network. The selection of the banks was aimed at ensuring adequate coverage, both geographically and by type of bank (medium-sized and large banks, small stand-alone banks and others belonging to groups, mutual banks). The sample design was based on that used for a data base including interest rates (TAXIA), which until the end of 2006 surveyed 215 reporting institutions, selected by size (measured by total lending to customers), geographical location and share of loans reported to the Central Credit Register. The original 215 banks sample was modified in two ways. First, intermediaries specialized in activities such as factoring, leasing, household mortgages and credit recovery were excluded, given that the questionnaire focused on lending to firms in traditional technical forms. Second, it was left up to local data collectors to submit the questionnaire to banks excluded from the TAXIA sample, provided they did not belong to the "minor" size category.

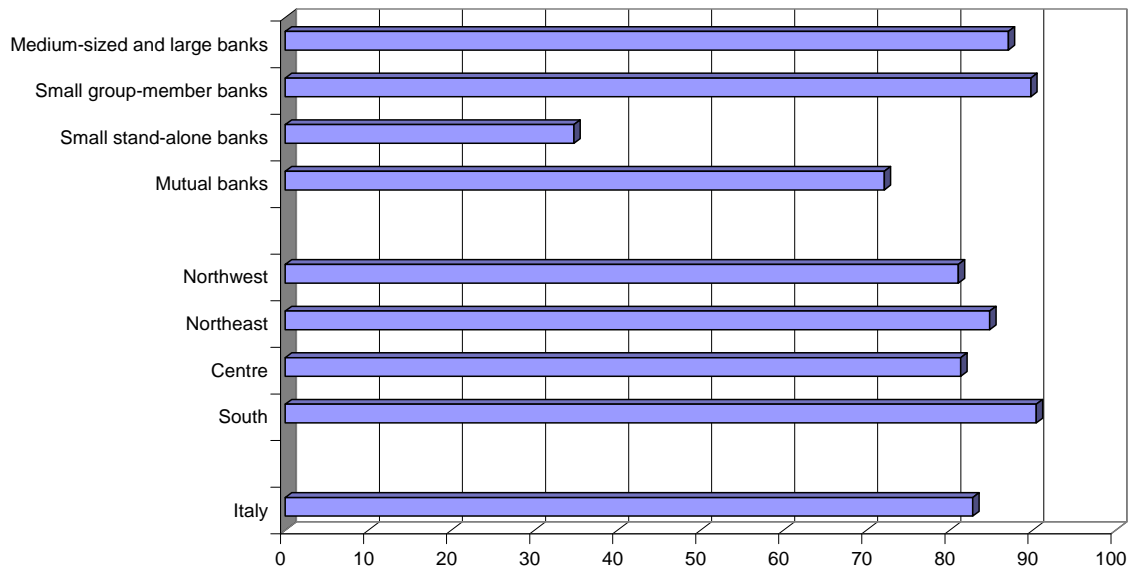
The final sample included 333 banks and 322 responses. The missing answers all refer to banks whose business lending was marginal or nil. The composition of the sample by geographical area and size is shown in Table 1. The sample accounts for 82.8 per cent of the total amount of outstanding loans to non financial firms in 2007 (Figure 1). Coverage is high throughout the country, ranging from 81.0 per cent in the regions of the Northwest to 90.4 per cent in the South; among the size/institutional classes this percentage contracts for small stand-alone banks (34.7 per cent), a category that includes several branches of foreign banks which were not surveyed.

Table 2 shows the mean and median size of the four classes used in the report. It appears significant that the average size of the stand-alone banks is around half that of those belonging to the same class size but part of a group.

The questionnaire contains mostly qualitative questions, and accordingly the data have been aggregated in two separate ways: either as simple frequencies of responses or as weighted frequencies where the weights are equal to loans SMEs or large firms, depending on which type of borrower the question refers to. The significance assigned in the first case is that of the diffusion of the phenomena (for example, what share of the banks use credit scoring), and in the second case that of the likelihood of the borrower's encountering a given phenomenon (using the same example, the share of lending to SMEs or large firms granted by banks using scoring techniques).

**Figure 1**

**Coverage of the sample**  
(percentages of total lending to firms)



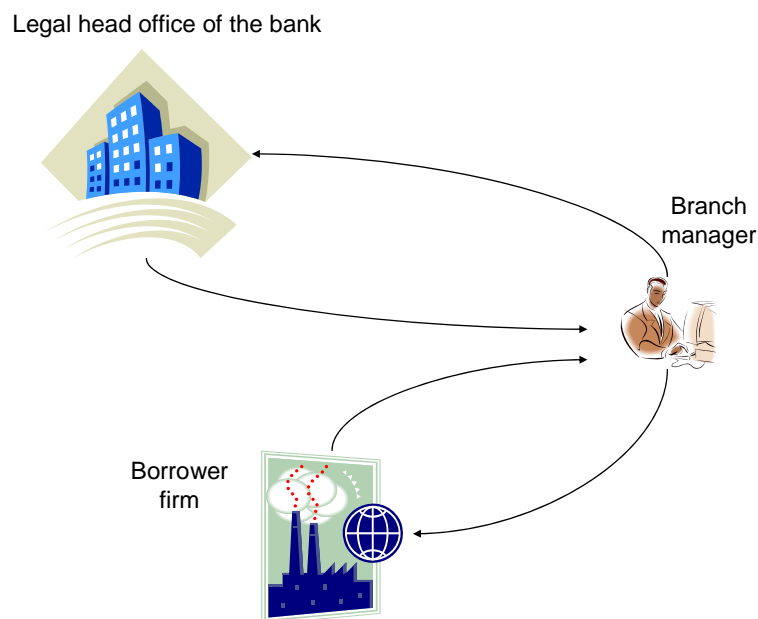
#### 4. Banks' organization, SMEs lending, and the role of the branch manager

##### 4.1 Distance from headquarters and banking presence in local credit markets

Some recent literature has focused on the effects that the distance between bank and firm can have on access to credit and its terms and conditions. This literature often treats the bank as a single entity, but if instead, as noted above, we recognize that the bank has an articulated internal structure, the question can be approached from two different standpoints, one referring to the distance between the borrower firm and the unit within the bank charged of lending decisions, the other to the distance between that unit and the head office, where the persons who exercise control powers are located. This is illustrated below.

This relationship between centre and branch may be afflicted by agency problems, just as severe as those traditionally considered in bank-firm relations. Apart from the costs of monitoring the branch manager's activity, distance can also increase the costs of transmitting qualitative information, lessen the incentives for the collection of this information, as well as enlarge the effort required to pass on best practices.<sup>2</sup> When instead of geographical distance there is hierarchical distance – measured by the number of organizational levels along the chain of command involved in the decision – the effects are similar.

<sup>2</sup> Berger and De Young (2001) have shown that a bank holding company's ability to transfer its own efficiency to the other banks in a group diminishes as the distance between the former and latter increases. Deng and Elyasiani (2005) have found that the risk of the holding company increases with the distance from its subsidiaries and interpret this in terms of greater ability of the local manager to engage in opportunistic behaviour when he operates in far-away markets.



In what follows we describe several indicators of the distance between centre and periphery for the banks in our sample, the number of local markets in which they do business, and how these factors evolved between 2000 and 2006.

To compute distance, first we must define the relevant geographical units and devise a suitable gauge. To this end, we define the location of the persons who ultimately control the bank as the city in which the bank's legal head office is established and that of the branch manager as the locality of the branch, itself defined as the main city within each of the "local labour market area" mapped by Istat in 2001. This procedure successfully balances the need for a geographical classification detailed enough to allow for precise measurement of the distance between head office and branch with the need to capture the differences between the market areas where the head office and the branches are located.<sup>3</sup>

Once the local labour market area where the bank's legal office is located is determined, we calculate the distance between that and all the other local labour markets where the bank has at least one branch.<sup>4</sup> The distances so obtained are weighted according to the local labour market's share in the bank's total lending. Weighting is necessary to prevent branches in far-off areas but not accounting for a significant portion of the bank's assets from having a disproportionate effect on the average distance.

The results are given in Table 3. The mean for this indicator in 2006 is 47 kilometres, the median 21 kilometres. The larger banks have a more extensive branch network and accordingly

<sup>3</sup> Some of the foregoing observations on the relationship between head office and local branches and the related agency problems might suggest adopting a "continuous space" and defining distance simply as the distance in kilometres between the head office and the branch. However, other aspects of the relationship are better defined by reference to the distance between the local markets of the two units. The first method would give a better gauge of the physical distance; the second highlights the distance, hence the differences, between the broader areas within which the two units are located.

<sup>4</sup> The local labour systems are identified by the geographical coordinates of their main municipality; the distance is calculated by the "great circle" formula, assuming the earth is spherical. Another assumption concerns the distance to branches located within the same local labour system as the head office. This could be set equal to zero or else calculated on the basis of the land area of that system. The results do not change when the distance is set to zero.

higher average distances than medium-sized, small and mutual banks. Statistical tests on these averages indicate that the differences between classes of bank are significantly different from zero. There are also significant inter-category differences in the number of local labour systems in which the bank has at least one branch (Table 4).

The average distance is highly variable. The inter-quartile difference is equal to 132 per cent of the median for all banks and is also high even within each of the size categories.

Between 2000 and 2006 there was a broad increase in the distance between the local labour system of the head office and that of the branch. The median rose for all categories of bank (except for mutual banks, for which it held constant), but the mean diminished slightly among large banks, while increasing for small and mutual banks. Statistical tests on the averages indicate that the differences are significantly different from zero for small and mutual banks but not for the large banks. The average number of local labour market areas in which banks had branches also increased over the period. In general the increase in distance mainly involved medium-sized banks, especially for banks belonging to groups, and also, though to a lesser extent, small non-group banks and mutual banks. In part, this is because some large banks involved in mergers reduced the number of branches and of local labour systems in which they were present, shortening their range of operations. Even excluding these banks, however, the increase of the average distance for the large banks is small and less pronounced than that recorded for the other size categories.

It is also interesting to examine the evolution of headquarters-branch distances not for single banks but for banking groups, considering all the local labour market areas with at least one branch and computing the distance from the parent bank's head office. For this we exclude groups that have only one bank and any branches or subsidiaries abroad. For the 33 banking groups so identified, the mean distance rises from 180 to 217 kilometres, the median from 131 to 241 kilometres, and the average number of local labour markets from 107 to 142.

The foregoing suggests several considerations. First, the variability in banks' size is reflected in huge differences in the extent of branch networks and in distance between centre and peripheral branches. But even within the various size and institutional classes the differences remain, which means that the problem of the cost of transmission of qualitative information, and agency problems in general, between branch managers and head offices differ in intensity from bank to bank, as do the organizational structures adopted to deal with them (see below).

Second, between 2000 and 2006 there was a general lengthening of distances, owing in part to the introduction of information and communications technology, which greatly reduced the cost of acquiring, processing and transmitting information (Berger, 2003).<sup>5</sup>

Third, the increase in distance was greater among small banks belonging to groups and to small non-group banks, and also to some extent among mutual banks. Large banks held the average distance of branches from the head office roughly unchanged; their overall range of action was increased via their group structure. This jibes with some recent works showing that small and minor banks have grown more than large banks (Bonaccorsi di Patti, Eramo and Gobbi, 2005).

#### *4.2 Organizational structure and layers of hierarchy*

The previous section considered the distance between head office and branches in geographical terms. Now we consider it in terms of organizational structure, measuring the "distance" between the branch manager and the top management of the bank by the organizational

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<sup>5</sup> Felici and Pagnini (2008) show that the banks with larger ICT endowments, other things (including profitability) being equal, increase their capacity to move into markets far away from their existing localities.

model adopted and the number of layers of management between them. The model may have a divisional structure, in which customers are segmented by size, or a single structure that performs all lending activities. In a divisional structure, the middle management and/or the type of peripheral unit varies with the size of the borrower firm; along with the modification of organizational roles, the delegation of powers and the way in which lending is planned and carried out also change. The number of layers of hierarchy is used to gauge the depth of the organizational structure.

*The model of organization.* – The responses to the questionnaire indicate that over 70 per cent of the large banks are organized by divisions, with customers segmented by size, typically divided into SMEs and large firms. For small banks belonging to groups this percentage falls to 33 per cent, and for small stand-alone banks to 24 per cent; for mutual banks it is 10 per cent. As a rule the variable used for segmenting firms is sales, although in a significant number of cases small banks use loan size. The modal sales threshold dividing small from large firms is €2.5 million. Among small banks, organization by divisions is a very recent phenomenon; almost 50 per cent of the small and mutual banks with this model adopted it in the last three years, compared with only about 10 per cent of the large banks.

Typically, large banks have greater differentiation of products, markets, and customers. Accordingly, the divisional organizational can exploit specialization, by assigning a single manager responsible for a given product or geographical area. Division structure also makes it easier to tailor adaptation to the industrial or local situation. And the large banks, thanks to potential scale economies, can more readily sustain the costs of divisional organization, which entails more staff and structures engaged in similar activities. Among other potential costs there is the need for closer coordination of relatively autonomous, diversified units.

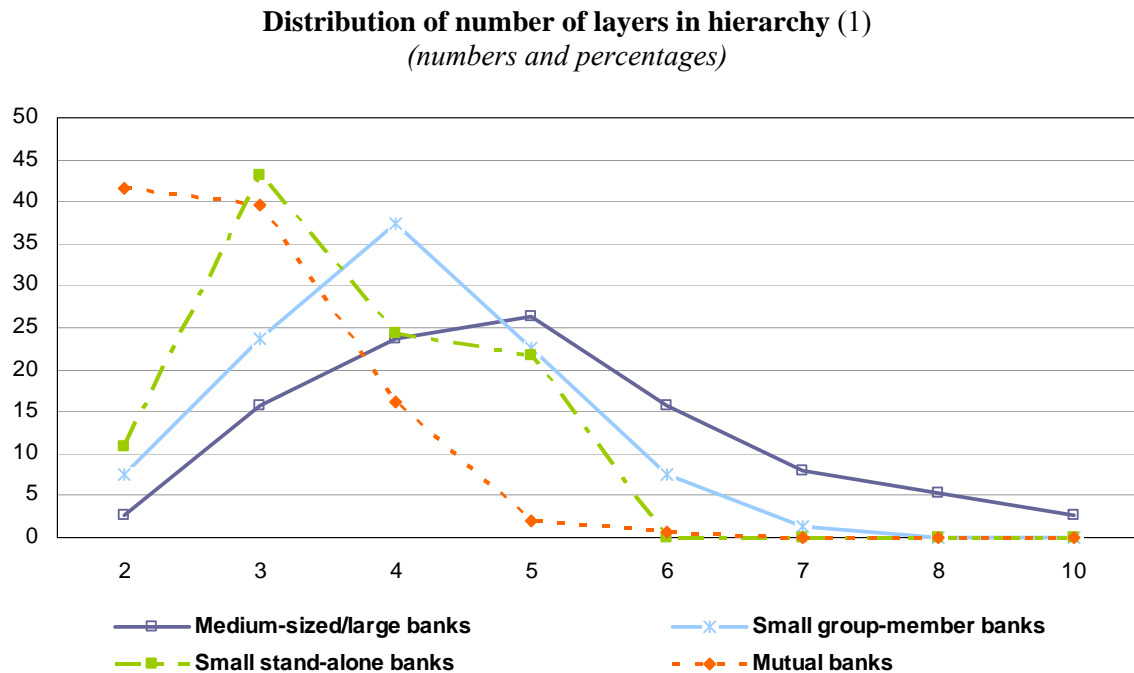
*Layers of hierarchy.* – The length of the chain of command is given by the number of ranks between the branch manager and the CEO.<sup>6</sup> These ranks are hierarchically ordered, and each has specific powers in terms of maximum loan amounts. In what follows we consider the positions involved in lending to SMEs.<sup>7</sup> The average number of layers varies significantly by institutional category: 5 for large banks, 4 for small group-member banks, 3.6 for small stand-alone banks and 2.8 for mutual banks. Figure 2 shows the distribution of layers of hierarchy according to this classification.

As bank size increases, not only does the average number of hierarchical layers increase but so does the variance of their distribution. The large banks are those with the greatest diversity in the length of the chain of command. One of five has a simplified organization (with fewer than three layers), while one in three has a highly complex structure (more than six layers). For mutual banks, more than 40 per cent have an elementary structure with just two levels: branch manager and CEO. However, even in this class there are more complex organizations; one in five has four or more layers.

The number of layers of hierarchy has a significant impact on a bank's operation. On the one hand more layers may mean higher costs for the transmission of information from one level to another and longer decision times. On the other, a flatter organizational chart, for a given size of staff, implies larger units, hence a larger area to control – in other words, a larger number of subordinates under each supervisor.

<sup>6</sup> We consider only the ranks that correspond to a significant rise in hierarchical level. This excludes, for instance, deputies and auxiliary staff but includes all the grades assigned to run an organizational unit.

<sup>7</sup> We do not comment on the data on layers of hierarchy involved in lending to large firms or the degree of decision-making autonomy enjoyed by branch managers in such lending. This decision follows from the limited role of branch managers in this segment. Moreover, only a minority of banks have different organizational structures for lending to SMEs and to large firms.

**Figure 2**

Source: Sample survey of 322 banks.

(1) The number of layers is the number of hierarchically ranked positions from branch manager through chief executive officer. The horizontal axis gives the number of layers, the vertical axis the percentage shares of the number of layers for each class of institution.

### 4.3 Branch managers' decision power

The branch manager obviously has a privileged position for acquiring the information relevant to loan decisions. However, the formal authority – the person holding the right of control – belongs to the top management of the bank. The organizational problems posed by the lack of coincidence of these two figures can be coped with either by transferring the information to the person endowed with the formal authority (central decision-making) or by assigning the power to decide to the person who has obtained the information (decentralized decision-making).<sup>8</sup> One solution creates problems of information transmission, the other problems of control.<sup>9</sup> Between these two extremes there is a continuum of degrees of decentralization to resolve the trade-off.

The literature on corporate organization has dealt with the problem of measuring the degree of decentralization of the power of decision from various standpoints.<sup>10</sup> In this survey the banks

<sup>8</sup> See Christie et al. (2003). The distinction between real and formal authority is from Aghion and Tirole (1997).

<sup>9</sup> If the power of decision were totally centralized, in the hands of top management, this could lead to organizational failures as a result of the branch manager's lack of incentive to acquire information. Also, the transmission of information from lower to higher levels may entail a loss of information, or at any rate a lag between information acquisition and decision. Finally, if agents are rationally constrained à la Simon, the bank's top management might not be capable of handling a large information flow. Decentralization, on the other hand, while allowing the power of decision to be in the hands of the person with the information, means a loss of top management control over that person's choices. The costs of delegating formal authority are defined as agency costs and depend on the fact that the aims pursued by the bank as such do not necessarily coincide with the personal objectives of the staff. Agency problems typically involve collusion between the branch manager and the borrower firm or the manipulation of the data she has gathered.

<sup>10</sup> Christie et al. (2003) and Acemoglu et al. (2006) identify autonomy of decision with the presence of profit centres within the corporation. This indicator reflects the observation that a cost centre controls either revenue or costs but not both, while a profit (continues)

were asked to indicate, for every hierarchical level, the maximum amount of credit that it could grant on its own authority. This information was used to construct an indicator of the degree of decentralization. This section too refers to lending to SMEs.<sup>11</sup>

The amount of credit that the branch manager can grant on his own power increases with the size of the bank (Table 5). The mean is €550,000 (and the median €250,000) for large banks, €200,000 for small banks belonging to groups, €90,000 for small stand-alone banks and €50,000 for mutual banks. However, these means conceal some variability within the subgroups, as is shown by the interquartile difference as a ratio to the median. The greatest variability is found among mutual banks; in one fifth of them the value is 0, and in one fifth it is more than €100,000. The amount of credit that the branch manager can extend autonomously is larger for mortgage loans (€124,000; Table 6) and smaller for uncollateralized overdraft facilities (€62,000) or unsecured loans (€54,000). These differences reflect the role of collateral.

Comparing the loan authorization power of the branch manager with that of the top management, we can construct an indicator to measure the degree of decentralization. The branch manager (or head of the local unit of the bank) and the CEO are the two figures that appear in virtually all the organization charts. Comparing the powers delegated to them, we can build an index of the branch manager's autonomy with respect to the powers of the CEO. This index equals 5 per cent in large banks, 11 per cent in small banks belonging to groups, 14 per cent in small stand-alone banks and nearly 20 per cent in mutual banks (Table 5). The index is negatively correlated with bank size because as the bank becomes larger the powers of the CEO increase more than proportionately with respect to those of the branch manager. The CEO himself performs different functions depending on type of bank. In mutual banks, for example, the most important decisions on loans to SMEs are taken directly by the bank's board or council, whereas in large banks they are taken lower down in the chain of command. Rather than compare such drastically different types of bank, again it is more meaningful to observe the variability within each category. And again the ratio of the interquartile difference to the median shows great variability.

The evidence presented so far refers to the year 2006. The questionnaire also asked about the trend in the past three years. Half the banks reported a tendency to greater decentralization, while just 4 per cent declared that they had centralized their decision-making powers (Table 7). This tendency characterized all the banks but was most pronounced for the large ones (about three quarters of which reported greater decentralization).

Several conclusions follow. First, the size of the bank is a major determinant of the delegation of powers, in absolute value, to the branch manager. Some large banks, which tend to be farther away from the local credit markets and the borrower firms, could endow their branches with considerable autonomy with a view to creating streamlined structures, relatively immune to the inertia and lack of dynamism typical of large corporations, and closer to the local community. The amount of lending authority may also be affected by the type of customer served. Banks with larger customers tend to have higher ceilings on their local units' lending powers.

Second, decentralization is more pronounced in small than in large banks. Greater geographical proximity of local to central offices and less complex lending business may foster the decentralization of powers of decision, thanks among other things to greater ease of control of top management over local managers. Yet by itself bank size does not explain the variability in the degree of decentralization. Within each of our size classes, the observed variance would appear to indicate significant variety in organizational arrangements.

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centre takes decisions involving both costs and revenue. The degree of decentralization is thus 0 when the level immediately below the CEO is a cost centre and 1 when it is a profit centre.

<sup>11</sup> The questionnaire also had a question on the autonomy of branch managers to price loans, but owing to the number of non-responses we have elected not to comment on these data.

The responses further reveal a general tendency towards decentralization. Together with the recent adoption of divisional models, this highlights a certain organizational dynamism, presumably in connection with increasing geographical distance between head office and branches and with the diffusion of ICT. Finally, the greater decentralization among large banks may be a response to the competition of smaller institutions in lending to SMEs in local credit markets.

#### *4.4 Branch managers' tenure*

The tenure of branch managers faces the bank with a trade-off. Greater stability in the position facilitates contacts and familiarity with the local market, hence the acquisition of soft information. But it also heightens the informational asymmetry between branch manager and head office, possibly enabling the former to reap private benefits (by collusion with local borrowers, say, or manipulation of the information that he transmits up the chain of command).

The survey found that the mean time for which branch managers held their position was nearly 4 years, against a median of 38 months and a mode of 36 months (Table 8). These figures are similar to those found in a similar survey by Ferri (1997). The mode (3 years) could depend on corporate routines and widespread organizational models shared by many banks. The term of office is shorter in the larger banks, longer in small stand-alone banks and mutual banks. The standard statistical tests show that all these differences are significantly different from zero. Small banks belonging to banking groups have values similar to large banks, suggesting that group organizational strategies extend to smaller intermediaries. The degree of mobility of branch managers shows considerable variability not only for the entire sample but also within each category of banks.

As to trends in tenure, nearly 40 per cent of the sample banks reported that it had shortened in the last three years, while 14 per cent reported a lengthening. The tendency towards greater mobility was broadly uniform also within bank classes. The heightened mobility of branch managers may be related to the introduction of ICT, which in practice may have reduced the rents deriving from close local bank-firm relations; to the increase in head-branch distance, which in turn presumably increases the costs of monitoring local managers' activities; to mergers and corporate restructuring, which have involved a large number of banks since the 1990s; and to heightened competition in credit markets, leading in turn to stiffer competition in the local bank manager markets.

#### *4.5 Branch managers' incentives*

The potential costs connected with the distance between head office and local units and with the misalignment between the personal objectives of local agents and those of the bank as such can be mitigated by incentive systems linking agents' compensation to results (Milgrom and Roberts, 1992). However, incentive systems can also entail excessive transfer of risk to the local agent.

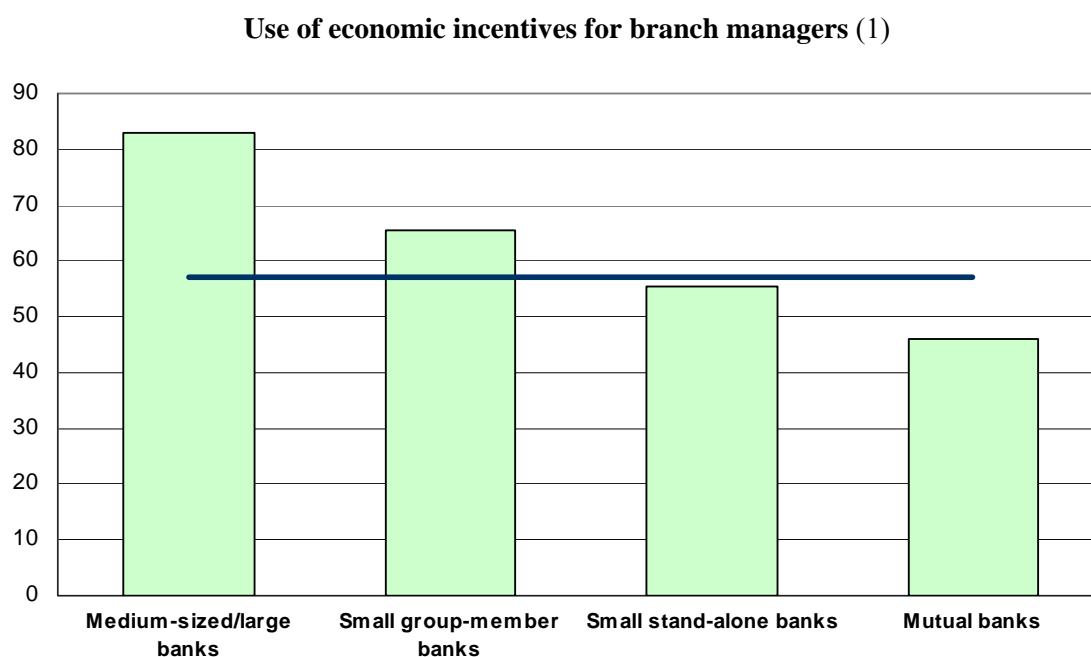
Incentives are most common in the bigger banks (Figure 3), with 83 per cent of the large banks in our sample stating that the use of incentives in connection with lending for branch managers' compensation is "very important" compared with an overall sample mean of 57 per cent. Mutual banks make least use of incentives (46 per cent). This may be explained by the higher incidence of agency costs in larger banks. That is, the greater the geographical and organizational distance between centre and periphery, the less ability there is to monitor local agents' activity. So incentives should help to align branch managers' goals with the bank's objectives.

As to the factors on which incentives are based, the most common response was the overall profitability of the local unit (e.g., gross income). This factor was especially important for large



banks and small group-member banks (Table 9). Practically nine-tenths of all the banks using incentives said overall profitability of the branch was a very significant factor. By contrast, small stand-alone banks and mutual banks are much more sensitive to the bad loan ratio or variations in bad loans. To simplify, larger banks and those belonging to groups tend to link local managers' incentives to the profitability of the branch and of its loan portfolio, while other banks, including mutual banks, tend to stress the containment of bad loans and limitation of credit risk.

**Figure 3**



Source: Sample survey of 322 banks.

(1) Percentage of banks that describe as "very important" at least one of the factors shown in Table 9 for the compensation of branch managers. The horizontal line represents the overall sample mean.

In the last three years the banks have made greater use of incentive schemes for branch managers' compensation (Table 10). The factors whose relative importance has increased have been gains in the overall profitability of the branch and the containment of bad loans. The share reporting an increase in the relevance attached to these factors was more than 40 per cent, against fewer than 5 per cent reporting a reduction in their importance. Again, the mutual banks were those paying the closest attention to the incidence and variation of bad loans and substandard loan assets.

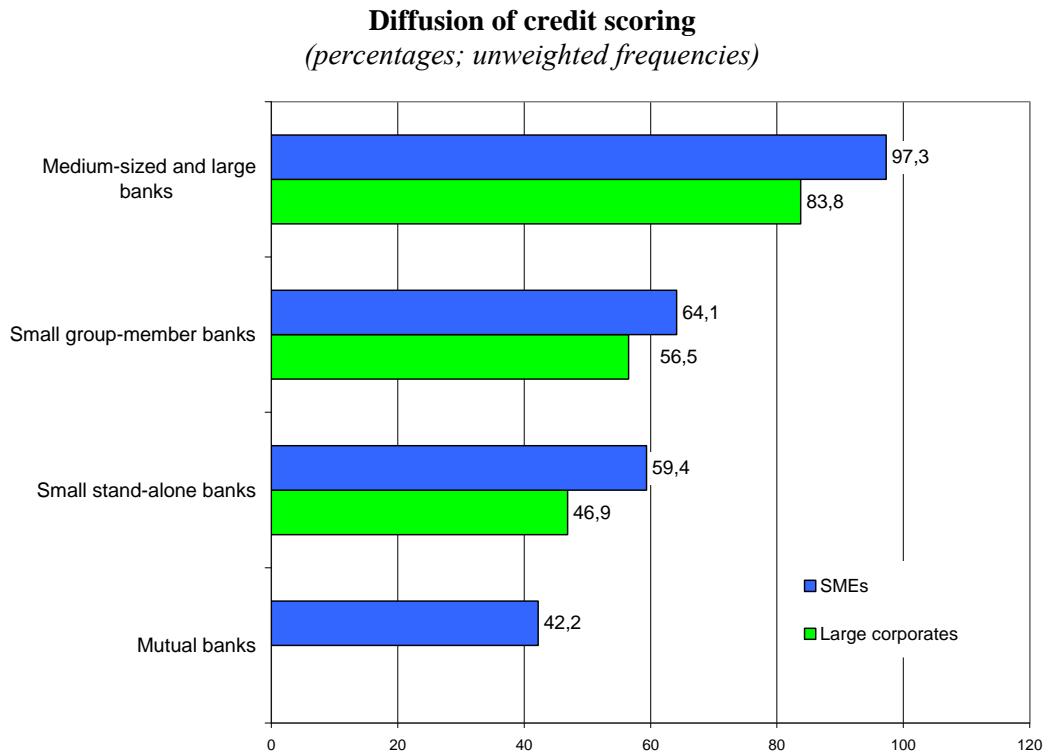
## **5. The importance of credit scoring techniques in assessing creditworthiness**

### *5.1 The diffusion of credit scoring techniques*

The plunging cost of data processing in recent years has fostered banks to introduce statistical techniques for measuring credit risk, supplementing their external and internal sources of information. Our survey of the Italian banking system shows the diffusion of credit scoring techniques for business lending. Consistent with our hypotheses in the introductory section, and as

other studies have shown (Bofondi and Lotti, 2005), these techniques have been mainly adopted by the larger banks with extensive branch networks, which can exploit economies of scale.

**Figure 4**



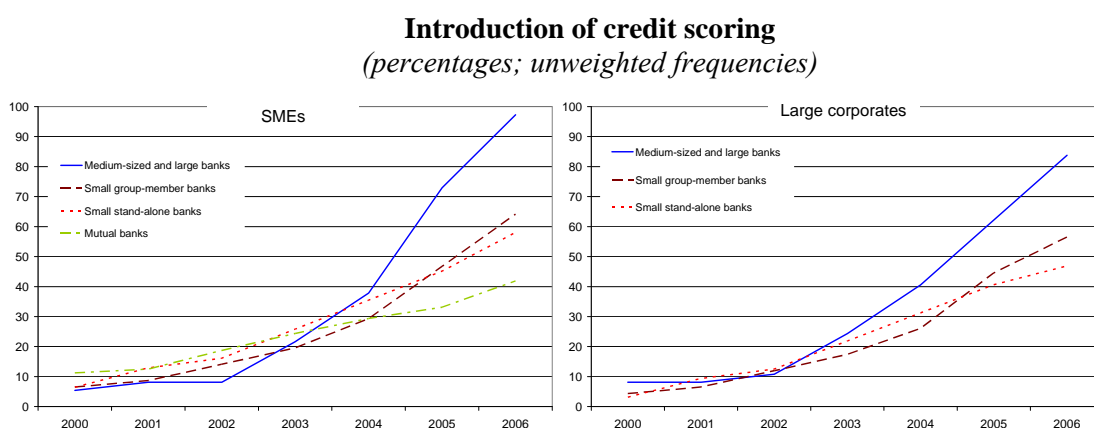
Source: Sample survey of 322 banks.

At the end of 2006, 57 per cent of the sample banks had scoring techniques in place to assess the creditworthiness of firms, whether large or small (Table 12). But the distribution was not uniform by type of intermediary: diffusion reached 97 per cent for medium-sized and large banks, 66 per cent for small banks belonging to groups, 59 per cent for small stand-alone banks, and just over 40 per cent for mutual banks (Figure 4). Moreover, scoring techniques were systematically more common for lending to SMEs. For large banks the difference was more than 13 percentage points (Table 12 and Figure 4). That is, the prevailing tendency is to use these techniques to reduce selection costs for smaller firms, even where the bank is less specialized in this segment, thus freeing resources for screening in the core business segment.

Italian banks began to adopt the scoring techniques substantially in 2003, and their introduction has been by degrees, accelerating sharply in recent years. In 2000 under 10 per cent of the banks had such techniques in place, in 2003 almost 25 per cent, and in 2006 more than half (Figure 5 and Table 12).

Presumably the spread of scoring techniques in recent years is related to the new capital adequacy accords (Basel II), which links capital requirements more directly to customer risk, with incentives for more accurate evaluation of the quality of the loan portfolio.<sup>12</sup>

Figure 5



Source: Sample survey of 322 banks.

The credit scoring techniques adopted by Italian banks differ both in origin (internal/external) and in the data used. At the end of 2006 more than 50 per cent of the banks that had introduced a credit scoring methodology had participated actively in its development, either alone or in cooperation with other institutions or consortia (Table 13). The degree of participation is correlated with bank size. Nearly all the larger banks had contributed actively to the development of the scoring method, small banks less commonly.

## 5.2 The data used for credit scoring

One of benefits deriving from credit scoring involves the management of the data available to banks. Banks can now fully exploit this information, integrating and combining data for systematic, replicable use. But accurate data extending over a suitably long period are indispensable to the reliability of the models' forecasts. The new techniques also impose a standardization of the documentation required for loan applications, which among other things facilitates subsequent securitization.

Adapting internal information systems originally designed for different purposes is one of the most serious problems and has slowed the introduction of the new techniques.<sup>13</sup> Consequently the models focus on the factors that have traditionally been used to assess creditworthiness (firms'

<sup>12</sup> After classifying their retail customers by risk under the internal ratings approach, banks must estimate the main risk components for each class and then calculate, by the Basel Committee's methodology, specific capital requirements for each. Thus the introduction of credit scoring may be highly advantageous to the banks, insofar as it can lower capital charges (Jankowitsch et al., 2007). So far very few banks, and only large ones, have begun the procedures towards the adoption of these methodologies for calculating capital requirements. To do so, in fact, banks must meet stringent qualitative and quantitative requirements, subject to a complex process of supervisory validation. But the possibility that the internal models may be validated and recognized for supervisory purposes has nevertheless fostered their diffusion (Bank for International Settlements, 2005) both by stimulating studies on the methodologies by specialized companies and by creating incentives for initiatives by consortiums of institutions.

<sup>13</sup> The numerous interbank mergers of recent years have also complicated the integration of data from different sources.

financial statements and credit history), while other data – both from external sources and available within the banking group – are used less frequently (Table 14). The question on this matter was phrased in ordinal terms, asking respondents to rank the various sources of information by importance (see the appendix). Figure 6 reconstructs the ranking based on the frequency of the answers “very important” and “decisive”.

There are significant differences in the weights of the factors used in credit scoring for SMEs. For mutual banks (and for the small banks), the most important factor is the financial statement, followed by the credit history with the bank and with the rest of the banking system. The larger banks, by contrast, assign greater importance to the firm’s past credit performance than to its accounting data (Figure 6).

Less importance attaches to the firm’s economic sector and geographical area, which in fact are not even considered in many cases (about a third of the models, accounting for 18 per cent of loans). Other external data sources, including the interbank register of bad cheques and payment cards and the Chamber of Commerce database, are of little importance and are often not used at all. Large banks and mutual banks are the ones that most commonly ignore them (31 and 26 per cent respectively, corresponding to 38 and 19 per cent of loans). Qualitative information is generally included in the estimation models, although with relatively modest weight in the bank’s overall assessment. Finally, large banks also consider any relations between the firm and other members of the bank’s group; even so, about 40 per cent of the large banks do not include this information in their models.

**Figure 6**

**Information sources included in scoring systems**  
(ranking of information sources by importance)

	<b>Medium-sized and large banks</b>	<b>Mutual banks</b>
1 <sup>st</sup>	State of credit relations with banking system	Income statement and balance sheet
2 <sup>nd</sup>	State of relations with bank	State of credit relations with banking system
3 <sup>rd</sup>	Income statement and balance sheet	State of relations with bank
4 <sup>th</sup>	Other outside sources	Other outside sources
5 <sup>th</sup>	Qualitative information	Qualitative information
6 <sup>th</sup>	Relations with banking group	Area and sector of activity

Source: Sample survey of 322 banks.

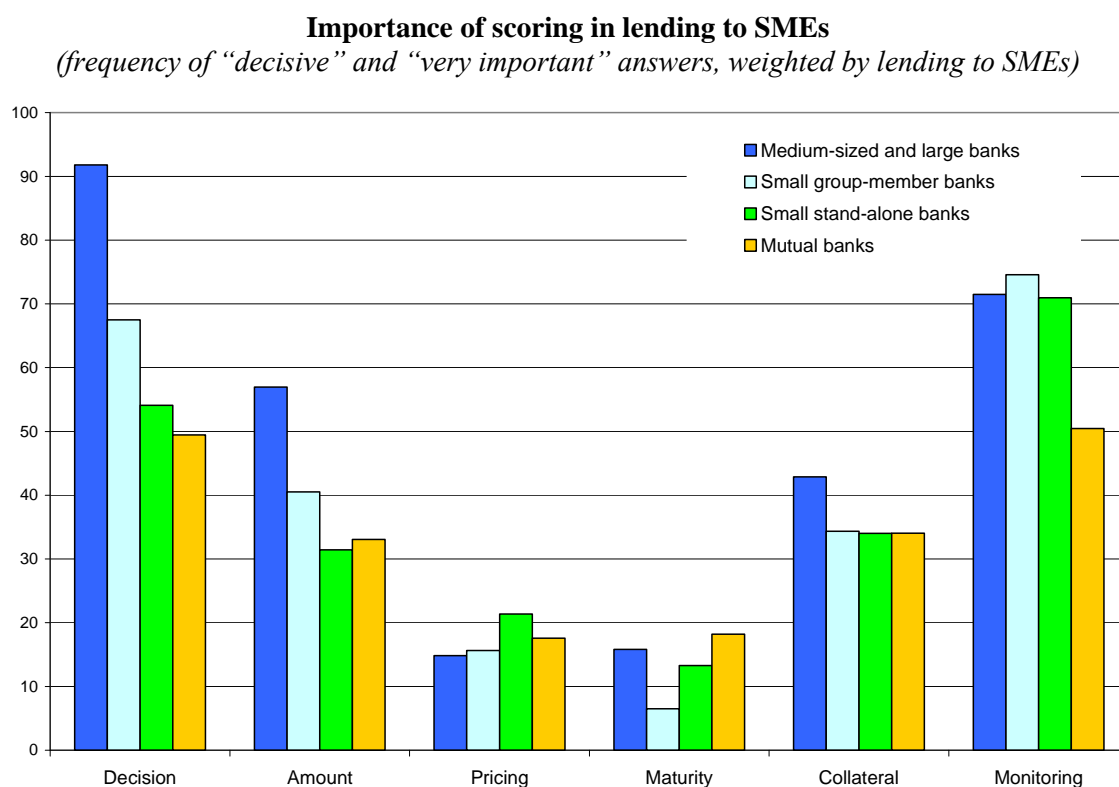
In evaluating the credit worthiness of large firms, the importance of the various sources of information used by the larger banks is similar to that used for small firms, but there are some differences in their relative ranking. In the former case, greater importance attaches to the company accounts and especially to qualitative information, generally relating to organizational structure, the stature of the management, and the quality of the investment project to be financed (Table 14). Overall, the models appear more flexible, as they allow for more judgmental components. With respect to large firms, more attention is paid to the state of the borrower’s existing relations with

the other members of the bank's group, although a substantial 35 per cent of large banks do not consider this factor.

### 5.3 The importance of credit scoring techniques in assessing creditworthiness

Statistical scoring techniques have gained considerable importance in the lending process, in particular in the decision whether or not to grant a loan. In most cases the score is decisive or very important (Table 15 and Figure 7). There are significant differences between banking groups, and the relative importance of quantitative techniques is definitely greater among the larger banks and decreases with the size of the institutions. Generally, the rating/scoring influences the size of the loan, and for the smaller firms it also affects the amount of collateral requested.

**Figure 7**



Source: Sample survey of 322 banks.

Though scoring techniques are widely used, they are still rarely employed to determine interest rates and loan maturities. This lack of an immediate impact of the borrower's credit score on the interest rate the bank charges would appear to indicate that the effect found by the literature in other countries, namely an expansion of the volume of lending to marginal customers at higher interest rates, has not (yet) emerged in Italy. But, consistently with developments in risk management and control, these methodologies have been widely used to monitor the situation of firms and the state of loans and accounts. The differences in practices concerning small and large

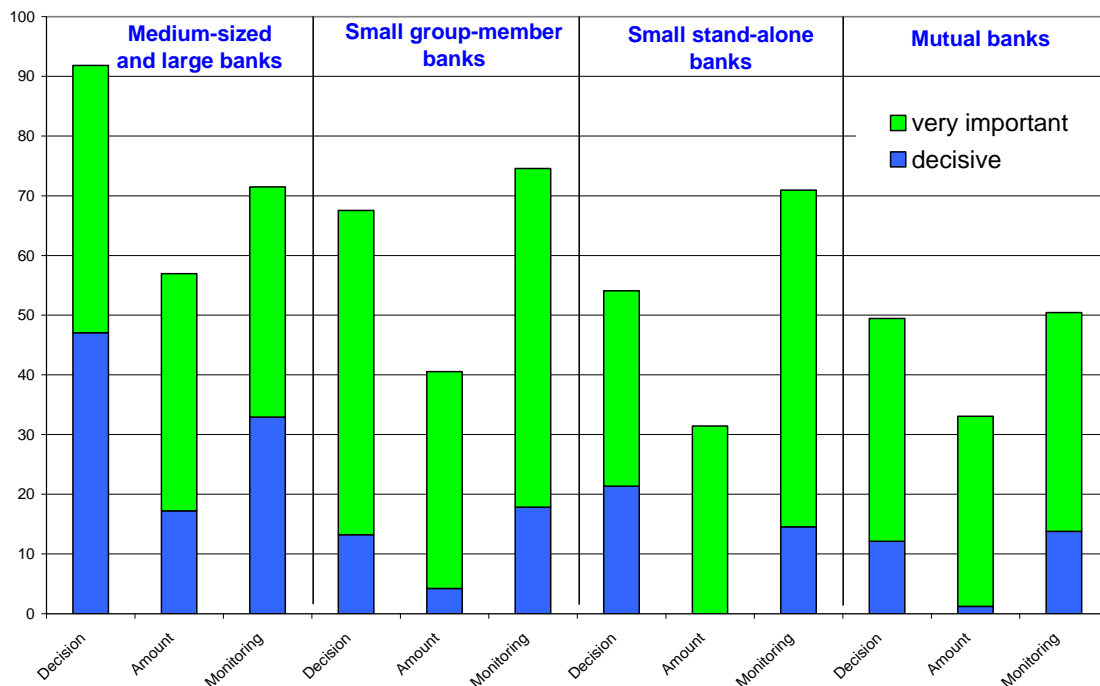
firms do not appear pronounced, though there is a somewhat greater tendency to use ratings to determine the pricing of loans to the larger firms (Table 15).

The bank’s flexibility in using scoring techniques is highly variable. It depends, on the one side, on the characteristics of the procedures chosen, which may provide for adapting scores to take account of information elements not included into the model, and, on the other side, on their actual importance in lending decisions and management, according to whether they are the main evaluation tool or a supplement to another method of assessment. The models’ degree of flexibility was gauged with reference to “decisive” as one of the possible responses on the importance of scoring methods. “Decisive” was counted separately from “very important” precisely in order to capture the possibility for loan officers to derogate from the automatic scores; the answer “decisive” was interpreted to mean practically no such flexibility. In all cases, the scores were more binding for large than for small banks.

For decisions on whether or not to lend to SMEs, credit scoring tools, while important, are “decisive” for only 18 per cent of the entire sample of banks and for a third of the large banks; weighted by volume of loans, the frequencies are higher (Figure 8), confirming that the discretionary power of loan officers tends to diminish as the size of the bank (and of the borrower firm) increases. Further, greater specialization in lending to SMEs corresponds to lower weight assigned to scoring in loan decisions.

**Figure 8**

**Flexibility in use of scoring techniques**  
(percentage share of answers “decisive” and “very important” in loan approvals to SMEs, weighted)



Source: Sample survey of 322 banks.

As we have seen, the likelihood of a bank’s developing its own scoring system internally, at least in part, increases with bank size. The purchase of a statistical procedure from outside could

reduce the bank's exercise of control over its own instrument for selecting borrowers, fostering the perception of the system as a "black box," both initially in relation to the algorithm and database and subsequently at times of revision (Frame, Srinivasan and Woosley, 2001). Our survey shows that in each size class of bank, credit scoring techniques for SMEs are more frequently decisive or very important in lending decisions when they are developed by the bank itself (Table 16).

#### *5.4 The information used in deciding on loan applications*

Technological change has affected the phase of selection of borrowers, making it easier to build quantitative models that can sum up the data on a potential borrower.

Credit scoring techniques can be used to enhance the information from other sources that banks ordinarily use in screening borrowers, or even replace them and become the main means of evaluation. One of our questions was what importance the bank assigned to the various sources of information it used to decide whether or not to grant a loan to a first-time applicant; the output of the statistical model is just one such source, and not always the most important.

The results (Table 17) are in line with expectations. For loans to SMEs, scoring methods are assigned high importance more frequently by larger banks, less frequently by smaller ones, while qualitative information is emphasized more commonly by mutual banks. In selecting large corporate borrowers, not SMEs, the statistical models are less important and qualitative information more so. Finally, small and mutual banks tend to assign considerable weight to the loan applicant's credit relations with the entire system, a tendency that is accentuated when the potential borrower is a larger firm.

## TABLES

Table 1

**Sample composition**  
(number of banks)

Class of bank	Northwest	Northeast	Centre	South/Islands	Total
Medium-sized/large	17	9	7	4	37
Small group-member	27	21	24	20	92
Small stand-alone	10	9	10	3	32
Mutual	54	57	40	10	161
<b>Total</b>	<b>108</b>	<b>96</b>	<b>81</b>	<b>37</b>	<b>322</b>

Table 2

**Size of sample banks**  
(millions of euros, number of employees and branches)

Class of bank	Volume of business		Employees		Branches	
	Mean	Median	Mean	Median	Mean	Median
Medium-sized/large	39,380	20,125	5,647	3,342	519	347
Small group-member	3,168	2,350	571	422	67	51
Small stand-alone	1,491	1,460	287	178	32	22
Mutual	668	518	116	96	14	12



**Table 3**

**Distance head office-branch (1)**  
(kilometers, percentages)

Class of bank	2000			2006		
	Mean	Median	Difference (2)	Mean	Median	Difference (2)
Medium-sized/large	152	116	126	151	117	136
Small group-member	50	30	99	66	39	100
Small stand-alone	26	21	67	31	22	69
Mutual	15	14	64	16	14	68
<b>Total</b>	<b>42</b>	<b>19</b>	<b>121</b>	<b>47</b>	<b>21</b>	<b>132</b>

Source: Sample survey of 322 banks.

(1) Banks present in sample both in 2000 and in 2006. Distance is mean distance in kilometers of head office from the local labour systems in which the bank is present, weighted by the bank's lending in that local labour system. – (2) Interquartile difference over median, in percent.

**Table 4**

**Geographical diffusion (1)**  
(numbers, percentages)

Class of bank	2000			2006		
	Mean	Median	Difference (2)	Mean	Median	Difference(2)
Medium-sized/large	96	60	147	111	70	117
Small group-member	12	10	100	19	15	97
Small stand-alone	9	5	80	11	7	100
Mutual	3	2	50	3	3	67
<b>Total</b>	<b>17</b>	<b>4</b>	<b>225</b>	<b>21</b>	<b>5</b>	<b>280</b>

Source: Sample survey of 322 banks.

(1) Banks present in sample both in 2000 and in 2006. Number of local labour systems in which the bank has at least one branch. – (2) Interquartile difference over median, in percent.

**Table 5**

**Delegation of powers**  
(thousands of euros and percent)

Class of bank	Autonomous decision-making power of branch manager, thousands of euros (1)			Index of relative power delegated (2)		
	Mean	Median	Difference (3)	Mean	Median	Difference (3)
Medium-sized/large	546	250	146	5.3	3.1	159
Small group-member	202	125	118	11.0	8.6	119
Small stand-alone	92	80	125	13.7	14.3	130
Mutual	53	30	217	19.2	16.7	122
<b>Total</b>	<b>154</b>	<b>75</b>	<b>173</b>	<b>14.7</b>	<b>10.8</b>	<b>177</b>

Source: Sample survey of 322 banks.

(1) Banks were asked: "Consider the granting of loans to non-financial companies applying to your bank for the first time and which, based on the information available, have no solvency problems. What is the maximum amount of credit (in thousands of euros) that can be autonomously granted by ...". The figure represents the power delegated to the branch manager or head of local unit. Lending to SMEs. – (2) The relative index is the amount of power delegated to the branch manager normalized with respect to that of the CEO. – (3) Interquartile difference over median, in percent.

**Table 6**

**Delegation of powers by technical form (1)**  
(thousands of euros and percentage index)

Matter for decision	Autonomous decision-making power of branch manager (1)		Index of relative power delegated (2)	
	Mean	Median	Mean	Median
Current account overdraft (3)	62	25	16.8	10.0
Self-liquidating credit (3)	107	50	17.4	11.8
Unsecured loans	54	25	16.7	10.0
Mortgage loans	124	60	18.3	10.0
Total credit	154	75	14.7	10.8

Source: Sample survey of 322 banks.

(1) The figure represents the decision-making power delegated to the branch manager or head of local unit, in thousands of euros; lending to SMEs. – (2) The relative index is the amount of power delegated to the branch manager normalized with respect to that of the CEO. – (3) For loans not secured by collateral.

**Table 7**

**Decentralization of powers of decision (1)**  
(percentages)

Class of bank	Tendency in decentralization		
	Decrease	No change	Increase
Medium-sized/large	5.4	21.6	73.0
Small group-member	7.5	38.7	53.8
Small stand-alone	2.7	45.9	51.4
Mutual	2.6	47.7	49.7
<b>Total</b>	<b>4.2</b>	<b>42.1</b>	<b>53.7</b>

Source: Sample survey of 322 banks.  
(1) Respondents were asked: "In the last three years has the degree of decentralization of powers of decision on lending in your bank increased, decreased or remained basically the same?". Lending to SMEs.

**Table 8**

**Average tenure of branch managers**  
(absolute values and percent)

Class of bank	Tenure in months (1)			Trend in the last three years (1)		
	Mean	Median	Difference (2)	Shortened	Unchanged	Lengthened
Medium-sized/large	32	32	33	39.4	45.5	15.1
Small group-member	38	36	50	36.5	54.0	9.5
Small stand-alone	49	38	63	26.7	60.0	13.3
Mutual	50	48	50	41.8	42.5	15.7
<b>Total</b>	<b>45</b>	<b>38</b>	<b>71</b>	<b>38.5</b>	<b>47.7</b>	<b>13.8</b>

Source: Sample survey of 322 banks.  
(1) Respondents were asked: "Indicate the average length of tenure of branch managers, in months (even an estimate). In the last three years has it lengthened, shortened or remained unchanged?". – (2) Interquartile difference over median, in percent.

**Table 9**

**Factors considered in determining incentives for branch managers (1)**  
(percentages)

	Medium-sized/large banks	Small group-member banks	Small stand-alone banks	Mutual banks	Total banks
Growth in lending	28.6	19.7	33.3	36.1	<b>29.6</b>
Bad debt and/or impaired loan rate	5.7	16.4	37.5	53.0	<b>32.0</b>
Change in bad debts and/or impaired loans	8.6	21.3	58.3	49.4	<b>35.0</b>
Net earnings on loan portfolio	25.7	14.7	29.2	19.3	<b>20.2</b>
Overall profitability of unit (e.g., gross income)	88.6	90.2	62.5	60.2	<b>74.4</b>
Average potential riskiness of loan portfolio	11.4	18.0	20.8	32.5	<b>23.2</b>
Source: Sample survey of 322 banks. (1) Percentage of banks that consider each factor "very important" for determining branch managers' compensation. The choices were "very important," "fairly important," "not very important" and "not important at all". Sample limited to banks using incentives linked to the factors specified.					

**Table 10**

**Trend in use of incentives for branch managers (1)**  
(percentages)

	Medium-sized/large banks	Small group-member banks	Small stand-alone banks	Mutual banks	Total banks
Growth in lending	28.1	25.0	13.6	5.2	<b>15.9</b>
Bad debt and/or impaired loan rate	34.6	33.3	31.6	48.6	<b>40.1</b>
Change in bad debts and/or impaired loans	39.3	42.6	36.8	48.0	<b>43.7</b>
Net earnings on loan portfolio	23.1	19.2	35.0	20.9	<b>22.5</b>
Overall profitability of unit (e.g., gross income)	26.5	48.3	36.4	41.0	<b>40.1</b>
Average potential riskiness of loan portfolio	48.3	33.3	33.3	43.6	<b>40.3</b>
Source: Sample survey of 322 banks. (1) Percentage of banks reporting an increase in the last three years in the importance of the factors indicated in branch managers' compensation. The possible answers were "increased," "essentially unchanged," "decreased" and "not relevant". Sample limited to banks indicating a tendency.					

**Table 11**

**Organizational variables by region (1)**  
(number of banks and percentages)

	Number of layers of hierarchy (2)	Power of branch manager (3)	Index of delegation of powers (4)	Tendency in decentralization (5)	Tenure in months (6)	Incentives for branch managers (7)
Northwest	3.28	89	16.6	50.0	40	53.1
Northeast	3.29	125	12.3	54.0	57	58.6
Centre	3.20	90	18.7	51.5	45	47.9
South and Islands	3.33	94	18.2	45.4	42	51.5

Source: Sample survey of 322 banks.

(1) Only small and mutual banks. – (2) Mean number of hierarchical levels from branch manager through CEO. – (3) Mean loan decision-making power of branch manager (thousands of euros). – (4) The relative index is the amount of power delegated to the branch manager normalized with respect to that of the CEO. – (5) Percentage of banks reporting an increase in decentralization in the last three years. – (6) Median tenure of branch manager at the branch. – (7) Percentage of banks that consider at least one of the factors in Table 6 as “very important” to branch managers’ compensation.

Table 12

**Diffusion of credit scoring models in assessing firms' creditworthiness (1)**  
(percentages)

Class and location of bank	2000	2003	2006	2006	
				SMEs	Large firms
<i>Banks using statistical/quantitative methodologies (percentage frequency of responses)</i>					
Class of bank					
Medium-sized/large	8.1	29.7	97.3	97.3	83.8
Small group-member	6.5	20.7	66.3	64.1	56.5
Small stand-alone	9.4	28.1	59.4	59.4	46.9
Mutual	11.8	24.8	42.2	42.2	–
<b>Total</b>	<b>9.6</b>	<b>24.5</b>	<b>57.1</b>	<b>56.5</b>	–
<i>Banks using statistical/quantitative methodologies (2) (response frequencies weighted by volume of lending to firms)</i>					
Class of bank					
Medium-sized/large	10.6	34.7	98.3	97.5	90.8
Small group-member	6.2	20.7	68.5	62.2	63.1
Small stand-alone	11.1	40.5	68.0	73.0	57.4
Mutual	11.4	21.6	39.0	40.0	–
<b>Total</b>	<b>9.9</b>	<b>31.4</b>	<b>87.8</b>	<b>81.4</b>	–
<i>Location of head office (small and mutual banks only)</i>					
Northwest	5.5	19.8	51.7	51.7	–
Northeast	8.1	19.5	42.5	42.5	–
Centre	14.9	31.1	58.1	56.8	–
South	15.2	30.3	63.6	60.6	–
<b>Total small and mutual banks</b>	<b>9.8</b>	<b>23.9</b>	<b>51.9</b>	<b>51.2</b>	–

Source: Sample survey of 322 banks.

(1) Respondents were asked: "In assessing creditworthiness, do you use automatic scores generated by statistical/quantitative methodologies (credit scoring and internal ratings)? Please indicate whether these methods are used for lending to SMEs and to large firms." (2) The percentage frequencies are weighted by share of total lending to firms for the data on 2003 and 2006, by lending to SMEs and large firms, respectively, for the last two columns.

**Table 13**

**How scoring models were developed (1)**  
(percentages)

Bank class and firm size	Internal	In collaboration with other institutions	Purchase from group company	Purchase from outside company	Other
<b>Lending to SMEs</b>					
Medium-sized/large	46.8	47.6	3.3	2.4	0.0
Small group-member	24.4	24.6	22.5	26.0	0.8
Small stand-alone	21.0	35.8	0.2	41.4	1.5
Mutual	11.9	40.5	18.3	24.6	4.7
<b>Lending to large firms</b>					
Medium-sized/large	52.6	38.0	6.1	3.3	0.0
Small group-member	18.6	21.7	19.6	25.7	14.4
Small stand-alone	33.6	35.5	0.6	30.3	0.0

Source: Sample survey of 322 banks.

(1) Percentage frequency of responses, weighted by volume of lending to SMEs and to large firms, respectively.

Table 14

**Information used in scoring models (1)**  
(percentages)

Information used (2)	SMEs				Large firms		
	Medium-sized/large banks	Small group-member banks	Small stand-alone banks	Mutual banks	Medium-sized/large banks	Small group-member banks	Small stand-alone banks
Financial statement data	46.5	71.0	56.1	82.6	86.7	77.5	29.9
Geographical area and economic sector	2.1	1.3	1.7	2.4	0.0	1.2	5.8
Credit relations with entire system (3)	85.1	35.6	75.4	50.0	35.0	47.3	76.1
Other outside sources of data (4)	11.8	9.8	9.8	9.8	3.1	7.3	16.0
Relations with bank	50.4	63.9	54.0	46.9	27.3	50.0	47.3
Relations with bank's group	3.2	6.9	0.0	0.0	8.7	9.3	0.0
Qualitative information (5)	4.7	13.4	5.5	3.8	33.7	8.8	22.6

Source: Sample survey of 322 banks.

(1) Sum of frequencies of responses indicating each source as one of the two most important, weighted by volume of lending to SMEs and large firms, respectively. Data for 2006. – (2) Banks were asked: “If you use statistical-quantitative methodologies for assessing firms’ creditworthiness, please rank by decreasing order of importance the data considered in your ‘calculation engine’ in assigning the overall score: 1 for the most important, 2 for the next most important, and so on. If you do not use any particular factor, answer NA”. – (3) Source: Central Credit Register or other credit bureau. – (4) Interbank register of bad cheques and payment cards, Protest bulletin, etc. – (5) Codifiable data, as through special questionnaires, on organization of the firm, characteristics of the project to fund, and so on.



Table 15

**Importance of scoring models in lending decisions (1)**  
(percentages)

Bank class and firm size	Lend/not	Amount	Pricing	Maturity	Collateral	Monitoring
<b>Lending to SMEs</b>						
Medium-sized/large	91.8	57.0	14.7	15.8	42.9	70.0
Small group-member	67.0	39.3	15.5	6.7	34.1	73.7
Small stand-alone	54.1	31.4	21.4	13.3	34.0	71.0
Mutual	47.5	31.8	16.5	17.5	31.9	48.5
<b>Lending to large firms</b>						
Medium-sized/large	88.0	70.2	20.3	29.0	35.6	82.6
Small group-member	67.6	34.8	17.3	9.0	27.9	61.4
Small stand-alone	50.1	33.2	32.1	14.3	32.1	81.9

Source: Sample survey of 322 banks..

(1) Banks were asked to: "Rank from 1 to 5, in decreasing order of importance. 1=decisive, 2=very important, 3=fairly important, 4=not very important, 5=not important at all. NA=not applicable." The table gives the sum of the frequencies of answers 1 and 2 (decisive or very important), sample limited to banks that use statistical-quantitative methods. Data for tge end of 2006. Frequencies weighted by volume of lending to SMEs and large firms respectively.

Table 16

**Importance of credit scoring models in loan approval (1)**  
(percentages)

Bank class and size of firm	Developed internally or in cooperation with other institutions	Purchased from outside	Developed internally or in cooperation with other institutions	Purchased from outside
	<i>Simple frequencies</i>		<i>Weighted frequencies (2)</i>	
<b>Lending to SMEs</b>				
Medium-sized/large	93.5	20.0	95.2	36.6
Small group-member	73.9	60.0	72.2	56.5
Small stand-alone	40.0	35.7	30.1	64.7
Mutual	54.5	51.4	52.8	43.9

Source: Sample survey of 322 banks.

(1) Banks were asked to: "Rank from 1 to 5, in decreasing order of importance, the factor in the decision to lend. 1=decisive, 2=very important, 3=fairly important, 4=not very important, 5=not important at all. NA=not applicable." The table gives the sum of the frequencies of answers 1 and 2 (decisive or very important), sample limited to banks that use statistical-quantitative methods. Data for the end of 2006. – (2) Frequencies weighted by volume of lending to SMEs.

Table 17

**Importance of factors in assessing creditworthiness of new loan applicant (1)**  
(percentages)

Information used (2)	SMEs				Large firms		
	Medium-sized/large banks	Small group-member banks	Small stand-alone banks	Mutual banks	Medium-sized/large banks	Small group-member banks	Small stand-alone banks
Statistical-quantitative methods	70.2	27.6	18.9	8.9	59.6	32.9	0.0
Financial statement data	95.2	85.7	95.2	96.5	100.0	95.2	98.2
Credit relations with entire system (3)	82.6	86.7	97.2	89.5	72.0	92.5	98.2
Availability of guarantees	28.3	51.8	45.7	42.0	3.9	24.4	33.5
Qualitative information (4)	35.8	33.5	33.4	49.9	69.2	48.8	61.8
First-hand information	16.3	15.9	9.6	15.0	3.9	4.7	2.9

Source: Sample survey of 322 banks.

(1) Sum of frequencies of responses indicating each source as one of the two most important, weighted by volume of lending to SMEs and large firms, respectively. Data for the end of 2006. – (2) The banks were asked: “For the granting of loans to non-financial firms that apply to you for the first time, please rank in decreasing order of importance the factors used in deciding whether or not to grant the loan. 1 for the most important, 2 for the next most important, and so on. Two different factors cannot be given the same rank. If you do not use any particular factor, answer NA.” – (3) Source: Central Credit Register or other credit bureau. Interbank register of bad cheques and payment cards, Protest bulletin, etc. – (4) Codifiable data, as through special questionnaires, on organization of the firm, characteristics of the project to fund, and so on.

## APPENDIX

**BANKS' LENDING: ORGANIZATIONAL AND TECHNICAL FACTORS IN ASSESSMENT**

Unless otherwise specified, answers as at 31 December 2006

Bank: \_\_\_\_\_ ABI code \_\_\_\_\_

Banking group: \_\_\_\_\_

**SECTION A: THE ORGANIZATION OF LENDING BUSINESS****A1** – With reference to lending to **non-financial firms**, please indicate whether your bank:

a) is organized by divisions, distinguishing between large and small borrower firms (e.g. retail and corporate) and, if so, since what year	Yes <input type="checkbox"/> No <input type="checkbox"/>	yr. _____	SMEs' share of your bank's total lending to non-financial firms _____ %
b) within its group (only for group members) specializes in one customer size segment; if so, since what year	Yes <input type="checkbox"/> No <input type="checkbox"/>	yr. _____	

**A2** – Still on lending to **non-financial firms**, please indicate the segments into which you divide customers by **size class**, specifying variable and threshold value (1).

		Name of segment	Variable (unit of measurement)	Threshold (2)	Sales equivalent of threshold value (3)
1)	SMEs				
2)	Large firms				

(1) If the bank is organized by divisions, specify the segments to which the divisions correspond. If your bank is specialized within a group, indicate your customer segment, the measurement variable and threshold value. If you do not segment customers, indicate only the most important size class of firms for your business. (2) For instance: "up to 100" should be written "<100"; "between 100 and 200" by "100-200"; "more than 100" by ">100". – (3) Only if you do not segment customers by volume of sales.

**In the rest of this questionnaire, "SMEs" and "large firms" mean, respectively, the size classes identified in the first and the second lines of question A2. If your business is exclusively or predominantly with one of the two segments, please fill out only the parts of the questionnaire relevant to that segment.**

**A3** – Consider the granting of **loans to first-time applicant non-financial firms**. The process may involve a number of positions within the bank (1): please indicate, for each of the customer segments specified above, these positions in increasing order of importance, starting from the initial "manager" of the lending relationship (e.g., branch manager, corporate loan officer), the geographical area and organization unit to which he belongs (e.g. branch, head office). If your bank belongs to a group, indicate the positions with the parent bank that are involved (N.B.: if necessary, add additional lines to the table).

	SMEs			Large firms		
	Position	Geographical area (2)	Organizational unit	Position	Geographical area (2)	Organizational unit
1						
2						
3						
4						
5						
6						

(1) Specify all the positions that may play a role in loan approval. For instance: branch loan officer, branch manager, coordinating branch manager, credit area director, CEO, Executive Committee, Board or Directors and, for group members, parent bank credit area director, and parent bank CEO, Executive Committee and Board of Directors. – (2) 1 = sub-provincial, 2 = province, 3 = multi-province, 4 = region, 5 = multi-region, NA = not applicable.

**A4.1** – Consider loans to first-time applicant non-financial firms (1). Please specify the maximum amount of credit (in thousands of euros) that can be autonomously granted by each of the positions named in question A3, distinguishing according to customer segment and technical form of credit (N.B.: if necessary, add additional lines to the table).

	SMEs					Large firms				
	Current account facility (2) (3)	Self-liquidating loans (2) (3)	Unsecured loans (2)	Mortgage loans (2)	Total credit (3)	Current account facility (2) (3)	Self-liquidating loans (2) (3)	Unsecured loans (2)	Mortgage loans (2)	Total credit (3)
1										
2										
3										
4										
5										
6										

(1) Answer for a firm which according to available information has no problems of solvency. – (2) If the category may include more than one case (as when the amount varies with type of branch), give the value representative of the largest number of loans. If the position responsible has no degree of autonomous power of decision, put “0”. If the bank does not make this type of loan, put “NA”. If a position has no lending ceiling save that set by law, put “max”. – (3) Consider loans not backed by collateral.

**A4.2** – With reference to lending both to new borrowers and to past customers, your bank probably also has a grid of standard terms concerning interest rates. What is the deviation, in basis points, from the standard terms (e.g.  $\pm 25$  basis points) that can be decided autonomously by the first three positions specified above (1), distinguishing by firm size and technical form (2).

	SMEs					Large firms				
	Current account facility (2) (3)	Self-liquidating loans (2) (3)	Unsecured loans (2)	Mortgage loans (2)	Total credit (3)	Current account facility (2) (3)	Self-liquidating loans (2) (3)	Unsecured loans (2)	Mortgage loans (2)	Total credit (3)
1										
2										
3										

(1) Refer to the positions specified in lines 1, 2 and 3 of question A3. – (2) If the category may include more than one case (as when the amount varies with type of branch), give the value representative of the largest number of loans. If the position responsible has no degree of autonomous power of decision, put “0”. If the bank does not make this type of loan, put “NA”. – (3) Consider loans not backed by collateral.

**A4.3** – In the last three years has the degree of decentralization of powers of decision on lending to non-financial firms in your bank increased, decreased or remained basically the same?

**SMEs:** increased  no change  decreased  NA  **Large firms:** increased  no change  decreased  NA

**A5** – What is the weight of the following factors in determining incentives for branch managers' compensation? In the last three years has the importance of each factor increased, decreased or remained essentially unchanged?

	Order of importance (1)	Tendency (2)
Growth in lending		
Bad debt and/or impaired loan ratio		
Change in bad debt and/or impaired loan ratio		
Net earnings on loan portfolio		
Overall profitability of unit (e.g. gross income)		
Average potential riskiness of loan portfolio		
Growth of direct fund-raising		
Growth of indirect fund-raising		
Other (please specify)		

(1) 1 = very important, 2 = fairly important, 3 = not very important, 4 = not important at all; NA = not applicable.

(2) 1 = increased; 2 = essentially unchanged; 3 = decreased; NA = not applicable.

**A6** – Please indicate the average length of tenure of branch managers, in months (even an estimate). In the **last three years** has it lengthened, shortened or remained unchanged?”

Mean tenure: \_\_\_\_\_ (months)

Tendency in last three years: lengthened|\_| unchanged|\_| shortened|\_| NA |\_|

## SECTION B: ASSESSMENT OF CREDITWORTHINESS

**B1** – In assessing creditworthiness, do you use automatic scores generated by **statistical/quantitative methodologies** (credit scoring and internal ratings)? Please indicate whether these methods are used for the types of lending listed below, the year they were introduced, whether they were developed internally or purchased from outside, and their importance in the decision whether or not to lend, amount, pricing, maturity, collateral and monitoring.

	Yes / No	Year of introduction (1)	Internal / external (2)	Importance of the method in decisions on:					
				Loan approval (3)	Amount (3)	Pricing (3)	Maturity (3)	Collateral (3)	Monitoring (3)
Loans to households									
Consumer credit									
Loans to SMEs									
Loans to large firms									

(1) Year when first introduced. – (2) Specify whether: 1 = the methodology was developed exclusively within the bank; 2 = it was developed in cooperation with other institutions or consortia; 3 = it was purchased from an outside company belonging to your group; 4 = it was purchased from an outside company not belonging to your group; 5 = other. – (3) Rank from 1 to 5 in decreasing order of importance: 1 = decisive, 2 = very important, 3 = fairly important, 4 = not very important, 5 = not important at all, NA = not applicable.

**B2** – If you use **statistical-quantitative methodologies** for assessing firms’ creditworthiness, please **rank** by decreasing order of importance the data considered in your “calculation engine” in assigning the overall score: **1 for the most important, 2 for the next most important, and so on**. No two factors can be given the same rank. If you do not use the factor, answer NA.

	Financial statement data	Geographical area and economic sector	Relations with banks (1)	Other outside data sources (2)	Relations with your bank (3)	Relations with your banking group (3)	Qualitative information (4)	Other (5) _____
SMEs								
Large firms								

(1) Central Credit Register and/or other credit bureaus. – (2) Interbank register of bad cheques and payment cards, Chambers of Commerce, specialized companies, etc. – (3) E.g., loans and deposits of firm with your bank. – (4) Firm’s organizational structure, project to finance, etc.. – (5) Specify.

**B3** – For the granting of loans to non-financial firms that apply to you for the first time, please rank in decreasing order of importance the factors used in deciding whether or not to grant the loan. 1 for the most important, 2 for the next most important, and so on. No two factors can be given the same rank. If you do not use the factor, answer NA.

	SMEs	Large firms
Statistical-quantitative methods exclusively		
Financial statement data (1)		
Credit relations with entire system (data from Central Credit Register and/or other credit bureaus or public sources, <i>i.e.</i> Interbank register of bad cheques and payment cards, Bulletin of protests, etc. (1)		
Availability of personal guarantees or collateral		
Qualitative information (organizational structure of firm, characteristics of project, etc.) (1)		
Other assessments based on first-hand information		
Other (specify)		
<i>(1) With respect to the statistical-quantitative methodologies referred to in question B2, please answer as regards the use of each source of information <u>outside</u> the algorithms.</i>		

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# INFORMATION TECHNOLOGY AND BANKING ORGANIZATION

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## 1. Introduction

Most banks organize their lending activity through a network of geographically dispersed branches, operating in different local credit markets. Those units are normally run by a local branch manager (henceforth LBM) who plays a critical role in collecting information about potential borrowers, in particular small and medium size firms. Through face to face interactions with the firms' managers and their local community, the LBM gains access to relevant information about firms' creditworthiness, builds relationships with the most promising potential borrowers in the market, screens applicants. Since the efficiency of the decision-making process requires the person responsible for decisions to have access to the knowledge which is valuable to those decisions, and since information transmission can be costly, some decision rights should be delegated to the LBMs, especially concerning small business lending. However, as stressed by principal-agent models, delegation raises agency costs since the LBM might pursue private benefits that are potentially conflicting with the maximization of bank's profits. Quite naturally, the optimal degree of delegation is the result of the trade-off between agency costs and the costs of transferring information within the organization.

Information and communication technologies (henceforth ICT) that deeply shocked credit markets during the last decades affect this trade-off along several dimensions. On the one hand, they brought about a substantial improvement in the CEO's ability to measure and observe LBM's output thereby reducing agency costs and favouring decentralization. On the other hand, they also contributed to reducing bottom-up communication costs and to tackling CEO's information overload, widening the possibilities to move decisions up in the hierarchy.

Moving from these opposing effects, the aim of this paper is to examine whether and how the introduction of ICT affects the allocation of decision rights inside the bank hierarchy. The issue is particularly relevant since it is usually held that an autonomous and active LBM may facilitate credit access for small firms that are more opaque and difficult to evaluate.

We derive a simple model of organizational design where the contrasting effects of ICT on the delegation of authority are represented. The model confirms the ambiguous effects of ICT on decentralization and also yields an equation for the optimal level of delegation which is estimated on a unique dataset reporting information on internal organization of a representative sample of Italian banks.<sup>1</sup> The survey concerns the role of LBMs in small business lending. The focus on lending to small and medium sized enterprises is motivated by the fact that typically LBMs have some authority on lending to small business, while decision powers on loans to large corporations are usually granted to managers at higher hierarchical level.

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<sup>1</sup> Data was gathered through a specially designed survey conducted by the Bank of Italy in 2007 reporting, among other variables, the distribution of power delegation across hierarchical levels and the adoption of credit scoring for small business lending. The sample include all medium and large banks and a representative sample of small banks and credit cooperative banks. See Albareto *et al.* (2008) for an illustration of the survey and for some evidences based on it.

Our main econometric findings indicate that banks equipped with more ICT capital and resorting to credit scoring delegate more decision-making power to their LBMs in small business lending activity. These results are robust to several additional controls and robustness checks, including instrumental variable estimation. Moreover, we find that the impact on decentralization is strengthened for banks with a greater orientation towards small business lending and for those that jointly hold higher ICT capital endowments and adopt credit scoring.

In light of our model, the interpretation of this evidence is that the impact of new technologies on the agency costs more than offset that on the costs of transmitting information (from local branches to headquarter) and on the improvement in central manager's decision ability. Information technology helps banks to improve the internal monitoring activity, thanks to timely information about lending practices and capability of controlling LBMs' activity and performance of local branches. Finally, credit scoring models, intranet infrastructures and more cost-effective voice and internet communication have made it easier to analyze credit applications at the branch level, to share documentation and to combine information stored in different database. All these factors lessen agency problems and favour delegation toward the peripheral units within the banking organization.<sup>2</sup>

The present paper is at the crossing of three strands of literature. One is related to the LBM's role in the banking industry. Despite its primacy in small business lending, research in this field is relatively scant. Previous contributions focus on the impact of organizational form – decentralization or hierarchy – on information production and transmission inside an organization (Stein, 2002), and on how a bank actually disseminates hard and soft information across different hierarchical layers (Liberti, 2005).<sup>3</sup> Though interesting from our point of view, most of the empirical findings in this literature rely on clinical studies of a single organization and are therefore difficult to generalize to the entire banking sector. The second strand of literature concerns the effects of new technologies in the banking industry. Berger (2003) assesses the impact of technological progress on productivity growth and on the structure of the banking industry.<sup>4</sup> Berger *et al.* (2005) examine the effect of adoption of credit scoring on credit availability and price conditions for small business lending. Felici and Pagnini (2008) investigate how the ability of banks to open branches in distant markets changed following the advent of ICT. None of these papers analyzed the impact of the new technologies on banks' organizational structure. This topic is at the core of a third strand of literature. In particular, Brynjolfsson and Hitt (1998) and Bresnahan *et al.* (2002), using firm-level data, find evidence of complementarities between information technology and workplace organization.<sup>5</sup> Bloom *et al.* (2009) distinguish between "information" and "communication" technologies and find that the former are associated with more autonomy and a wider span of control; the latter, by contrast, decrease autonomy for both workers and plant managers. These studies employ data from firms belonging to diverse industries, whereas

<sup>2</sup> Obviously, there can be other channels through which new technologies are enabling greater decentralization. For example, they can facilitate the information transmission from the centre to the periphery, coordination of local branches and/or reduce the costs of acquiring information locally. Following Autor *et al.* (2003), new technologies can also substitute the LBM in carrying out a limited and well-defined set of standardized and manual activities – say "routine tasks" – increasing the efficiency of cognitive and interactive tasks. These further channels are omitted in our model for sake of simplicity. However, their effects are discussed in the following section.

<sup>3</sup> Stein (2002) argue that decentralization is more attractive when information is soft whereas large hierarchical firms with multiple layers of management have a comparative advantage when information is hard and can be costlessly passed along within the hierarchy. Liberti (2005) and Liberti and Mian (2009) empirically show that loans that go to higher levels (that are more distant from the source of information) rely more on hard information and less on soft information. Uchida *et al.* (2008) analyze whether loan officer attributes affect the production of soft information. The role of loan officer has been investigated also in Udell (1989), Ferri (1997), Scott (2006), and Hertzberg *et al.* (2009). For a more general analysis of the importance of bank organization on lending activity see Berger and Udell (2002) and Berger *et al.* (2005).

<sup>4</sup> See also Casolaro and Gobbi (2007) for evidence on Italian banking industry.

<sup>5</sup> See also Gurbaxani and Whang (1991), Christie *et al.* (2003), Colombo and Delmastro (2004) and Rajan and Wulf (2006).

our paper is the first to examine the impact of the new technologies on the internal organization of banks. Focusing on a single industry, with relatively homogenous inputs and outputs, may help mitigate problems of combining data from heterogeneous industries. Besides, factors like asymmetries of information and agency costs underlined by the theories on firm internal organization are likely to have a special relevance in the banking sector.

The rest of the paper is organized as follows. Section 2 outlines a theoretical framework describing the trade-off between centralization and decentralization and investigates the impact of ICT on its terms. Sections 3 and 4 illustrate the empirical strategy and the data used in the paper, respectively. Section 5 presents the results and a set of robustness checks. Section 6 concludes.

## 2. The impact of ICT on banking internal organization

As explained in the introduction, the expected impact of ICT on decentralization is theoretically ambiguous. In order to clarify this intuition and to get some guidance in setting-up an estimable equation we derive a simple model of decision making in banking, trying to capture the main trade-offs highlighted by the theoretical literature on delegation.<sup>6</sup> First, delegation provides incentives to the agent (the LBM); second, delegation determines a loss of control for the principal (the CEO) and may lead to bad decisions being made if the incentives of the agent are not fully aligned to those of the principal; third, centralization entails additional costs for the principal related to collecting information and making a decision; fourth, the principal may wish to monitor the agent when she is delegated power, and this generates some extra costs, as well.<sup>7</sup> The new technologies affect the costs for transmitting and processing information as well as those for monitoring LBM's activity, thus influencing the choice between centralization and decentralization.<sup>8</sup>

Our model is as follows: two agents operate in a bank, the LBM and the CEO (or headquarter). The latter decides how much authority to delegate to the LBM. Loans of different size randomly arrive to the bank. Loan size  $L$  is distributed according to an uniform distribution with support  $[0, \bar{L}]$ . The LBM exerts unobservable effort to improve the quality of loan origination. She collects information on the local credit market and on potential borrowers, and she builds relations with firms which may apply for a loan. The more effort she exerts in this loan generation activity, the higher the probability that potential borrowers are of good quality, and therefore that loans generate a high payoff. We assume that neither the loan generating activity, nor the quality of borrowers is verifiable so that contracts to incentive the LBM cannot be written. The LBM derives

<sup>6</sup> Our model blends elements from the literature on delegation as a response to agency problems with elements from the literature on delegation as a way to minimize the costs of transmitting information within the organization.

<sup>7</sup> Delegation of authority to the LBM may increase her initiative and participation in the organization and her propensity to acquire and use soft information (Aghion and Tirole, 1997; Stein, 2002; Zbojnik, 2002). Moreover, by delegating power to the agent who directly collects information, banks can fully exploit economies arising from local capabilities and task specialization (Geanakoplos and Milgrom, 1991), thereby saving on the costs of transferring information within the organization. However, principal agent models point to the fact that decentralization implies a loss of control, i.e. the agent is freer to pursue private benefits that are potentially conflicting with principal or CEO's interests. Typical agency costs in the banking industry consist of LBM incentives to grant loans to poor quality borrowers in order to increase the funds allocated to the branch, or because of a personal friendship with the owner, the prospect of a future job offer from the borrowing firm or illegal kickbacks. These agency costs may be alleviated through monitoring or incentive mechanisms that are however, in the presence of incomplete information, imperfect and costly to implement. For an analysis of organizational failures due to leaks and delays in information transmission between the top and the bottom of the hierarchy and vice versa, see also Radner (1993) and van Zandt (1999).

<sup>8</sup> ICT is likely to improve the monitoring ability of the central management, raising the chances to detect misbehaviour from the LBM. This, in turn, would increase the scope for decentralization by reducing agency costs (Hubbard, 2000). On the other hand, ICT adoption lowers the costs of bottom-up communications and it improves CEO's computation abilities thereby reducing her information overload (Bresnahan *et al.*, 2002). The result would be, in this case, greater centralization.

a private benefit if she is delegated power and the loan is granted. If decision powers are delegated, the CEO monitors the LBM's activity, learns the quality of the firm, and may decide to over-rule LBM's decision.

In order to better illustrate our model, we sketch its timing:

1. The CEO designs the organization, by choosing the threshold loan size  $L^*$  above which decision are centralized.
2. LBM exerts effort in the loan generation activity.
3. The bank receives a loan application of size  $L$ . The decision to grant the loan is centralized or decentralized according to whether  $L$  is above or below the threshold  $L^*$ .
4. The person in charge of the decision observes the quality of the firm and decides about granting the loan. CEO monitors the LBM if the decision is decentralized, and possibly overturns it.
5. Payoffs are realized.

If the CEO centralizes loans above a threshold  $L^*$ , her expected payoff is

$$\frac{\bar{L} - L^*}{\bar{L}} \pi_{CEO}^C + \frac{L^*}{\bar{L}} \pi_{CEO}^D$$

where  $\pi_{CEO}^C$  is the payoff of the CEO from centralization while  $\pi_{CEO}^D$  is the payoff from delegation. Denote as  $x$  the probability the decision is delegated (that corresponds to  $L/\bar{L}$ , since loans are distributed uniformly).

We assume that the effort exerted by the LBM in the loan generation activity raises the probability that the quality of the loan is high. Let  $e$  denote this probability and assume that it coincides with the effort exerted by the LBM. Our interpretation is that the more the LBM exerts effort in collecting soft information and building relationship with prospective borrowers, the higher the average quality of firms applying for credit.

The LBM's payoff is:

$$\Pi_{LBM} = x \cdot \Pi_{LBM}^D + (1 - x) \cdot \Pi_{LBM}^C - \frac{1}{2} e^2$$

where:

$$\Pi_{LBM}^D = (1 - m) \cdot 0 + m[eB + (1 - e) \cdot 0]$$

$$\Pi_{LBM}^C = 0$$

$B$  is the private benefit accruing to the LBM if the loan is granted (granting more loans increases the funds allocated to the branch, the connections with the debtor, etc.). Since the LBM derives the private benefit  $B$  when loans are granted, she decides to offer the loan independently of firm quality. By monitoring the LBM's decision, the CEO learns the quality of the firm. In case of delegation, if monitoring does not succeed (with probability  $1 - m$ ) we assume it is optimal not to grant the loan. If monitoring succeeds (with probability  $m$ ) the loan is granted only if the borrower

is of high quality (it happens with probability  $e$ ).<sup>9</sup> In case of centralization, payoff of the LBM is normalized to 0.

The LBM chooses effort optimally to maximize her expected payoff. Hence optimal effort is:

$$e = xmB$$

which shows that effort increases provided the LBM is delegated more power with higher probability (same intuition as in Aghion and Tirole, 1997), monitoring is more likely to succeed, and private benefit is larger.<sup>10</sup>

CEO's payoff is:

$$\Pi_{CEO} = x \cdot \Pi_{CEO}^D + (1-x) \cdot \Pi_{CEO}^C$$

where:

$$\Pi_{CEO}^D = (1-m) \cdot 0 + m[eH + (1-e) \cdot 0] - c^{mon}$$

$$\Pi_{CEO}^C = eH + (1-e) \cdot 0 - c^{inf} - c^{dec}$$

In case of delegation, if monitoring does not succeed (with probability  $1-m$ ) the loan is not granted and CEO's payoff is normalized to 0. If monitoring succeeds (with probability  $m$ ) the loan is granted only if it is of high quality (with probability  $e$ ); if the quality of firms applying for credit is good the payoff is high and will be denoted by  $H$ . If the loan is bad instead, the CEO manages to over-rule the decision by the LBM, the loan is not granted and this yields a low payoff normalized to 0. Monitoring is beneficial, since it allows the CEO to provide incentives to the LBM.<sup>11</sup> Delegating decision power also entails a monitoring activity that is costly ( $c^{mon}$ ).

In case of centralization, the screening activity and lending decisions by the CEO also benefit from the loan generating activity performed by the LBM: if the quality of firms applying for credit is good (with probability  $e$ ) then loan is granted and the CEO's expected payoff is  $H$ ; if firms is not good (with probability  $1-e$ ) the loan is not granted, and payoff is normalized to zero. Centralizing decision power also entails costs of transmitting information from the LBM ( $c^{inf}$ ) and of processing information and making a decision ( $c^{dec}$ ).<sup>12</sup>

The optimization problem of the CEO is

$$\max_x x \cdot \Pi_{CEO}^D + (1-x) \cdot \Pi_{CEO}^C$$

or

<sup>9</sup> We could assume that when monitoring fails the loan is granted, and results would be essentially unchanged.

<sup>10</sup> Optimal effort must be such that  $e \leq 1$ , so that  $e$  is a well defined probability.

<sup>11</sup> An alternative formulation posits that when monitoring succeeds and the firm is of bad quality, the CEO is able to fetch a positive payoff by modifying the decision of the LBM. What matters for our results is the assumption that successful monitoring yields a larger payoff to the CEO than if monitoring fails.

<sup>12</sup> With no loss of generality, we are normalizing the cost of making a decision about the loan to zero for the LBM. This follows since we can assume that she has better access to information about borrowers and also that given her incentives, she does not exert much effort to evaluate the quality of borrowers, since she always prefer to grant a loan.

$$\max_x x \cdot (meH - c^{mon}) + (1-x) \cdot (eH - c^{inf} - c^{dec})$$

where  $e = xmB$  and  $0 \leq x \leq 1$ .

It can be verified that this function is concave in  $x$  and optimal delegation is:

$$x^* = \frac{1}{2m(1-m)BH} [mHB + (c^{inf} + c^{dec} - c^{mon})]$$

which shows that the CEO delegates authority more, the higher the costs of transmitting information and of making a decision, and the lower the cost of monitoring.<sup>13</sup>

The effect of ICT endowment on delegation is ambiguous, since it affects the cost of transmitting information, the cost of deciding about the loan, and the cost of monitoring. Both according to theory, and on the basis of availability of data, we assume that the cost of transmitting information within the bank depends upon the ICT endowments, the distance of the branch from the headquarter and the size of the bank, as follows:

$$c^{inf} = \gamma_1 ICT + \gamma_2 dist + \gamma_3 size$$

where we assume that  $\gamma_1 < 0$ , as ICT reduces the cost of transmitting information within the organization, while it is assumed that  $\gamma_2 > 0$ ,  $\gamma_3 > 0$  since these costs are likely to increase in the case of wider geographical branch networks implying longer centre-periphery distances and of larger and more complex organizations. Finally, we assume that  $c^{dec}$  and  $c^{mon}$  depend on the same variables as those determining  $c^{inf}$ :

$$c^{dec} = \theta_1 ICT + \theta_2 dist + \theta_3 size$$

$$c^{mon} = \lambda_1 ICT + \lambda_2 dist + \lambda_3 size$$

Moreover the effects of those variables are also assumed to be the same as before implying that  $\theta_1 < 0$ ,  $\theta_2 > 0$ ,  $\theta_3 > 0$  and  $\lambda_1 < 0$ ,  $\lambda_2 > 0$ ,  $\lambda_3 > 0$ . By plugging the expressions for costs into the equation for optimal delegation, we obtain:

$$x^* = \frac{mBH}{2m(1-m)BH} + \frac{+(\gamma_1 + \theta_1 - \lambda_1)}{2m(1-m)BH} ICT + \frac{(\gamma_2 + \theta_2 - \lambda_2)}{2m(1-m)BH} dist + \frac{(\gamma_3 + \theta_3 - \lambda_3)}{2m(1-m)BH} size$$

and this yields an estimable equation for the optimal delegation by bank  $i$ :

$$x_i^* = \frac{L}{L_i} = \beta_0 + \beta_1 ICT + \beta_2 dist + \beta_3 size + \varepsilon_i \quad (1)$$

This simple estimable model suggests that the effect of ICT on delegation of authority is ambiguous, since it depends upon the sign of  $(\gamma_1 + \theta_1 - \lambda_1)$ , which is to say, that it depends upon whether ICT impacts more strongly on the cost of transmitting information, on the cost of decision making, or on the cost of monitoring.

<sup>13</sup> Notice that the non-negativity constraint may be binding, and  $x^*=0$  if the numerator is negative. Similarly, if the optimal  $x^*>1$ , the constraint  $x \leq 1$  will be binding.

There are a few assumptions of the model which are critical to obtain a simple linear estimable equation. First, the distribution of loans is assumed to be uniform. In a more general model, the dependent variable could be a complex function of the absolute loan size which is delegated to the LBM. Hence, as a robustness check, we also estimate the model using “absolute” delegation as a dependent variable, since this is just the maximal size of loans on which decision powers are granted to the LBM. Second, we are assuming that optimal effort  $e$  does not depend on ICT. Removing this assumption would generate a non linear relationship between optimal delegation and ICT. Then, the first order condition for optimal delegation could still be brought to data and estimated by non-linear least squares, or it could be approximated by a linear equation. More generally, we could have written a more complex and richer model to capture the different channels through which ICT affect delegation of authority.<sup>14</sup> We believe our model captures the most relevant channels through which ICT affects delegation. Adding further channels would not change the main prediction that ICT has an ambiguous effect on delegation at the cost of yielding a complex non linear model to estimate. Third, we are modelling the LBM’s activity as one of loan generation. The LBM collects information and builds relationships with the most promising potential borrowers, in this way raising the average quality of firms that actually apply for a loan. However, LBM, also collects information about borrowers when they actually apply for a loan (in our model, after a loan of size  $L$  arrives), in order to support the decision to grant the loan. This occurs both if the decision is delegated and if it is centralized. Hence, we can easily extend our model to include this further activity performed by the LBM, allowing for ICT to impact on that, and little would change.

### 3. Empirical strategy

In order to take equation (1) to data, it is necessary to think about the process through which banks invest in ICT, especially since organizational form and ICT adoption may be jointly determined. The scenario we have in mind starts from the recent waves of innovation in the telecommunication and computer sectors. These developments brought about a dramatic fall in the price of hardware and software and induce banks as well as firms in other industries to speed up ICT adoption. However, the intensity and speed of reaction to this largely exogenous price shock differ across banks depending on the quality of the management, the lending practices existing before the introduction of the new technologies and other organizational variables.

In particular, we assume that the introduction of the new technologies will take time to exert its effects because of the existence of learning costs related to their use and the uncertainty surrounding their returns. Moreover, after some time, ICT will affect those components of the organizational structure that are more flexible and present lower adjustment costs such as our proxy for the LBM’s decision power (more on this below). This justifies our econometric strategy based on the idea that ICT adoption influences the degree of decision-making centralization in small business lending. In the long run it is likely that ICT adoption and organizational factors will be jointly determined as underlined by the literature (Breshnan *et al.*, 2002). But in the short and medium term, it is reasonable to assume that the casual link runs from ICT to organizational variables.

The empirical analysis is carried out on a cross section of about 300 Italian banks and the empirical specification follows from equation (1):

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<sup>14</sup> Just to make a few examples, new technologies can affect the decision costs of the LBM when she is in charge of the decision; they affect the LBM’s ability to monitor the borrower after the loan is granted; they affect the cost of transmitting information from the headquarter to local branches (besides bottom-up communications) and diminish the coordination costs of peripheral units.



$$PD_i = \alpha + \beta_1 ICT\_CAP_i + \beta_2 SCORING_i + \delta X_i + \mu_i$$

where  $PD_i$  represents the empirical counterparts of  $x^*$ , the optimal delegation identified in equation (1). More specifically,  $PD_i$  equals the ratio between the loan size that the LBM of bank  $i$  can autonomously grant to a small firm applying for credit and the corresponding amount that can be extended by bank's CEO. In our data, the power delegation of the CEO mirrors the upperbound of the loan distribution that arrives to the bank. The implicit assumption is that the maximum loan amount applied by a firm corresponds to the maximum sum of money that can be granted by the vertex of the bank. Therefore the ratio between LBM's and CEO's power delegation identifies the threshold that discriminates between delegation and centralization. Among the explanatory variables, new technologies are represented through  $ICT\_CAP$  and  $SCORING$ .  $ICT\_CAP_i$  is the log of ICT capital stock per employee in bank  $i$  considered with a three year lag;  $SCORING_i$  is a discrete variable that distinguishes the following situations: no adoption of credit scoring for small business lending, adoption in the last 2 years and adoption since at least 3 years. As explained above, the use of lagged values for these variables is consistent with a short run causal relationship in which power delegation is determined by new technologies adoption. Moreover, the use of lags for all the regressors may help solving simultaneity problems that might affect our econometric findings.

The use of  $ICT\_CAP$  or some of its related proxies is relatively common in empirical studies on organization. It picks up the effects that the investment in computers and software might have on the relationship between the vertex of the bank organization and the peripheral managers. The role of  $SCORING$  is relatively new and it is clearly specific to lending markets. These techniques provide a standardized screening procedure that allows banks to reduce costs of recording and transmitting information and to speed up the loan approval process. Implementation of such a lending technology is intimately related to the use of the new technologies and consequently is considered here as part of that process. Credit scoring models, intranet infrastructures and communication technologies allow timely and frequent information about lending practices and local branches' performances. Other improvements include efficiency gains in accessing data, sharing documentation, in combining information stored in different database, and in communicating between headquarter and peripheral units. Finally, there can be positive spillovers between credit scoring and ICT endowments since scoring models affect how information is recorded and stored while software and other applications affect how information is processed. We also include a set of covariates (size, distance, etc.) varying across banks and that are also taken with a three year lag.<sup>15</sup>  $\beta_1$  and  $\beta_2$  are the key parameters to be estimated.

#### 4. Data

The dataset is obtained by combining information on banking internal organization taken from a specially designed survey and additional data derived from the Supervisory Reports (SR) of the Bank of Italy. The survey, conducted by the Bank of Italy in 2007, included questions about the organizational structure of the lending activity, the distribution of power delegation across hierarchical levels and the adoption of credit scoring for small business lending. The targeted sample consisted of more than 300 banks that include the universe of medium and large banks and a representative sample of small and cooperatives banks.<sup>16</sup> We excluded those intermediaries that

<sup>15</sup> In what follows, we will use lagged values for the explanatory variables whenever it was possible. For some regressors, we observe data for the year 2006 only (see Table A1 in the appendix).

<sup>16</sup> The accuracy of the questionnaire was guaranteed through several checks before and after the realization of the survey. First, the questionnaire was tested with preliminary interviews with bank managers to detect potential ambiguities in the phrasing and (continues)

do not lend to small firms (e.g. those specialized in lending to large firms) and foreign bank branches. The final sample consists of 297 observations. The SR contains balance sheet data, loan portfolio characteristics and other information disclosed by banks complying with prudential regulation requirements.

In the following subsections we will describe our key variables whereas Table A1 in the Appendix reports a complete list and description of the covariates included in vector  $X_i$  and that will be used in the empirical analysis.

#### 4.1 Power delegation

One of the goals of the survey was to get a measure of the degree of delegation in the loan origination process. To this end, banks were asked to list all the figures within the organization involved in lending activity, ordered hierarchically from the local loan officer up to the board of directors (see Table A2 in the Appendix). In addition, banks were asked to indicate the maximum loan amount that each figure can grant in autonomy to a small firm applying for a bank's credit for the first time.<sup>17</sup> This choice was motivated by the need to avoid that past characteristics of a bank's loan portfolio had a too strong impact on the decision to decentralize authority. At last, levels of delegation had to be referred to applicants exhibiting a risk level that a bank judge *a priori* as normal. In other words, we wanted to observe bank organizational strategies for the pool of applicants that are neither exceptionally good or bad because these borrowers are normally rare and at the same time they may induce an abnormally low or high level of delegation toward the LBM.

The distribution of power delegation across the hierarchical layers mirrors the allocation of formal authority within the organization. Following Aghion and Tirole (1997), formal authority refers to the right to make decisions, where the attribution of authority is ratified by a contractual relationship. In our framework, this kind of power is transferred from the CEO to the subordinates by means of an act of delegation. When the CEO keeps formal authority, she is in charge of the decision process concerning the loan approval. If the CEO delegates decision-making power to the LBM, the latter is able to act autonomously within the limits set by the act of delegation. Starting from the distribution of power delegation across the hierarchical layers, we built a measure of decentralization for each bank, as suggested by our structural model. This is obtained by normalizing the credit amount offered by the LBM with respect to that of the CEO.<sup>18</sup>

On average the LBM has a power delegation that is 15 percent of that of the CEO. This percentage is smaller for large banks (about 5 percent) and higher for cooperative banks (nearly 20 percent). Power delegation is zero for about 10 percent of the banks whereas the maximum is 68 percent. The distribution of the variable is right-skewed with the mass concentrated around values that are not very distant from zero. However there is quite a lot of variance across banks: the 25 and 75 percentiles are respectively equal to 3 and to 22 percent.<sup>19</sup>

LBM's autonomy is clearly a multifaceted concept and therefore is very difficult to represent through a unique index. Under this respect, our proposed measure may clearly have some limitations. First, it does not pick up other aspects of the loan contract that may characterize LBM's authority like the power to set interest rates and to ask for collaterals. Second, being based on a

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improper question formulations. Second, several rounds of telephone interviews were conducted to avoid missing data and to correct inconsistent responses in the questionnaire. The response rate was nearly 100 percent.

<sup>17</sup> This means that a specific applicant was not a customer of that bank at time  $t-1$ .

<sup>18</sup> In our sample there is a great variance across banks with respect to organizational structure and hierarchical layers. The LBM and the CEO are two figures featuring almost all the banking organizations.

<sup>19</sup> The distribution of LBMs' absolute power delegation across banks is reported in Figure A1 in the Appendix.

concept of formal authority, our index could misrepresent LBM's real authority that pertains to the effective control over decisions and that derives from the knowledge of crucial information (Aghion and Tirole, 1997). For instance, an high level of *PD* could not necessarily signal LBM's real authority for those banks that do not allow a LBM to remain in the same branch for a sufficient time span as to accumulate qualitative knowledge of the local credit applicants.

The first objection can be addressed by observing that the power to grant a loan is crucial within a bank-firm relationship and that power delegation is arguably correlated with other aspects that characterize LBM's authority in the lending process. The second objection will also be addressed by introducing a set of robustness checks aimed at controlling for other organizational variables that affect the LBM's capability of acquiring information.

Finally, our index can also be evaluated through a comparison with alternative proxies for the decentralization of decision-making power used by the literature on organization. Bresnahan *et al.* (2002) propose an indicator based on the importance of self-managing teams among the production workers. Colombo and Delmastro (2004) rank modes of allocating decision-making – centralization, partial delegation and full delegation – depending on the autonomy of plant managers in taking some strategic decisions related to plant's activity. Christie *et al.* (2003) and Acemoglu *et al.* (2007) define an organizational unit of the firm as decentralized when it is designed as a profit centre. The basic assumption is that a profit-centre unit has a broader set of decision rights than a cost-centre unit.<sup>20</sup> Compared to the other indexes, our indicator is based on objective data and not on a subjective assessment about the importance of the peripheral manager. Second, it can be directly interpretable as a measure of how much decision rights are allocated to the local branch level. Third, it is continuous and therefore it is not subject to the loss of information connected to a discrete measure.

#### 4.2 ICT capital stock and credit scoring

As stated above, new technologies are represented through ICT capital stock and credit scoring adoption. The former has been computed using the perpetual inventory method. Formally:

$$ICT\_CAP_{i,t} = \sum_j K_{i,j,t} = \sum_j [(1 - \delta_j)K_{i,j,t-1} + I_{i,j,t}]$$

where  $K_{i,j,t}$  is the capital stock of bank  $i$  for a particular asset type  $j$  at time  $t$ ,  $\delta_j$  is the constant rate of depreciation for asset  $j$ , and  $I_{i,j,t}$  is the real investment by bank  $i$  for asset  $j$  at time  $t$ . Types of assets include hardware, software and premises for computing equipment. Bank nominal investment flows are deflated using the hedonic price indexes developed by the Bureau of Economic Analysis and adjusted for the variation in the EU/USD exchange rate.<sup>21</sup> Then, capital stock is obtained as a weighted sum of the past real investments, with weights given by the relative efficiency of capital goods. Depreciation rates are assumed to be constant over time and different across types of assets. Following Jorgenson and Stiroh (2000), software and hardware are assumed to depreciate at a yearly rate of 31.5 percent, premises for computing equipment at a rate of 11.5 percent.<sup>22</sup>

<sup>20</sup> In Christie *et al.* (2003) the decentralization measure is obtained from a questionnaire, which asks the firm's management to identify the second level below the CEO and tell whether it is a profit center, cost center or a mixture of the two.

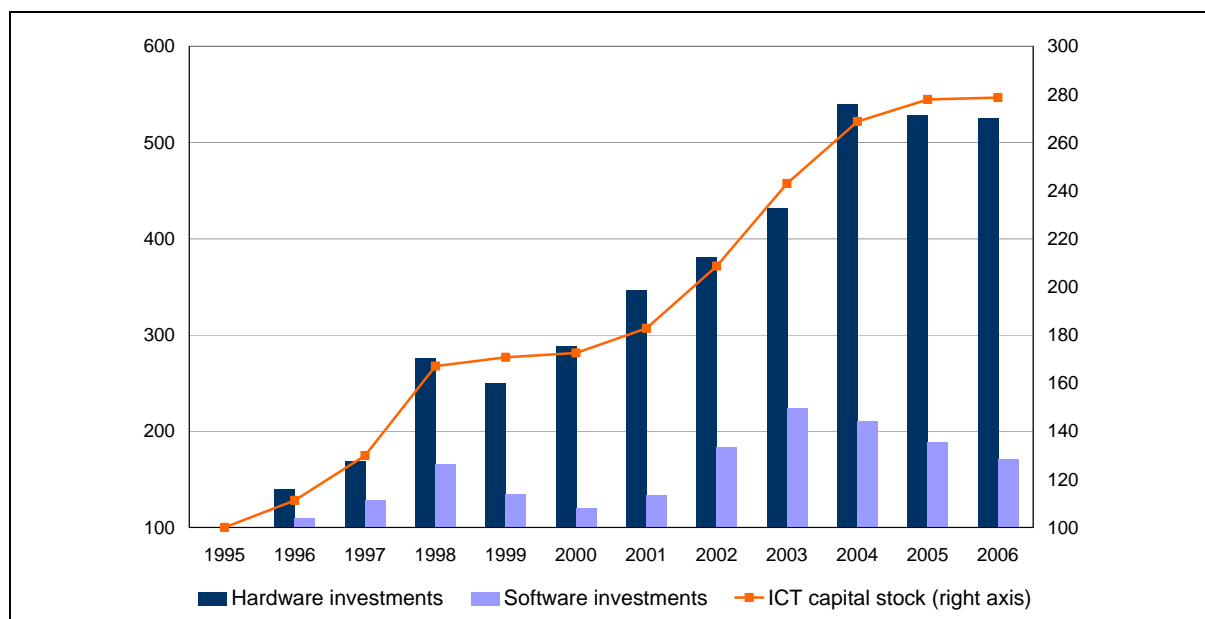
<sup>21</sup> We rely on hedonic prices to supplement traditional price index methods that do not properly account for the rapid technological progress in ICT industry. Just to give an example, a new computer might offer twice the memory of its predecessor with no change in its production cost. Therefore the data on ICT investments in current prices need to be deflated to arrive at constant-quality prices.

<sup>22</sup> Data on ICT investments are available starting from 1984. For 1983 the capital stock is set equal to zero. Although not fully satisfactory, this assumption does not affect our results because of the high capital stock depreciation rate.

The ICT capital had been steadily increasing during the last decade: in 2006 its real value was almost three times as large as in 1995 (Figure 1). Investments in hardware augmented by more than 400 percent, the software component by 70 percent. This trend was mostly due to the exponential decline in the price/performance ratio of computers and related technology, reflected in the BEA price deflator.

Figure 1

**Real ICT investments and capital stock**  
(1995=100)



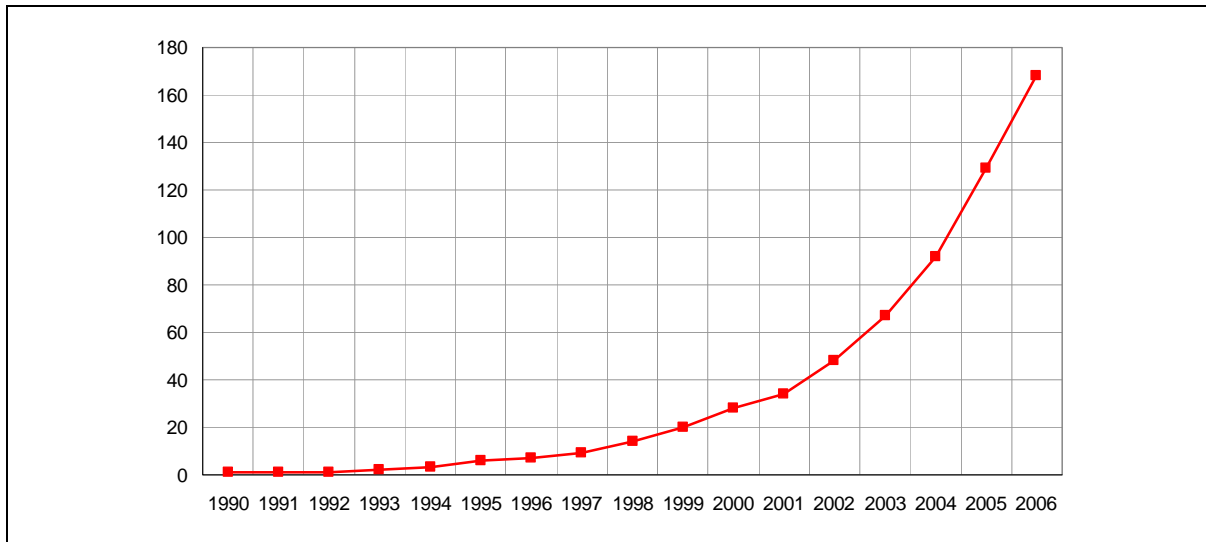
Source: Supervisory Reports of the Bank of Italy, Istat and BEA.

Credit scoring is the process of assigning a quantitative measure – the score – to a potential borrower (Feldman, 1997). The score represents an estimate of the borrower's future loan performance and is obtained combining information from firms' balance sheet data, credit history of the loan applicant and, sometimes, qualitative information. Our survey documents the diffusion of this financial innovation across Italian banks (Albaretto *et al.*, 2008). Banks were asked to report whether they adopted credit scoring for small business lending and (if so) the number of years since the adoption. In 2006 about 60 percent of the banks in the sample adopted those techniques. The adoption rate accelerated in recent years, probably because of the New Basel Capital Accord (Figure 2). Almost all the medium and large banks adopted credit scoring whereas about 65 percent of small banks and 45 percent of credit cooperative banks followed the same strategy.<sup>23</sup>

<sup>23</sup> See also Akhavian *et al.* (2005).

Figure 2

## Adoption of small business credit scoring by year



Source: Survey on Banking internal organization.

Number of banks that adopted credit scoring per year. The sample consists of 297 observations.

## 5. Results

### 5.1 Main findings

Correlations between the explanatory variables reported in Table A3 show that most of them are strongly correlated with bank size (*SIZE*). To cope with the potential collinearity problem, we start with a very parsimonious specification in which regressors include only our ICT variables and *SIZE* (see Table 1). *SIZE* is included to get rid of the differences across banks attributable to the heterogeneity in terms of organizational complexity and institutional nature. Moreover our key explanatory variables, *ICT\_CAP* and *SCORING*, are included separately in columns I and II and simultaneously in column III. Columns IV through VII add stepwise further controls to the basic specification.

*SIZE* has a negative and significant effect on the dependent variable. This finding is consistent with the idea that large banks face higher agency costs and therefore delegate less to the peripheral units within the organization. The other covariates are correlated with *SIZE* therefore it might not be possible to correctly and separately identify their effects. Since we are not interested in a structural interpretation of their parameters, these regressors are added to the specification as they can potentially affect LBM's decisional power and their omission could distort our econometric findings. We start adding a set of dummies for CEO's location. These regional dummies pick up all the influences that local environment might have on CEO's attitudes and strategies including its propensity to delegate; they are particularly relevant in the case of small banks since they control also for the characteristics of the local markets where these banks operate. *DISTANCE*, which is equal to the log of the average distance between the local branches and the bank headquarter, is negatively and significantly associated to the degree of decentralization. This evidence is consistent with the fact that, all else being equal, agency costs increase with the CEO-

LBM physical distance thereby augmenting the need to centralize decision-making within the organization in response to a loss of control.<sup>24</sup> *LOAN SIZE* (the average size of loans that each bank offers to non financial firms) is introduced since LBM's role is enhanced when lending activity is focused on small business. However, *LOAN SIZE* does not significantly affect the degree of decentralization, probably because of the collinearity problems mentioned before. Last, we include *BRANCH SIZE* to control for the fact that a LBM running a larger branch could occupy a higher position within the bank hierarchy and because of that might also be given a larger autonomy. The estimated parameter for this variable is positive, consistently with our expectations.

Table 1

## Baseline results

	I	II	III	IV	V	VI	VII
<b>ICT_CAP</b>	<b>0.013***</b> (0.004)		<b>0.012**</b> (0.005)	<b>0.012***</b> (0.004)	<b>0.013***</b> (0.004)	<b>0.013***</b> (0.004)	<b>0.012***</b> (0.004)
<b>SCORING 0-2</b>		<b>-0.012</b> (0.017)	<b>-0.018</b> (0.017)	<b>-0.024</b> (0.018)	<b>-0.020</b> (0.017)	<b>-0.020</b> (0.018)	<b>-0.022</b> (0.018)
<b>SCORING 3+</b>		<b>0.069***</b> (0.024)	<b>0.060**</b> (0.024)	<b>0.063**</b> (0.024)	<b>0.071***</b> (0.025)	<b>0.069***</b> (0.025)	<b>0.070***</b> (0.024)
SIZE	-0.035*** (0.005)	-0.031*** (0.005)	-0.033*** (0.005)	-0.032*** (0.005)	-0.013 (0.009)	-0.018* (0.009)	-0.028*** (0.010)
DISTANCE					-0.040*** (0.015)	-0.034** (0.016)	-0.030* (0.016)
LOAN SIZE						0.026 (0.021)	0.009 (0.023)
BRANCH SIZE							0.070** (0.030)
FE	-	-	-	YES	YES	YES	YES
Observations	291	296	291	291	291	289	289
R-squared	0.13	0.16	0.18	0.26	0.27	0.28	0.29

OLS estimates. The dependent variable is PD that is the ratio between the loan size that a LBM can autonomously grant to a small firm applying for credit and the corresponding amount that can be extended by the CEO. The key explanatory variables are ICT (log of ICT capital stock per employee) and SCORING (dummies equal to 1 if the bank adopted small business credit scoring in the last 2 years or since at least 3 years, respectively). Robust standard errors are reported in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

As far as our key explanatory variables are concerned, our findings clearly indicate that banks holding more ICT capital and having adopted credit scoring techniques since at least 3 years increase LBM's decision power over small business lending. Estimated parameter for *ICT\_CAP* and *SCORING 3+* are both positive and significantly different from zero. On the contrary, the impact of *SCORING 0-2* is not significant. It is likely that learning costs associated to the introduction of scoring techniques and uncertainty surrounding their screening capabilities do not enable them to have an immediate and/or a short-term impact on power delegation. Notably, these results are confirmed even when *ICT\_CAP* and *SCORING 3+* are included in the same regression,

<sup>24</sup> Other papers analyzing the effects of center-periphery distance on bank strategies include Felici and Pagnini (2008) and Berger and De Young (2001).

showing that their effects can be separately identified. Moreover, the magnitude of the coefficients and their statistical significance is substantially similar in all the specifications proposed. Bresnahan *et al.* (2002) and Colombo and Delmastro (2004) find similar results on the relationship between ICT adoption and decentralization using firm level data.

The role of ICT variables in shaping internal organization is also quantitatively relevant. According to our estimate, the adoption of credit scoring since at least 3 years increases our index of power delegation by 0.07, nearly one-half the mean value. Moving from the first to the third quartile in the distribution of the ICT stock per employee, would increase the index of power delegation by about 10 percent. To compare the magnitudes of the effects associated to the two variables, we treat *SCORING* as it were continuous. It turns out, that a one standard deviation augment for *ICT\_CAP* (*SCORING* 3+) would lead to an increase by 14 (20) percent of the standard deviation for *PD*, thereby showing that the intensity of the two effects is not dissimilar.

Our findings suggest that the new technologies complement rather than substitute the role of the LBM in small business lending. By increasing its investments in computers and software and by adopting credit scoring, a bank improves the quality and the frequency of reporting on the performance of the different local branches. Improvements in the internal monitoring, in turn, favour more delegation exploiting LBMs' local capabilities and specialization in business lending. In the parlour of our model in section 2, these savings on agency costs brought about by new technologies could overcome those generated through the fall in communication costs and the improvement in CEO's decisional process. In turn, these effects would modify the balance between centralization and decentralization favouring the latter.

A potential criticism that can be raised against our interpretation is the following. Suppose that banks adopting credit scoring organize their loan origination process in a hierarchical way. Namely, in the first stage of that process they screen loan applicants through the scoring system. In the second stage, they attribute loan power origination to a LBM if and only if that applicant obtained a sufficiently high score in the first stage of the evaluation process. Hence, under that organization mode, the positive correlation between *PD* and scoring would merely reflect the fact that a LBM could originate loans only for those applicants passing the test carried out in the first stage screening procedure. This argument however is not fully convincing in the context of our empirical analysis. In fact, the banks participating the survey were asked to indicate delegation levels referred to relatively good quality borrowers, *i.e.* presumably those credit applicants passing the test in the first stage screening procedure described above.<sup>25</sup>

## 5.2 Alternative measure of power delegation

In this subsection we control the robustness of our results using a different definition of power delegation, namely the (absolute) maximum loan amount that a LBM can grant in autonomy to a small firm. We start again with a very parsimonious specification and then we add stepwise the main covariates (Table 2). The absolute amount of power delegation is positively and significantly associated with *SIZE*. Again, most of the bank variables are strongly correlated with size and therefore it might not be possible to correctly and separately identify their effects. For example, the coefficients on *SIZE* is reduced when we add *LOAN SIZE*. Larger banks typically focus their lending on larger firms which, in turn, borrow greater amount of money. Therefore, the positive

<sup>25</sup> Furthermore, our findings continue to be interpretable as a positive relationship between scoring adoption and decentralization of decision rights, since *PD* measures the amount of lending that can be granted at the branch level (*i.e.*, without relying on the approval of higher hierarchical layers), independently from the chosen organizational mode.

association between the loan officer delegation and the size of the bank partly reflects the fact that larger banks need to delegate more in order to keep lending decisions at the local branch level.

**Table 2****Baseline results with absolute level of delegation**

	I	II	III	IV	V	VI	VII
<b>ICT_CAP</b>	<b>0.135**</b> (0.057)		<b>0.119**</b> (0.060)	<b>0.107*</b> (0.061)	<b>0.109*</b> (0.061)	<b>0.119*</b> (0.058)	<b>0.110**</b> (0.056)
<b>SCORING 0-2</b>		<b>0.336</b> (0.213)	<b>0.302</b> (0.216)	<b>0.339</b> (0.219)	<b>0.347</b> (0.218)	<b>0.361*</b> (0.214)	<b>0.324</b> (0.218)
<b>SCORING 3+</b>		<b>0.412*</b> (0.212)	<b>0.352</b> (0.215)	<b>0.398*</b> (0.219)	<b>0.414*</b> (0.222)	<b>0.390*</b> (0.222)	<b>0.393*</b> (0.221)
SIZE	0.646*** (0.057)	0.631*** (0.060)	0.620*** (0.061)	0.558*** (0.064)	0.601*** (0.119)	0.490*** (0.105)	0.427*** (0.118)
DISTANCE					-0.092 (0.198)	0.035 (0.171)	0.083 (0.173)
LOAN SIZE						0.544** (0.248)	0.430* (0.260)
BRANCH SIZE							0.401 (0.387)
FE	-	-	-	YES	YES	YES	YES
Observations	291	296	291	291	291	291	289
R-squared	0.33	0.32	0.34	0.43	0.43	0.45	0.45

OLS estimates. The dependent variable is the loan size that a LBM can autonomously grant to a small firm applying for credit. The key explanatory variables are ICT (log of ICT capital stock per employee) and SCORING (dummies equal to 1 if the bank adopted small business credit scoring in the last 2 years or since at least 3 years, respectively). Robust standard errors are reported in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

As far as *ICT\_CAP* and *SCORING 3+* are concerned, our results are fairly consistent with those presented in Table 1. The impact of the new technologies on the level of LBM's power delegation is positive and significant in almost all the specifications. In particular, increasing the ICT capital stock per employee by 10 percent leads to an augment by 1 percent in the maximum amount of the loan that a LBM can autonomously grant to a small firm applying for credit. Having adopted credit scoring since at least 3 years increases the absolute level of power delegation by 10 percent.

Although our empirical findings are qualitatively confirmed when we use the absolute level of LBM's power delegation as dependent variable, we will use the relative measure in the rest of the empirical analysis. Apart from the fact that the relative index is directly suggested by our structural model (see above), it is also much closer to what we are really interested in since establishing the degree of decentralization in an organization necessarily means measuring the autonomy of the local manager with respect to the pinnacle of the hierarchy. Moreover, a relative index enables us to get rid of the huge differences existing across Italian banks in terms of size, business focus and institutional nature.



## 5.3 Robustness checks

In this subsection we provide several robustness checks.<sup>26</sup>

Table 3

## Controlling for other banks' characteristics and organizational variables

	I	II	III	IV	V	VI	VII
<b>ICT_CAP</b>	<b>0.012***</b> (0.004)	<b>0.012***</b> (0.004)	<b>0.014***</b> (0.004)	<b>0.011***</b> (0.004)	<b>0.014***</b> (0.004)	<b>0.014***</b> (0.004)	<b>0.014***</b> (0.004)
<b>SCORING 0-2</b>	<b>-0.020</b> (0.018)	<b>-0.020</b> (0.019)	<b>-0.015</b> (0.017)	<b>-0.017</b> (0.018)	<b>-0.034*</b> (0.020)	<b>-0.034*</b> (0.020)	<b>-0.026</b> (0.021)
<b>SCORING 3+</b>	<b>0.071***</b> (0.024)	<b>0.072***</b> (0.025)	<b>0.072***</b> (0.024)	<b>0.081***</b> (0.025)	<b>0.070***</b> (0.026)	<b>0.070***</b> (0.026)	<b>0.083***</b> (0.026)
SIZE	-0.029*** (0.011)	-0.025** (0.011)	-0.020* (0.011)	-0.030*** (0.011)	-0.036*** (0.012)	-0.035*** (0.012)	-0.030** (0.015)
DISTANCE	-0.031* (0.017)	-0.031* (0.018)	-0.030* (0.016)	-0.031* (0.017)	-0.021 (0.018)	-0.023 (0.019)	-0.028 (0.021)
LOAN SIZE	0.005 (0.024)	-0.013 (0.027)	0.013 (0.023)	0.005 (0.029)	0.028 (0.027)	0.029 (0.027)	-0.006 (0.034)
BRANCH SIZE	0.074** (0.030)	0.070** (0.030)	0.066** (0.029)	0.090*** (0.033)	0.077** (0.032)	0.076** (0.032)	0.112*** (0.037)
ROA	0.224 (0.848)						0.837 (2.737)
BAD LOANS		0.116 (0.192)					0.008 (0.331)
NUMLEV			-0.067** (0.029)				-0.045 (0.035)
TURNOVER				0.017 (0.023)			-0.015 (0.027)
CEO EDU					-0.014 (0.017)		-0.011 (0.020)
CEO AGE						-0.001 (0.002)	0.000 (0.002)
FE	YES	YES	YES	YES	YES	YES	YES
Observations	287	285	289	268	254	254	231
R-squared	0.30	0.29	0.31	0.32	0.31	0.31	0.34

OLS estimates. The dependent variable is PD that is the ratio between the loan size that a LBM can autonomously grant to a small firm applying for credit and the corresponding amount that can be extended by the CEO. The key explanatory variables are ICT (log of ICT capital stock per employee) and SCORING (dummies equal to 1 if the bank adopted small business credit scoring in the last 2 years or since at least 3 years, respectively). Robust standard errors are reported in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

In Table 3 we add further controls to our preferred empirical specifications. We start by adding bank profitability, approximated by return on assets (ROA) that can be considered as a proxy for CEO's managerial talent.<sup>27</sup> A talented CEO could have a stronger propensity to adopt

<sup>26</sup> In unreported evidence we also control the robustness of our results using different empirical specifications. Namely, we use a TOBIT model instead of OLS in order to take account of the fact that our measure of decentralization, PD, varies between 0 and 1. We also consider an alternative estimation method (Stata's glm procedure) enhanced to deal with fractional response data (see Papke and Wooldridge, 1996). The empirical findings are substantially unchanged.

<sup>27</sup> This variable could also signal bank market power.

new technologies and could be also better able to select good quality LBMs and therefore to delegate more power to them. In column II we add *BAD LOANS* (the ratio of bad loans to total lending) that should capture the effects of the riskiness of the loan portfolio on delegation. In particular, a riskier loan portfolio could induce a lower degree of decentralization. Based on our findings, none of these variables play a significant role.

Columns III through VII add variables referring to the internal bank organization and to CEO's characteristics. *NUMLEV* is the log of the number of hierarchical levels between the LBM and the CEO and it should capture how the depth of the hierarchical structure affects the degree of decentralization. *NUMLEV* is negatively and significantly associated to the degree of power delegation. This evidence is consistent with the fact that in a deeper organization decision rights are distributed on a higher number of intermediate positions and therefore peripheral managers are likely to have less decision-making power. *TURNOVER* measures the average LBM's permanence within the same local branch. The introduction of *TURNOVER* is aimed at controlling for further variables that might affect real LBM's authority in small business lending. The latter might vary with the bank's internal policy concerning LBMs' turnover across local branches since a higher permanence within the same local branch can be associated to better knowledge of the local credit market.

Finally, we control for CEO's individual characteristics since they may affect both the adoption of new technologies and the banking internal organization. For instance, a younger and/or a more educated CEO may be more willing to adopt innovative organizational strategies and to introduce new technologies. Therefore we include *CEO EDU* – a dummy variable that is equal to 1 if the CEO is graduated – and *CEO AGE* – the age of the CEO of the bank. Most of the coefficients on these additional controls are not significantly different from zero. On the contrary, the coefficients on *ICT\_CAP* and *SCORING 3+* are unaffected by all these robustness checks, *i.e.* they remain stable and highly significant in all the specifications adopted.

Table 4

## Sample splits

	By size:		By small business specialization:	
	Small banks	Large banks	Small fraction of small business	Large fraction of small business
<b>ICT_CAP</b>	<b>0.017***</b> (0.006)	<b>0.006</b> (0.004)	<b>0.004</b> (0.005)	<b>0.017**</b> (0.007)
<b>SCORING 0-2</b>	<b>-0.031</b> (0.029)	<b>-0.000</b> (0.018)	<b>0.003</b> (0.026)	<b>-0.031</b> (0.023)
<b>SCORING 3+</b>	<b>0.082**</b> (0.040)	<b>0.053**</b> (0.026)	<b>0.059*</b> (0.031)	<b>0.075**</b> (0.036)
SIZE	-0.015 (0.026)	-0.033*** (0.006)	-0.031*** (0.008)	-0.027** (0.011)
Observations	145	146	146	145
R-squared	0.09	0.21	0.17	0.13

OLS estimates. The dependent variable is PD that is the ratio between the loan size that a LBM can autonomously grant to a small firm applying for credit and the corresponding amount that can be extended by the CEO. The key explanatory variables are ICT (log of ICT capital stock per employee) and SCORING (dummies equal to 1 if the bank adopted small business credit scoring in the last 2 years or since at least 3 years, respectively). Robust standard errors are reported in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Banks of our sample are very heterogeneous in terms of their size that, in turn, is strongly correlated with other variables approximating lending practices and internal organization. Therefore, one might want to examine whether the empirical findings hold when considering samples of banks more homogenous in terms of size. We define small (large) banks those with total assets below (above) the median and we run separate regressions for these subsamples (see Table 4). It is worth noticing that the results should be interpreted with caution given the limited number of observations available. Our key variables (*ICT\_CAP* and *SCORING 3+*) have the expected positive sign in both subsamples, even though the impact seems to be somewhat stronger (and with higher level of significance) for small banks. This effect might be driven by higher specialization of these banks in small business lending, as emphasized by the second sample split. In fact, the magnitude and the statistical significance of the coefficients of our key variables are higher for banks having a larger fraction of small business in their portfolio. By exploiting the predictions of our model, a possible explanation for this evidence is that the reduction of monitoring costs due to ICT adoption was larger for banks with smaller and more opaque customers. Alternatively (and perhaps more reasonably), new technologies have reduced the cost of transmitting and processing information (and thus pushed towards more centralization) especially for banks relying extensively on hard information.

Table 5

## Complementarities between ICT and credit scoring

	Baseline	Interaction
<b>ICT_CAP</b>	<b>0.012***</b> (0.004)	<b>0.009***</b> (0.004)
<b>SCORING 0-2</b>	<b>-0.022</b> (0.018)	<b>-0.019</b> (0.018)
<b>SCORING 3+</b>	<b>0.070***</b> (0.024)	<b>0.176**</b> (0.068)
<b>ICT × SCORING 3+</b>		<b>0.020*</b> (0.011)
SIZE	-0.028*** (0.010)	-0.028*** (0.010)
DISTANCE	-0.030* (0.016)	-0.031** (0.016)
LOAN SIZE	0.009 (0.023)	0.007 (0.023)
BRANCH SIZE	0.070** (0.030)	0.064** (0.030)
FE	YES	YES
Observations	289	289
R-squared	0.29	0.30

OLS estimates. The dependent variable is PD that is the ratio between the loan size that a LBM can autonomously grant to a small firm applying for credit and the corresponding amount that can be extended by the CEO. The key explanatory variables are ICT (log of ICT capital stock per employee) and SCORING (dummies equal to 1 if the bank adopted small business credit scoring in the last 2 years or since at least 3 years, respectively). Robust standard errors are reported in brackets; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Finally, we look for the existence of possible spillovers between ICT variables and the adoption of credit scoring techniques. In Table 5 we report our baseline specification and an additional column with the interaction term between ICT and credit scoring. The coefficients on *ICT\_CAP* and *SCORING 3+* remain significant and with the expected sign. In addition, the coefficient on the interaction term is positively and significantly associated to the degree of decentralization. This means that the effects of ICT capital on decentralization are stronger for those banks adopting credit scoring; on the other way round the impact of credit scoring is enhanced when intermediaries have large ICT capital endowments. Therefore, multiple complementarities between decentralization strategy, ICT endowments and scoring techniques arise.

#### 5.4 IV estimation

So far, our results suggest that there is a strong correlation between ICT variables and the degree of power delegation to the LBM. Lagged values were used to avoid potential endogeneity of some explanatory variables. However, there might still be some omitted determinants of power delegation that are also correlated with the adoption of new technologies. Moreover, the direction of causality could be reversed with respect to the one suggested by our empirical specification. To address these endogeneity issues, we instrument *ICT\_CAP* and *SCORING*. Specifically, we use the lagged value of *ICT\_CAP* as instrument for the current ICT endowment and the adoption of credit scoring for either consumption credit or mortgages as instruments for the adoption of credit scoring for small business lending. Let's discuss them in turn.

Our first instrument is *ICT\_95*, the log of the ICT capital stock per employee in 1995. Using lags of the explanatory variables as instruments is frequently seen as controversial. In particular, instruments cannot be sufficiently correlated with the endogenous variable or there might be time invariant omitted variables driving both the dependent variable and the lagged values of the instruments. In our empirical framework, the first problem does not arise since our instrument is highly correlated with the current endowments of ICT capital. As for the existence of time invariant omitted factors, we are confident that this is not an issue in our case because of the length of the time span and the peculiarity of the period considered. The Italian banking system underwent a deep restructuring in the 90's including M&A that induced wide changes in the management of each bank. Also the external conditions deeply changed and banks nowadays face an environment largely unpredictable in the 90's.<sup>28</sup> Moreover, the ICT capital stock within a specific time span is strongly related to ICT investments in that period because of the high depreciation rate of this type of assets. ICT investments, in turn, are volatile and lumpy – *i.e.* they concentrate in a relatively short period of time – and they are plausibly unrelated to the organizational structure observed ten years later. As additional instrument we also introduce *ICT\_00*, the log of the ICT capital stock per employee for the year 2000. We exploit the fact that many banks made significant investments in new software and hardware in that period because of the widespread concern that the information system would cease operating between December 31, 1999 and January 1, 2000 – the so-called millennium bug. Once again, the determinants of these investments are plausibly unrelated with the current allocation of decision-making power.

<sup>28</sup> In the decade in question, there has been an increase in the size and in the geographical reach of the banks, the competition in the local credit markets is augmented and the skill composition of the workforce is changed, thus largely modifying the environment in which banks operate.

Table 6

## IV estimates

	I	II	III	IV
<b>ICT_CAP</b>	<b>0.029**</b> (0.012)	<b>0.029**</b> (0.012)	<b>0.011***</b> (0.004)	<b>0.011***</b> (0.004)
<b>SCORING 0-2</b>	<b>-0.026</b> (0.025)	<b>-0.026</b> (0.024)	<b>-0.022</b> (0.024)	<b>-0.023</b> (0.023)
<b>SCORING 3+</b>	<b>0.066*</b> (0.039)	<b>0.064*</b> (0.033)	<b>0.061</b> (0.039)	<b>0.060*</b> (0.033)
SIZE	-0.028** (0.012)	-0.028** (0.012)	-0.030*** (0.011)	-0.030*** (0.011)
DISTANCE	-0.035* (0.019)	-0.034* (0.018)	-0.027 (0.018)	-0.027 (0.018)
LOAN SIZE	0.001 (0.028)	0.001 (0.028)	0.010 (0.030)	0.010 (0.030)
BRANCH SIZE	0.060* (0.033)	0.061* (0.033)	0.066** (0.029)	0.066** (0.029)
FE	YES	YES	YES	YES
Instrumental variables	<i>ICT_95</i> <i>SCORE_CC</i>	<i>ICT_95</i> <i>SCORE_MO</i>	<i>ICT_00</i> <i>SCORE_CC</i>	<i>ICT_00</i> <i>SCORE_MO</i>
Observations	263	263	278	278
R-squared	0.09	0.21	0.17	0.13

IV estimates. The dependent variable is PD that is the ratio between the loan size that a LBM can autonomously grant to a small firm applying for credit and the corresponding amount that can be extended by the CEO. The key explanatory variables are ICT (log of ICT capital stock per employee) and SCORING (dummies equal to 1 if the bank adopted small business credit scoring in the last 2 years or since at least 3 years, respectively). The lagged values of ICT (*ICT\_95* and *ICT\_00*) are used as instrument for the actual ICT endowment; the adoption of credit scoring for either credit consumption or mortgages (*SCORE\_CC* and *SCORE\_MO*, respectively) are used as instrument for the adoption of credit scoring for small business lending. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

*SCORE\_CC* is the instrument for the adoption of credit scoring for small business lending. This variable is built in the same way as *SCORING* with the further condition that the adoption of credit scoring for consumption credit must have occurred in the same year or earlier than for small business lending. The correlation between *SCORE\_CC* and *SCORING* is due to the fact that adoption of a scoring system for consumer credit historically preceded and hence facilitated the introduction of these lending technologies in small business lending.<sup>29</sup> Data seem to support this hypothesis. Apart from the indirect effect through *SCORING*, *SCORE\_CC* has no direct effect on *PD*. This assumption is based on the recognition that consumers and small firms have historically been approached with two different “lending technologies”. In consumption credit the creditworthiness is quickly assessed through standardized procedures and in an impersonal way. In contrast, in small business lending it is usually emphasized the role of soft information and the primacy of the loan officer who personally interacts with the firm. This is why credit scoring has become first used for consumer credit decisions (automobile, credit card, and mortgage loans) and

<sup>29</sup> The experience accumulated with credit scoring in the local branches may favor the extension of these techniques to other activities. Prior adopters are also likely to have a more codified database that are necessary to implement a credit scoring mechanism.

it has taken longer to be adopted for business loans.<sup>30</sup> In sum, we believe that the motivations driving the adoption of credit scoring for consumer credits are plausibly uncorrelated with the determinants of power delegation to the LBM in business lending. Using a similar argument, we use *SCORE\_MO* – adoption of credit scoring for mortgage – as a further instrumental variable.

The IV estimates are reported in Table 6. As mentioned before, the instruments proposed are strongly correlated with our potentially endogenous explanatory variables. The first stage F-statistics are above the rule-of-thumb of 10 traditionally used to assess the strength of instruments. The results clearly confirm previous findings that ICT adoption gets along with a larger decentralization in small business lending. Estimated parameter for *SCORING* is only marginally affected by the use of instrumental variables. As far as the estimated coefficient for *ICT\_CAP* is concerned, it is (if any) upward revised and it remains highly significant.

## 6. Conclusions

Over the past decades, advances in information technology have transformed the production process and the workplace organization. As far as we know, this paper represents the first attempt at examining the impact of the new technologies on the internal organization in the banking industry.

The issue is relevant for two main reasons. First, the allocation of decision-making power across hierarchical layers is one of the distinctive feature of an organization. Specifically, the degree of autonomy of the LBM is the key variable as far as small firms' credit access is concerned. Second, the banking industry is particularly interesting since it is nowadays one of the most intensive adopters of ICT. Moreover, factors like asymmetries of information and agency costs underlined by the theories on firm internal organization are likely to have a special relevance in the banking sector.

We derive a simple model of organization design that yields an estimable equation about the relation between technology adoption and degree of delegation in lending activity. This relation has been empirically investigated using a unique and specifically tailored dataset including about 300 Italian banks. We find that banks equipped with more ICT capital and resorting to credit scoring delegate more decision power to their LBMs. These results are robust to many additional controls, including instrumental variable estimation.

Hence, worries about the introduction of the new technologies and the negative effects on small business credit access seem to be exaggerated. Indeed, ICT adoption has favoured delegation of the decision rights to the LBMs. Our interpretation is that the lessening of agency problems (leading to more delegation) due to the adoption of new technologies more than offset the efficiency gains in transmitting and processing information (that, in turn, would push towards more centralization). It also likely that computers and related technologies has substituted the LBM in carrying out standardized and manual activities, leaving her free to focus on “border” lending practices. Decentralization may imply that, *de facto*, a larger number of lending practices are decided at the branch level, where relevant information resides. Granting more responsibilities to the LBMs can promote their initiative and effort in collecting and act on soft information. All these facts might have relevant consequences in terms of credit access for small firms, especially those

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<sup>30</sup> In the U.S., the first country where credit scoring was adopted during the fifties, these techniques concerned mainly mortgage loans and credits of small size. Only in the nineties these procedures have become applied also to small business lending activity. The adoption of credit scoring in Italy started much later. However, also in Italy the adoption concerned first mortgage loans and consumer credit and only after small business lending – even though the time gap is much more restricted. See Bofondi and Lotti (2005) for an analysis of the diffusion of credit scoring in Italy. See Albareto *et al.* (2008) for more recent evidences.

with a limited operating history or that are more opaque. It is also reasonable to expect, in the near future, an increase of the degree of decentralization due to the wide adoption of credit scoring in recent years and the continuing progress in ICT industry. Quite evidently, all these considerations hold true in those circumstances in which the LBM has actually better access to proprietary information about borrowers' quality with respect to CEO and she is also better able to act on that information.

As a task for the future research agenda, it could be interesting to elaborate an empirical strategy aimed at identifying the different channels through which ICT may affect decentralization. Moreover, it could also be of interest an attempt at analysing the heterogeneity of the strategies followed by the banks in the adoption of credit scoring methods and how these reflect on credit allocation.

## APPENDIX

Table A1

## Descriptive statistics

Variable	Description (1)	Mean	St. dev.
PD	Ratio between the loan size that a LBM can autonomously grant to small firm applying for credit and the corresponding amount that can be extended by the CEO (2006)	0.15	(0.144)
PD (absolute level)	Log of the loan size that a LBM can autonomously grant to small firm applying for credit (2006)	3.90	(1.775)
ICT_CAP	Log of ICT capital stock per employee	-5.54	(1.616)
SCORING 0-2	Dummy equal to 1 if the bank adopted small business credit scoring in the last 2 years	0.35	(0.477)
SCORING 3+	Dummy equal to 1 if the bank adopted small business credit scoring since at least 3 years	0.23	(0.419)
ICT_95	Log of ICT capital stock per employee (1995)	-5.67	(1.309)
ICT_00	Log of ICT capital stock per employee (2000)	-5.43	(1.435)
SCORE CC 0-2	Dummy equal to 1 if the bank adopted credit scoring for credit consumption in the last 2 years and before or in the same year of the adoption of credit scoring for small business lending	0.15	(0.356)
SCORE CC 3+	Dummy equal to 1 if the bank adopted credit scoring for credit consumption since at least 3 years and before or in the same year of the adoption of credit scoring for small business lending	0.22	(0.412)
SCORE MO 0-2	Dummy equal to 1 if the bank adopted credit scoring for mortgages in the last 2 years and before or in the same year of the adoption of credit scoring for small business lending	0.18	(0.381)
SCORE MO 3+	Dummy equal to 1 if the bank adopted credit scoring for mortgages since at least 3 years and before or in the same year of the adoption of credit scoring for small business lending	0.23	(0.421)
SIZE	Log of total assets	20.69	(1.476)
DISTANCE	Log of average distance (in kilometers) between the headquarter of the bank and the local markets where the bank has at least one branch. The distance is weighted by the amount of loans borrowed in the market where the local branches are situated	3.10	(0.895)
LOAN SIZE	Log of the average loan size in the bank's portfolio	11.57	(0.548)
BRANCH SIZE	Log of the number of employees per branch	1.66	(0.350)
ROA	Returns on assets	0.01	(0.008)
BAD LOANS	Ratio of bad loans on total lending	0.04	(0.044)
NUMLEV	(Log of the) number of hierarchical levels between the LBM and the CEO (2006)	1.19	(0.355)
TURNOVER	(Log of the) average permanence (in months) of the LBM within the same branch (2006)	3.71	(0.430)
CEO EDU	Dummy equal to 1 if the CEO has a university degree	0.38	(0.487)
CEO AGE	Age of the CEO	53.48	(6.123)

Source: Supervisory Report of the Bank of Italy, Survey on Banking internal organization.

(1) Data refer to 2003 if not otherwise specified.



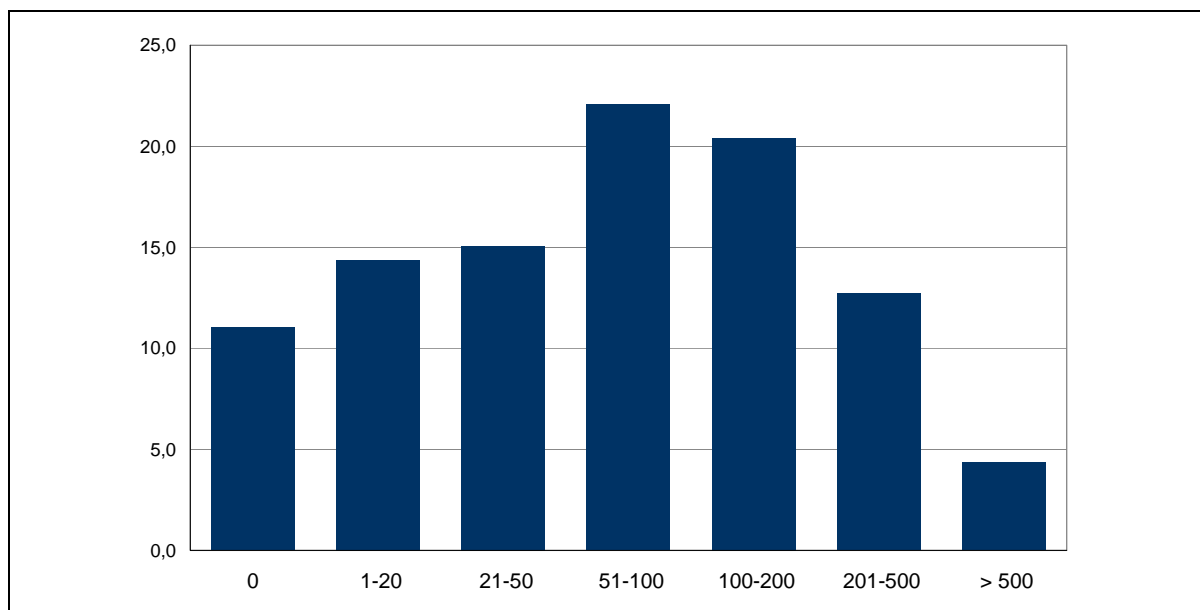
Table A2

## Survey on Banking internal organization

<i>Question 1: Hierarchical levels</i>	<i>Question 2: Power delegation</i>
<p>Consider the lending activity to small business. This activity may involve several figures of the bank's internal organization. Please list all these figures starting from the one at the bottom of the hierarchy (e.g. loan officer) up to the board of the directors. If the bank belongs to a group, list also the figures of the group who may participate at the lending process.</p>	<p>Consider the lending practice for a firm applying for credit for the first time. Please write down the maximum amount of loan that can be granted in autonomy by each of the figure indicated. Levels of delegation had to be referred to applicants exhibiting a risk level that a bank judge <i>a priori</i> as normal.</p>
<p>Description of the hierarchical levels:</p>	<p>Maximum amount (in thousands of euros):</p>
1) _____	_____
2) _____	_____
3) _____	_____
4) _____	_____
5) _____	_____
6) _____	_____
7) _____	_____
8) _____	_____
9) _____	_____
10) _____	_____
11) _____	_____
12) _____	_____
Source: Survey on Banking internal organization.	

Figure A1

## The distribution of absolute power delegation of LBM



The x-axis reports classes of absolute power delegation of the LBM (in thousands of euro); the y-axis the frequencies.  
Source: Survey on Banking internal organization

Table A3

## Matrix of correlation between the explanatory variables

	ICT_ CAP	SCOR ING 3+	SIZE	DIST ANCE	LOAN SIZE	BRANC H SIZE	ROA	BAD LOAN S	NUML EV	TUR NOV ER
ICT_CAP										
SCORING 3+	0.118 (0.044)									
SIZE	0.159 (0.007)	-0.018 (0.754)								
DISTANCE	0.146 (0.013)	0.055 (0.349)	0.787 (0.000)							
LOAN SIZE	-0.054 (0.363)	-0.032 (0.582)	0.208 (0.000)	-0.084 (0.152)						
BRANCH SIZE	0.171 (0.004)	-0.050 (0.392)	0.595 (0.000)	0.407 (0.000)	0.268 (0.000)					
ROA	-0.037 (0.531)	0.020 (0.729)	0.235 (0.000)	-0.025 (0.665)	0.301 (0.000)	0.272 (0.000)				
BAD LOANS	0.097 (0.102)	0.012 (0.843)	0.016 (0.788)	0.169 (0.004)	0.301 (0.000)	0.049 (0.407)	-0.114 (0.054)			
NUMLEV	0.170 (0.004)	-0.021 (0.725)	0.622 (0.000)	0.503 (0.000)	0.086 (0.137)	0.360 (0.000)	0.194 (0.001)	-0.024 (0.684)		
TURNOVER	0.032 (0.598)	0.058 (0.337)	-0.293 (0.000)	-0.318 (0.000)	0.004 (0.950)	-0.143 (0.019)	0.150 (0.013)	0.073 (0.231)	-0.336 (0.000)	
The p-values are reported in brackets.										

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# BANK ACQUISITIONS AND DECENTRALIZATION CHOICES

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## 1. Introduction

Banking consolidation has strongly intensified since the mid-1990s involving an increasing number of intermediaries. The number of Italian banks decreased from 970 in 1995 to 806 in 2007; over the same period, mergers and acquisitions (M&As) accounted for more than 70 per cent of banks' total assets. Furthermore, at the end of 2007 the top five Italian holding banks represented more than 50 per cent of the banking system's total assets. One of the most common concerns is that the consolidation process creates larger and more complex banks; therefore, it could favour hierarchy *versus* decentralization, increasing the functional distance between lender and borrower and reducing relationship lending (Alessandrini *et al.*, 2005). Nevertheless, studies focusing on M&As do not agree that the effect of consolidation on credit supply or post-dealing portfolio diversification is unambiguous. Empirical analysis usually indicates that M&As among small banks enhance small business lending, whereas the opposite effect emerges when large banks are involved. The effect of consolidation may also diverge across geographical areas and types of deal. Merged banks usually reduce the share of credit granted to SMEs while acquired banks show a higher orientation towards small business lending, especially if they have a local geographical reach (Beretta and Del Prete, 2007).

How could this heterogeneity in the consequences of M&As be explained? We believe that it could be originated by changes in the internal organization of a bank following the consolidation process, especially in terms of centralization *versus* decentralization choices. This intermediate effect on organization has often been neglected by the empirical studies on bank M&As, mainly due to lack of specific data: this is why bank size has usually been employed as a simple proxy of bank complexity (Berger and Udell, 2002; Cerqueiro *et al.*, 2007).

The link between consolidation and organizational re-shaping is crucial. According to the theory, merged or acquired banks could suffer from scope diseconomies in retail services (such as SME finance), discouraging decentralization because of increased agency costs (Aghion and Tirole, 1997; Stein, 2002).<sup>1</sup> Decentralization implies higher agency costs in order to face loss of control over local officers and to limit moral hazard behaviour. The trade-off between decentralization and control defines the organizational design: during the restructuring phase that follows a merger or an acquisition, it is likely that the allocation of lending decision rights will change across hierarchical levels, in order to create a new equilibrium within the bank's organization.

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<sup>1</sup> In Stein's model decentralized banks, whose local loan officers have more decision-making power, improve research incentives to collect and use proprietary information on opaque borrowers.

The purpose of our paper is to verify possible structural changes in the *decentralization* versus *centralization* choice following banking acquisitions.<sup>2</sup> These changes may especially affect small business lending, for which it is more difficult to transfer information across a hierarchy. Using a unique data set on banking organization, we focus on the internal loan approval mechanism concerning SME financing. We then investigate whether Italian bank acquisitions affect power delegation across hierarchical levels and personnel turnover. We also investigate how the degree of dissimilarity among bidder and target banks can hamper the integration process and favour organizational complexity versus decentralization. This can lead to pinpointing the mechanism at work to shed light on the mixed results of banking consolidation on relationship lending as well.<sup>3</sup>

To the best of our knowledge there are no empirical studies examining whether banks involved in M&As experience significant changes in their internal structures and small business lending strategies: our paper is a first attempt to go in that direction.

Organizational data are drawn from a special survey conducted at the end of 2006 by the Bank of Italy on a sample of around 300 banks. The sample represents almost the entire universe of domestic banks, excluding intermediaries specialized in consumer credit, leasing and factoring, and Italian branches of foreign banks. We combine such data with census and balance sheet indicators.

Our main results are the following. Acquisitions positively affect the amount of loans the branch manager of the target bank can autonomously grant to SMEs. The power delegated to the Chief Executive Officer (CEO) shows a greater increase. These interventions tend to smooth the differences between the dealing partners. Within acquired bank organizations, these adjustments engender a systematically different distribution of decision rights across hierarchical levels. At the same time, we find that branch officers' turnover is higher for banks involved in acquisitions. Since the local manager's decisional power is positively affected by the deal, we cannot support the common concern that the consolidation process reduces decentralization. We argue that the higher turnover of local officers is mainly related to monitoring the costs of larger organizations associated with the increasing decision-making power delegated to local branch managers.

The paper is organized as follows. Section 2 presents a review of the literature concerning the main effects of bank consolidation on relationship lending and related organizational implications. Section 3 describes the data and variables employed in the econometric exercise while Section 4 sets out the empirical methodology. Section 5 presents the baseline results; Sections 6 and 7, respectively, report more detailed estimates and robustness checks, and Section 8 concludes.

## 2. Related literature and research questions

Our paper is related to two strands of the literature: on the one hand, those studies analysing the empirical consequences of M&As; on the other, papers examining agency problems in delegating power across hierarchical levels.

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<sup>2</sup> We focus on acquisitions rather than mergers because we still have the chance to distinguish between target and bidder, characterized by a specific organizational framework. Our principal interest is, moreover, to study the changes of power delegation in target banks; this would not be possible in the case of a merger, because the target disappears after the deal.

<sup>3</sup> We do not investigate the effect of organizational changes on credit supply, because this further link has already been examined by a large strand of literature, summarized in the following section. Concerning the relation between more decentralized banking organizations and the greater extent of relationship banking, see Benvenuti *et al.* (2009). The relation between organizational framework, business specialization and the economic performance of a bank is empirically analysed for the Italian banks, in Bongini *et al.* (2007).

With respect to the first, many researchers have studied the impact of M&As on banking performance and credit availability. Some studies have documented a reduction in credit supply to small borrowers, due to the growing organizational complexity of banks (Berger *et al.*, 1995; Peek and Rosengren, 1996; Udell, 1998; Scott and Dunkelberg, 2003). For Italian banks, Focarelli *et al.* (2002) show that a merger usually causes a greater share of credit to be granted to large companies, persistent in the long-run, while this effect is not always found after an acquisition. Credit rationing has been better quantified by considering the geographical extent of bank activity or by distinguishing results by bank size (Keeton, 1996; Peek and Rosengren, 1998; Avery and Samolyk, 2000; De Vincenzo and Iannotti, 2002; Sapienza, 2002; Beretta and Del Prete, 2007). Other empirical findings have supported the idea of the dynamic effects of M&As which, in the long-run, stimulate the role of local and new banks and only lead to a temporary reduction in credit supply to SMEs<sup>4</sup> (Berger *et al.*, 1998; Berger *et al.*, 2001; Berger *et al.*, 2000; Keeton, 2000; Bonaccorsi di Patti and Gobbi, 2001; Bonaccorsi di Patti and Gobbi, 2007).

However, these studies do not provide evidence on the “root cause” of the changes in banking credit policy after M&As. Moreover, mixed results of M&As between large and small banks underline the existence of a “crucial” link between banking organization, lending technology and specialization in SME finance. Since in this literature organizational changes are latent variables, size and geographical reach are widely employed as proxies of banking organization, even if these proxies might not be fully satisfactory.

The second strand of the literature can shed further light on this topic. When firm size enlarges, agency and information costs tend to develop more than proportionally (Berger and Udell, 2002). Larger intermediaries, stemming from consolidation, may experience diseconomies *à la* Williamson (1988),<sup>5</sup> because of higher coordination costs in lending during the transition period (especially if information is innately soft, as for SMEs); as a consequence, organizational diseconomies can shrink the scope of large banks (Cerqueiro *et al.*, 2007).

Agency problems could be important in explaining the different results of M&As. When two or more very dissimilar institutions consolidate, they face higher integration costs due to differences between dealing partners in terms of corporate culture, performance, information technology, lending practices and workplace environments. In such cases, the cost of control could increase and cause some difficulties for target banks in sustaining previous credit relations or performance. Consequently, parent banks have to cope with an organizational trade-off between delegation and control over the target intermediary.

Agency models highlight how organizational shocks, mainly caused by M&As, could affect in different ways incentives for local loan managers to set up relationship lending and gather soft information. Following Stein’s framework, within larger banks information has to go through several hierarchical layers (*organizational complexity*); thus the transmission of proprietary (soft) information upward could be difficult, because it cannot be directly verified by anyone other than the agent who produces it. This means that in more complex organizations, CEOs are less efficient in creating incentives and in distributing funding across branches to finance more opaque firms. There are many reasons for this: more levels of bureaucracy, lower motivation for line managers, greater agency or moral hazard problems (which arise when the decision-making power is separated from expertise on information). Stein (2002) argues that, when soft information is

<sup>4</sup> If loans that are adversely affected have a positive net present value, the consolidation process may generate business opportunities for rival banks and modify their lending organization. This may also happen because local banks benefit from their knowledge of the economic environment and from their comparative advantage in gathering soft information.

<sup>5</sup> Studies on banking performance after M&As (Focarelli *et al.*, 1999 and Del Prete, 2002) suggest diversification revenues following a merger and portfolio restructuring after an acquisition; they confirm that there are few cost savings, due to rigidity in personnel and organizational structures, both for large and mutual banks.



crucial, decentralized banks are more efficient in financing smaller firms. This model, based on agent incentives and soft information, could explain why M&As involving small banks generally have a lower impact on small business lending.

Consolidation can also generate greater organizational complexity and hence higher costs for monitoring local managers; therefore the local managers' tenure at the same branch could be lower (Ferri, 1997), providing fewer incentives to establish *face-to-face* relationships with SMEs.

Organizational shocks after a deal could be influenced by technological innovation, too. The implementation of innovative internal rating systems should reduce the disadvantage of large and centralized banks in the treatment of SME information (Akhavain *et al.*, 2005; Berger *et al.*, 2005a; Berger and Udell, 2006). These techniques may also mitigate agency problems, since their adoption in the evaluation of creditworthiness can also facilitate the remote control of lending decisions by local managers. Evidence suggests that large and consolidated banks show a higher share of credit granted to SMEs if they have adopted rating or scoring systems (Frame *et al.*, 2001) or a closer correlation between interest rates and the risk of default (Panetta *et al.*, 2004).

These theoretical predictions have been tested using the link between size and hierarchical complexity (Berger *et al.*, 2005b) and by case studies. Liberti (2003 and 2005), using data on a large bank's loan approvals, argues that transmission of, and reliance on, soft information is higher under decentralized than centralized institutions. This is consistent with the findings of Liberti and Mian (2006), who show that soft information depreciates across hierarchical levels and that whoever is given more authority puts more effort into collecting soft information.

To our knowledge, no empirical evidence is at present available about the effect of M&As on banks' organizational features. In this paper, we take up the following question: "Do bank acquisitions influence organization design (centralization/decentralization) and potentially affect local loan officers' incentives?". We also try to test whether Stein's hypothesis of a trade-off between delegation and control is true. To this end, we analyse banks entering a group following an acquisition, so as to corroborate and better explain the mixed effects of consolidation.

### 3. Data and variables

#### 3.1 *Dependent variables: organizational features*

Organizational data are drawn from a survey conducted by the Bank of Italy on a non-random sample of about 300 banks, depicting lending practices at the end of 2006 and representing around 80 per cent of the Italian banking system's total loans to firms. Intermediaries specialized in consumer credit, leasing and factoring financing were excluded, as well as all Italian branches of foreign banks. The survey covers almost the whole spectrum of banks above a minimum threshold in terms of size and organizational complexity, including virtually all large, medium and small banks, and excluding very small intermediaries. The accuracy of the data collected is reasonably high.<sup>6</sup>

In order to compare two homogenous groups of intermediaries, we have excluded from the sample those banks that underwent a merger between 2000 and 2005. Therefore, the econometric analysis compares banks that have experienced an acquisition, either as bidder or target, and banks that did not take part in any deal during the same period. We have also excluded outlier observations and banks that only finance long-term investment projects.

<sup>6</sup> Preliminary interviews with bankers helped in organizing the questions properly, avoiding potential ambivalences; *ex post* interviews helped to fill missing information and to fix erratic responses. For more details, see Albareto *et al.* (2008).

The survey focuses on the organizational design of business lending and, secondly, on the implementation of rating systems. The information about bank organizational structure is very analytical. Banks were asked to give information about: the number of hierarchical layers involved in the decision to grant loans to SMEs, the amount of finance up to which each hierarchical level may lend autonomously (from the branch loan officer up to the board of directors), the type of information required (soft *versus* hard information), the frequency of loan officer turnover, the importance of credit scoring and internal rating methodologies in the assessment of credit.

Our delegation indexes are equal to the amount of loans the local manager and the CEO are respectively allowed to grant to SMEs (logarithms).<sup>7</sup> The first indicator provides information about the power of the “periphery” to grant credit autonomously, the latter informs about the authority of the top management. We have chosen the General Manager to embody the CEO because this hierarchical level is always present. The branch loan officer and the top management can respectively represent the “agent” and the “principal” indicated in the theoretical literature (Stein, 2002).<sup>8</sup>

The second step involved drawing information from the survey sample on loan officers’ turnover to assess whether the length of tenure managing a branch (in terms of the number of months) is affected by involvement in M&As. On the one hand, establishing close and long-lasting relations with opaque borrowers should be directly linked to the stability of local managers. On the other hand, the longer the time a manager works in the same branch, the higher the likelihood of moral hazard behaviour. The loan officer’s turnover is intrinsically related to relationship lending, but it is also a device for the top management to reduce monitoring costs, which increase when power must be delegated. This is the case, for instance, in financing opaque SMEs, for which information is not easily transferable upwards.

Descriptive statistics on the sample employed for the baseline estimates are presented in Table 1, with variable definitions. On average, a branch manager can grant loans up to €136,000 autonomously; the median is considerably lower (€70,000), since the upper bound is lower for small and mutual banks. The power delegated to the CEO is about €2.4 million; again the median value is significantly lower (€0.5 million). Local officers stay in charge for an average of 46 months; the distribution is relatively narrow: the first quartile is 35 months, the third is 60.

Table 2 reports descriptive statistics on organizational features across the banks involved (either as bidder or target) or not involved in acquisitions. By and large, acquiring banks are large intermediaries; their delegation indexes are higher than the sample mean. Their local officers show a faster turnover, most likely because of the extent of their branch network. Target banks in acquisition deals are larger than sample mean, too. Their officers have considerable delegated power (albeit, in median, less than the power of officers in bidder banks) and a fast turnover. Banks not involved in the consolidation process are largely small and local: this contributes to explain the lower degree of power delegated to their local officers and their slower turnover, too.

### 3.2 *Dummies accounting for bank acquisitions*

In order to capture systematic differences in lending strategy following an acquisition, we build a dummy for each kind of dealing partner (bidder or target banks); it is equal to 1 for each

<sup>7</sup> The threshold under which a borrower can be classified as an “SME” varies from bank to bank; the most frequent classification term is the total of net sales.

<sup>8</sup> In some unreported estimates, we have also experimented an index of *internal decisional decentralization*, calculated for each bank  $i$ , as the ratio between the maximum amount of finance up to which a branch loan officer may lend autonomously and the CEO can lend (“internal decentralization”).

bank involved in a deal, and zero otherwise. Information on acquisitions is drawn from the Bank of Italy's Register of Banking Groups.<sup>9</sup>

We try to overcome the difficulties of trying to capture a dynamic phenomenon in a cross-section estimate by building two sets of dummies: these distinguish recent acquisitions (between 2003 and 2005, *new*) from older ones (between 2000 and 2002, *old*). Disentangling operations over time allows us to verify whether there are temporary effects or not: we expect different restructuring results depending on the time these deals took place.

Another interesting feature to investigate is the different effect of deals among geographically contiguous banks from those involving distant intermediaries. With this aim, we interact the dummy identifying a target bank with dummy variables measuring the geographical reach between dealing partners. The first (*Overlap*) refers to the overlapping in branch networks of the target and its bidder: it is equal to 1 if more than 50 per cent of the branches of the target is located in provinces in which the bidder has also branches,<sup>10</sup> and zero otherwise; at the same time *NoOverlap* is its orthogonal dummy in order to split target banks into two homogenous groups. A second set of dummies, *Inmkt* and its orthogonal *Outmkt*, refers to the legal headquarters of dealing partners: dividing Italy into two areas (North and Centre; South), the dummy *Inmkt* is equal to 1 if the target is headquartered in the same area of the bidder, and zero otherwise. It is the opposite for the dummy *Outmkt*.

Finally, to control if the effects of an acquisition are different for large and small banks, we interact the dummy "target bank" with a dummy *Small (Large)* bank, which is equal to 1 if at the end of 2006 the total assets of the bank were less (more) than €1.3 billion, and zero otherwise.

### 3.3 Other controls

In our econometric exercise, we control for other bank-level features (average loan, portfolio risk, profitability, banks belonging to banking groups, geographical location of the headquarters, presence in industrial districts), potentially able to affect bank organization.

The log of total assets is our size variable; as already seen, banks involved in acquisitions (either as bidder or target) are larger than others (Table 2). Our specialization index in small business lending is measured as the average size of loans to firms and households; for this feature, there does not seem to be a strong variability between the different groups of banks. The ratio between profits before taxes and total assets (ROA) informs us about bank profitability: as expected, the profitability of acquiring banks is higher than both target and independent banks. The share between non-performing loans and total loans is our proxy for the bank portfolio credit risk; also in this respect, bidders perform better than targets, and rivals are in the middle. Data used to build previous bank-level characteristics are drawn from the Bank of Italy Supervisory Reports.

Our control for local environment is the "district index", constructed for each bank as the share of branches located in municipalities classified as industrial districts according to Istat taxonomy. Our hypothesis is that banks with wide activity in district areas will be encouraged to set up close relationships with local SMEs; this may enhance the importance of soft information and promote decentralized organizations. The index is on average 36 per cent, and it is higher for stand-alone banks.

<sup>9</sup> Information on merged banks, instead, is drawn from the Census of Banks (SIOTEC) and it is employed to cut them out of the sample.

<sup>10</sup> The distribution of this ratio is polarized between very small and very large values; the threshold of 50 per cent seems to represent a satisfactory cut-off to split the sample into the two groups.

A control for the bank's geographical location is provided by the dummy *South*, that is equal to 1 if the intermediary's headquarters are located in the South of Italy. With respect to governance, the dummy *Group* is equal to 1 if, at the beginning and at the end of the sample period, the bank was part of a bank group and it has not been acquired in the meantime.

Other variables contribute to define bank organizational design in lending to SMEs. First of all, organizational complexity depends on the ability to process information. For this purpose, we distinguish between banks that have adopted a credit scoring system and intermediaries which have not.<sup>11</sup> Moreover, using the pecking order on sources of information about borrowers (financial statements, credit registers, qualitative data, etc.), we operate a distinction between intermediaries giving great importance to soft information and banks for which this kind of information is less important.<sup>12</sup>

#### 4. Empirical methodology

An acquisition can generate changes in the degree of hierarchy and in the decentralization of the decision-making process of the target bank, due to the need to merge the different cultures, information systems and know-how of the target and the bidder. The latter may experience some organizational change, too: for instance, some managers could be temporarily employed in the acquired bank's structure.<sup>13</sup> If this is the case, by comparing banks that have experienced acquisitions in a six-year period before 2006 with those which were not involved in any deal, we should be able to capture different organizational strategies.

Therefore, the purpose of our empirical analysis is to verify to what extent the organization of SME loan approval of bank  $i$  is explained by its involvement in consolidation. To this end, we employ two sets of regressions to assess if bank acquisitions affect the decision-making rights of both the loan officer and the CEO. A third econometric exercise investigates the effect on the loan officer's turnover, in order to capture both branch managers' incentives to finance small firms and headquarters monitoring strategy. In fact, while the delegation system sheds lights on "formal" authority, turnover – conditioning local officers' real decision-making power – is likely to represent a better proxy for the agent's incentives in relationship lending (Scott, 2006) and for monitoring the costs of large institutions (Ferri, 1997).

The equations to be estimated have the following form:

$$LO\ Delegation_i = f(Dummy\ Acq_{Bidder}, Dummy\ Acq_{Target}, \mathbf{X}_i) \quad (1)$$

$$CEO\ Delegation_i = f(Dummy\ Acq_{Bidder}, Dummy\ Acq_{Target}, \mathbf{X}_i) \quad (2)$$

$$LO\ Tenure_i = f(Dummy\ Acq_{Bidder}, Dummy\ Acq_{Target}, \mathbf{X}_i) \quad (3)$$

We capture acquisition events by means of the dummy variables described in the previous section (*Dummy Acq*); moreover, we introduce controls for individual characteristics (vector  $\mathbf{X}_i$ ), such as bank *size*, average *loan size*, credit portfolio *risk*, *profitability*, *governance* (banks belonging to a group), *geographical localization* of the headquarters, and *presence in district areas*. All bank-level variables aim to control for differences across intermediaries, potentially causing heterogeneity in organizational complexity and in lending technologies.

<sup>11</sup> With respect to target banks, we examine if the scoring was introduced after the acquisition.

<sup>12</sup> The indicator referring to the importance of soft information is based on the ranking of two factors: "qualitative information" and "personal knowledge" of the customer.

<sup>13</sup> Albareto *et al.* (2008) show first descriptive evidence from the survey conducted by the Bank of Italy (see Section 3). This study emphasizes the difference, both in branch officers' delegated power and turnover, between local banks belonging to groups and other stand-alone local banks.

The analysis is carried out with an OLS estimate on a cross-section of 235 banks that provided information on their organization in lending to large and small firms. Our main findings are checked by using splitting samples and matching methods. Each dependent variable is measured at the end of 2006, while regressors are one-period lagged, or taken as the mean over the whole six-year period, to tackle endogeneity.

## 5. Results

### 5.1 *Delegation of power across hierarchical levels*

In the first step of our econometric exercise, we aim to investigate the distribution of power delegation across hierarchical layers among banks experiencing acquisitions and those not involved in any deal. To this end, our dependent variable is defined as the maximum amount that a local branch officer can autonomously grant to SMEs. At the same time, we also check the decision-making power of the CEO, in order to clearly disentangle the different impacts of the *reorganization* both at the top management and at the branch level within a target bank. Furthermore, the simultaneous analysis of these two measures of (formal) authority for each hierarchical level shows which variable drives bank centralization-decentralization choices concerning small business lending in the post-acquisition period. In order to implement robustness checks on our results, we start with a very parsimonious model and then, following a stepwise approach, we insert other bank-level controls in the estimation. Findings from the different models and our baseline specification are shown in Table 3.

We find that acquisitions positively affect the powers delegated both to the loan officer and to the CEO for loan approval; the effect on the latter is higher than on the former.<sup>14</sup> Consequently, being acquired in the period 2000-2005 improves formal decision-making power at both headquarters and branch level within a target bank. This result is very significant, especially in our baseline specification (model IV), which controls for many bank characteristics. The coefficient of the dummy “target” suggests that the power delegated is more than double for acquired banks with respect to those not involved in any deal in the same period. Therefore, having recently become part of a group causes empowerment along hierarchical layers in order to move towards the higher levels of the bidder. This evidence is consistent with the strand of the empirical literature supporting the idea that target banks specialize more on small business loans after becoming part of a group (Beretta and Del Prete, 2007).<sup>15</sup>

The increasing delegation of power across all the organizational levels of the target bank may have different causes. One possibility is that the CEO of the parent bank will appoint a new top management with higher powers to enhance its supervision. Even if no removal strategy is followed, another hypothesis is that the power delegated to the CEO of the target bank may be increased in order to match the higher level of the bidder’s CEO, and to strategically merge different loan approval mechanisms. The real determinant may depend upon on the main

<sup>14</sup> This is why in an unreported regression, using the ratio between LO and CEO powers as a dependent variable, we obtain a negative correlation with the dummy identifying a target bank, suggesting a lower internal decentralization degree. Consequently, it does not seem to provide evidence of a decline in the decision-making power of banks newly belonging to banking groups, but only of a major *functional distance*, in terms of decision-making power, between the ‘vertex’ and the ‘periphery’ in the lending process of target banks.

<sup>15</sup> Our results also seem to suggest that acquiring banks show a lower delegation of power in lending to SMEs for both top management and loan officers. Even if this evidence is not statistically significant, it is likely that the increasing complexity after the deal may reduce their comparative advantage in treating soft information, by raising coordination costs across branches and headquarters. All these changes within a banking group may favour higher specialization on the part of acquiring banks in lending to large and medium-sized firms and a prominent expertise of their targets in SME finance.

motivation of the deal: when acquisition is driven by the desire to restructure the target, the former hypothesis is more likely, otherwise the latter is more plausible.

Among the other controls, bank size plays an important role in explaining the different degrees of delegation across hierarchical levels. As expected, bank size is positively correlated with the amount of credit that CEOs and branch officers can autonomously grant to small firms; in fact, delegation to these two management layers is set higher by large and complex banks. Similar effects are determined by the governance scheme: a bank belonging to a group, even if not acquired recently, shows higher decision-making rights at both hierarchical levels, in order to foster size growth.

Power delegation seems not to be affected by bank risk and profitability. Instead, it is lower if the bank's headquarters are located in a Southern region, a geographical area where firms are riskier due to higher local diseconomies and negative externalities.<sup>16</sup> Finally, we find that local loan officers' decision-making power is positively affected by bank specialization in Italian district areas (*i.e.* agglomerations of SMEs): the greater the share of district branches, the greater the power assigned to local managers. This result is in line with the evidence that district areas create information spillovers and increase opportunities for local managers to establish *face-to-face* relationships with small firms to collect soft information more easily.

## 5.2 Branch loan officers' turnover

In the second step, we measure to what extent the local loan officer's length of tenure at the same branch (number of months, in logarithms) is influenced by the bank's involvement in acquisition. The results of this set of estimates are presented in Table 3, which shows a stepwise approach as in the previous section.

As pointed out above, this indicator is affected by the trade-off between the relationship lending approach and the moral hazard problem. On the one hand, the longer the time a local loan officer manages the same branch, the greater the personal incentive to develop close relationships with opaque borrowers and to collect soft information (Uchida *et al.*, 2006).<sup>17</sup> We find that bank profitability lengthens the time spent by loan officers at the same branch, while portfolio risk increases their turnover. This evidence supports the fact that bank profitability and risk could affect loan officers' incentives to develop relationship lending; in fact, bank performance is often adopted as a scale to define local managers' compensation schemes.

On the other hand, more complex organizations cost more to control: reducing the length of tenure of the branch officer is an effective strategy to reduce agency problems, even if this is in conflict with relationship banking. Our results show that size is negatively correlated with loan officer length of tenure, as is belonging to a banking group. These findings are consistent with previous evidence on Italian banks, supporting a greater turnover of loan officers in large banks with respect to small ones, especially mutual banks, because of growing monitoring costs (Ferri, 1997).

Moreover, banks that grow in size following acquisitions face higher integration and agency costs. In line with our suppositions, the turnover of local loan officers is greater in acquired banks.

<sup>16</sup> The effect of the dummy *South* is statistically significant relatively to CEO's decision-making right, while for loan officer delegation we get the expected sign but the result is not robust: this evidence is probably due to the fact that the monitoring is firstly on top management behaviour, mainly if the acquisition is driven by restructuring the target.

<sup>17</sup> These findings are consistent with Scott and Dunkelberg (1999), who emphasize the primacy of the loan officer's role in the relationship paradigm. In fact, by examining the effect of US banking industry consolidation on SME finance, they argue that a loan officer's turnover is negatively correlated with credit availability and positively correlated with the SME searching for a new bank.

In particular, from our baseline specification, we can argue that these officers stay in the same branch for a period lasting around 21 per cent less than others not involved in any deal. This evidence could offer insight into the fact that the greater turnover is actually a method of reducing agency costs by monitoring loan officers' moral hazard risks within more complex banks, above all if delegated powers increase. Our results are consistent with the findings provided by Udell (1989), who argues that those banks delegating more responsibility to their loan officers, have to invest more in monitoring their outcomes.<sup>18</sup>

## 6. Further specifications

### 6.1 *Disentangling different lending techniques*

As already seen in the literature review, the preferred way of processing information – and, more specifically, soft information – may influence the organizational design, and in particular variables such as loan officers' decision-making power and turnover. In the spite of better qualifying our baseline results on the effect of acquisitions, we look at two other organizational characteristics: the adoption of scoring systems in the assessment of customers' creditworthiness and the importance given by the bank to soft information.

With respect to the use of credit scoring, we add to the baseline model a dummy *Score* signalling the implementation – after the acquisition, in the case of target banks – of an internal rating system concerning SME finance. In order to capture special effects due to reorganization after the deal, we also interact the dummy *Score* with that identifying an acquired bank. The results, for each of the three dependent variables examined in the previous section, are shown in Table 4.1: the dummy *Score* is positive but not significant, while the parameter of its interaction is negative and statistically significant in explaining the loan officer's decision-making power. This suggests that for banks that widely employ credit scoring models, the post-acquisition growth of the local manager's autonomy is less important. This is an expected result, because the use of these hard information lending techniques should be a way for a parent bank to strictly monitor local officers' outcomes within the newly acquired intermediary.

In order to analyse the importance a bank gives to soft information, we employ a dummy *Soft* identifying the bank for which this feature is important, and its interaction with the dummy *Target* (Table 4.2). In this case the interaction term has no significant effects: no differential effects are found for the delegation schemes of acquired banks. We also find that the higher the importance of the soft information the lower the local officer's turnover (branch officers stay in charge for a longer period). This also seems to make sense: a fast turnover is a better way to control officers, but it is likely to engender the disruption of personal knowledge and relationships.

### 6.2 *Recent and old acquisitions*

In order to mitigate the difficulty of measuring a dynamic phenomenon like an acquisition in a cross-section estimation, we try to distinguish the deals performed in the three years before the reference-year of the survey (2006) from the older ones. The economic literature about M&As often identifies a “transition period”, generally lasting three years, in which some changes in the organizational structure progressively emerge to find a new equilibrium, followed by a “completion

<sup>18</sup> Further evidence, emerging from our exercise, is that, *ceteris paribus*, turnover grows after an acquisition for bidder banks as well. This is probably due to the willingness of the acquiring intermediary to place its managers in a key role within some of the most crucial branches of the target bank.

period”, when the consequences of the M&A should have consolidated. To make this distinction, as seen in Section 4, we build two sets of dummy “target banks” to distinguish recent events (*new*) from older ones (*old*), respectively between 2003 and 2005 and between 2000 and 2002. Disentangling acquisitions over time allows us to verify whether or not there are long-term effects: we expect different restructuring results depending on the time deals took place.

The results of this exercise are presented in Table 5.1. The post-acquisition growth of the autonomy of the local officer and of the CEO is significant in the transition period, but its effect is reinforced after a three-year period. This seems to be consistent with the progressive implementation of a new delegation scheme by acquiring banks. The effects on turnover are similar in the two sub-periods, even if the parameter of the older acquisitions is more significant. Consequently, these findings generally suggest that the integration of different organizations and cultures takes time.

### 6.3 Small versus large banks

Another interesting question is whether the centralization-decentralization choice after an acquisition differs according to the size of the target. *A priori*, we can suppose that the smaller the target, the harder and the faster the impact of the acquisition on its organization. To test this hypothesis, we split the dummy “target bank” between small and large intermediaries with the same approach employed in previous sections.

The results are shown in Table 5.2. As expected, the effects of acquisitions on powers delegated to both the local officer and the CEO are stronger for smaller targets. In fact, the parameters of small banks are greater than those of the larger intermediaries. The effects on turnover are stronger for small banks, but in this case the difference is small.

### 6.4 Geographical proximity between bidder and target

The effect of an acquisition on the internal organization of the target bank could be influenced by the geographical proximity to its bidder. Proximity can make dealing partners more similar and reduce integration costs in the transition period. We can suppose that the bidder will be more worried about moral hazard behaviour if its target operates far away, in a less known area: this could lead, at the same time, to less delegation of power and a faster turnover of local officers. To testing this hypothesis, as seen in Section 4, we employ different interactions with the dummy “target bank”: the first is related to the overlapping of the branch networks of bidders and targets, the second investigates if the headquarters of bidders and targets are (or are not) located in the same area.

Results are presented in Table 5.3. As expected, if the provinces covered by the branch network of the target are largely “new provinces” for the bidder (*NoOverlap*), the post-acquisition growth of local managers’ and top management’s decision-making powers is weaker. This suggests that the bidder is willing to strictly monitor the officers of its target, because a lower level of knowledge of the new local markets can generate higher risks. However, we do not find any significant difference in turnover. On the one hand, in the case of low overlapping, the need to limit moral hazard would suggest a faster turnover; on the other hand, this would cause a loss of specific local information, that could be useful at banking group level.

The second exercise (see also Alessandrini *et al.*, 2008) better qualifies previous findings. Results (see Table 5.4) suggest that the post-acquisition growth of a local officer’s power emerges only in the case of an “*in-market*” deal, that is if the headquarters of the dealing partners (bidder and target) are located in the same area (*Inmkt*). The growth of the CEO’s power holds in both



hypotheses, but if bidder and target are headquartered in different areas, the improvement of the top management's decision-making power within the acquired bank is smaller and less statistically significant. Since in our sample the acquiring banks are all located in Northern and Central Italy, these results suggest that when the target is a Southern intermediary, the bidder's organizational behaviour in terms of power delegated is more careful, due to higher credit risk in the Southern area.

The increase in turnover is stronger following an "out-market" deal. This may indicate the willingness of the bidder to place its own managers in control of some of the target's branches, perceived as more critical.

## 7. Robustness checks: matching methodologies

It is important to note that acquired banks might not be a random sample from the population. To the extent that the acquisition targets differ systematically from other banks, a problem of simultaneity between ownership *status* and other performance and organizational variables could arise and bias the estimates. In order to address this endogeneity problem, we check previous results by running a propensity score matching. This procedure controls for the selection bias by restricting the comparison to differences within carefully selected pairs of banks.<sup>19</sup>

The aim of the analysis is to estimate the causal effect of the concentration process on a bank's organizational features, in terms of power delegated and turnover. So, we can write the following difference:

$$E(Y_1 - Y_0 \mid_{T=1,X}) = [E(Y_1 \mid_{T=1,X}) - E(Y_0 \mid_{T=0,X})] - [E(Y_0 \mid_{T=1,X}) - E(Y_0 \mid_{T=0,X})] \quad (4)$$

The second term of the first difference ( $Y_0$ ) is, however, an unobserved counterfactual; the matching technique is a way of constructing this missing counterfactual by making comparisons conditional on a vector  $X$  of observable bank characteristics. Moreover, the underlying assumption is that, conditional on vector  $X$  relevant to the acquisition decision, a target and a stand-alone bank would exhibit similar organizational features under the same circumstances. So, the second difference in squared brackets in the equation (4) represents the selection bias, which is assumed to be zero conditional on  $X$ . Since conditioning on the propensity score is equivalent to conditioning on all variables in the treatment model, we follow this methodology.

The propensity score (p-score) is the predicted probability of treatment which, in our case, is the probability of a bank being acquired. Then, we employ propensity score matching and we build homogenous groups to compare the organizational features of banks within the pairs of observations matched on their p-score value (Becker and Ichino, 2004). Hence, if our matching process is successful, we can give a causal interpretation of the average difference in power delegation and turnover indicators between treated and control banks.

Following this approach, as a first step, we use a probit regression to model the binary outcome of a bank acquired in the period 2000-06 as a function of bank-specific characteristics. In the selection of the relevant variables for the acquisition decision, we follow Focarelli *et al.* (1999)

<sup>19</sup> Each pair consists of an acquired and a stand-alone bank with similar observable characteristics in a two-year period preceding the acquisition. In order to maximize the matching probability, for this exercise, we use the whole sample of acquired banks for which we have organizational data, without dropping banks that have undergone a merger in the period under investigation. These matching methodologies have had their original application in labour economics, but they have become increasingly popular in other causal economic analyses. They are often combined with a difference-in-difference approach, in order to capture differences in the path of performance before and after the treatment event. Unfortunately, we are not able to follow this approach because our organizational variables are observed only at the end of 2006.

and we control for bank size, portfolio risk, profitability, assets and liabilities composition and cost efficiency; for target banks all these indicators are taken as a mean on a two-year period preceding the deal, in order to avoid endogeneity. Results of the probit estimation (not reported) suggest – as expected – that acquired banks are more problematic in terms of risk and efficiency and that their acquisition would be motivated by the restructuring strategies of the holding bank.<sup>20</sup>

The predicted probabilities (p-score) are used to assign to each acquired bank the closest bank not involved in acquisition. To measure how well the propensity score performs in our exercise, we test the “balancing hypothesis”, by implementing the procedure suggested by Becker and Ichino (2004). This procedure calculates the difference between the treated and the control group in terms of each of the above variables and runs simple *t*-tests on the differences within 5 bands of the propensity score.<sup>21</sup> Using both the predicted probabilities and the five balancing blocks, for all treated (acquired) banks in our sample we perform on each organizational dependent variable (delegation measures and loan officer’s turnover) an Average Treatment Test (ATT) to compute the average effect on the treated. We compare this result with the coefficient of the dummy “target” estimated in our OLS baseline specification (Table 3). To calculate the ATT value, we employ the Kernel Matching method; therefore, all treated observations are matched with a weighted average of all controls, with weights that are inversely proportional to the distance between the propensity scores of those treated and the controls.

Results are presented in Table 6 and are in line with alternative evidence (not reported), obtained using the Neighbour Matching method. Findings suggest the robustness of previous OLS estimations. Consequently, we can conclude that when a bank is included in a banking group, the “new” top management of the target benefits from an enlargement of its decision-making power, because of the alignment to the higher level of the holding bank. At the same time, the loan officer’s power increases, even if to a lesser extent. Moreover, the local officer’s tenure at the same branch seems to become lower relative to the other banks not involved in acquisitions.

## 8. Concluding remarks

In this paper we investigate the causal links between the organizational features of SME lending policies and the banking consolidation process, mainly with respect to bank acquisitions. This process has been particularly intense since the mid-1990s; consequently, most of the evidence documented by studies on M&As could depend on the relevant impact of the reorganization of the banking industry.

The availability of a new data set, built using a special survey on Italian banks, allowed us to analyse the effect of M&As on organizational design for small business lending. In particular, in this paper we focus on power delegated across hierarchical levels and on the branch officer turnover. We take into account other bank-level characteristics, too, which are able to affect lending techniques and organizational design.

According to our results, the decision-making power at various hierarchical levels within an acquired bank gains from the deal: after controlling for many characteristics, the maximum amount that a local officer can autonomously lend increases after an acquisition, as well do the decision-

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<sup>20</sup> In the probit model we have also inserted among the regressors dummy variables for the event that each bank will take part in a merger in the subsequent period and other bank-level characteristics, such as: presence in “district” areas, specialization in small business lending, etc. All these variables are not significant in the probit estimation for the event that a bank will be acquired in the period 2000-2005.

<sup>21</sup> All the differences for the five groups (the default) are found to be small and statistically insignificant (the so-called “balancing hypothesis”). As a result, we are confident that we can group together relatively homogeneous banks.

making rights of the CEO of the target bank. This evidence can be explained by the need to move towards the higher autonomy of the acquiring bank, in order to better merge different lending policies after the deal.

Conversely, entering a banking group may worsen agency problems and increase monitoring costs, because of the higher complexity during the integration phase, especially if the strategy of the acquiring bank is to delegate more power. In this case, we find that loan officer turnover increases for target intermediaries, most likely as a mechanism to contain monitoring costs.

In the case of acquisition, decentralization strategy and monitoring policy seems to be favoured if bidder and target banks are similar, thereby reducing integration costs. Consequently, the gains in terms of decision-making power are greater if the dealing partners have a more similar geographical reach, both in terms of branch network and the location of their headquarters.

Our study recognizes the links between the consolidation process and bank organization. Our findings seem to support a post-acquisition trade-off between decentralization choices and agency problems, exacerbated by the growing complexity and by the need to mitigate moral hazard behaviour within expanding banking groups. However, further research could provide many interesting insights. In particular, it would be useful to analyse in greater depth the timing of a bank's organizational set-up, moving from a simple cross-section to a more informative panel data analysis.

## APPENDIX

Table 1

## Descriptive statistics on the estimation sample

Variable	Description	Mean	Std. dev.	Median	Q25	Q75
<i>Organizational indicators (year 2006)</i>						
Loan officer's delegation	Amount of finance up to which a local loan officer can autonomously grant to a small firm (here in thousand of euros; in the estimates in log)	136.31	314.44	70.00	15.00	150.00
CEO's delegation	Amount of finance up to which the CEO can autonomously grant to a small firm (here in thousand of euros; in the estimates in log)	2,428.50	6,988.91	500.00	150.00	1,600.00
Loan officer's tenure at the same branch	Average period of tenure of a local loan officer at the head of the same branch (here in number of months; in the estimates in log)	46.06	20.84	40.00	35.00	60.00
<i>Bank-level characteristics</i>						
Average loan size	Average individual size of loans granted to firms and households (log of euros)	11.06	0.54	11.04	10.75	11.32
Bank size	Total assets (log of euros) at the end of 2005	20.72	1.31	20.40	19.77	21.39
Roa	Ratio between profits before taxes and total assets (percentage); average 2000-05.	0.85	0.61	0.90	0.71	1.10
Portfolio risk	Ratio between non-performing loans and total loans (percentage); average 2000-05	3.70	4.21	2.56	1.69	4.13
District branches	Share of branches located in municipalities classified as industrial districts (percentage)	36.21	36.03	21.01	0.00	66.67
The estimation sample is the one employed for the baseline specification (Table 3, Model IV).						

Table 2

## Descriptive statistics: differences across clusters of banks

Variables and cluster of banks	Obs.	Mean	Std. dev.	Median	Q25	Q75
<i>Acquiring banks (bidders)</i>						
Loan officer's delegation	11	242.55	190.84	250.00	100.00	400.00
CEO's delegation	11	7,204.55	6,487.85	4,500.00	3,500.00	15,000.00
Loan officer's tenure at the same branch	10	31.20	7.02	32.00	26.00	36.00
<i>Acquired banks (targets)</i>						
Loan officer's delegation	32	267.19	537.48	150.00	101.50	257.50
CEO's delegation	32	5,451.13	8,264.99	2,750.00	1,300.00	6,200.00
Loan officer's tenure at the same branch	30	34.07	10.61	35.50	25.00	36.00
<i>Other banks</i>						
Loan officer's delegation	190	108.12	260.19	50.00	10.00	100.00
CEO's delegation	191	1,647.03	6,562.41	310.00	120.00	900.00
Loan officer's tenure at the same branch	177	48.93	21.60	48.00	36.00	60.00
The estimation sample is the one employed for the baseline specification (Table 3, Model IV).						

Table 3

## Baseline results

	Loan officer's delegation (log level)				CEO's delegation (log level)			
	I	II	III	IV	I	II	III	IV
DBidder	-0.6905 [0.6479]	-0.4205 [0.6383]	-0.5266 [0.6451]	-0.5264 [0.6434]	-0.2370 [0.3776]	-0.0370 [0.4204]	-0.1453 [0.4251]	-0.1453 [0.4259]
DTarget	0.9173*** [0.2597]	1.1482*** [0.2635]	1.1741*** [0.2678]	1.1833*** [0.2632]	1.1018*** [0.2105]	1.2729*** [0.2124]	1.2993*** [0.2109]	1.2996*** [0.2113]
Average loan size	-0.4204* [0.2341]	-0.3428 [0.2277]	-0.3925* [0.2349]	-0.3732* [0.2225]	-0.2506 [0.2307]	-0.1931 [0.2262]	-0.2439 [0.2255]	-0.2433 [0.2232]
Bank size	0.7183*** [0.0890]	0.6150*** [0.0949]	0.6399*** [0.0965]	0.6578*** [0.0971]	1.0151*** [0.0668]	0.9386*** [0.0702]	0.9641*** [0.0710]	0.9646*** [0.0725]
Roa	0.2009 [0.2262]	0.1949 [0.2279]	0.1736 [0.2332]	0.1480 [0.2247]	-0.0228 [0.0903]	-0.0272 [0.0888]	-0.0490 [0.0929]	-0.0498 [0.0937]
Risk	-0.0024 [0.0262]	-0.0030 [0.0232]	0.0156 [0.0285]	0.0238 [0.0284]	-0.0236 [0.0211]	-0.0240 [0.0177]	-0.0050 [0.0188]	-0.0047 [0.0193]
DGroup		0.8850*** [0.2538]	0.8390*** [0.2566]	0.8532*** [0.2593]		0.6558*** [0.2168]	0.6088*** [0.2183]	0.6092*** [0.2178]
DSouth			-0.5341 [0.4314]	-0.4056 [0.4374]			-0.5456** [0.2446]	-0.5416** [0.2392]
District branches				0.0062* [0.0032]				0.0002 [0.0027]
Constant	-6.8520** [2.9820]	-5.7206* [3.0248]	-5.6748* [3.0069]	-6.5069** [2.9510]	-12.0770*** [2.6889]	-11.2387*** [2.7048]	-11.1919*** [2.6973]	-11.2178*** [2.6426]
Observations	235	235	235	235	235	235	235	235
R-squared	0.29	0.31	0.31	0.32	0.59	0.61	0.61	0.61

OLS estimation with robust standard errors [in brackets]; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Table 3 (cont.)

## Baseline results

	LO's tenure at the same branch			
	I	II	III	IV
DBidder	-0.1931* [0.1051]	-0.2435** [0.1213]	-0.2179* [0.1231]	-0.2180* [0.1226]
DTarget	-0.1848*** [0.0667]	-0.2325*** [0.0697]	-0.2389*** [0.0703]	-0.2387*** [0.0704]
Average loan size	-0.0043 [0.0678]	-0.0132 [0.0705]	-0.0009 [0.0727]	0.0011 [0.0734]
Bank size	-0.0729*** [0.0224]	-0.0527** [0.0245]	-0.0585** [0.0249]	-0.0611** [0.0253]
Roa	0.2171*** [0.0671]	0.2206*** [0.0662]	0.2273*** [0.0665]	0.2303*** [0.0667]
Risk	-0.0077 [0.0049]	-0.0072 [0.0054]	-0.0119* [0.0062]	-0.0129** [0.0065]
DGroup		-0.1686** [0.0710]	-0.1581** [0.0711]	-0.1592** [0.0705]
DSouth			0.1324 [0.0966]	0.1166 [0.0981]
District branches				-0.0008 [0.0008]
Constant	5.1748*** [0.7926]	4.8813*** [0.8106]	4.8614*** [0.8123]	4.9275*** [0.8195]
Observations	223	223	223	223
R-squared	0.22	0.23	0.24	0.24

OLS estimation with robust standard errors [in brackets]; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Table 4

## Comparing different lending techniques

	1. Use of credit scoring			2. Relevance of soft information		
	LO deleg.	CEO deleg.	LO tenure	LO deleg.	CEO deleg.	LO tenure
DBidder	-0.6528 [0.6402]	-0.1425 [0.4478]	-0.2469** [0.1215]	-0.4178 [0.6472]	-0.1612 [0.4268]	-0.2514** [0.1187]
DTarget	1.9887*** [0.3159]	1.3269*** [0.2501]	-0.1251 [0.1392]	1.1252*** [0.3282]	1.3300*** [0.2867]	-0.2037** [0.0952]
Average loan size	-0.4339* [0.2280]	-0.2654 [0.2300]	-0.0434 [0.0677]	-0.3948* [0.2232]	-0.2408 [0.2270]	0.0003 [0.0717]
Bank size	0.6708*** [0.1006]	0.9738*** [0.0775]	-0.0550** [0.0266]	0.6479*** [0.0977]	0.9654*** [0.0723]	-0.0609** [0.0254]
Roa	0.1069 [0.2225]	-0.0727 [0.0986]	0.2498*** [0.0641]	0.1478 [0.2159]	-0.0476 [0.0979]	0.2498*** [0.0642]
Risk	0.0177 [0.0300]	0.0029 [0.0193]	-0.0153** [0.0070]	0.0220 [0.0281]	-0.0045 [0.0192]	-0.0125** [0.0059]
DGroup	0.8137*** [0.2662]	0.6147*** [0.2266]	-0.1765** [0.0705]	0.8493*** [0.2571]	0.6067*** [0.2194]	-0.1576** [0.0679]
DSouth	-0.5810 [0.4976]	-0.7409*** [0.2532]	0.1166 [0.1012]	-0.3990 [0.4276]	-0.5431** [0.2414]	0.1255 [0.0930]
District branches	0.0061* [0.0033]	-0.0002 [0.0027]	-0.0010 [0.0008]	0.0064* [0.0033]	0.0001 [0.0027]	-0.0009 [0.0008]
DScore	0.2468 [0.2553]	-0.1285 [0.1813]	0.0001 [0.0619]			
DTarget*DScore	-1.1766*** [0.4125]	-0.0178 [0.3544]	-0.1298 [0.1557]			
DSoft				-0.3251 [0.2409]	0.0424 [0.1864]	0.1289** [0.0588]
DTarget*DSoft				0.0715 [0.4663]	-0.0677 [0.4014]	-0.0953 [0.1324]
Constant	-6.1618** [3.0350]	-11.0742*** [2.6109]	5.2958*** [0.7840]	-5.8856* [3.0113]	-11.2822*** [2.6936]	4.8451*** [0.8309]
Observations	227	227	215	234	234	221
R-squared	0.33	0.61	0.26	0.33	0.61	0.27

OLS estimation with robust standard errors [in brackets]; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.



Table 5

## Focus on time of deal and on bank size effect - I

	1. Old vs. New			2. Small vs. Large		
	LO deleg.	CEO deleg.	LO tenure	LO deleg.	CEO deleg.	LO tenure
DBidder	-0.5679 [0.6465]	-0.1938 [0.4232]	-0.2242* [0.1236]	-0.6309 [0.6539]	-0.3078 [0.4367]	-0.2080 [0.1274]
DTarget*Old	1.1527*** [0.2875]	1.3235*** [0.2562]	-0.2394*** [0.0749]			
DTarget*New	0.8255* [0.4832]	0.8114** [0.3502]	-0.2393** [0.1115]			
DTarget*Small				1.5555*** [0.3627]	1.8785*** [0.2611]	-0.2808*** [0.0701]
DTarget*Large				0.9249*** [0.3174]	0.8978*** [0.2551]	-0.2158** [0.0973]
Average loan size	-0.3572 [0.2301]	-0.2288 [0.2263]	-0.0039 [0.0738]	-0.4050* [0.2276]	-0.2927 [0.2237]	0.0033 [0.0741]
Bank size	0.6687*** [0.0985]	0.9776*** [0.0729]	-0.0593** [0.0256]	0.6937*** [0.1040]	1.0205*** [0.0789]	-0.0646** [0.0276]
Roa	0.1271 [0.2108]	-0.0788 [0.0884]	0.2291*** [0.0660]	0.1692 [0.2311]	-0.0168 [0.1064]	0.2310*** [0.0661]
Risk	0.0263 [0.0291]	-0.0026 [0.0204]	-0.0139** [0.0065]	0.0234 [0.0287]	-0.0053 [0.0193]	-0.0128* [0.0065]
DGroup	0.8277*** [0.2593]	0.5817*** [0.2165]	-0.1625** [0.0711]	0.7977*** [0.2673]	0.5230** [0.2216]	-0.1544** [0.0723]
DSouth	-0.4580 [0.4481]	-0.6047** [0.2618]	0.1290 [0.0966]	-0.3917 [0.4398]	-0.5199** [0.2366]	0.1161 [0.0987]
District branches	0.0062* [0.0032]	0.0001 [0.0027]	-0.0008 [0.0008]	0.0061* [0.0032]	0.0000 [0.0027]	-0.0008 [0.0008]
Constant	-6.8765** [3.0457]	-11.6005*** [2.6549]	4.9508*** [0.8138]	-6.8966** [2.9809]	-11.8239*** [2.6344]	4.9717*** [0.8195]
Observations	235	235	223	235	235	223
R-squared	0.32	0.61	0.24	0.33	0.62	0.24

OLS estimation with robust standard errors [in brackets]; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Table 5 (cont.)

## Focus on target and bidder geographical reach - II

	3. Network overlapping			4. In-market Vs. Out-market		
	LO deleg.	CEO deleg.	LO tenure	LO deleg.	CEO deleg.	LO tenure
DBidder	-0.5915 [0.6501]	-0.1828 [0.4163]	-0.2050* [0.1234]	-0.5164 [0.6457]	-0.1279 [0.4276]	-0.2137* [0.1225]
DTarget*NoOverlap	0.9530*** [0.3233]	1.1303*** [0.2397]	-0.2384*** [0.0863]			
DTarget*Overlap	1.3706*** [0.3335]	1.6043*** [0.2787]	-0.2459*** [0.0915]			
DTarget*Inmkt				1.2465*** [0.2866]	1.4094*** [0.2296]	-0.2180*** [0.0760]
DTarget*Outmkt				0.9149 [0.6050]	0.8335* [0.4382]	-0.3227** [0.1588]
Average loan size	-0.3301 [0.2363]	-0.1916 [0.2246]	-0.0103 [0.0758]	-0.3776* [0.2212]	-0.2509 [0.2227]	-0.0007 [0.0740]
Bank size	0.6826*** [0.1013]	0.9833*** [0.0709]	-0.0662** [0.0264]	0.6564*** [0.0973]	0.9622*** [0.0723]	-0.0619** [0.0253]
Roa	0.1414 [0.2172]	-0.0510 [0.0891]	0.2372*** [0.0633]	0.1489 [0.2271]	-0.0481 [0.0968]	0.2297*** [0.0669]
Risk	0.0252 [0.0283]	-0.0029 [0.0190]	-0.0133** [0.0066]	0.0222 [0.0289]	-0.0074 [0.0185]	-0.0135** [0.0067]
DGroup	0.8146*** [0.2614]	0.5897*** [0.2130]	-0.1537** [0.0714]	0.8538*** [0.2597]	0.6103*** [0.2175]	-0.1583** [0.0705]
DSouth	-0.3459 [0.4495]	-0.4808** [0.2384]	0.1198 [0.0997]	-0.3133 [0.5135]	-0.3812 [0.2580]	0.1458 [0.1082]
District branches	0.0065** [0.0033]	0.0005 [0.0027]	-0.0008 [0.0008]	0.0062* [0.0032]	0.0001 [0.0027]	-0.0008 [0.0008]
Constant	-7.4882** [3.2549]	-12.1876*** [2.6053]	5.1507*** [0.8716]	-6.4327** [2.9614]	-11.0889*** [2.6548]	4.9639*** [0.8298]
Observations	235	235	223	235	235	223
R-squared	0.32	0.61	0.24	0.32	0.61	0.24

OLS estimation with robust standard errors [in brackets]; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Table 6

## Robustness checks: matching methodology

<b>Dependent Variables</b>	<b>N. obs. treated</b>	<b>N. Controls</b>	<b>Average treatment effect</b>	<b>Bootstrapped stand. errors</b>	<b>Significance level</b>
Loan officer's delegation	36	120	0.681	0.357	**
CEO's delegation	36	120	1.184	0.401	***
Loan officer's tenure at the same branch	39	190	-0.117	0.073	*
The Average Treatment Test is calculated using the Kernel methodology; the common support option has been applied; * significant at 10%; ** significant at 5%; *** significant at 1%.					

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## DISCUSSION

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The paper “Information technology and banking organization” by Mocetti, Pagnini and Sette is an interesting contribution to the debate on information technology in banking. It inquires into how ICT impacts on the local loan officer’s autonomy in small business lending, finding that decentralization increases when more ICT is employed and when credit scoring techniques are adopted.

The contribution of the paper is strong in several respects. First, the literature has covered the effects of technology on banks’ performance but not on organizational structures using bank-level data. This study complements the existing literature with an analysis of the impact of information technology and credit scoring on the autonomy of branch managers in lending to SMEs, and it exploits a unique dataset including ICT and decentralization data, for a sample of 300 Italian banks in 2006.

The paper might have explored the link between technology and organizational structure in more open fashion. Its empirical model assumes a one-direction causality in the relationship, and thus presumes the validity of the technological imperative: technology determines organization. Yet the organizational and management literature has concluded that “the technological imperative has a long history, but the empirical evidence has generated contradictory findings. [...] Information systems both centralized and decentralized authority” (Markus and Robey, 1988, p. 585). It seems that since the eighties a new imperative has been emerging: the interaction between technology and organization. Two relevant dimensions characterize the interaction. First, in presence of uncertainty, the interaction is affected by flexibility, that is the ability of a bank to develop an internal organizational system (such as an organizational structure with high modularity and high organicness) that is able to adapt rapidly to modified market conditions (Fusconi, 1996). Second, the interaction takes place not only in the long run, but also in the short and medium term (Bresnahan *et al.*, 2002). The existence of the interaction between technology and organization is something that might be fruitfully explored by a test of causality, such as the Granger causality Wald test based on a VAR (Granger and Newbold, 1986), in addition to the test using instrumental variables.

The paper considers two types of ICT investment: hardware and software. While these are surely major components of ICT spending, one might also include ICT services, since hardware and software account for only about 50 per cent of the total ICT investment by EU banks (Beccalli, 2007). This is especially true for small and medium-sized banks, which mainly acquire ICT services via outsourcing (just consider the services provided in outsourcing by the central associations and consortiums). Given that services represent a substantial and growing proportion of total ICT investment, this outsourcing expenditure should be included in the calculation. Additionally, alternative measures of the ICT index might have been employed in robustness checks: not only ICT capital stock per employee but also the ratio of ICT capital stock to total costs.

The ICT explanatory variable is included with a lag of three years. This attempt to consider a lagged effect of ICT on organization is highly appropriate. While the ICT literature sets the time required to observe the impact of ICT on performance at five years (Brynjolfsson and Hitt, 2000),

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we are not aware of any public evidence showing that three years are required to observe the effect of ICT on the organization. The paper would benefit from a further analysis of the length of the lag.

A more general issue concerns the test of the hypothesis underlying the overall analysis, *i.e.* the fact that greater delegation of decision-making power increases lending to SMEs. One wonders whether it would be possible to devise an empirical test of the effect of decentralization on the quantity of loans granted by a specific bank. The paper might also make a greater effort to distinguish the delegation effects according to the technology intensity of the bank (as by comparing banks in the first and the last quartiles in ICT investment). Are there differences in decentralization correlated with greater/less investment in ICT? Finally, the paper could well be more ambitious in investigating the joint effect of ICT and decentralization on productivity. Do more ICT and greater decentralization lead to improvements in productivity? This question is at the heart of the debate (Solow, 1987; Brynjolfssojn and Hitt, 1998; Carr, 2003), and it would be very interesting to pursue it.

The paper “Bank acquisitions and decentralization choices” by Beretta and Del Prete investigates the impact of acquisitions on decentralization. The focus is on the changes in the decision-making powers of CEOs and branch managers of the Italian banks involved in acquisitions before 2006. The main findings are: i) an increase in the powers delegated to the target bank after the acquisition, occurring immediately and lasting for three years; and ii) an increase in the branch managers’ turnover for banks involved in acquisitions.

The analysis is based on a unique, high-quality, detailed dataset with bank-level information and it examines an interesting and relevant topic not previously analysed in the extensive literature on bank mergers and acquisitions (perhaps precisely because of the lack of data at the bank level). And it uses a methodology (propensity score matching) that overcomes the limitations of the OLS methodology.

Decentralization, the paper’s dependent variable, is crucial but particularly complicated to measure. The proxy that the authors adopt is the delegation of power in lending decisions, but this is just one of the various dimensions of decentralization identified by the organizational literature (Pugh *et al.* 1968; Hall, 1991). First, decentralization can be defined not only in terms of decision-making autonomy of the periphery, but also in terms of the scope and effectiveness of control systems. From this perspective, credit scoring can be interpreted as a tool to monitor the branch, or rather to compensate for the presence of greater delegation. Second, decentralization depends on the manner in which exceptions are handled, *i.e.* the flexibility in the use of the scoring system and the possibility of derogation to the ratings resulting from it. Another issue is that decentralization represents just one dimension of the organizational structure. Consequently, it could be appropriate to consider other structural dimensions (e.g., hierarchical levels).

Some other suggestions could be addressed to the sample and the model. As far as the sample is concerned, the number of targets and bidders under investigation is very limited (11 bidders and 32 targets). There is an asymmetry with respect the control group (190 observations). Further, the ratio between the number of discriminatory observations (11 and 32) and the number of explanatory variables (6 or 9) could raise concerns of model over-fitting, which could be overcome by using a panel dataset. With reference to the model, the paper employs an appropriate methodology (propensity score matching) as a robustness check; since this approach overcomes many of the limitations of the OLS methodology, it might be better to present propensity score matching as the reference methodology. Also, the model assumes the instantaneous impact of the acquisition on the delegation of powers. As there is no previous evidence of such immediacy, further tests might well have been proposed, particularly with the introduction of lagged variables.

As regards the variables, the results could be strengthened by considering industry-adjusted values (that is, bidder minus control sample, and target minus control sample). The paper uses

unadjusted values for all variables, but the values of bidders and targets are affected by developments in the industry unrelated to acquisitions, and this could be fruitfully taken into account. The paper would also benefit from a test on the collinearity problems potentially affecting the set of explanatory variables.

Finally, the paper's contribution could be further enhanced in two dimensions. First, the assumption (not tested) is that the root cause of the variation in credit policies after acquisitions is the organizational change. But is the organizational change necessarily the actual root cause? Second, an interesting consequence to be tested is whether the increase in the delegation of powers to the target and the increased turnover of local managers lead to changes in the amount of credit granted to SMEs. Specifically, it could be interesting to test the causality of the relationship between organizational change and lending volume.

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## DISCUSSION

*Barbara Chizzolini\**

1. The papers by Enrico Beretta, Silvia Del Prete and by Sauro Mocetti, Marcello Pagnini, Enrico Sette deal with the causes and effects of changes in banking organization after liberalization, the increased concentration in banking markets and the onset of widespread use of information and communication technologies. Together they offer a clear picture of the organization and strategy of the Italian banks operating in local banking markets before the global financial crisis of 2007-08, which I suspect is still substantially unchanged.

Both papers are mainly concerned with the delegation of decision power on lending approval from bank headquarters to the periphery. Both exploit an interesting and unique dataset concerning the internal organization of more than 300 Italian banks drawn from a special survey. Their results may be summarised as follows:

- Information and communication technologies tend to increase the delegation of decision-making power to local branch managers.
- The power to grant credit to SMEs increases for both CEOs and local loan officers of the acquired banks immediately after the merger; that is, decision-making delegation increases.
- The mobility (turnover) of branch managers also increases.

2. Theory points to a trade-off in decentralization, between the benefits from greater knowledge of local markets and the costs of monitoring and of potential moral hazard in the behaviour of local branch officers. The optimal amount of delegation, as measured by a threshold value for loan size relative to maximum loan size below which the power of decision is transferred to the branch manager, is derived in Mocetti, Pagnini and Sette's "Information technology and bank organization" from a theoretical model<sup>1</sup> as a function of the expected benefits for both the branch manager and the central CEO and of information transmission, decision-making and monitoring costs.

The theory is tested by regressing PD, a measure of the maximal loan size a branch manager may approve relative to that which the CEO can grant, on IT investment and adoption, on measures of credit scoring procedure adoption and on controls. The study finds that ICT and credit scoring affect delegation/decentralization strongly and positively.

I have three main comments:

*i.* The benefits to the branch manager. Theory indicates that the amount of delegation depends on the profitability/quality of loans approved and on manager's private benefits.

In particular, the latter affect the effort that branch managers make in securing high-quality loans. There is no measure of these benefits in the empirical model. Why not? Would it be possible

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<sup>1</sup> This theoretical model, however, could be rewritten in a much simpler way.

to find an observable variable to control for them, maybe using the answers to the survey questions about incentives to local bank managers?

The ICT and scoring coefficients might be biased upwards because of the omission of this potentially relevant variable.

*ii. Risk and information technology.* The authors control for the possibility that risk may bias their estimates by including in the definition of PD only loans that are judged “normal” in terms of risk. But this leaves the reader with a desire to know something more about whether and how much ICT and credit scoring affect risk-taking at local level. This is likely to be the subject of future research.

*iii. Endogeneity issues.* Most of these issues have been taken into account in several robustness checks, but to my mind the structure of the “demand” side of the market has not been considered sufficiently: the location (hence the characteristics of customers) of the branching network (not only of the bank’s central headquarters) might be determined jointly with the centrally decided amount of delegation and investment in technology.<sup>2</sup> Which comes first in the causal series of events is not entirely clear to me. Is it possible to at least introduce a control for the main geographical area of operations of banks in the sample?

Again, the ICT and scoring coefficients might be biased.

**3.** To test whether and how bank acquisitions (merged banks are excluded from the sample) affect delegation/decentralization choices, Enrico Beretta and Silvia Del Prete in “Bank acquisitions and decentralization choices” estimate the following three equations:

$$LO \text{ Delegation} = f(\text{Dummy acquired}, \text{dummy acquiring}, X)$$

$$CEO \text{ Delegation} = f(\text{Dummy acquired}, \text{dummy acquiring}, X)$$

$$LO \text{ Tenure} = f(\text{Dummy acquired}, \text{dummy acquiring}, X)$$

Where LO (CEO) *Delegation* is the “maximum amount that a local Loan Officer (CEO) can autonomously grant to SMEs” and LO *Tenure* is the number of months of tenure of a local Loan officer.

Controlling for a number of factors, such as bank size, group membership, profitability and risk, geographical proximity between bidder and target, the authors find that “Acquisitions positively affect the powers delegated both to the loan officer and to the CEO for loan approval; the effect of the latter is higher than on the former”, and that “the turnover of local loan officers is greater in acquired banks.”

I have one main question about this paper, very much related to the “endogeneity” issue I raised for the previous paper:

Is the maximum amount of the LO’s loan approval authority on average greater because the bank has been party to an acquisition, or has the bank been acquired because its loan portfolio in local markets is characterized by relatively “large” loans?

The treatment analysis and all the robustness checks suggest that the first causal chain applies. Still, I would be more comfortable if the dependent variables in the delegation equations were measured in relative terms, either with respect to the average loan size of the bank or, if possible, of the market where the bank operates. As it is, taken together with the finding of very high branch manager mobility (LO turnover) in acquired banks, they may actually measure the

<sup>2</sup> See Cerasi et al. (2000), Bresnahan (2002).

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bank's specialization in the loan market, with acquired banks specializing in lending to medium-sized customers while smaller and mutual banks specialize in lending to very small firms.<sup>3</sup>

4. I found both papers interesting and convincing in their results and, taken together, they indicate that liberalization and concentration in banking markets have given the larger banks that were the first to invest in ICT and in more flexible, decentralized organization a competitive advantage in lending to medium-sized firms in local markets through fairly standardized and efficient procedures.

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<sup>3</sup> See Berger (1998), for the bimodal distribution of banks by size in the loan markets after deregulation and the waves of M&A deals in banking.

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**Session 2**

**BANKING ORGANIZATION AND SMALL BUSINESS LENDING**





# THE RETAIL ACTIVITY OF FOREIGN BANKS: EFFECTS ON CREDIT SUPPLY TO HOUSEHOLDS AND FIRMS

*Luigi Infante\* and Paola Rossi\*\**

## 1. Introduction

In the last decade, the increased presence of foreign intermediaries in many countries has heated the debate about the effect of the new entrants on the banking sectors of the host countries. While the empirical evidence has confirmed that multinational banks may improve competition in credit markets, the theoretical literature has emphasized how the existence of information asymmetries give a significant advantage to national banks making it difficult for new entrants to compete. Following Sengupta (2007), foreign competitors are expected to focus on those segments of the market that are less opaque where products and conditions may be more easily standardized. According to Dell'Araccia and Marquez (2004), new entrants will act more aggressively towards clients for whom information problems are less important, while incumbent banks will then maintain a large market share in segments with substantial entry barriers, where they can extract higher profits from relationship lending (*flight to captivity*).

Although the impact of foreign players should be different depending upon the importance of information asymmetries, most of the empirical literature considers country aggregates, mainly because of data constraints, without differentiating according to the class of customer or the type of loan. This paper tries to overcome this shortcoming. Analysing the effects of the increasing activity of foreign banks in Italy, we are especially concerned with distinguishing between lending towards households and businesses and taking into account different loan contracts.

In this respect, Italy is an interesting testing ground to analyse the effect of multinational banking. Since the 1990s, the Italian banking sector has undergone profound changes, following significant regulatory developments: barriers to branch expansion as well as restrictions to banking activities were removed; obstacles to foreign bank entry were overcome, thanks to the principles of mutual recognition and home country control introduced by the European Second Banking Directive. In response to the ongoing process of liberalization, the banking sector has undertaken a demanding process of restructuring and reorganization, with a substantial recovery in efficiency. While there is widespread evidence of increasing competition within the Italian banking sector,<sup>1</sup> the role played in this process by the growing presence of foreign intermediaries has been partially overlooked.

The share of foreign banks in Italy has now risen to about 19 per cent of total assets (Bank of Italy, 2007); it was just above 5 per cent in the mid-1990s. Furthermore, market shares are extremely diversified across Italian provinces and they are generally higher when calculated on credit granted to households than to businesses.

The debt burden of Italian households – while increasing rapidly in recent years – remains limited in an international comparison; most of the debt consists of mortgages for housing

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<sup>1</sup> Angelini and Cetorelli (2003), Gobbi and Lotti, (2004), Bofondi, Bonaccorsi di Patti and Gobbi, 2006. On the effect of M&As, see Focarelli and Panetta (2003).

purchases. In the last decade, foreign banks have sharply increased their lending to households, while foreign intermediaries have specialized in mortgage loans or consumer credit (Casolaro, Gambacorta and Guiso, 2005).

Conversely, the development of business lending by foreign banks has been limited, partly because of the peculiar structure of the Italian productive sector. In comparison with other economies at a similar level of industrialization, Italy is characterized by the prevalence of small and medium-sized enterprises, for which bank debt is nearly the only source of external financing (if we exclude commercial debt): there are very few listed companies or companies with access to international financial markets.

Besides increasing market share, foreign banks in Italy display a fairly differentiated degree of business expansion across Italian provinces; we exploit this geographical variability to measure how the presence of foreign banks affects the competitive pressure within local credit markets. We test it with reference to: i) a customers' mobility index;<sup>2</sup> ii) the level of interest rates and the spreads between lending and deposit rates applied on average to the different classes of customers; and iii) the collateral required. Our dataset covers the period 1997-2006 and draws on information at the provincial level. In the estimates, we control for local credit market characteristics (concentration and size of the market, number of new branches, credit risk, and financial development), to identify the distinctive role currently played by foreign intermediaries. The choice of the province where a foreign bank decides to operate may give rise to some kind of endogeneity; we tackle this problem by using a two-step estimator, according to the methodology proposed by Robinson (1989) and we end up with stable results.

We show that foreign intermediaries exert significant competitive pressure in credit markets. Their presence increases the mobility of banks' market share, both for loans to households and to businesses. For the latter, however, the displacement is decidedly more limited and it appears mainly in short-term lending.

Then we test whether this greater competitive pressure from foreign intermediaries has an impact on average lending rates either directly, through more aggressive credit policies, or indirectly, inducing other banks to react by reducing their rates to maintain their positions. In our regressions, lending rates to households and to businesses are measured by looking at the difference from the average three-month interbank rate, which approximates the cost of bank's internal funds.<sup>3</sup>

As far as mortgage loans are concerned, increased competition by foreign banks comes with a reduction in interest rates: a rise in the foreign banks' share from the 25th to the 75th percentile of the distribution implies a fall in interest rates of 15 basis points (18 points between 2002 and 2006). In recent years, we also detect a reduction in collateral posted by households, an outcome that is consistent with the gradual introduction of high loan-to-value mortgages by foreign banks.

On the other hand, there is no evidence of a significant impact on lending rates applied to the business sector: neither short-term rates, nor longer maturity rates seem affected. In our view, this result is rooted in the information asymmetries in (small) business lending. Furthermore, products supplied and conditions applied to firms cannot be easily standardized. Still, we note a

<sup>2</sup> We adjust market shares to account for mergers and acquisitions among banks in the sample period.

<sup>3</sup> We rerun the estimates considering the spread between loan and deposit rates in the same area. This variable is commonly used to measure the mark-up, and it is a proxy for bank market power (Levine, 2004; Martinez Peria and Mody, 2004). Deposit rates, however, are available only for sight deposits, a source of funds not usually related to mortgages. Therefore, we use these estimates as robustness checks for our previous results.

reduction in real collateral posted on long-term loans. The effect, initially weak, strengthens over time.

Our findings are consistent with recent theoretical literature. The increased mobility of customers without any significant effect on lending rates may partially support the hypothesis put forward in Dell’Ariccia and Marquez (2004). They model the propensity of local banks to specialize in opaque market segments (“flight to captivity”). On the contrary, a greater mobility of households, accompanied by a reduction in mortgage rates, confirms that the competitive pressure is more effective when products are standardized and information asymmetries less important (Sengupta, 2007; Leaner and Schnitzer, 2006). The evidence tends to reject the hypothesis that collateral is used to select low-risk customers (Sengupta, 2007). However, this result may be peculiar to our data, because of the well-known inefficiencies of the Italian judicial system.

The work is organized as follows. Section 2 briefly reviews the theoretical and empirical literature about the determinants and effects of foreign bank entry. Section 3 accounts for the development of foreign intermediaries in Italy in the last decade. Empirical analysis follows in Section 4 where we consider the impact of the presence of foreign banks on the mobility of market share, on lending rates and collateral required. Section 5 performs a series of robustness checks, conditioning on the likelihood of operating in a given province. The last section concludes.

## **2. Related literature**

The decision of a bank to enter a foreign country has been driven historically by the internationalization of borrowers: the growing interdependence of the world economy has transformed many banks into multinational corporations. This trend reflects the need to provide credit and financial services to customers going abroad (following the client).<sup>4</sup> Over time, however, the need to expand into new markets (local market opportunities) as well as to diversify assets internationally has gained importance.<sup>5</sup>

According to industrial organization theory, the entry (or the threat of entry) of a new company into the market will lead to greater competition and lower market power. However, the banking industry shows significant peculiarities because of the pervasive presence of information asymmetries between lenders and borrowers. This market failure affects the decision to enter and modifies its effects: the advantage of incumbents – resulting from information gathering through repeated interactions with entrepreneurs – limits the ability of new entrants to provide better conditions for customers, because of the risk of attracting bad borrowers (the “winner’s curse”).

Local banks have more information about their customers, which is crucial to small business lending (the “home field” advantage). Barriers to entry may be even greater if a bank arrives from abroad: foreign banks generally belong to large holding groups, whose headquarters may be geographically remote and also culturally and institutionally distant. The empirical evidence confirms that foreign banks experience greater difficulties in establishing relationships with small and more opaque enterprises (Berger, Klapper and Udell, 2001). According to Mian (2006),

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<sup>4</sup> Among others, see Grubel (1977), Aliber (1984), Williams (1997). Empirical studies on the determinants of entry and activity of foreign banks have largely confirmed the importance of economic integration among counties (Goldberg and Saunders, 1981; Goldberg and Johnson, 1990; Grosse and Goldberg, 1991; Brealey and Kaplanis, 1996; Yamori, 1998; Sagari, 1992); an exception is Williams (1996).

<sup>5</sup> Local market opportunities are emphasized by the eclectic theory (Dunning, 1977). Among localization factors, the literature has stressed the role played by market features of host countries, such as inefficiencies, regulatory restraints or limits to banking activities that offer profit opportunities to new entrants. By contrast, the agglomeration economies offered by financial centres may be an important factor of attraction (Davis, 1990). For empirical evidence, see Claessens, Demirgüç-Kunt and Huizinga (2001), Focarelli and Pozzolo (2001), Magri, Mori and Rossi (2005).

distance constraints are mainly driven by information-gathering and agency costs, rather than greater enforcement problems.

On the other hand, intermediaries that operate internationally may be more efficient, because they may have better screening techniques, skilled management, lower capital costs, and they can exploit economies of scale or scope (Berger, DeYoung, Genay and Udell, 2000; Claes and Hainz, 2006; Lehner and Schnitzer, 2006). These factors could partially offset the information disadvantage (the global advantage hypothesis). Indeed, according to Claessens, Demirgüç-Kunt and Huizinga (2001), foreign competitors tend to be more efficient and profitable (Mahajan, Rangan and Zardkoobi, 1996).

In Sengupta (2007), the ability of the foreign entrant to attract good borrowers is limited by the need to offer lower lending rates (pooling equilibrium): either the new entrant is more efficient in some respect, or the market will be dominated by the incumbent bank, which will have both an information and a cost advantage. The more opaque the borrowers, the higher the efficiency required to overcome the initial information disadvantage. Alternatively, the incoming bank can ask for collateral as a discriminating device against high-risk entrepreneurs (separating equilibrium). Collateral pledging is costly and improves efficiency only in those countries with a well-functioning judicial system and adequate legal protection for creditors. In Claessens and Van Horen (2008), the institutional framework plays a crucial role in determining the likelihood of entry of foreign intermediaries: an environment that is similar both in the home and the destination country may give rise to a competitive advantage.

According to Dell'Ariccia and Marquez (2004), having to compete with efficient new entrants, the incumbent bank will try to exploit its superior information by specializing in those market segments where adverse selection problems are more severe (flight to captivity). Incumbent banks will keep large market shares in segments with substantial entry barriers, where they can extract higher profits from relationship lending. To clients for whom information problems are less important, new entrants may act more aggressively and interest rate reductions should be more pronounced. Yet, the effect on small, opaque firms may still be positive. According to Giannetti and Ongena (2009), an increase in foreign bank presence is correlated with a higher probability that previously unbanked firms will establish bank relationships mainly with domestic banks; a firm's access to bank lending is possibly favoured by increased foreign competition.

Again, in Lehner and Schnitzer (2006) this increased competitive pressure is expected to be sharper in markets with low product differentiation. According to Claes and Hainz (2006), in the case of entry by acquisition, the local bank's information advantage is coupled with the higher efficiency of the foreign bank. Given the pre-eminent position of the new intermediary, the overall effect on rates will be less than in the case of entry via the on-site opening of a branch.

By and large, new entrants from abroad are expected to be welfare improving, but there are possible drawbacks. In the case of a negative correlation between the degree of imperfect information and the average quality of entrepreneurs, the specialization in captive segments (more opaque and then more risky) by local banks could lead to a deterioration in the average quality of assets (Dell'Ariccia and Marquez, 2004). In developing countries, the competition from foreign players may bring about the so-called cream skimming effect: smaller and more opaque firms are separated from larger companies and pooled with riskier firms, to which higher interest rates are applied (Detragiache, Tressel and Gupta, 2006). Concern has also been expressed by Berger et al (2005): if large foreign banks crowd out smaller domestic ones, the supply of loans to information-opaque small businesses, lending could be negatively affected.

There is widespread empirical evidence that increased competition from foreign banks has positive effects. According to Claessens, Demirgüç-Kunt and Huizinga (2001), on the basis of data on almost 8,000 banks from 80 countries, the presence of foreign banks improves efficiency and

reduces profit margins. Uiboupin (2004) reports similar results for the countries of Central and Eastern Europe. Moreover, restricting the entry of foreign intermediaries would raise interest margins (Levine, 2004) and the market power of incumbents (Claessens and Laeven, 2003). The effects on competition are also detected in the Italian case, albeit indirectly, where the decision by foreign operators to enter the market is determined by the profit opportunities offered (Magri, Mori and Rossi, 2005). Martinez Peria and Mody (2004) find that interest rate spreads are lower for foreign banks operating in Latin America, while their presence tends to reduce the operating costs of domestic banks. De Haas and Van Lelyveld (2003, 2008) finds that foreign banks have a stabilizing effect on credit supply in Central and Eastern Europe. The access to the internal capital market can alleviate the negative effects of a liquidity shock (because the holding company can provide support). On the other hand, multinational banks may amplify pro-cyclicality, switching their activity towards booming economies at the expenses of those countries that are experiencing a downturn. Furthermore, according to Detragiache Tressel and Gupta (2006), the more foreign intermediaries there are in developing countries the lower the credit supply - a result that is not replicated in advanced economies.

Sector analyses are limited. According to Clarke, Cribari and Martinez (2001), financial constraints are mitigated by the presence of foreign intermediaries. Giannetti and Ongena (2005) find that the entry of foreign banks in Eastern European countries has a positive impact on credit availability, and this is especially true for large companies. Mian (2006), using data on more than 80,000 loans to firms located in Pakistan, finds that foreign banks tend to avoid lending to information-opaque firms, which would require more relationship banking.

Overall, both theoretical analysis and empirical evidence seem to indicate that the impact of foreign competitors will differ depending on the level of information asymmetry, the degree of standardization of products and the importance of customer relationships. We expect a partial reallocation of customers among incoming banks and local intermediaries: the former will focus on more transactional and competitive markets, where the impact on interest rates should be stronger; the latter will specialize in segments that are more opaque. Collateral could either increase, if employed as a selection mechanism, or decrease, if it is used as a competitive device.

### 3. Foreign banks in Italy: some stylized facts

At the end of 2007, there were 98 foreign banks in Italy, 74 branches and 24 subsidiaries. The two categories are based on the location of the controlling shareholders of the bank.<sup>6</sup> Most of them (72 out of 98) were headquartered in Milan, the main financial centre of the country.<sup>7</sup> The total number of incoming banks has been steadily increasing over the last two decades (Chart 1). Since the second part of the 1990s, entry by means of subsidiaries and acquisitions has been gaining importance with respect to branches, consistently with the increased activity in retail markets.<sup>8</sup>

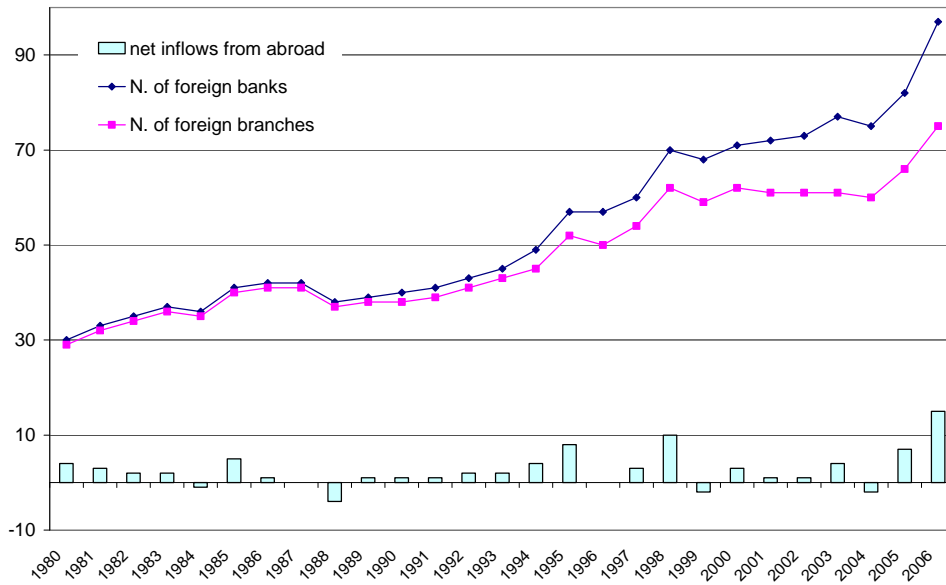
<sup>6</sup> We only analyse foreign branches and subsidiaries, thus excluding minority shareholdings. By subsidiary we mean a bank that is legally autonomous but controlled (through the majority of votes) by a holding company located abroad, while a branch is part of a foreign bank and has no legal autonomy. On the presence of foreign banks with the form of minority shareholdings, see Focarelli and Pozzolo (2001). In the estimates, we did not consider acquisitions by foreign banks made in 2006 (the last year of observation) to avoid discontinuity in the data.

<sup>7</sup> A first wave of entries took place between 1977 and 1983, together with the integration of the world economy and the improvement of Italy's international trade position. In this period, the regulatory restrictions to Italian banks offered profit opportunities for foreign operators to be exploited in loco. A new wave of arrivals occurred with the launch of the European single market (Magri, Mori, Rossi, 2005).

<sup>8</sup> Sunk costs affect the decision whether and how to enter a foreign market (Bugamelli and Infante, 2003). The choice is associated with the activity the bank proposes to carry out (Claeys and Hainz, 2006, Van Tassel and Vishwasrao, 2005). Acquisitions and (continues)

Figure 1

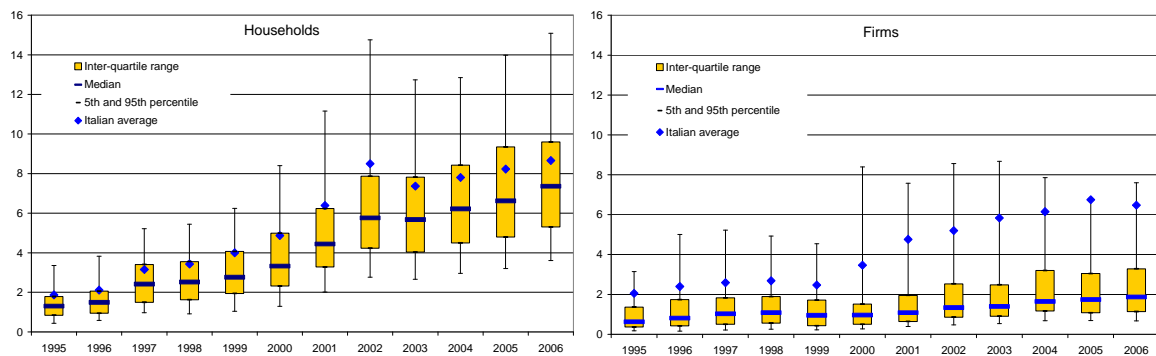
FOREIGN BANKS IN ITALY



Source: Banks' Register.

Figure 2

DISTRIBUTION OF FOREIGN BANKS' MARKET SHARE IN THE ITALIAN PROVINCES



Source: Bank Supervisory Report. Data refer to branches and subsidiaries of foreign banks; takeovers of Italian banks taking place in 2006 are not included.

subsidiaries give a network of branches to the new entrant. This choice is consistent with the aim of operating in the retail sector, where information asymmetries tend to favour banks with a widespread presence in the territory.

Between 1995 and 2006, the market share of foreign intermediaries in Italy rose from 5.2 to 13.7 per cent of total assets (Table A1); in early 2007 it was 19 per cent. Initially, they used to operate mainly in wholesale markets and with large multinational companies. In 1995, lending activities were limited, while off-balance sheet operations accounted for more than 42 per cent of the system, especially for trading in securities and derivatives. Since then, activity has gradually changed; market shares in lending activity have grown strongly and deposit-taking has increased too, albeit at a slower pace. Simultaneously, off-balance sheet activities have been greatly reduced.

However, this evolution has not been uniform nationwide. Figure 2 charts the main statistical indicators of the distribution of foreign banks' market share across the Italian provinces. It shows the high variability of their presence. For businesses, the national average is always above the third quartile, pointing to very concentrated activity in a limited number of zones. The findings confirm there has been a higher increase in positions for households than for businesses. In the following sections, this geographical variability and its dynamics over time is used to measure the effect of foreign intermediaries on competitive conditions within credit markets.

#### 4. The effect on market share, interest rates and collateral

##### 4.1 Customer mobility

The first test we perform is to verify whether – and to what extent – the entry of foreign players improves customer mobility.

Several studies, focusing on the degree of rivalry within a market, use market share changes as a measure of competitive pressure stemming from either incumbents or new competitors (Caves and Porter, 1978; Davies and Geroski, 1997). Relative stability in the ranking of firms in the market could suggest collusive behaviour (Heggstad and Rhoades, 1976). Likewise, from a theoretical point of view, few movements in market share do not necessarily mean there is a lack of rivalry, *i.e.* in a perfect competition framework, market shares remain stable. However, this is very unlikely (Shepherd, 1970): even in markets that are not highly concentrated, entrepreneurs will use various strategies to differentiate their products, which leads to movements in market share.

In the banking industry, tight entry regulation reduces market share instability. In Italy, during the last two decades, constraints to geographical expansion and to various activities have been removed. In the same period, several mergers and acquisitions have taken place. Notwithstanding the increased concentration of the market, big banks have suffered from market share losses, while small and foreign banks have improved their positions (Bonaccorsi di Patti, Eramo, Gobbi, 2005). Most likely, reorganizations following M&As have loosened customer relationships (Sapienza, 2002).

In order to isolate the changes not induced by competition, in this section all the indicators have been adjusted to account for mergers and acquisitions among Italian banks in the sample period, by re-building pro-forma consolidated data for banks resulting from the aggregations.

We therefore computed the following (absolute) mobility index (MI) by province and market segment:

$$[1] \quad MI_{k,p,t+1} = \sum_{j=1,n} |MS_{j,k,p,t+1} - MS_{j,k,p,t}|$$

where MS is the market share of the  $j$ -th bank in the  $p$ -th province at time  $t$  (as said adjusted for mergers and acquisitions);  $n$  is the overall number of banks operating in the  $p$ -th province;  $k$  are the market segments considered (loans, short-term loans and mortgages to households or



businesses).<sup>9</sup> This index has the advantage of exploiting the variability of the distribution as a whole.<sup>10</sup>

The MI index has been regressed as in the following specification:

$$[2] \quad MI_{k,p,t+1} = \alpha + \beta (\text{Foreign Bank market share } k)_{p,t-1} + \gamma (\text{Controls } k)_{p,t-1} + d_t + u_p + \varepsilon_{p,t}$$

where  $d_t$  is a time *dummy*, and  $u_p$  is unobserved provincial heterogeneity. The estimates take into account fixed effects at provincial level. The time span runs from 1997 up to 2006; data are yearly averages for 103 provinces. All regressors are lagged by one period, to reduce endogeneity problems. Since the dependent variable is equal to the change in market shares between time  $t$  and  $t+1$ , there is a two-year lag with respect to right-hand side variables. Table A2 reports some descriptive statistics of the variables.

The regressor of interest is the *foreign banks' market share*. This variable should give a more precise measure of the impact of foreign intermediaries than other indicators such as the number of foreign banks or branches in the market (Claessens, Demirgüç-Kunt and Huizinga, 2001). In fact, as we will discuss in Section 5, foreign banks are involved in retail activities remotely as well (without on-site presence) and other measures could understate the true effect of these intermediaries.

As a control variable, we introduced the Herfindahl concentration index, a common measure for market structure.<sup>11</sup> We further considered the number of new branches (per 10 thousand inhabitants), in order to control both the entry of new banks and the raising of the level of rivalry among incumbents as a result of the opening of new branches.

A measure of indebtedness of households and businesses is also included, in the form of mortgage per capita or total loans over value-added, respectively. The share of small business lending over total loans in the province is considered to capture the dimensional structure of firms in local credit markets and, thereby, the importance of relationship lending.

Credit risk is proxied by the ratio between non-performing loans over total loans to households and firms; markets with lower credit risk should attract more intermediaries and could be associated with a higher degree of rivalry. As a further control, we used the size of the local credit market, which also proxies the degree of financial development; this is computed as the sum of loans and deposits over the population (Kato and Honjo, 2006; Woodrow Eckard, 1987).

Table A3 shows the results in reference to households. Foreign bank presence is positively related to the instability index for mortgages (column [5]), while it is not statistically significant for short-term operations or total loans to households (columns [1] and [3], respectively).

As far as mortgages are concerned, moving from the first to the third quartile in the distribution of foreign banks' market shares enhances the mobility by 1 percentage point. Since the average mobility index is around 13 per cent, this would account for a 7 per cent increase in the mobility of customers.

<sup>9</sup> As far as households are concerned, we do not consider consumer credit, due to the lack of a geographical breakdown before 2002.

<sup>10</sup> There is a heated debate on the best indicator to measure the instability of market share, i.e. absolute versus relative or computed on the top 3 or 5 largest firms, and so on. See Kato and Honjo (2006) for a recent contribution. For Italy, market share instability in the banking sector is analysed in De Bonis and Ferrando (2000), to verify whether the joint presence of the same banks in different provinces leads to collusive behaviour.

<sup>11</sup> Other structural indicators, such as the share of the 3 largest banks in the market or the number of banks on the population, produced nearly identical results.

We verified the possible different impacts of foreign intermediaries over time. To this end, the foreign bank variable is split into two sub-periods, the first between 1997 and 2001; the second between 2002 and 2006 (Table A3, columns [2], [4] and [6]).

In column [6], the coefficients are statistically similar (with a P-value equal to 0.83 and the F-test equal to 0.05). However, foreign banks recently expanded their activity unevenly across the Italian provinces. As a consequence, the impact between 2002 and 2006 is higher: moving from the 25th to 75th percentile of the distribution of foreign banks' market share, mobility rises by 1.1 percentage points, almost two and a half times higher than before, corresponding to 9 per cent of the average mobility of the second sub-period.

Among the control variables, greater market concentration (with a higher Herfindahl index) implies higher customer mobility. Other concentration indexes pointed to the same results. This finding is consistent with other evidence on this issue. According to Sakakibara and Porter (2001), when non-price competition is crucial, rivalry in a concentrated industry becomes harder. For Italy, De Bonis and Ferrando (2000) read the positive effect of the Herfindahl index as the consequence of the entry of larger banks into areas where small intermediaries, with high market power, used to prevail.

Developed credit markets offer greater profit opportunities, implying greater customer mobility in all the regressions. The degree of indebtedness has a negative sign; most likely this variable also captures part of the potential risk. The other variables - credit risk or opening new branches - are not significant.

Moving on to look at firms (Table A4), foreign banks seem to exert some competitive pressure on both total and short-term loans (columns [1] and [3], respectively), while there is not any influence longer maturity (column [5]).

For short-term loans, an increase in the market share of foreign banks from the 25th to the 75th percentile amplifies the mobility of firms by 0.4 percentage points, corresponding to 2.8 per cent of total mobility. The effect – although statistically significant – appears small from the economic point of view. This result is consistent with the theory emphasizing the difficulties for new entrants to evaluate firms' creditworthiness without well-established customer relationships. Our estimates suggest that market shares are basically reallocated in short-term lending, while no effect is detected for loans with longer maturities, usually related to collateralized loans. This further confirms other evidence (see Gormley, 2010) in which a large reduction in business lending to firms with fewer tangible assets is observed following the entry of foreign banks.

The variable measuring small business lending in the provinces has a negative and significant impact, signalling lower mobility in those markets where the presence of small firms is higher and, consequently more relationship lending is needed. Other variables' results are in line with what has been already discussed for households.

The intermediation of foreign banks is narrow in some provinces; this could affect the significance of some coefficients of the previous estimates. Therefore, we verified the robustness of our results through weighted regressions, where the weights consist of the foreign banks' market shares in all provinces. Our main findings are confirmed (Table A5).

## 4.2 *Interest rates*

As a further step, our analysis focuses on establishing to what extent, and for what products, foreign banks influence the average interest rate charged to customers.

Our dependent variable is defined as the difference between lending rates and the three-month interbank rates, the latter approximating the cost of internal funds for the bank. *Ceteris paribus*, a decrease in this differential, associated with an increase in the presence of foreign banks, would point to an improvement in market competition. As a robustness check, we consider the differential between the lending and deposit rates applied in each province. This variable has the advantage of measuring the spread in each province; on the other hand, interest rates on bank liabilities are reported only for sight deposits, a source of funding not usually correlated to medium and long-term lending.<sup>12</sup>

For households, we take the interest rates applied to mortgages for housing purchases. As far as business lending is concerned, interest rates are defined as follows: *i*) the interest rate on overdraft facilities generally used by bank as the reference rate on short-term uncollateralized loans; *ii*) the interest rate on medium and long-term (usually collateralized) loans. The interbank rate is equal to the yearly average of the three-month Euribor rate.

We want to test whether competition from foreign players has an impact on provincial rates either directly, through more aggressive credit policies, or indirectly, forcing other banks to reduce their prices to retain customers. However, our database allows us to detect only the *spillover effect* on the average rates applied in the province. Data on interest rates come from a survey that, until 2004, was limited to a sample of about 70 intermediaries, none of which was a foreign bank. Since 2004 onwards, the sample has been enlarged to about 250 banks (Bank of Italy, 2003), but very few foreign intermediaries were included. At the end of 2005, foreign banks accounted for only 2.2 per cent of mortgages to households reported in the survey; for businesses, the coverage was even lower, equal to 1.6 per cent for long-term loans and 0.3 per cent for short-term loans. Therefore, we are not able to verify if these intermediaries follow more aggressive credit policies and apply lower interest rates; we can only assess whether their presence induces incumbents to react to greater competitive pressure which leads, on average, to lower interest rates.

To test this hypothesis, we used a simple specification where lending rates – in difference to either Euribor [Eq. 3] or deposit rates [Eq. 4] – are a function of foreign banks' market share (in the province and market segment analysed) and other control variables, according to the following equation:

$$[3] \quad (\text{Interest rate on loans } k - \text{Euribor})_{p,t} = \alpha + \beta(\text{Foreign banks market shares } k)_{p,t} + \gamma(\text{Controls } k)_{p,t} + d_t + u_p + \varepsilon_{p,t}$$

$$[4] \quad (\text{Interest rate on loans } k - \text{Interest rate on deposits})_{p,t} = \alpha + \beta(\text{Foreign banks market shares } k)_{p,t} + \gamma(\text{Controls } k)_{p,t} + d_t + u_p + \varepsilon_{p,t}$$

where  $d_t$  is a set of annual dummies,  $u_p$  is the unobserved heterogeneity at the provincial level. The subscript  $k$  refers to the separated regressions related to: mortgages to households, overdraft facilities and long-term loans to firms. Data cover the period from 1997 to 2006.

Equations [3] and [4] contain a complete set of time dummies to take into account cyclical effects not caught by other variables and to which the banks usually react with changes in the

<sup>12</sup> However, Kok Sorensen and Lichtenberger (2007) use deposit rates as a proxy of the cost of funding when explaining the dispersion in interest rates on mortgages across countries in the Euro area.

margins. As before, further differences across Italian geographical areas, for which we do not control adequately, are captured using fixed effects at the provincial level.<sup>13</sup>

We use the same regressors already discussed in the previous section. Again, all the right-hand side variables are lagged by one period, to limit endogeneity problems. As previously discussed, since data on interest rates on lending do not include foreign banks (at least up to 2004), this further reduces the simultaneity issue that could arise between market shares held by foreign intermediaries and interest rates.

We expect that the effect on interest rates stemming from the presence of foreign banks to vary according to the market segments where these players compete: if foreign banks compete on the same line of business with domestic banks, interest rates should be systematically reduced (Martinez Peria and Mody, 2004). On the other hand, greater competitive pressure could drive domestic banks towards opaque markets, where they have an information advantage and charge higher interest rates. The result could be an increase in the average interest rate applied by incumbents, due to a change in the composition of their customers (Dell’Ariccia and Marquez, 2004). If this is the case, even an interest rate reduction to a good borrower would be difficult to identify in aggregated data and the foreign presence could be associated to a positive effect on average interest rates charged in the province.

Tables A6 and A7 report the results.

As for mortgages, a greater presence of foreign banks reduces the average *spread* (Table A6, columns [1] and [3]). When the market share of foreign banks moves from the 25th to the 75th percentile of the distribution, the spread between the lending rate and the Euribor decreases by 15 basis points. The results are very similar when the dependent is defined in terms of the difference from deposit rates (about 13 basis points). Furthermore, although the coefficients of foreign banks in the two sub-sample periods are very similar, the impact of their presence is stronger between 2002 and 2006 (column [2]): moving from the 25th to the 75th percentile, the spread decreases by 18 basis points, a reduction that is nearly double that detected in the first period.

This result is consistent with the arrival of foreign banks specialized in housing finance. In the meantime, the growth of the Italian real estate market has boosted households’ indebtedness. Competition in the mortgage market has intensified: innovative contracts have been introduced – especially by foreign banks – and the range of available products has widened. The use of credit scoring techniques could have contributed to these developments (Albaretto *et al.* 2008); these techniques have turned mortgage contracts into a relatively standardized product, making the entry of foreign intermediaries easier.

Among the other regressors, the Herfindahl index is always statistically significant and positively correlated to interest rates.<sup>14</sup> New branches boost competition and reduce interest rates on mortgages. Household indebtedness (mortgages per capita in the province) does not affect the spread between lending rates and the interbank rate, but it leads to an increase in the spread with deposit rates (Table A6, col. [1] and [3]), in line with other empirical evidence (Kok Sorensen and Lichtenberger, 2007). Financial market development and credit risk (non-performing loans over total loans) do not have significant effects on interest rates.

<sup>13</sup> Data on value added, employment rate, and so on, at a provincial level, are available with a high lag. Notwithstanding the loss of observations, using these variables we do not detect any significant differences in the estimated coefficients.

<sup>14</sup> The expected sign of the Herfindahl index is ambiguous and it leads to a different interpretation (see Berger, 1995, for a review). Empirical evidence for Italy is mixed, too; Focarelli and Panetta (2003) find that concentration is significant, reducing deposit rates; on the contrary, it does not affect interest rates for Bofondi, Bonaccorsi di Patti and Gobbi (2006), while it is significant for Fatica, Fiori and Piersante (2006).

For business lending, the activity of foreign banks does not exert any statistically significant effect on the interest rates applied to firms (Table A7, col. [1]-[8]).

On the other hand, well-developed financial markets reduce interest rates on short-term lending, while the coefficient is not significant on long-term lending.<sup>15</sup> The Herfindahl concentration index is not statistically significant, while opening up new branches reduces the interest rates applied to medium and long-term loans to firms. Furthermore, the greater the share of loans granted to small firms in the province, the higher the interest rates applied, due to a high degree of opaqueness and the consequent difficulty of the market to evaluate creditworthiness. Credit risk increases the short-term interest rate while it is not significant on the long-term rate. The latter is affected by the degree of firms' indebtedness, a result that could catch part of the potential long-term default risk, which is not well controlled by non-performing loans. The degree of firms' indebtedness in the province is negatively correlated with short-term interest rates, most likely behaving as a proxy for the development of the local financial market.

In our data, lending rates are reported only for loans larger than €75,000, giving rise to a *censoring* of small lending which could bias our estimates. To address this issue, we added, to the previous equations [3] and [4], a proxy for the coverage of the reported data in the survey, built as the ratio between the amount of loans reported in the survey and the actual stock of loans (of the same type and in the same area) reported by Bank Supervisory statements. The results, both in direction and in size, do not change.

Our conclusions are confirmed also by weighted regressions (Table A8), where the weights are computed as the foreign banks' market shares at the provincial level.

#### 4.3 *The collateral required*

Foreign banks could compete with domestic banks on other features of the loans rather than in terms of interest rates, for instance by adopting a different policy for the collateral required. As a result, the collateral could be reduced as a reaction to the increased competition, or it could be raised as a device to screen good customers to whom lower interest rates could be offered (Sengupta, 2007).

To verify these two opposite hypotheses, in the following regression we used the share of collateralized loans over total loans as the dependent variable:

$$[5] \quad (\text{Collateralized loans/Total loans})_{p,t} = \alpha + \beta (\text{Foreign banks' market shares})_{p,t} + \gamma (\text{Controls})_{p,t} + d_t + u_p + \varepsilon_{p,t}$$

We split real and personal guarantees. In the estimates (not reported) on short-term collateralized loans, we do not detect any effect for households or firms. On the other hand, significant results have emerged for medium and long-term collateralized loans (Table A9). For households, an increase in the activity of foreign banks is associated with a reduction in real collateral, partially balanced by an increase in the personal guarantees posted (Table A9, col. [1], [2] and [3]). These results appear consistent with the growing diffusion of high loan-to-value mortgages (where the share of real collateral falls), commonly backed by extra personal guarantees.

This result holds for firms, too: the greater the presence of foreign intermediaries, the smaller the share of collateralized loans (columns [5] and [6]). The other variables point to an increase in

<sup>15</sup> It is significant when the spread is measured in relation to deposit rates. For these loans, the use of the interest rate on sight deposits as proxies of the cost of long-term funding is particularly problematic and could capture a spurious effect.

the competitive pressure: the collateral posted is negatively correlated to the degree of financial development and to the number of new branches opened; on the contrary, it increases along with the greater presence of smaller firms.

In the two sub-periods analysed, the results are confirmed, both for households and firms.

As before, we verify the robustness of the estimates' running weighted regressions. The main findings are confirmed (Table A10).

## 5. Choosing where to operate: robustness checks with a two-step procedure

Our findings could be affected by the *ex ante* choice of the provinces where foreign banks decide to operate significantly. To minimize their initial information disadvantage, these intermediaries could only enter those areas where credit risk is lower and customer screening less important; consequently, lending rates are lower in these areas.<sup>16</sup>

This decision could give rise to a selection problem, due to the particular features of the area where foreign banks operate, which is difficult to assess by means of instrumental variables (Garen, 1988). Therefore, to address this issue we used a two-stage estimator, similar to that proposed by Heckman (1978, 1979), with the aim of controlling for any remaining selection bias driven by unobserved factors changing over time and in a different way across provinces.

However, despite the limited number of provinces where foreign banks decided to open a branch, they grant loans to customers located in all provinces. Still, the level of activity is not uniformly distributed over the different areas, with some provinces showing a level of foreign bank intermediation close to zero.

In the first stage, we computed the probability that the level of activity of foreign banks in a province is above a certain threshold, identified according to the distribution of foreign banks' market share. We considered different thresholds, equal to the 10th and to the 20th percentile of the distribution;<sup>17</sup> corresponding respectively to market shares equal to about 1 and 1.5 per cent. The selection choice is defined as follows:

$$[6] \quad \text{Selection equation: } y_{p,t} = \alpha + \beta (X)_{p,t} + d_t + \varepsilon_{p,t}$$

where  $y_{p,t}=1$  if foreign banks grant total loans greater than the 10th [or 20th] percentile of their market shares' distribution.

As a further test, we estimated a different selection equation, where the dependent variable is equal to 1 if foreign intermediaries have at least one branch in that area. The decision to open a branch indicates the aim of increasing the penetration in the area, but hinges on the need to balance the related sunk costs with the expected profits. Therefore, we deem that the features of local financial markets, the expected income and potential risks of the lending activity play a key role in the entry decision (Gobbi and Lotti, 2004).

As already mentioned, even without any branches, the bank can operate by remote control. The selection, differently from Heckman (1978, 1979), does not generate censoring of the

<sup>16</sup> Such a critique should be particularly important for firms, for which lending by foreign banks is more concentrated in the northern areas. Nonetheless, this is exactly the case in which we did not find any significant results. On the contrary, lending to households is decidedly widespread nationwide and we detect a significant effect of foreign intermediaries.

<sup>17</sup> It has also considered a threshold corresponding to the fifth percentile, which gives results very similar to those for the 10th percentile.

observations in the structural equation. Lee (1978), dealing with a similar case, uses a selection equation in the first stage (as in equation [6]) and estimates in the second step two structural relations:

$$[7a] \quad T_{p,t}^0 = \alpha^0 + \gamma^0_1 Z_{p,t}^0 + \gamma^0_2 \phi(\cdot)/(1-\Phi(\cdot))_{p,t} + \eta_{p,t}^0 \quad \text{if } y_{p,t}=0$$

$$[7b] \quad T_{p,t}^1 = \alpha^1 + \gamma^1_1 Z_{p,t}^1 + \gamma^1_2 \phi(\cdot)/\Phi(\cdot)_{p,t} + \eta_{p,t}^1 \quad \text{if } y_{p,t}=1$$

where, in our case,  $T$  represents the mobility index, interest rates or the share of collateralized loans and  $Z$  indicates the control variables. The two equations are clearly augmented with a further control, respectively  $\phi(\cdot)/(1-\Phi(\cdot))$  and  $\phi(\cdot)/\Phi(\cdot)$ , or the *inverse Mills ratio*.

Robinson (1989) estimates the two equations jointly, obtaining a more efficient estimator in the following way:

$$[8] \quad T_{p,t} = \alpha^0 + (\alpha^1 - \alpha^0)y_{p,t} + \gamma_1 Z_{p,t} + \gamma^0_2 \lambda_{p,t} + (\gamma^1_2 - \gamma^0_2) \lambda_{p,t}^* y_{p,t} + d_t + u_p + \eta_{p,t}$$

where  $\lambda_{p,t}$  is equal to  $\phi(\cdot)/(1-\Phi(\cdot))_{p,t}$  if  $y_{p,t} = 0$  while it is equal to  $\phi(\cdot)/\Phi(\cdot)_{p,t}$  if  $y_{p,t} = 1$

Therefore, we estimate the equations reported in the previous section, conditioned to the likelihood that foreign banks operate in the province with at least one branch or their activity exceeds the selected threshold (equation [8]).

The various specifications of the selection equation [6] include, as regressors, the degree of financial development of the area (total loans and deposits pro capite); credit risk (non-performing loans over total loans in the province); and the Herfindahl concentration index. As before,  $d_t$  is a set of annual dummies.

We consider three identification variables. First, the population living in the province (in logarithms), which captures the potential size of the market,<sup>18</sup> while it is not correlated to credit variables in the second step. Second, we add the average distance of the province  $p$  from the headquarters of foreign banks in Italy. The distance affects the knowledge of the area: the greater the distance, the more difficult it is to screen the customers and monitor the relationship (Mian, 2006). Therefore, we expect it will reduce the activity level as well as the probability of opening a branch in the area. Nevertheless, we cannot exclude that the lack of knowledge induces a foreign intermediary to open a branch to fill the information gap. As a further identification variable, we used the number of crimes against property carried out by *unknown persons* to the total number of crimes against property in all provinces. This variable is intended as a proxy for social capital in the province. The variable should capture the degree of opaqueness of the market, measuring the share of crimes not dealt with by the judiciary system because the culprit could not be ascertained.

In Table A11, we report the different specification of equation [6] with probit models. The results are in line with our expectations. Foreign banks tend to open a branch in more developed, low concentrated and low risk credit markets.

The distance reduces the probability of operating and opening a branch. Population is always significant and affects positively both the entry decision and the activity level in the province. The number of crimes against property significantly reduces the probability of operating in the province or opening a new branch.

Conditioning our previous estimates for probability estimated in equation [6], the results are confirmed. For the sake of simplicity, in Table A12 we report only the main coefficients referring to foreign banks' market shares and the *inverse Mills ratio*, along with the correlations between the

<sup>18</sup> Alternatively, the value added has been considered. Specifications that replace population with this variable lead to similar results.

errors in the first and second stage regressions (Rho). The significance of the *inverse Mills ratio* is poor and mainly affects interest rates and collateral, showing that a selection process is at work in the estimates. Nonetheless, the results are robust to the new specifications and previous interpretations are confirmed.

## 6. Conclusions

In this paper we have measured the impact of foreign banks' activity on Italian credit markets. To capture the level of activity of foreign intermediaries, we used their market shares in the different geographical areas and with reference to the various lines of business. We studied this variable in relation to: i) customers' mobility index at the provincial level; ii) interest rates applied on average to the different customers (households and firms); and iii) the collateral required.

In the estimates, we controlled for other factors that could affect our dependent variables, such as the degree of concentration of the market, the number of newly opened branches, credit risk, the development of financial markets, and the degree of indebtedness of households and firms. A two-step procedure controlled for possible endogeneity problems related to the provinces where foreign banks mainly operate or have their establishments.

Our results show that foreign intermediaries exert significant competitive pressure in the different lines of business analysed. They increase the mobility of customers, both households and businesses. For the former, such a pressure comes with a reduction in the interest rates on mortgage loans. The reduction is economically significant, equal to 15 basis points over the decade, about 18 basis points in the last five years. Recently, we have also observed a reduction in real collateral posted; this finding is consistent with the steady diffusion of contracts whose loan-to-value is higher than in the past.

There no evidence of a significant impact on interest rates applied to firms, though we observe a slight reduction in the share of collateralized loans associated with the greater presence of foreign intermediaries.

Consistently with the banking theory, in our view the different effect we detect for households and businesses depends upon both the degree of standardization of the products (greater for mortgages to households) and the exposure to asymmetric information (higher for credit to firms). Firms' heterogeneity remains to be analysed; conditions applied to business lending are not very standardized. They depend on a firm's characteristics and the bargaining process between the bank and its customer. Most likely, in this field, competition from new entrants is complex and more time is needed for its effects to be felt.



## APPENDIX

Table A1

**Market Share of Foreign Banks in Italy**  
(percentage values; annual averages)

	1995	1998	2001	2003	2006
Total assets	5.2	9.1	6.8	6.7	13.7
Total loans	2.7	5.8	6.9	8.4	16.0
Interbank loans	15.7	22.6	10.8	10.2	17.8
Securities	6.3	11.5	11.0	6.2	14.1
Funding	2.0	3.3	2.9	3.9	12.0
Interbank deposits	16.3	27.2	20.9	21.3	28.3
Endorsement loans	5.4	9.7	16.8	11.4	16.2
Guarantees and commitments	42.6	67.5	11.0	6.1	12.3
Securities custody	5.6	6.6	10.3	10.4	23.5

Source: Bank Supervisory Report. Data refers to branches and subsidiaries.

Table A2

## Descriptive Statistics

	Average	Std. Dev.	50° perc.	25° perc.	75° perc.	Source
<b>Market share instability:</b>						
Total credits to households	0.124	0.054	0.113	0.094	0.140	Supervisory Report, Bank of Italy
Mortgages to households	0.134	0.059	0.123	0.098	0.152	Supervisory Report, Bank of Italy
Short-term credits to households	0.182	0.077	0.168	0.136	0.210	Supervisory Report, Bank of Italy
Total credits to firms	0.145	0.068	0.129	0.104	0.162	Supervisory Report, Bank of Italy
Long-term credits to firms	0.179	0.080	0.162	0.131	0.207	Supervisory Report, Bank of Italy
Short-term credits to firms	0.163	0.083	0.144	0.117	0.186	Supervisory Report, Bank of Italy
Current account to firms	0.165	0.088	0.146	0.116	0.190	Supervisory Report, Bank of Italy
<b>Interest rates differentials between:</b>						
Long-term rate to households and Euribor	1.880	0.953	1.727	1.227	2.409	Bank of Italy's survey
Long-term rate to households and funding rate	3.890	0.960	3.727	3.259	4.300	Bank of Italy's survey
Overdraft rate to firms and Euribor	5.970	1.482	3.801	3.286	4.456	Bank of Italy's survey
Overdraft rate to firms and fundig rate	7.980	1.406	7.994	7.013	8.984	Bank of Italy's survey
Long-term rate to firms and Euribor	1.990	1.353	1.813	1.239	2.477	Bank of Italy's survey
Long-term rate to firms and funding rate	4.001	1.322	3.801	3.286	4.456	Bank of Italy's survey
<b>Market share of credits to households:</b>						
Long-term credits with personal collateral	0.072	0.038	0.063	0.046	0.088	Bank of Italy's survey
Long-term credits with real collateral	0.722	0.090	0.734	0.667	0.789	Supervisory Report, Bank of Italy
<b>Market share of credits to firms:</b>						
Long-term credits with personal collateral	0.183	0.063	0.174	0.144	0.207	Supervisory Report, Bank of Italy
Long-term credits with real collateral	0.584	0.098	0.600	0.535	0.650	Supervisory Report, Bank of Italy

Table A2 (continued)

## Descriptive Statistics

	Average	Std. Dev.	50° perc.	25° perc.	75° perc.	Source
<b>Foreign banks' market share related to:</b>						
Households' credits	0.047	0.034	0.039	0.031	0.063	Supervisory Report, Bank of Italy
Mortgages to households	0.029	0.027	0.022	0.011	0.037	Supervisory Report, Bank of Italy
Short-term loans to households	0.090	0.067	0.071	0.035	0.132	Supervisory Report, Bank of Italy
Loans to firms	0.020	0.025	0.012	0.007	0.023	Supervisory Report, Bank of Italy
Long-term loans to firms	0.009	0.018	0.003	0.001	0.008	Supervisory Report, Bank of Italy
Short-term loans to firms	0.008	0.017	0.003	0.001	0.007	Supervisory Report, Bank of Italy
Current account to firms	0.007	0.015	0.002	0.001	0.006	Supervisory Report, Bank of Italy
Herfindahl index over households loans	0.118	0.052	0.106	0.082	0.140	Supervisory Report, Bank of Italy
Herfindahl index over households mortgages	0.136	0.062	0.119	0.094	0.160	Supervisory Report, Bank of Italy
Herfindahl index over firms' loans	0.105	0.040	0.095	0.077	0.122	Supervisory Report, Bank of Italy
Financial development (loans+deposits per capita)	20.173	10.568	19.227	11.780	26.075	Supervisory Report and Istat
Loans to households per capita	2.804.4	1.474.4	2.406.1	1.664.8	3.784.4	Supervisory Report and Istat
Mortgages to households per capita	1.953.5	1.178.5	1.612.1	1.039.3	2.639.5	Supervisory Report and Istat
Short term loans to households per capita	850.9	351.9	798.9	577.6	1.060.9	Supervisory Report and Istat
Credits to firms over the Value Added	0.38	0.16	0.36	0.25	0.50	Supervisory Report and Istat
Long-term loans to firms over the Value Added	0.13	0.05	0.12	0.09	0.16	Supervisory Report and Istat
Short-term loans to firms over the Value added	0.13	0.06	0.12	0.08	0.17	Supervisory Report and Istat
Share of loans to small firms	0.204	0.107	0.182	0.122	0.274	Supervisory Report, Bank of Italy
Bad loans over total loans to household	0.087	0.074	0.062	0.036	0.106	Supervisory Report, Bank of Italy
Bad loans over total loans to firms	0.178	0.132	0.084	0.046	0.190	Supervisory Report, Bank of Italy
New branches (per 10,000 inhabitants)	0.143	0.307	0.092	0.033	0.183	Bank of Italy and Istat

Table A3

**Market shares instability at t+1 in the households sector**  
(within estimator with provincial fixed effects)

	Total loans		Short-term loans		Mortgages	
	[1]	[2]	[3]	[4]	[5]	[6]
Foreign banks' market shares <sub>t-1</sub>	0.119 (0.130)	—	-0.081 (0.101)	—	0.403*** (0.137)	—
Foreign banks' market shares <sub>t-1</sub> 1997-2001	—	-0.207 (0.252)	—	-0.441** (0.206)	—	0.448* (0.253)
Foreign banks' market shares <sub>t-1</sub> 2002-2006	—	0.060 (0.135)	—	-0.117 (0.103)	—	0.409*** (0.140)
Herfindahl <sub>t-1</sub>	0.562*** (0.063)	0.554*** (0.063)	0.493*** (0.089)	0.475*** (0.090)	0.473*** (0.050)	0.473*** (0.050)
Financial development <sub>t-1</sub>	1.472** (0.684)	1.543** (0.685)	2.289** (0.899)	2.397*** (0.899)	1.281* (0.711)	1.273* (0.712)
Log (Loans per capita <sub>t-1</sub> )	-0.090*** (0.020)	-0.094*** (0.020)	—	—	—	—
Log (Mortgages per capita <sub>t-1</sub> )	—	—	—	—	-0.047** (0.019)	-0.046** (0.019)
Log (Short-term loans per capita <sub>t-1</sub> )	—	—	-0.096*** (0.021)	-0.103*** (0.022)	—	—
Bad loans <sub>t-1</sub>	0.081 (0.058)	0.082 (0.058)	0.017 (0.083)	0.012 (0.082)	0.081 (0.062)	0.081 (0.062)
New branches <sub>t-1</sub>	-0.002 (0.005)	-0.001 (0.005)	-0.000 (0.007)	-0.001 (0.007)	0.002 (0.005)	0.002 (0.005)
Number of observations	1.022	1.022	1.022	1.022	1.022	1.022
R <sup>2</sup> within	0.26	0.26	0.24	0.24	0.28	0.28

All the estimates include annual dummies and a constant term. Standard errors in parenthesis. \* level of significance between 5 and 10 per cent, \*\* level of significance between 1 and 5 per cent, \*\*\* level of significance at 1 per cent.

Table A4

**Market shares instability at t+1 in the firms sector***(within estimator with provincial fixed effects)*

	Total loans		Short-term loans		Mortgages	
	[1]	[2]	[3]	[4]	[5]	[6]
Foreign banks' market shares <sub>t-1</sub>	0.347** (0.141)	—	0.693** (0.267)	—	0.360 (0.230)	—
Foreign banks' market shares <sub>t-1</sub> 1997-2001	—	0.365* (0.215)	—	0.476* (0.255)	—	0.905** (0.375)
Foreign banks' market shares <sub>t-1</sub> 2002-2006	—	0.343** (0.146)	—	0.750*** (0.262)	—	0.245 (0.239)
Share of loans to small firms <sub>t-1</sub>	-0.209** (0.086)	-0.208** (0.086)	-0.256** (0.107)	-0.261** (0.107)	-0.269** (0.105)	-0.294** (0.106)
Herfindahl <sub>t-1</sub>	0.230* (0.128)	0.230* (0.128)	0.619*** (0.150)	0.621*** (0.150)	0.076 (0.147)	0.055 (0.147)
Financial development <sub>t-1</sub>	1.494 (1.006)	1.512 (1.019)	0.885 (1.216)	0.757 (1.220)	-1.314 (1.108)	-1.177 (1.109)
Log(Loans over value added <sub>t-2</sub> )	-0.012 (0.019)	-0.013 (0.019)	—	—	—	—
Log(Mortgages over value added <sub>t-2</sub> )	—	—	—	—	-0.029* (0.017)	-0.032* (0.018)
Log (Short-term loans over value added <sub>t-2</sub> )	—	—	-0.023 (0.019)	-0.020 (0.019)	—	—
Bad loans <sub>t-1</sub>	0.012 (0.034)	0.012 (0.034)	-0.007 (0.042)	-0.012 (0.043)	0.057 (0.041)	0.060 (0.041)
New branches <sub>t-1</sub>	0.004 (0.006)	0.004 (0.006)	0.009 (0.008)	0.009 (0.008)	0.000 (0.008)	0.001 (0.008)
Number of observations	919	919	919	919	919	919
R <sup>2</sup> within	0.06	0.06	0.05	0.06	0.10	0.10

All the estimates include annual dummies and a constant term. Standard errors in parenthesis. \*, \* level of significance between 5 and 10 per cent, \*\* level of significance between 1 and 5 per cent, \*\*\* level of significance at 1 per cent.

Table A5

**Market shares instability at t+1**  
(within estimator weighted by total loans of foreign banks in all provinces)

	Total loans [1]	Short-term loans [2]	Mortgages [3]
	<b>Households</b>		
Foreign banks' market shares <sub>t-1</sub>	0.193 (0.187)	0.242* (0.143)	0.376* (0.198)
	<b>Firms</b>		
Foreign banks' market shares <sub>t-1</sub>	0.496** (0.206)	0.887*** (0.338)	0.282 (0.338)

Table A6

**Medium and long-term interest rates applied to households**  
(within estimator with provincial fixed effects)

	Differential with respect to Euribor		Differential with respect to funding rate	
	[1]	[2]	[3]	[4]
Foreign banks' market shares <sub>t-1</sub>	-6.255*** (1.527)		-5.475*** (1.737)	
(Foreign banks' market shares <sub>t-1</sub> ) <sub>1997-2001</sub>	—	-6.081*** (2.225)	—	-4.778* (2.530)
(Foreign banks' market shares <sub>t-1</sub> ) <sub>2002-2006</sub>	—	-6.244*** (1.531)	—	-5.432*** (1.741)
Herfindahl <sub>t-1</sub>	1.474** (0.571)	1.478** (0.572)	1.960*** (0.649)	1.974*** (0.650)
Financial development <sub>t-1</sub>	-1.127 (7.559)	-1.206 (7.599)	4.048 (8.594)	3.731 (8.639)
Log (Mortgages per capita <sub>t-1</sub> )	0.291 (0.214)	0.293 (0.214)	0.796*** (0.243)	0.804*** (0.244)
Bad loans <sub>t-1</sub>	-0.015 (0.611)	-0.016 (0.612)	-0.057 (0.695)	-0.063 (0.696)
New branches <sub>t-1</sub>	-0.171*** (0.057)	-0.172*** (0.057)	-0.141** (0.065)	-0.142** (0.065)
Number of observations	1.030	1.030	1.030	1.030
R <sup>2</sup> within	0.73	0.73	0.60	0.60
All the estimates include annual dummies and a constant term. Standard errors in parenthesis. * level of significance between 5 and 10 per cent, ** level of significance between 1 and 5 per cent, *** level of significance at 1 per cent.				

Table A7

**Interest rates applied to firms**  
(within estimator with provincial fixed effects)

	Differential with respect to Euribor				Differential with respect to funding rate			
	Current account		Mortgages		Current account		Mortgages	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Foreign banks' market shares <sub>t-1</sub>	-1.147 (2.369)		-2.667 (3.666)		-1.956 (2.628)		-2.058 (3.772)	
Foreign banks' market shares <sub>t-1</sub> 1997-2001		-2.496 (2.535)		-3.873 (5.535)		-3.472 (2.813)		-2.960 (5.693)
Foreign banks' market shares <sub>t-1</sub> 2002-2006		1.492 (2.959)		-2.231 (3.856)		1.008 (3.283)		-1.799 (3.967)
Share of loans to small firms <sub>t-1</sub>	2.576*** (0.855)	2.497*** (0.856)	-0.035 (1.655)	0.009 (1.663)	3.413*** (0.949)	3.323*** (0.950)	0.666 (1.702)	0.700 (1.711)
Herfindahl <sub>t-1</sub>	0.521 (1.235)	0.477 (1.234)	-0.528 (2.379)	-0.478 (2.387)	0.841 (1.370)	0.792 (1.369)	-0.104 (2.447)	-0.067 (2.455)
Financial development <sub>t-1</sub>	-41.001*** (9.696)	-42.882*** (9.771)	27.147 (19.179)	26.934 (19.204)	-30.455*** (10.758)	-32.568*** (10.840)	40.821** (19.729)	40.662** (19.755)
Log (Loans over value added <sub>t-2</sub> )	-0.452*** (0.153)	-0.422*** (0.154)	0.709* (0.372)	0.712* (0.372)	-0.302* (0.169)	-0.268 (0.171)	0.742** (0.382)	0.744** (0.383)
Bad loans <sub>t-1</sub>	0.657** (0.337)	0.617* (0.338)	-0.025 (0.648)	-0.030 (0.648)	0.928** (0.374)	0.884** (0.375)	0.242 (0.666)	0.238 (0.667)
New branches <sub>t-1</sub>	-0.009 (0.064)	-0.010 (0.064)	-0.263** (0.123)	-0.263** (0.123)	0.027 (0.071)	0.026 (0.071)	-0.227* (0.127)	-0.228* (0.127)
Number of obs.	919	919	919	919	919	919	919	919
R <sup>2</sup> within	0.76	0.76	0.38	0.38	0.37	0.38	0.24	0.24

All the estimates include annual dummies and a constant term. Standard errors in parenthesis.  
\* level of significance between 5 and 10 per cent, \*\* level of significance between 1 and 5 per cent, \*\*\* level of significance at 1 per cent.

Table A8

**Medium and long-term interest rates**  
(within estimator weighted by total loans of foreign banks in all provinces)

	Differential with respect to Euribor		Differential with respect to funding rate	
	Current account	Mortgages	Current account	Mortgages
Foreign banks' market shares <sub>t-1</sub>	<b>Households</b>			
	-6.337** (2.687)		-7.758*** (2.346)	
Foreign banks' market shares <sub>t-1</sub>	<b>Firms</b>			
	-1.428 (3.451)	-4.379 (5.154)	-1.625 (3.028)	-3.917 (5.021)

Table A9

**Medium and long-term collateral**  
(within estimator with provincial fixed effects)

	Households			Firms		
	Personal	Real		Personal	Real	
	[1]	[2]	[3]	[4]	[5]	[6]
Foreign banks' market shares <sub>t-1</sub>	0.199*** (0.048)	-0.677*** (0.137)		0.201 (0.161)	-0.568*** (0.181)	
Foreign banks' market shares <sub>t-1</sub> 1997-2001			-0.569*** (0.199)			-0.474* (0.273)
Foreign banks' market shares <sub>t-1</sub> 2002-2006			-0.670*** (0.137)			-0.595*** (0.190)
Share of loans to small firms <sub>t-1</sub>				0.090 (0.073)	0.158** (0.082)	0.155* (0.082)
Herfindahl <sub>t-1</sub>	-0.013 (0.018)	-0.080 (0.051)	-0.079 (0.051)	-0.150** (0.066)	0.059 (0.074)	0.057 (0.074)
Financial development <sub>t-1</sub>	0.420* (0.241)	0.352 (0.676)	0.303 (0.679)	1.365 (0.835)	-2.947*** (0.937)	-2.932*** (0.938)
Log (Mortgages per capita <sub>t-1</sub> )	-0.010 (0.007)	-0.033* (0.019)	-0.032* (0.019)			
Log (Loans over value added <sub>t-2</sub> )				0.014 (0.017)	-0.025 (0.019)	-0.025 (0.019)
Bad loans <sub>t-1</sub>	0.044** (0.019)	-0.030 (0.055)	-0.030 (0.055)	-0.027 (0.028)	-0.034 (0.031)	-0.034 (0.031)
New branches <sub>t-1</sub>	-0.000 (0.002)	-0.008 (0.005)	-0.008 (0.005)	0.006 (0.005)	-0.014** (0.006)	-0.013** (0.006)
Number of observations	1.030	1.030	1.030	919	919	919
R <sup>2</sup> within	0.44	0.29	0.29	0.08	0.19	0.19

All the estimates include annual dummies and a constant term. Standard errors in parenthesis. \* level of significance between 5 and 10 per cent, \*\* level of significance between 1 and 5 per cent, \*\*\* level of significance at 1 per cent.

Table A10

**Medium and long-term collateral**  
(within estimator weighted by total loans of foreign banks in all provinces)

	Personal	Real
	<b>Households</b>	
Foreign bank market share <sub>t-1</sub>	0.346*** (0.069)	-0.826*** (0.190)
	<b>Firms</b>	
Foreign bank market share <sub>t-1</sub>	0.319* (0.186)	-0.975*** (0.246)



Table A11

**Probability of operating or entering a province with an establishment**  
(*probit estimates*)

	<b>dummy 10° percentile</b>	<b>dummy 20° percentile</b>	<b>dummy presence of establishments</b>
	[a]	[b]	[c]
Financial development <sub>t-1</sub>	-14.946 (24.081)	21.837 (15.255)	28.984*** (10.301)
Herfindahl <sub>t-1</sub>	-7.995*** (1.882)	-11.339*** (1.613)	-4.413*** (1.415)
Bad loans <sub>t-1</sub>	-7.420*** (1.640)	-2.479** (1.162)	-1.923** (0.865)
Log of population <sub>t-1</sub>	3.813*** (0.386)	2.664*** (0.228)	1.761*** (0.127)
Distance	-0.004*** (0.001)	-0.003*** (0.000)	-0.001*** (0.000)
Crimes against properties by person(s) unknown <sub>t-1</sub>	-9.318*** (2.386)	-2.023 (1.601)	-3.735*** (1.104)
Number of observations	1030	1030	1030
Pseudo R <sup>2</sup>	0.685	0.546	0.418

All the estimates include annual dummies and a constant term. Standard errors in parenthesis. \* level of significance between 5 and 10 per cent, \*\* level of significance between 1 and 5 per cent, \*\*\* level of significance at 1 per cent.

Table A12

**Corrections for the operativity and presence of a foreign bank establishment**  
(within estimator with provincial fixed effects)

Dependent variable	[a]			[b]			[c]		
	Foreign banks' market shares <sub>t-1</sub>	Inverse Mills Ratio (1)	Rho	Foreign banks' market shares <sub>t-1</sub>	Inverse Mills Ratio (1)	Rho	Foreign banks' market shares <sub>t-1</sub>	Inverse Mills Ratio (1)	Rho
Market share instability in households' mortgages	0.424 *** (0.142)	-0.003 (0.009)	-0.05	0.410 *** (0.143)	0.008 (0.007)	0.14	0.439*** (0.143)	0.016 (0.013)	0.28
Market share instability in short-term loans to firms	0.691** (0.267)	-0.020 (0.014)	-0.20	0.701*** (0.267)	0.007 (0.011)	0.07	0.681** (0.266)	-0.039* (0.022)	-0.44
Market share instability in long-term loans to firms	0.357 (0.231)	0.024* (0.014)	0.24	0.387* (0.231)	0.025 (0.010)	0.30	0.373 (0.232)	0.012 (0.021)	0.16
Medium and long-term interest rate to households	-6.284*** (1.533)	-0.058 (0.095)	-0.09	-6.152*** (1.535)	0.051 (0.074)	0.08	-6.205*** (1.532)	0.193 (0.138)	0.29
Interest rates on overdraft to firms	-1.004 (2.351)	0.259** (0.114)	0.22	-1.178 (2.359)	-0.008 (0.088)	-0.01	-0.911 (2.349)	0.343** (0.172)	0.36
Medium and long-term interest rates to firms	-2.756 (3.672)	-0.040 (0.217)	-0.03	-2.851 (3.679)	0.070 (0.167)	0.05	-2.908 (3.690)	0.001 (0.334)	0.00
Real collateral to mortgages to households	-0.671*** (0.137)	0.004 (0.008)	0.05	-0.673*** (0.137)	0.005 (0.007)	0.06	-0.653*** (0.137)	0.021* (0.012)	0.25
Real collateral to medium and long-term loans to firms	-0.581*** (0.181)	0.026** (0.011)	0.23	-0.597*** (0.181)	0.009 (0.008)	0.11	-0.620*** (0.180)	-0.005 (0.016)	-0.05

(1) Computed with estimates reported in the respective columns of table A11.

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# DEBT RESTRUCTURING AND THE ROLE OF LENDING TECHNOLOGIES

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## 1. Introduction

Debt restructuring may preserve the ongoing concern of firms facing financial distress but which still have profitable investment projects. It is a complex bargaining process which involves the firm and its lenders. When a borrower faces financial distress, the lender bank has to decide whether to take part in the workout process or not. We study this decision, taking into account banks' heterogeneity in terms of organization and lending technologies.

Most of the existing literature on this argument considers bank debt easier to renegotiate than public debt, because banks are better able to produce and process information on firms' economic prospects, especially in the case of small and medium-sized enterprises (SMEs). Banks may both mitigate information asymmetries and facilitate coordination among lenders (Bolton and Scharfstein, 1996; Bris and Welch, 2005). They decide whether to liquidate or to reorganize the firm by providing the extra funds needed to ensure that the firm stays in operation. However, there is wide cross-country evidence that firms maintain relationships with many banks.<sup>1</sup> In a multiple banking framework, banks may behave differently as regards workout decisions, *i.e.* some banks decide to restructure their loans to financially distressed firms, while others do not. To the best of our knowledge, so far heterogeneity in restructuring has received little attention in the literature.

Recent theoretical and empirical literature have highlighted the role of different organization and lending technology adopted by the bank in shaping the type of relationship developed with the borrower (Stein, 2002; Berger and Udell, 2002; Berger *et al.*, 2005a; Berger, Frame and Miller, 2005b). We expect these factors to be especially important in the renegotiation process, when coordination problems arise and information asymmetries become even more relevant. Using a recent survey about Italian banks, we are able to link the choice to restructure the debt of a financially distressed firm to a series of variables that pin down organizational factors within the lending banks. Thus, this paper connects the literature on bank organization with the literature on debt restructuring.

In order to evaluate the restructuring decision, we perform an econometric analysis on Italian firms and their lending banks. The Italian case is particularly interesting to analyse: multiple banking relationships are widespread among SMEs (Detragiache, Garella and Guiso, 2000), while a harsh bankruptcy regime and the inefficiencies of the judicial system imply that reorganizations are better done privately. We use loan-level data, with the addition of information on both borrowing firms and lending banks. Starting from firms' financial statements (*Cerved*), we select those firms that faced financial distress (that is, whose cash flows fell below their net financing costs) at least once between 2002 and 2004. Balance-sheet data have been combined with

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<sup>1</sup> According to Ongena and Smith (2000), large firms located in 22 countries have an average of 5.6 banking relationships.



information concerning relations with the banking system (*Central Credit Register*) and with a special survey carried out in 2007 by the Bank of Italy on the organization and technology used in lending activities by Italian banks (*Bank organization survey*). The survey investigates the degree of bank decentralization and the comparative relevance of soft and hard information (credit scoring) in assessing credit risk. Thus we have a sample of about 30,000 loan-level observations (bank-firm relations), relating to more than 9,000 distressed Italian firms and 300 Italian banks.

These data allow us to evaluate the divergent strategies followed by banks when a borrowing firm becomes financially distressed. We define the restructuring decision either as the rescheduling of bank loan maturity or the extension of new loans to a firm in distress. These interventions loosen the borrower's financing constraints. They are economically significant: in our sample, among the firms that were able to renegotiate outstanding debt with at least one of the lending banks, only 8 per cent leaves the market, against 30 per cent among those firms that did not renegotiate their debt. Therefore, even if we do not address the default issue, we are confident that studying banks' decisions has an important economic motivation.

When we study this decision, we have to take into account the sample selection issue. While we have a representative sample of firms in distress, we only observe the banks which actually lent to those firms: firms choose the banks from which they borrow and banks decide whether to lend or not. This selection process, clearly endogenous, may bias the results. It is related to firm characteristics, such as size, risk and location, and, more importantly, to the credit policy of the bank. These elements are likely to influence, *ex ante*, the characteristics of lending banks – in terms of size, technology, etc. – and, *ex post*, the restructuring decision. We address this issue by estimating a probit model with sample selection. In the selection equation, we consider as potential lenders all those intermediaries that have at least one branch in the province where the firm is located. In this way, we study the restructuring decision which all the banks operating in the local credit market could have taken with respect to the firms in distress.

We find that bank heterogeneity accounts for the decision to restructure credit to SMEs in distress. While one third of the firms can restructure outstanding debt with at least one bank, it never happens that all the lending banks decide to restructure simultaneously. The probability of restructuring is higher when a lending bank relies more on soft information (relationship lending) rather than on hard information (transactional lending) and adopts a decentralized structure with more power allocated to local managers. The bank's restructuring decision also depends negatively on its distance from borrowing firms.

However there are significant complementarities among organizational variables: the adoption of credit scoring increases the likelihood of restructuring if banks also use these techniques systematically in the monitoring process and if they adopt more decentralized structures.

From a methodological point of view, our results emphasize the importance of taking bank heterogeneity into account when analysing the restructuring process. From a policy point of view, we argue that even if bank consolidation and the increasing use of credit scoring may raise concerns for SMEs in distress, the enhanced implementation of statistical techniques and effective decentralization of decision-making can offset their effects.

The paper is organised as follows. Section II contains a brief review of the theoretical background. Section III describes data sources and introduces some descriptive statistics. The empirical results are reported in Sections IV and V. Section VI concludes.

## 2. Literature review

This paper is rooted in two different strands of literature. The first analyses the bank-debt restructuring in the event of financial distress. The second studies the role of different bank organizations and lending technologies in company financing. To our knowledge, so far these two strands have followed different tracks. In recent years research assuming banks' heterogeneity has blossomed – at least when analysing variables such as credit availability, its price and risk, and market entry decisions – while the empirical literature dealing with financial restructuring has continued to assume that bank behaviour is homogenous.

According to Jensen (1989), as long as the going-concern value of the distressed firm exceeds the liquidation value, its debt will be renegotiated to assure survival. Moving from this statement, a well-developed body of literature has focused on the borrower-lender bargaining process in the design of debt contracts (Hart and Moore, 1998). With complete contracts, *ex ante* bargaining makes renegotiation in cases of distress unnecessary. On the contrary, when contracts are incomplete there is room for *ex post* renegotiation. Nonetheless, renegotiation is hampered by information problems, causing both coordination failures and difficulties in evaluating company prospects. More in general, the literature focuses on three aspects that may affect debt restructuring: *i*) the coordination between lenders; *ii*) the evaluation of firms' prospects after the occurrence of the financial distress (information asymmetries); and *iii*) the lenders' incentives to restructure.

As regards coordination, the presence of many lenders may lead to liquidation even if this is economically inefficient (White, 1989). Most of the theory assumes that coordination failures arise when debt is public or, at least, highly dispersed, while privately-held debt – mostly bank loans – is easier to renegotiate (Brown, James and Mooradian, 1993; Bolton and Scharfstein, 1996; Bolton and Freixas, 2000). If creditors do not coordinate their responses to a renegotiation offer or to a default threat, a single creditor will prefer to free-ride on the debt restructuring offer.<sup>2</sup> An increase in the number of lenders reduces the incentive of the borrower to repudiate debt payments (strategic default incentive), since contracts are more difficult to renegotiate (Bergloef and von Thadden, 1994; Bolton and Scharfstein, 1996; Manove, Padilla and Pagano, 2001). In a recent paper, however, Bris and Welch (2005) reach the opposite conclusion on the optimal number of creditors: since creditors recover less when they are dispersed, a firm that opts for multiple creditors *ex ante* has a better bargaining position in the case of financial distress *ex post*. Therefore, a good quality firm may choose just one house bank to signal its confidence it will not go bankrupt, while a risky firm will tend to increase the number of lenders. Similarly, Carletti, Cerasi and Daltung (2007) predict a greater use of multiple-bank lending when firms are less profitable and monitoring costs are high. Coordination may be achieved by means of a formal contract among the creditors, such as bank pools (Brunner and Krahen, 2008). However, large pools (*i.e.* pools with many member banks) have a negative impact on the likelihood of a successful turnaround.<sup>3</sup> Again, the evidence is against a simple trade-off between the number of banks and the borrower's ability to obtain a debt renegotiation.

It is particularly difficult to evaluate firm prospects when financial distress occurs, because of lower reliance on hard information about a firm's records (Giammarino, 1989; Boot, 2000; Davydenko and Franks, 2008). Relationship lending is assumed to help to restructure the

<sup>2</sup> Small lenders have an incentive to hold out, even if restructuring would be in the general interest (Bergman and Callen, 1991; Gertner and Scharfstein, 1991; Rajan, 1992).

<sup>3</sup> Using Italian data, Carmignani and Omiccioli (2007) evaluate the conflicting effects of the concentration of creditors, showing that the overall effect of a high concentration of bank credit is a higher probability of financial distress but a lower probability of liquidation.

outstanding debt of firms facing financial distress (Longhofer and Santos, 2000; Hoshi, Kashyap and Scharfstein, 1990). It is worth mentioning that in this situation creditors could prefer to postpone the liquidation decision, leaving the debt high and waiting for more information about the firm's viability. This is what Kahl (2002) calls "controlled liquidation". Liquidation is assumed to be a dynamic process, in which postponing the decision could be economically efficient for the bank. In fact, it may limit the downside risk; if assets lose value, creditors may proceed with an informed liquidation decision later on. This strategy comes at the cost of inducing less efficient investment decisions on the part of distressed firms. Therefore, it is an optimal choice only when there is a fair degree of uncertainty about a firm's recovery prospects.

In the literature on financial restructuring, creditors within the same category or seniority are commonly assumed to behave uniformly. While dispersed publicly-owned debt is considered separately from more concentrated bank debt (Bolton and Freixas, 2000), it is frequently assumed that banks will follow similar strategies, with few exceptions.<sup>4</sup> Detragiache, Garella and Guiso (2000) also consider the possibility that different banks may behave in different ways according to their liquidity problems. Moreover, according to Manove, Padilla and Pagano (2001) well secured banks may under invest in project screening activities (the lazy bank hypothesis). Kordana and Posner (1999) suggest that the secured creditor's incentives are skewed towards liquidation over reorganization.

Banks have usually been thought of as single agents, thus neglecting the complexity of their organizational forms and the potentially diverging objectives of the agents inside them.<sup>5</sup> However, a more recent strand of literature, deriving from firm theory, has underlined the importance of banks' heterogeneity also in an organizational perspective (Stein, 2002). The adoption of different lending technologies is intrinsically related to the design of the proper incentives within the bank. According to Aghion and Tirole (1997), the amount of communication within an organization depends on the allocation of formal authority. Increasing the decision-making power at the lower level of the hierarchy fosters information gathering and initiative, the cost being a loss of control over local managers, who may pursue their own private interests. We believe that organizational schemes and lending technologies are also important when the bank has to decide whether to restructure its loans to a distressed firm.

Information on a firm's prospects is clearly related to lending technologies. The adoption of remote banking and credit scoring tends to enhance the use of impersonal methods of contact: transaction-based lending may substitute relationship lending and this could affect bank lending policy when it comes to restructuring decisions, since soft information may be less important. Mian (2006) finds that in Pakistan foreign banks are less prone to renegotiate bilaterally in the case of default than domestic banks, suggesting that relationship lending makes financial restructuring easier than transactional lending. On the other hand, the effect of credit scoring techniques is not obvious: improved accuracy in evaluating creditworthiness may allow the bank to expand its lending towards informationally opaque firms (Berger *et al.*, 2005a); it may also reduce moral hazard, a key factor in cases of distress.

Relationship lending is based on proprietary information collected, in particular, by the loan officer through repeated interaction over time with the firm (Berger and Udell, 2002). Decentralization increases the incentives to collect soft information, which is not wasted along hierarchical lines (Stein, 2002). It significantly alters the interaction between the bank's

<sup>4</sup> In Bulow and Shoven (1978), three classes of claimants are analysed: bondholders, bank lenders and equity holders. Bondholders are assumed to be a non-cohesive group of lenders; therefore, to avoid bankruptcy, the main bank must provide the extra funds necessary to pay other creditors. Small banks are not included in the model, while their loans are placed with the bondholder claims. Therefore, bank heterogeneity is not analysed in the model.

<sup>5</sup> Rajan (1992) assumes that bank debt is easily renegotiated "because the bank is a monolithic, readily accessible creditor."

headquarters and its local branches and thus the decision-making process in the financial restructuring phase. Power delegation may convey stronger incentives towards debt restructuring; among the drawbacks, it may expose the loan officer to the risk of capture by the borrowing firm, delaying liquidation even when this is the most efficient solution. For many reasons, it may be in the loan officer's interest to conceal a deteriorating borrower's conditions, a problem that is exacerbated by delegating more authority to loan officers (Berger and Udell, 2002).

Agency costs to monitor local managers tend to increase with distance. The top management of the bank will be less familiar with the local economic and social environment. Greater physical and cultural distance makes it difficult to collect and communicate soft information and to monitor local managers (Degryse and Ongena, 2004; Alessandrini, Presbitero and Zazzaro, 2009). This could explain why the allocation of decision-making power to these officers tends to decrease with distance (Mocetti, Pagnini and Sette, 2010) and why foreign banks tend to be weaker at relational functions such as renegotiation and recovery of bad loans, functions that require strong information and control mechanisms (Mian, 2006).

More detailed measures of bank-organization heterogeneity have gradually begun to appear in the literature, recognizing the importance of the organizational schemes and technological progress (Berger, 2003; Berger *et al.*, 2005a, 2005b; Degryse *et al.*, 2009; Frame *et al.*, 2001; Petersen and Rajan, 2002; Scott, 2006). However, studies adopting a bank heterogeneity perspective have focused on aspects such as credit availability, its price and risk, and market entry. To the best of our knowledge, so far the literature on debt restructuring has instead downplayed the role of bank organization and lending technology.

### 3. Data description and stylized facts

To perform the econometric analysis, we build a unique data set at the loan level, using three sources of information, respectively regarding firms, their lending banks, and the characteristics of bank-firm relations.

First we use a dataset from Cerved consisting of company accounts. Cerved is a reliable source of information on Italian companies. Information is drawn from official data recorded at the Italian Registry of Companies and from financial statements filed annually at the Italian Chambers of Commerce on a compulsory basis. Cerved provides information nearly on the entire universe of Italian joint stock and public and private limited liability companies. The information provided includes company profiles and summary financial statements (balance sheets, income statements and financial ratios). We restrict the analysis to manufacturing firms or those offering private non-financial services, whose turnover before the occurrence of financial distress was between 1 and 50 million euros. Then we select those firms whose cash flows (earnings before provisions, interest and taxes) fell below their net financing costs at least once within the 2002-04 period (*i.e.* their coverage ratio became less than one).<sup>6</sup> In this situation, the firm is not able to meet its contractual repayment obligations. This is what we will call "financial distress" from here on. We consider only firms presenting this condition for the first time, in order to select those at the onset of the crises. We identify the distress event as the year in which this situation occurs for the first time. We close the sample in 2004, in order to have three years after the distress event (up to 2007) to assess the result of the workout.<sup>7</sup> We do not include listed companies in the sample, nor companies with access to financial markets; for firms in the sample, bank debt is mostly the only source of external finance, if we exclude trade credit.

<sup>6</sup> We also tried using different thresholds without significantly altering the results.

<sup>7</sup> That is, if financial distress occurs in 2004, the three-year window after the distress event is 2005-07.

This first set of information has been matched with Central Credit Register data (*Centrale dei rischi*; CR hereafter). The CR reports data on credit lines granted by every bank to each of the selected firms.<sup>8</sup> The CR also provides the number of banking relations and the quality of loans. For any distressed firm, data are taken at time  $t$  (the year of the distress event) and at time  $t+3$  (in order to evaluate the evolution of bank-firm relations and the result of the workout). We drop from the sample those firms that were classified as bad borrowers at the moment of the distress event by most of the lending banks, while we keep those that became non-performing in the following years.<sup>9</sup>

Then, we add additional information on lending banks, by using a Bank of Italy special survey conducted in 2007, which collected unique information on organization and technology used in lending activities by more than 300 Italian banks involved in the survey (Albareto *et al.*, 2008). The survey focuses on two aspects. First, it explores the role of local branches in small business lending, reporting the limits assigned to local loan officers and CEOs in extending credit to small businesses autonomously, the average turnover of local managers and the use of economic incentives to reward their activity. Second, it describes the diffusion of statistical models to manage credit risk: the year of introduction; their effective use in lending, pricing and monitoring the loan; and the importance the bank gives to other sources of information, such as personal knowledge. We also include other information from the Banking Supervision Reports.

Once all the sources of information have been matched, the sample numbers 9,150 firms facing financial distress and more than 300 banks. Our unit of observation is defined by a unique bank-firm pair. Since we observe about 3.5 banks for each borrowing firm, we have about 30,000 bank-firm observations. The econometric analysis has been conducted at this loan (bank-firm relationship) level.

Between 2002 and 2004, the average share of firms in financial distress in the total population was 5 per cent (Table 1). The share was higher for the service sector than for manufacturing; inside manufacturing, it was higher in traditional industries, such as textiles, clothing and footwear.

At time  $t+3$ , about one fifth of the distressed firms has exited the market, while almost 80 per cent still survive, in most of the cases no longer in financial distress (53 per cent; Table 2).

As far as the restructuring process is concerned, slightly more than one third of the firms is allowed to restructure outstanding debt by at least one bank (Table 3). Among the firms that have restructured their debt, exits are less than 10 per cent, against 30 per cent for the others. By and large, only some of the lending banks agree to restructure, while others do not. Thus, when computed at bank-firm level, the incidence of debt renegotiation goes down to 16 per cent. More specifically, in 23.5 per cent of cases only one bank restructures; two or more banks are found to restructure in the remaining cases (13 per cent; Table 3). Apart from one-to-one banking relationships, it never happens that all the lending banks decide to restructure simultaneously: in a nutshell, banks show heterogeneous lending behaviour.

Table 4 gives some descriptive statistics on the evolution of the main bank aggregates over the three-year window following the financial distress. From  $t$  to  $t+3$ , the credit used (considering only firms that have survived) increased at a yearly rate of about 4 per cent, while a higher growth rate was recorded for the economy overall. The increase in short-term lending was lower than in

<sup>8</sup> The CR records the exposures of banks for which the amount of credit granted or drawn or the guarantee provided exceeds the threshold of 75,000 euros.

<sup>9</sup> Since non-performing loans are assimilated to defaults in Italian supervisory regulation, these cases are similar to cross-defaults.

longer maturity exposure, whose incidence thus increased, from 45 to 48 per cent. The average number of lending banks and the credit concentration index remained substantially stable over the sample period. The incidence of bad debts on the sum of performing and non-performing loans (considering both exits and survivors) consistently increased, from 0 to 23 per cent.

#### 4. The probability of bank debt restructuring

##### 4.1 The model

When a borrower faces financial distress, the bank has to decide whether to take part in workout activities (*occurrence of workout*). Workout activities consist of rescheduling loan maturity and/or extending new credit; it may also encompass the arrangement of a lender syndicate, the provision of consultancy services, debt equity swaps and other kinds of involvement of the bank in restructuring (Elsas and Krahen, 2002). Some time after this decision, we observe if the firm still survives (*success of workout*) or has been liquidated. The bulk of the existing empirical literature is concerned with the success of workout.<sup>10</sup> In our analysis we depart from the prevailing literature as we observe every single bank–firm relationship (loan-level data) and report bank features such as organization and lending technologies, while previous studies use mainly information on firms and on the type of relationship with the banking system.

We study how a single bank contributes to the workout, adopting credit decisions such as rescheduling a maturity or agreeing a new credit extension. Following the taxonomy introduced by Brunner and Krahen (2008), bank debt is restructured if one of the following two conditions are present in the three years after the crisis:

- a) long term debt has increased while total loans have stayed the same or decreased only slightly (no more than 10 per cent);
- b) total loans have increased.

Therefore, our dependent variable (*RESTR*) is a dummy that is equal to 1 if the bank provides a maturity extension (option *a*) or an increase in total credit during the three years after the crisis (option *b*), 0 otherwise. With these interventions, the bank is loosening the borrower's financing constraints, most likely because it is willing to continue the relationship with the firm.<sup>11</sup> Consistently with our purpose, we also consider as non-restructured (*RESTR*=0) those firms that run into voluntary or forced liquidation, or are classified as bad borrowers by their lenders.<sup>12</sup> As a robustness check, in Section 5 we explore different definitions of the dependent variables. First, we consider the two previous conditions separately. We control for the cases in which restructuring is approved before time  $t+3$  (*i.e.*  $t+1$  or  $t+2$ ), but this decision is reversed afterwards.<sup>13</sup> Lastly, we define the restructuring operation in terms of the amount of new credit extended.

We estimate the probability that a bank restructures loans to a firm in distress as a function of balance-sheet data, relationship lending information and data on the organization and technology used by lending banks.

<sup>10</sup> At least in the short run. As usual in the related empirical literature, we follow the firms' history for 3 years after the occurrence of financial distress.

<sup>11</sup> We do not consider other types of restructuring, such as debt equity-swaps, lender syndicates or others, which are very uncommon for SMEs in distress.

<sup>12</sup> Due to inefficiencies in the Italian judicial system, the length of bankruptcy procedures often exceeds that of the analysed period (3 years after the occurrence of financial distress). Therefore the bad loan classification is usually a preliminary phase leading to liquidation.

<sup>13</sup> The previous definition classified these cases as non-restructured firms.

As a first step, we estimate a simple probit model of the type:

$$(1) \mathcal{Y} = 1(x\beta + \varepsilon > 0),$$

where  $1(\cdot)$  is equal to 1 if the relation inside the brackets is true.

The log likelihood is:

$$LL = \sum_{y=1} \ln\{\Phi(x\beta)\} + \sum_{y=0} \ln\{1 - \Phi(x\beta)\}$$

where  $\Phi$  denotes the standard cumulative normal distribution.

Still, this method does not address the primary concern which may bias our results: firms choose the banks from which they borrow and banks decide whether or not to lend (Berger *et al.*, 2005a; Guiso and Minetti, 2007). As a consequence, while we have a representative sample of firms in distress, we observe only those banks which actually lent to those firms, *i.e.* only the selected banks.

This selection process is clearly endogenous: it is related to firm characteristics, such as size, risk and location, and, more important to our purposes, to the credit policy followed by the bank. This process is of prime importance in the case of a firm which is small and risky. In fact, firms may decide to have relations with those banks they believe more willing to restructure outstanding debt in case of distress. On the contrary, they may just want to conceal the situation, moving to banks they think have more difficulties in detecting the real prospects of investment projects. Furthermore, according to Bris and Welch (2005), the entrepreneur will try to enlarge the number of creditors to gain a better bargaining position in case of distress. All these elements are likely to influence, *ex ante*, the characteristics of lending banks – in terms of size, technology, etc. – and, *ex post*, the restructuring decision.

To address this issue, we estimate a probit model with sample selection (Heckman, 1979) by means of maximum-likelihood estimation method, of the type:

$$(2) \quad \text{Sample selection:} \quad \mathcal{Y}_1 = 1(x_1\beta_1 + \varepsilon_1 > 0)$$

$$\text{Restructuring equation:} \quad \mathcal{Y}_2 = 1(x_2\beta_2 + \varepsilon_2 > 0) \quad \text{observed if } Y_1=1$$

$$\varepsilon_1, \varepsilon_2 \sim N(0, 1), \quad \text{corr}(\varepsilon_1, \varepsilon_2) = \rho$$

where  $1(\cdot)$  is equal to 1 if the relation inside the brackets is true. The main variable is observed only if the first equation is verified. The log likelihood is then:

$$LL = \sum_{y_1=1, y_2=1} \ln\{\Phi_2(x_1\beta_1, x_2\beta_2, \rho)\} + \sum_{y_1=1, y_2=0} \ln\{\Phi_2(x_1\beta_1, -x_2\beta_2, -\rho)\} + \sum_{y_1=0} \ln\{1 - \Phi(x_1\beta_1)\}$$

In the sample selection equation, we consider as potential lending banks all those intermediaries that have at least one branch in the province in which the firm is located. By

controlling for the selection of the lending banks, our aim is to study the restructuring decision which all the banks operating in the local credit market could have taken with respect to the firm facing distress.

The number of observations increases to more than 340,000 in the selection equation. Obviously, at this stage we do not introduce any information regarding bank-firm relations (which only exist for those banks actually selected). Our identification variable is the market share of the bank, computed on the number of branches. This variable has a univariate correlation of 0.33 with the selection variable (Table 6) against a correlation of 0.04 with the restructuring variable. The choice of this variable is based on the idea that if the bank has a widespread presence in the area, most likely the firm will select it. If the bank is not selected, this might be because the firm did apply for a loan but the bank rejected it, or because the firm did not apply for a loan in the first place, expecting the bank to be “tough” *i.e.* not willing to help in case of distress. We tried to capture the latter hypothesis by means of the second identification variable, which is the average collateral over total loans the bank requires in the same area from its business clients. Even if the correlation of this variable with the selection variable is statistically weak, we think it has important economic significance.

\* \* \*

To control for the anticipated going-concern value of the firm, we introduced various balance-sheet indices, such as the ratio of financial liabilities on total liabilities (*leverage*), return on assets (*ROA*) and net interest payments over total assets (*financing costs over assets*); we also introduce the firm size (*log of total assets*), as well as sector (two-digit Ateco code) and regional dummies. The balance-sheet variables are calculated as an average of the three years before the crisis.

To capture the concentration of lending across banks, we consider two variables: the first is a dummy (*Single*), equal to 1 if the firm has just one lending relationship; the second is the share of the bank over the total outstanding debt. We follow previous studies (Detragiache, Garella and Guiso, 2000; Guiso and Minetti, 2004 and 2007), in which multiple lending is a two-step decision: first, the firm decides whether to borrow from one or more banks; then it decides how concentrated its bank debt should be. The share of collateral over total credit extended by each bank is then introduced to control for the guarantee posted by the firm to the lending bank.

Our key variables are those capturing the heterogeneity among banks. All these regressors come from the special survey carried out by the Bank of Italy.

We first consider the lending technology used by the bank. We follow the conceptual framework described by Berger and Udell (2006). We introduce a dummy variable indicating whether a bank has adopted credit scoring techniques in small business lending (*Scoring*). According to Berger and Udell (2006), credit scoring is a transaction technology based primarily on hard information. Moreover, in the survey, banks are asked to evaluate how important they regard soft information in the lending process; therefore, we are able to add a dummy if the bank has stated that qualitative information is an important element in assessing the credit worthiness of SMEs (*Soft information*). We also use two dummy variables to capture the differences between banks that use credit scoring only as a decision-making rule and those also using the scores in the monitoring process.

We deem the degree of decentralization of the lending decision to be very important on bank behaviour (Stein, 2002). Delegation improves incentives to gather soft information and encourages initiative on the part of local managers. Using data from the survey, we computed a delegation index as the amount of credit the local branch manager of the bank can extend autonomously to small businesses, with respect to the amount the CEO himself can grant without referring to the



bank's board (*Delegation*). To verify the soundness of our results, we also use the index in absolute terms, as the amount (in logs) of credit that a local branch manager can autonomously extend to a small firm.

Decentralized banks may partially offset the different objectives of local and central managers by designing appropriate incentives. To ensure local managers apply the appropriate effort in obtaining and processing information, their remuneration is usually linked to the economic performance of the branch they manage: we introduce a dummy for the existence of economic incentives to remunerate local managers (*Incentives*). On the other hand, to avoid excessive involvement in local economies, branch managers are commonly moved on a regular basis. In the estimates, we also add the average length of tenure (in months) of these managers (*Turnover*).

Finally, the size of the bank and its distance from the borrower may be important factors in influencing the decision whether to support a firm in distress. Therefore, we introduce dummies for the type and dimension of the bank and we measured the physical distance between bank headquarters and the location of the firm (*Distance*). A growing number of contributions address this issue.<sup>14</sup> Distance is related to the type of relationship with the firm. Larger banks tend to use transactional technology in lending to firms located far away (Berger, Frame and Miller, 2005b). Monitoring costs tend to increase with borrower-lender distance. Furthermore, intermediaries lending at a greater distance are less involved in local economies than smaller banks, which are part of the community and have fewer ways of diversifying their assets. Mian (2006) finds that geographical and cultural distance is an important attribute in explaining the lending, recovery and renegotiation differences between domestic and foreign banks.

Table 5 reports some descriptive statistics about the main variables used in the estimates, including balance-sheet indices and bank organization variables. At this descriptive stage, we just note that in the case of a bank-firm restructured relationship (observations for which *RESTR*=1), the average value is higher for *Roa* and *Size*, and lower for *Scoring* and *Distance*, that is restructured firms are larger, more profitable and the lending banks are geographically closer and make less use of credit scoring. Finally, Table 6 shows the cross-correlations between variables.

## 4.2 The results

Table 7 reports the results of the econometric analysis. The first two columns report the restructuring equation and the selection equation from our baseline specification; we compare these results with a restructuring equation estimated by means of a simple probit (Col. 3). Then, we introduce some extensions for credit scoring techniques, by controlling if they are used in the lending decision and monitoring procedures (Col. 4). Additional specifications are reported in the following columns of Table 7.

As far as the Heckman procedure is concerned, in the selection equation (Col. 1) the two identification variables are strongly significant and they show the expected signs: banks with a higher market share in the province are more likely to be picked up; the same is true when they ask for a lower level of collateral. The selection process is an important issue to address, as suggested by the significance of the estimated  $\rho$ . Furthermore, most of the effects in the restructuring equation (Col. 2) are stronger when estimated by the Heckman procedure than when a simple probit is used (Col. 3), confirming that we need to correct for sample selection.

<sup>14</sup> On the effects of the physical and functional distance of a lending bank from a borrowing firm, see Alessandrini, Presbitero and Zazzaro (2009) and Degryse and Ongena (2004) for a review.

In the restructuring process (Cols. 2-8), our results related to balance-sheet variables seem to point to consistent outcomes. The more favourable the financial position of the firm (lower interest payments and leverage), the higher the likelihood of restructuring. This is also true for firm profitability (measured by *ROA*), which increases the probability of restructuring outstanding debt. On the other hand, debt restructuring is more frequent for smaller firms.

Moving to variables related to bank concentration, the econometric analysis provides new insights on the recent theoretical and empirical literature on credit concentration. Our results show that a non-linearity does exist, which in turn may support the theory put forward in Detragiache, Garella and Guiso (2000) and Guiso and Minetti (2004 and 2007), in which multiple lending is modelled as a two-step decision: first, the firm decides whether to borrow from one or more banks; then it decides how concentrated its bank debt should be. In our results, single banking helps to restructure outstanding debt: the estimated coefficient for *Single* is positive and significant. On the other hand, once multiple banking is chosen, it is rational for a risky firm to spread its debt: the probability of obtaining debt restructuring in the case of distress decreases with the size of the lending share of each bank.<sup>15</sup> An alternative specification (not reported) in which we use the Herfindahl concentration index points in the same direction.

We introduce the share of the bank over the total outstanding debt separately for the leading bank, *i.e.* the bank which has extended the higher share (*Share of the main bank*), and the other intermediaries (Col. 6). The effect of lending shares is lower for the main bank than for the other intermediaries – the test that the two variables have the same coefficient is rejected at 1 per cent – but it is still detectable in the data.<sup>16</sup> Thus, banks tend to limit further increases in their exposure towards risky business when it is already high. As described in more detail in the next section, this interpretation is further improved by comparing the results in relation to the type of restructuring: it becomes more and more difficult to get further credit as the share of the bank increases, while it has no effect on the likelihood of obtaining a maturity extension for outstanding debt.

This evidence can add a further rationale to the findings of Ongena, Tümer-Alkan and von Westernhagen (2007), who show that firms with a higher probability of default are expected to have a larger number of banks and a significantly lower degree of credit concentration. It is also shown that the usual imitative behaviour of small banks with respect to the main bank applies to a lower extent in the case of a firm in distress, which borrows more from other banks rather than from the main bank. Our result is also consistent with the theory stated in Detragiache, Garella and Guiso (2000), since the risk of fund withdrawal because of a bank liquidity shock is more difficult to balance for a firm in distress. Furthermore, according to Bris and Welch (2005), a firm that opts for multiple creditors *ex ante* assumes a better bargaining position in the case of financial distress *ex post* (Guiso and Minetti, 2004 and 2007; Ongena, Tümer-Alkan and von Westernhagen, 2007).

The coefficient estimated for *Collateral* is negative and significant, suggesting that banks restructure less when bank credit is better secured. This finding appears to be consistent with some explanations proposed in the theoretical literature. According to the *lazy bank* hypothesis (Manove, Padilla and Pagano, 2001), in the case of distress, well secured banks may free-ride on screening activities and other initiatives aiming at preserving a firm's operations. In addition, it should be more difficult to reconcile divergent borrowers' preferences when borrowers are endowed with different seniorities (Bolton and Scharfsten, 1996). This finding is also consistent with the asset-based lending theory, where collateral is the primary source of repayment (Berger and Udell, 2006).

<sup>15</sup> Since the variables *Single* and *Bank share* are correlated (Table 6), we also introduced them separately. The above described results are confirmed.

<sup>16</sup> Nearly the same result is obtained in a specification (not reported) which excludes the dummy *Single*.

With regard to the variables capturing bank heterogeneity, the dummies for the type of bank maintain some explanatory power. It is worth noting that small cooperative banks tend to restructure more than large and medium banks (our benchmark), while other small banks do not. Therefore, we believe that cooperative banks do follow different strategies when dealing with small firms in distress, even after controlling for their lending technology and organization. Most likely, this result is related to their nature as cooperatives rather than to their size: the other small banks in the sample do not show any detectable difference in restructuring propensity.

While controlling for bank size, the type of organization and lending technology still explain the restructuring decision. The estimated sign of the variable *Scoring* is negative and very significant, *i.e.* the introduction of credit scoring techniques reduces the probability that a bank will restructure credit to firms in distress (Table 7, Col. 1).

Since this issue is of great interest, we have explored in detail the role of credit scoring techniques, exploiting more comprehensive information on how credit scoring is actually implemented by banks.

Banks were asked to assess whether credit scoring techniques were important both in the loan decision and in the monitoring process. In the restructuring equation, we introduced two dummies, to control for the use of scores in credit-extension decisions (*Score\_Decision*) and in the monitoring process (*Score\_Monitoring*), respectively.<sup>17</sup> The estimates in Column 4 report our preferred specification. It turns out that the estimated coefficient is negative for *Score\_Decision*; on the contrary, it assumes a positive sign for *Score\_Monitoring*. Note that banks use credit scoring techniques more frequently in the decision-making process to extend credit, rather than in the monitoring process, thus explaining the overall negative effect of *Scoring*. In our view, the opposite signs estimated for the two dummies suggest that the use of credit scoring is not by itself an obstacle to restructuring, while the way it is implemented matters. In the monitoring stage, the use of statistical techniques signals a continuous process of gathering and analysing information over the entire life cycle of the firm-bank relationship, rather than an episodic application of automatic techniques. Most likely, the use of these methods reduces monitoring costs, thus helping debt renegotiation for firms in a very crucial phase of their life.

We further investigate the use of credit scoring by defining this variable differently. Since we know the year of adoption of these techniques by banks, we can exploit this information. The credit scoring dummy is now equal to 1 if credit scoring was adopted before the restructuring decision but after the distress event; 0 otherwise. In doing so, we are now sure the variable is completely exogenous with respect to the selection process. Our results are qualitatively and quantitatively confirmed (Col. 7).

The decentralization-degree variable (*Delegation*) positively affects the probability of restructuring. This result is also confirmed when we introduce the variable in absolute terms (column 5 of table 7). Being closer to SMEs and having more power in the decision-making process, local managers may use personal relations to collect soft information. This helps the restructuring process. Of course, we cannot rule out that local managers have the incentive to hide a deteriorating borrower's condition or that they are looking for private benefits (Aghion and Tirole, 1997; Berger and Udell, 2002). We will come back to this point later on. It is worth mentioning that when *Scoring* and *Delegation* are interacted, the resulting interaction effect assumes a positive value, indicating that the use of credit scoring increases the probability of restructuring if banks also adopt more decentralized structures (Col. 8). The mean of the interaction effect is equal to

<sup>17</sup> We did not change the selection equation in the first step, since we believe that is difficult for the borrower to know the way these techniques are implemented by the lending bank. However, the results are very similar considering these variables in the selection equation.

0.176, with a standard error of 0.0649; for the sake of simplicity, it is calculated with a simple probit estimation, using the “inteff” procedure proposed by Norton, Wang and Ai (2004). This result is consistent with the hypothesis that even when accomplished by larger banks, decentralization may counterbalance the effects of a rigid implementation of automatic techniques.

The *Turnover* variable is never significant. This may attenuate the possible concern about the estimated (positive) coefficient of the *Delegation* variable. In fact, more delegation may entail better incentives and information for local loan officers, thus allowing a proper selection of better firms; on the other hand, it may introduce the risk that credit is allocated to unworthy borrowers, because of agency problems between the loan officer and his bank. In any case, this risk should increase with the length of tenure of the local officer. To disentangle the hypothesis of more accurate information from that of capture, we therefore interact *Turnover* and *Delegation*. Since the interaction variable turns out to be always insignificant, this gives some further support to the improved information explanation.<sup>18</sup>

The bank-firm distance is a measure for both the type of lending relationship and information about the overall economic conditions of the area where the firm is located. However, this variable is obviously linked both to bank size and the type of bank organization.<sup>19</sup> Therefore we add it only at the end, in order to analyse whether it affects the results or not. We find that lending at a greater distance significantly decreases the probability of restructuring. In the meantime, our main results remain stable. It is also worth mentioning that the coefficient for *Cooperative banks* decreases, suggesting that part of its effect depends on a very close proximity to distressed firms; at the same time, the coefficient for *Cooperative banks* remains highly significant – while we do not detect any effect on restructuring likelihood as far as other small banks are concerned, supporting the hypothesis that the effect comes from the cooperative form rather than size.

## 5. Robustness check

### 5.1 Sample splits and different definitions of the dependent variable

In this section, starting from our preferred specification (Spec. 4 of Table 7) we perform some robustness checks. The results are reported in Table 8.

In the first place, we split the sample by considering separately: small firms with total sales lower than 10 million euros (Tab. 8, Col. 1); and medium-sized businesses with sales of 10 to 50 million euros (Col. 2). Our results remain generally unchanged. In line with the theory, soft information and economic incentives are (only slightly) significant for small firms, while they are insignificant for medium-sized businesses; this is true both in the selection and the restructuring equations. In the latter, the distance seems to play a role only for smaller firms, while it loses significance as firm size increases. As far as credit scoring in lending and monitoring is concerned, the two variables have the same sign but the marginal effect for medium-sized firms is more than twice that of smaller firms.

Then we explore different definitions of the dependent variables (in the table we report only the second stage, since the selection equation remains unchanged).

First, we define the restructuring in terms of credit *granted* instead of credit actually *used* (Col. 3). Then we control for the cases in which the concessions – rescheduling or new finance –

<sup>18</sup> At the same time, we think that this issue is sufficiently important to merit further analysis, in future research work.

<sup>19</sup> For the sake of simplicity, we do not report the various steps in which we progressively add the variables.

are approved before time  $t+3$  (that is  $t+1$  or  $t+2$ ), but this decision is reversed afterwards in the three-year window (Col. 4).<sup>20</sup> Next, we split the variable, considering separately the cases in which only the maturity is rescheduled (point  $a$  in the previous definition; Col. 5), from cases in which the firm obtains new finance (point  $b$  in previous definition; Col. 6). In the next paragraph we will also define the restructuring in terms of the quantity of new credit extended.

However, through these various definitions of the dependent variable, the estimated results for the regressors of interest remain mostly unchanged. As further evidence, we signal that banks are more prone to reschedule maturity rather than to extend new credit towards highly leveraged firms. As a matter of fact, the marginal effects of balance-sheet variables are much higher when banks decide to allow new credit lines rather than to extend loan maturity. This evidence is consistent with the idea that banks tend to postpone the liquidation decision by rescheduling their debt claims if there is increasing uncertainty about a firm's prospects (Kahl, 2002).

Disentangling the type of restructuring also improves our understanding of the credit concentration effect: as a bank's lending share increases, it tends to avoid the extension of new loans, while its share has no effect on the likelihood of maturity rescheduling.

Finally, we focus our attention on the eventuality that the restructuring process is an inefficient economic outcome. To ensure economic efficiency, only the debt of firms with positive investment opportunities should be renegotiated, while non-viable firms are better liquidated.

In the previous estimates, we controlled for the expected net present value of distressed firms by introducing the average balance-sheet indexes computed before the crisis. This is a backward looking strategy, since we do not have the proper variable to split viable from non-viable firms according to their future prospects; nevertheless we can presume that the most likely candidates to exit the market in the near future are those firms still in distress at  $t+3$  (about one-fourth of the sample; Table 2). Thus, we conduct an econometric analysis considering only those firms which are no longer in financial distress at  $t+3$ . When we replicate the econometric exercise with reference to these firms (Col. 7 of Table 6), our previous results are confirmed. This evidence provides some support to the hypothesis of more efficient restructuring of distressed firms, but the issue would require further analysis and is left for further research.

## 5.2 *More on the endogeneity of organizational variables*

Indeed, most of the organizational variables are likely to be endogenous. If incentive schemes, decentralization and use of technology are properly designed and implemented, one would expect them to lead to the selection of better firms. Thus, the bank should be keener on renegotiating the debt of these firms since they are good clients that have been hit by bad luck and the bank wishes to maintain the relationship. In other words, proper organizational schemes could promote an *ex ante* selection (at the very first credit decision) of better firms. If this is the case, firms will obtain debt renegotiation irrespective of the actual importance of the organization variables.

Note that we have already tackled this issue, by controlling for the matching of the bank-firm relationship in the first stage, when our key variables are used in the selection equation. Furthermore, we introduced the financing position and profitability of the firm (*leverage*, *ROA*, *financing costs on assets*) before the occurrence of the distress. These controls allow us to

<sup>20</sup> The previous definition classified these cases as not restructured firms.

distinguish between *ex ante* better firms (those suffering distress only after a period of good profitability) and riskier firms (for which distress occurs in unfavourable economic conditions).

Notwithstanding these controls, a sceptic could still argue that residual borrower-level variation is spuriously correlated with firms' quality. To further address this concern, following Mian (2006), we add firm-level fixed effects to the estimated equation, thus controlling for all possible borrower-specific variations. For the sake of simplicity, we use a simple linear probability model, but we obtain similar results when a conditional logit model is used. Obviously we drop all firms with just one lending relation (*Single*=1). This methodology emphasizes the heterogeneous behaviour of different lending banks towards the same firm in distress.

The estimated coefficients (see Table 9) regarding our main organizational variables (*distance*, *scoring*, *soft information*, *incentive*, *delegation*) remain mainly unaffected, suggesting that our results are not driven by unobserved borrower characteristics since they are robust to the inclusion of borrower fixed effects. Thus, we are more confident of the relevance of lending technologies and banks' organizational schemes for the financial-restructuring process.

Lastly, we introduced fixed effect by banks. In this way we can test whether there is some time-discontinuity in the behaviour of the same bank towards different firms before and after introducing credit scoring techniques. We know the year of adoption of these techniques and we can exploit this information.<sup>21</sup> Thus, we redefined the credit scoring dummy: it is now equal to 1 if it was adopted before the restructuring decision; 0 if it was adopted afterwards. We can see how the implementation of credit scoring changes the probability after the introduction. Again the result points to a harsher regime following the adoption of credit scoring, in line with our previous results.

### 5.3 The intensity of bank debt restructuring

So far, the results discussed in the previous section are robust to different specifications of the dependent variable and to different estimation methods.

We further check the robustness of these estimates using an alternative definition of the restructuring process. First, we try to capture the intensity of bank involvement towards the distressed firm. More in detail, we assess the extent by which a bank makes further concessions, by using the log of new credit extended in the three years following the crises. We use this information as a new definition of our dependent variable. Obviously, we should again address a selection problem. As a matter of fact, we have to take into account that: *i*) the observed bank-firm relationship is the result of a self selection process; *ii*) only the subgroup of restructured firms had the chance to obtain new finance. It is worthwhile recalling here that one condition we used to define debt restructuring is actually an increase in credit extended in the case of distress (option *b* in our definition). These aspects call for an appropriate technique to solve this double-selection problem. To this purpose, we adopt a standard bivariate decision problem as proposed by Meng and Schmidt (1985) and Tunali (1986).<sup>22</sup> This method allows us to control for the fact that a firm may agree on a restructuring plan and obtain new credit only after a two-stage participation decision, *i.e.* the firm's decision to participate in the credit market and the bank's decision to extend credit to that firm. Therefore in the first stage we estimate these two equations by a bivariate probit with partial observability:

$$(3) \quad y_{1ij} = x_{1ij} b_1 + e_{1ij} \quad (\text{firm } i \text{ applies for credit to bank } j \text{ if } y_{1ij} > 0)$$

<sup>21</sup> From the survey, we know the year of adoption only for credit scoring, not for other variables.

<sup>22</sup> For an application to the labour market analysis, see Mohanty (2005).

$$(4) \quad y_{2ij} = x_{2ij} b_2 + e_{2ij} \quad (\text{bank } j \text{ decides to restructure the debt of firm } i \text{ if } y_{2ij} > 0)$$

We include in  $x_{1,ij}$  and  $x_{2,ij}$  a set of variables aimed at capturing all the economic and financial determinants of the credit decision. We also include the two identification variables already discussed in the previous section: the bank market share in the province, measured by the number of branches, and the average collateral requested by the bank from firms in the same province.

In the second step of the analysis, we estimate a restructuring equation for the borrowing firms only, where the dependent variable,  $Y_i^m$ , is the new credit extended; we use OLS and add the two corrections for the self-selection bias:

$$(5) \quad Y_i^m = x_{3i} b_3 + c_{13} \lambda_{1i} + c_{23} \lambda_{2i} + u_i$$

Where:

$$Y_i^m = \log \text{loans}_{t+3} - \log \text{loans}_t, \quad u_i = \varepsilon_i - c_{13} \lambda_{1i} - c_{23} \lambda_{2i},$$

$$\lambda_{1i} = \frac{\phi(x_{1i} b_1) \Phi\left(\frac{x_{2i} b_2 - \rho x_{1i} b_1}{\sqrt{1 - \rho^2}}\right)}{F(x_{1i} b_1, x_{2i} b_2, \rho)} \quad \lambda_{2i} = \frac{\phi(x_{2i} b_2) \Phi\left(\frac{x_{1i} b_1 - \rho x_{2i} b_2}{\sqrt{1 - \rho^2}}\right)}{F(x_{1i} b_1, x_{2i} b_2, \rho)}$$

$\phi$  and  $\Phi$  represent, respectively, the density and the cumulative function of a standard normal distribution, while  $\rho$  is the correlation of the error terms in the bivariate probit.

Table 10 reports the estimated results using the method discussed above (Col. 2), compared with those obtained by an estimation without sample-selection correction (Col. 1). By applying this method, our results appear to be unaffected or, in some cases, even strengthened.

As an alternative estimation technique, we considered a Tobit model,<sup>23</sup> whose dependent variable is zero in the case where no restructuring is recorded (if  $RESTR=0$ ) and it is equal to the growth of credit in the three years after the crises ( $\log \text{loans}_{t+3} - \log \text{loans}_t$ ) in the case of restructuring (if  $RESTR=1$ ). The (log) likelihood function is:

$$LL = \sum_{y_i > 0} \ln \frac{1}{\sigma} \phi\left(\frac{y_i - x_i \beta}{\sigma}\right) + \sum_{y_i = 0} \ln \left[ 1 - \Phi\left(\frac{\beta' x_i}{\sigma}\right) \right],$$

The results, reported in the last column of Table 10, confirm our previous evidence.

<sup>23</sup> The hypothesis underlying the Tobit model was that the explanatory variables would influence in the same way both the probability of restructuring and the quantity of credit extended. This hypothesis may be too restrictive, in that the explanatory variables may affect the two phenomena in different ways or may be relevant in only one of the decisions.

## 6. Concluding remarks

In this paper we have studied the bank-debt restructuring process of SMEs in financial distress, taking bank heterogeneity into account thanks to a survey conducted by the Bank of Italy on bank organization and lending technology. Our results show that banks follow heterogeneous strategies when facing financially distressed firms, in that they may behave very differently according to their organization and lending technologies. While bank size seems far less important, in line with the literature on lending technologies we show that more impersonal bank-firm relations, lending at a great distance and relying on credit scoring techniques (transactional lending) may decrease the likelihood of bank debt restructuring, compared with cases where there is relationship banking.

However, we show that technological and organizational arrangements may balance the effects of transactional lending. Decentralization of decision-making and a more systematic use of statistical techniques, especially in the monitoring process, can facilitate financial restructuring. In particular, the use of credit scoring is associated with a higher probability of debt restructuring when a bank also adopts a more decentralized structure and also uses these methods to monitor the lending relationship.

From a policy perspective, better understanding of the mechanisms behind banks' decisions towards firms in distress is economically significant. The restructuring decision is a crucial step in preserving the continuation of a firm in distress but still with profitable investment opportunities. While consolidation and the increasing use of credit scoring may raise concerns for SMEs in distress, our results suggest that enhanced implementation of statistical techniques and effective decentralization of decision-making may offset these effects. At the same time, the growing emphasis of regulators on bank organization appears to be consistent with our results. Our work also suggests that the common assumption of uniform bank behaviour in the case of distress should be reconsidered; at the same time, that bank size *per se* cannot fully explain this heterogeneity among banks, as individual choices relating to strategies, organizational forms, and lending technologies may have important consequences on banks' behaviour.



## APPENDIX

### Definition of variables

*Dependent variables* (Source: Central Credit Register):

*Restr*: binary variable equal to 1 if at least one of these two conditions has occurred: *i*) long-term debt has increased while total loans stayed the same or decreased only slightly (no more than 10 per cent); *ii*) total loans have increased. Firms in voluntary or forced liquidation, and those classified as bad borrowers are considered as non-restructured.

*Firm variables* (Source: Cerved):

*Financing cost on assets*: ratio of net interest expenses to total assets;

*Leverage*: Ratio of financial debts to the sum of financial debts and net equity;

*Size*: (Log of ) total assets;

*ROA*: Return on assets;

*Coverage*: ratio of earnings before interests, taxes and depreciation to net interest expenses. [This variable has been used to select firms facing financial distress].

*Bank-firm relationship variables* (Source: Central Credit Register):

*Distance*: distance (Log of KMs) between the bank's headquarters and the location of the borrowing firm;

*Bank share*: share of the bank over total outstanding debt;

*Share of the main bank*: share of the main bank over total outstanding debt, when the bank is the principal one (with the larger position); 0 otherwise.

*Share of other banks*: share of the bank over total outstanding debt, when the bank is *not* the principal one; 0 otherwise;

*Collateral*: ratio of collateralized loans to total loans;

*Single*: binary variable equal to 1 if there is just one lending bank;

*Bank organization variables* (Source: Bank of Italy, Survey on bank organization):

*Scoring*: binary variable equal to 1 if a bank uses scores in 2003 as a rule in the decision-making process, instead of adopting a more flexible approach;

*Score decision*: binary variable equal to 1 if a bank uses credit scoring techniques in 2003 and these are considered as an important instrument when deciding new credit extension;

*Score monitoring*: binary variable equal to 1 if a bank uses credit scoring techniques in 2003 and these are considered as an important instrument in the monitoring process;

*Delegation*: index of delegation in favour of local managers, computed as the amount of loans to SMEs that they can extend autonomously with respect to the amount the CEO of the bank can extend;

*Soft information*: binary variable equal to 1 if a bank has stated that qualitative information is important in credit decisions;

*Incentive*: binary variable equal to 1 if local managers are compensated by means of a performance-related wage;

*Turnover*: average length of tenure of the local loan officer (in months);

*Time*: time (in years) since the adoption of credit-scoring techniques in 2003.

*Other bank variables* (Source: Bank of Italy, Banking Supervision Reports:

*Small banks in groups*: binary variable equal to 1 if a bank is both small in size and a member of a banking group;

*Small banks*: binary variable equal to 1 if a bank is small and it is *not* member of a banking group;

*Cooperative banks*: binary variable equal to 1 if a bank is both small and a cooperative (“Banca di Credito Cooperativo”, according to the Italian banking law).

Table 1

**Firms in distress**  
(% of firms)

<b>Firms in distress for the first time in the year considered</b> (% of firms)	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>Average</b>
Total	3.7	6.4	5.0	5.0
<i>By sector</i>				
Manufacturing	3.2	5.8	4.4	4.5
Services	4.2	7.1	5.5	5.6
<i>By area</i>				
North	3.5	6.4	4.7	4.8
Centre	3.7	6.6	5.4	5.2
South	4.8	6.6	5.5	5.6
<i>By size</i>				
1-10 million euros	3.5	6.7	5.1	5.1
10-50 million euros	5.0	5.1	4.2	4.8
Source: Cerved. Simple frequencies on the number of firms not in distress at the beginning of the period.				

Table 2

**Situation at  $t+3$  of firms in distress in  $t$**   
(% of firms)

<b>Situation at <math>t+3</math></b> (% of firms)	<b>By sector</b>		<b>By area</b>			<b>By size</b> (million euros)		<b>Total</b>
	<b>Manufac- turing</b>	<b>Services</b>	<b>North</b>	<b>Centre</b>	<b>South</b>	<b>1-10</b>	<b>10-50</b>	
Exits	19.8	22.4	20.5	20.9	24.4	21.7	18.3	21.1
Survivors	80.2	77.6	79.5	79.1	75.6	78.3	81.7	78.9
<i>Still in distress</i>	22.3	28.5	25.2	26.5	25.3	24.2	31.7	25.5
<i>Out of distress</i>	57.9	49.1	54.2	52.6	50.3	54.1	50.0	53.4
Total	100	100	100	100	100	100	100	100
Source: Cerved, Central Credit Register. Simple frequencies on the number of firms in distress in $t$ .								

Table 3

**Financial restructuring of firms in distress**  
(% of firms)

Situation at $t+3$ (% of firms)	By sector		By area			By size (million euros)		Total
	Manuf.	Serv.	North	Centre	South	1-10	10-50	
Exits	19.8	22.4	20.5	20.9	24.4	21.7	18.3	21.1
Survivors	80.2	77.6	79.5	79.1	75.6	78.3	81.7	78.9
At least one bank restructures ( $a+b$ )	40.4	33.7	37.1	39.8	32.0	34.7	48.2	36.4
Only one bank	24.9	22.7	23.5	25.3	22.2	23.9	22.6	23.5
2 banks	9.3	7.3	8.6	8.2	6.5	7.4	12.5	8.0
3 banks	3.8	2.4	3.0	3.8	2.4	2.4	6.3	3.0
4 or more banks	2.5	1.4	2.02	2.4	0.9	1.0	6.7	1.9
All the banks restructures ( $a$ )	2.0	4.1	2.8	3.3	4.4	3.4	1.4	3.1
Some banks restructures, others do not ( $b$ )	38.4	29.6	34.3	36.5	27.6	31.3	46.8	33.3
Less than half of banks	33.8	25.1	29.7	31.4	24.0	27.0	40.8	28.7
More than half	4.6	4.5	4.6	5.1	3.6	4.3	6.0	4.6
Financially restructured (1)	16.1	16.6	16.3	17.1	15.5	15.9	17.9	16.4

Source: Cerved, Central Credit Register. All the statistics refer to the simple frequencies of firms on the total of distressed firms, except (1), which refers to the number of bank-firm relationships.

**Table 4****Main credit variables**

Variables	<i>t</i> (year of financial distress)	<i>t+3</i>
Bank credit (1)		13.3
Number of banks	4.7	4.7
Herfindhal index, computed on bank credit	0.47	0.48
Long-term bank credit (%share of bank credit)	44.8	47.8
Collaterals (%share of bank credit)	17.6	18.7
Bad loans (% share of bank credit) (2)	0.0	23.0

Source: Cerved, Central Credit Register. All the statistics refer to the survivor firms, except (2), which refers to all distressed firms in the sample.  
(1) Growth rate of bank credit between t and t+3.

Table 5

**Sample statistics**  
(bank-firm relationships)

Variables	All the sample of distressed firms (RESTR=0;1)					Only the non restructured firms (RESTR=0)	Only the restructured firms (RESTR=1)
	Mean	Std. Dev.	Median	1 <sup>st</sup> quartile	3 <sup>rd</sup> quartile	Mean	Mean
<i>Dependent variable</i>							
Restructuring	0.16	0.37	0.00	0.00	0.00	0.00	1.00
<i>Firm variables</i>							
Leverage	0.74	2.05	0.79	0.60	0.91	0.74	0.74
Size (log of total assets)	8.35	1.10	8.30	7.53	9.10	8.30	8.40
ROA	-0.05	0.13	-0.02	-0.07	0.00	-0.05	-0.03
Financing cost on assets	0.03	0.02	0.02	0.01	0.04	0.03	0.03
<i>Bank relationship variables</i>							
Herfindhal	0.58	0.29	0.52	0.34	0.90	0.59	0.53
Distance	1.60	1.92	0.89	0.24	2.26	1.60	1.50
<i>Bank organization variables</i>							
Scoring	0.25	0.43	0.00	0.00	1.00	0.26	0.21
Score_decision	0.23	0.42	0.00	0.00	0.00	0.23	0.19
Score_monitoring	0.16	0.37	0.00	0.00	0.00	0.16	0.16
Soft Information	0.54	0.50	1.00	0.00	1.00	0.54	0.52
Delegation	0.07	0.09	0.03	0.01	0.09	0.07	0.08
Incentive	0.84	0.37	1.00	1.00	1.00	0.83	0.87
Turnover	31.7	11.5	30.0	24.0	36.0	31.8	31.0

Source: Cerved, Central Credit Register, Bank of Italy Survey on bank organization. All the statistics refer to the bank-firm relationships.

Table 6

## Correlations between variables

	RESTR	Selection	Finan. costs /assets	ROA	Leverage	Size	Collateral (bank- firm level)	Single	Bank share
RESTR	1								
Selection		1							
Finan. costs /assets	-0.027	0.062	1						
ROA	0.042	0.001	-0.038	1					
Leverage	-0.014	0.058	0.143	-0.016	1				
Size (log of total assets)	-0.050	0.116	-0.134	-0.035	0.062	1			
Collateral (bank-firm level)	-0.087	0.289	0.023	-0.002	0.033	0.046	1		
Single	-0.011	0.158	-0.030	0.005	-0.023	-0.025	0.075	1	
Bank share	-0.051		-0.120	-0.010	-0.128	-0.356	0.228	0.635	1
Scoring	-0.019	-0.013	0.002	0.003	-0.002	-0.007	-0.009	-0.002	-0.016
Score_decision	-0.019	0.015	0.002	0.003	-0.002	-0.006	-0.006	0.006	-0.012
Score_monitoring	0.018	-0.002	0.004	0.003	0.001	-0.005	-0.007	-0.004	-0.040
Delegation	0.025	-0.066	0.001	-0.001	0.001	-0.001	0.002	-0.021	-0.005
Soft information	0.000	-0.018	-0.001	0.000	0.003	0.002	0.001	-0.006	0.009
Incentive	0.010	0.048	0.011	0.007	0.001	-0.005	0.007	0.012	-0.002
Turnover	0.013	-0.090	0.004	0.004	0.009	0.000	-0.014	-0.023	0.013
Distance	-0.037	-0.043	-0.004	0.008	-0.021	-0.023	-0.003	-0.011	-0.047
Share of bank branches in the prov.	0.042	0.328	0.016	0.010	0.004	-0.008	0.084	0.119	0.169
Avg. collateral, by bank in the prov.	-0.011	-0.010	-0.005	0.005	-0.001	-0.016	0.056	0.003	0.115
... continues									

	Scoring	Score decision	Score monitor	Delega- tion	Soft informa- tion	Incentive	Turnover	Distance	Share (bank branches)
Scoring	1								
Score_decision	0.840	1							
Score_monitoring	0.733	0.608	1						
Delegation	0.100	0.075	0.139	1					
Soft information	0.070	0.036	-0.037	0.100	1				
Incentive	-0.079	-0.082	-0.139	-0.156	-0.091	1			
Turnover	0.023	0.014	0.031	0.260	0.023	-0.254	1		
Distance	0.084	0.132	0.087	-0.074	-0.071	0.046	-0.178	1	
Share of bank branches in the prov.	0.035	0.085	-0.035	-0.154	-0.030	0.097	-0.121	-0.126	1
Avg. collateral, by bank in the prov.	-0.037	-0.074	-0.089	0.164	-0.024	-0.112	0.194	-0.086	0.050

Source: Cerved, Central Credit Register, Bank of Italy Survey on bank organization.

**Table 7**  
**Probability of restructuring outstanding bank debt**  
*(Heckman and simple probit regressions; marginal effects for the restructuring equations)*

Variables	1		2		3		4		5		6		7		8	
	Baseline		Probit of		Preferred		Ddelegation		Share of the		Scoring		Scoring *			
	Selection	Restruct.	baseline	Restruct.	heckprob	Restruct.	(absolute)	Restruct.	main bank	Restruct.	exogenous	Restruct.	delegation	Restruct.	Restruct.	
Financing costs/assets	7.492*** [19.73]	-1.311*** [5.88]	-0.881*** [5.99]	-1.341*** [5.99]	-1.366*** [6.10]	-1.348*** [6.02]	-1.395*** [5.83]	-1.299*** [5.941]								
ROA	0.152 [1.58]	0.399*** [4.41]	0.361*** [5.18]	0.401*** [4.41]	0.397*** [4.38]	0.393*** [4.35]	0.400*** [4.43]	0.389*** [4.289]								
Leverage	0.173*** [22.9]	-0.027* [1.86]	-0.019** [2.02]	-0.028** [1.95]	-0.029** [2.01]	-0.029** [1.97]	-0.026** [1.84]	-0.028* [1.940]								
Size (log of tot. assets)	0.230*** [36.04]	-0.040*** [8.82]	-0.027*** [9.03]	-0.042*** [9.31]	-0.043*** [9.55]	-0.044*** [9.56]	-0.038*** [8.51]	-0.039*** [9.032]								
Collateral (single firm)	---	-0.189*** [9.89]	-0.172*** [9.97]	-0.193*** [10.05]	-0.182*** [9.33]	-0.195*** [10.14]	-0.192*** [10.05]	-0.190*** [10.011]								
Single (1 / 0)	---	0.070*** [3.42]	0.058*** [3.17]	0.071*** [3.48]	0.073*** [3.56]	0.063*** [3.08]	0.068*** [3.31]	0.070*** [3.417]								
Bank share	---	-0.190*** [10.48]	-0.157*** [10.02]	-0.190*** [10.49]	-0.194*** [10.67]	---	-0.189*** [10.44]	-0.188*** [10.463]								
Share of the main bank	---	---	---	---	---	-0.192*** [10.59]	---	---								
Share of other banks	---	---	---	---	---	-0.277*** [7.19]	---	---								
Scoring (1 / 0)	-0.163*** [22.51]	-0.029*** [3.69]	-0.027*** [3.76]	---	---	---	---	-0.046*** [4.459]								
Score_decision (1 / 0)	---	---	---	-0.087*** [8.28]	-0.070*** [6.43]	-0.087*** [8.25]	---	---								
Score_monitoring (1/0)	---	---	---	0.115*** [8.48]	0.099*** [7.34]	0.116*** [8.46]	---	---								
Score exogenous	---	---	---	---	---	---	-0.027*** [3.61]	---								
Delegation (relative)	0.409*** [10.49]	0.258*** [6.12]	0.209*** [5.57]	0.122*** [2.72]	---	0.121*** [2.71]	0.208*** [5.09]	0.153*** [2.798]								
Delegation (absolute)	---	---	---	---	0.018*** [7.15]	---	---	---								
Scoring*delegation	---	---	---	---	---	---	---	0.204*** [2.725]								
Soft information (1 / 0)	0.015** [2.59]	0.011 [1.59]	0.003 [0.56]	0.018*** [2.75]	0.013* [1.95]	0.019*** [2.75]	-0.002 [0.34]	0.011* [1.672]								
Incentive (1 / 0)	0.009 [0.90]	0.025** [2.46]	0.023** [2.49]	0.040*** [3.81]	0.031** [2.87]	0.040*** [3.78]	0.029** [2.77]	0.018* [1.749]								
Turnover	-0.007*** [23.44]	0.000 [0.64]	0.000 [0.32]	0.000 [0.37]	0.000 [1.37]	-0.001 [0.40]	0.000 [0.33]	0.000 [0.214]								
Distance	-0.054*** [25.13]	-0.009*** [3.65]	-0.015*** [7.95]	-0.009*** [3.88]	-0.010*** [4.02]	-0.009*** [3.91]	-0.011*** [4.80]	-0.008*** [3.381]								
Small banks in groups	-0.332*** [38.86]	-0.003 [0.73]	-0.023*** [2.80]	-0.001 [0.12]	0.018* [1.79]	-0.001 [0.12]	-0.014 [1.49]	-0.007 [0.754]								
Small banks	-0.372*** [20.17]	0.015 [0.71]	-0.016 [0.90]	0.012 [0.54]	0.037* [1.69]	0.012 [0.56]	-0.002 [0.12]	0.020 [0.951]								
Cooperative banks	-0.543*** [35.45]	0.068*** [3.88]	0.018 [1.29]	0.087*** [4.93]	0.139*** [8.20]	0.086*** [4.90]	0.057*** [3.21]	0.072*** [4.187]								
Bank share in the prov.	7.173*** [163.23]	---	---	---	---	---	---	---								
Avg. collateral	-0.122*** [6.94]	---	---	---	---	---	---	---								
Rho		-0.151***		-0.165***	-0.169***	-0.166***	-0.143									
Uncensored		29,491		29,491	29,515	29,491	29,491	29,491								
and total obs.		340,736	29,491	340,736	340,960	340,736	340,736	340,736								

The regressions also include the constant as well as regional, sector and year dummies. Robust z statistics are in brackets. Standard errors are adjusted for clustering in firms. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.



Table 8

**Restructuring and financial distress: robustness check**  
(Heckman selection estimation, restructuring equation. Marginal effects)

Variables	1	2	3	4	5	6	7
	Sample up to 10 million	Sample 10 to 50 million	Restructuring on credit granted	Restructuring before $t+3$	Restructuring only maturity extension	Restructuring with new finance	Only firms out of distress at $t+3$
Financing costs on assets	-1.417** [5.96]	-1.253** [2.26]	-1.637*** [7.34]	-1.573*** [6.98]	-0.601*** [3.13]	-1.465*** [6.48]	-0.402 [-1.31]
ROA	0.350*** [3.75]	0.509* [1.74]	0.448*** [4.59]	0.433*** [4.25]	0.280*** [3.31]	0.379*** [4.17]	0.475*** [4.01]
Leverage	-0.043*** [2.67]	-0.023 [1.29]	-0.009 [0.70]	-0.039** [2.33]	0.017* [1.84]	-0.041*** [2.76]	-0.009 [-0.70]
Size (log of total assets)	-0.049*** [8.15]	-0.077*** [5.32]	-0.025*** [5.61]	-0.049*** [-10.81]	-0.007* [1.90]	-0.044*** [9.54]	-0.033*** [-5.63]
Collateral (bank-firm level)	-0.185*** [8.66]	-0.188*** [4.36]	-0.203*** [10.95]	-0.188*** [9.16]	-0.106*** [6.19]	-0.160*** [8.31]	-0.227*** [-8.41]
Single (1 / 0)	0.068*** [3.14]	0.001 [0.02]	0.004 [0.23]	0.066*** [3.43]	-0.030* [1.84]	0.124*** [5.90]	0.068** [2.42]
Bank share	-0.178*** [9.13]	-0.245*** [5.24]	-0.057*** [3.20]	-0.209*** [11.76]	0.012 [0.85]	-0.261*** [13.93]	-0.223*** [-8.96]
Score_decision (1 / 0)	-0.070*** [5.97]	-0.160*** [6.82]	-0.060*** [5.67]	-0.108*** [10.19]	-0.082*** [8.90]	-0.080*** [7.65]	-0.088*** [-6.07]
Score_monitoring (1 / 0)	0.092*** [5.88]	0.204*** [7.46]	0.083*** [6.04]	0.134*** [10.48]	0.099*** [6.93]	0.111*** [7.94]	0.118*** [6.40]
Delegation (relative)	0.089* [1.76]	0.230** [2.41]	0.209*** [4.71]	0.082* [1.86]	0.189*** [4.71]	0.094** [2.13]	0.070 [1.15]
Soft information (1 / 0)	0.024*** [3.04]	-0.001 [0.08]	0.019** [2.92]	0.006 [0.88]	0.011* [1.85]	0.018*** [2.71]	0.023** [2.48]
Incentive (1 / 0)	0.053*** [4.37]	-0.006 [0.29]	0.039*** [3.71]	0.036*** [3.49]	0.053*** [5.71]	0.034*** [3.29]	0.042*** [2.81]
Turnover	0.000 [0.18]	-0.001 [1.23]	-0.001** [2.17]	0.000 [0.30]	-0.001*** [3.36]	0.000 [0.18]	0.000 [-0.79]
Distance	-0.012*** [4.09]	-0.006 [1.21]	-0.008*** [3.51]	-0.010*** [4.08]	-0.008*** [3.74]	-0.008*** [3.30]	-0.011*** [-3.15]
Small banks in groups	-0.007 [0.66]	0.019 [0.94]	-0.009 [0.95]	-0.008 [0.88]	-0.030*** [3.62]	0.004 [0.39]	-0.011 [-0.79]
Small banks	0.014 [0.60]	0.009 [0.18]	-0.027 [1.29]	0.009 [0.42]	-0.015 [0.83]	0.012 [0.59]	-0.026 [-0.86]
Cooperative banks	0.083*** [4.21]	0.101** [2.61]	0.050*** [2.92]	0.056*** [3.35]	0.023 [1.39]	0.091*** [5.12]	0.077*** [3.25]
Rho	-0.137***	-0.281***	-0.180***	-0.153***	-0.170***	-0.161***	-0.1461***
Uncensored and total obs.	22,285 285,496	7,241 55,240	29,491 340,736	29,491 340,736	29,491 340,736	29,491 340,736	14,857 172,605

The regressions also include the constant, as well as regional, sector and year dummies. Robust z statistics are in brackets. Standard errors are adjusted for clustering in firms. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

**Table 9**

**Restructuring and financial distress: fixed effects for firms or banks**  
(linear probability models)

Fixed effects for firms		Fixed effects for banks	
Collateral (bank-firm level)	-0.130*** [6.11]	Financing cost on assets	-0.933*** [6.46]
Bank share	-0.128*** [6.37]	ROA	0.294*** [4.93]
Scoring (1 / 0)	-0.033*** [3.49]	Leverage	-0.019** [2.33]
Delegation (relative)	0.135*** [2.81]	Size ( log of total assets )	-0.027*** [9.56]
Soft information (1 / 0)	0.013* [1.71]	Collateral (bank-firm level)	-0.114*** [7.40]
Incentive (1 / 0)	0.022* [1.78]	Single (1 / 0)	0.065*** [3.83]
Turnover	-0.000 [0.80]	Bank share	-0.172*** [11.46]
Distance	-0.014*** [5.52]	Scoring in the year of restructuring	-0.0533*** [2.96]
Small banks in groups	-0.016 [1.53]	Distance	-0.019*** [8.85]
Small banks	-0.011 [0.45]		
Cooperative banks	0.044** [2.43]		
n. observation	22,250	n. observations	29,491
n. of groups	7,702	n. of groups	270
The regressions also include the constant.		The regressions also include the constant, as well as regional, sector and year dummies.	

Table 10

**New credit to firms in distress**  
(bivariate probit and Tobit estimation)

Variables	1	2	3	4
	New credit without sample selection correction	New credit with sample selection - baseline specification	New credit with sample selection - preferred specification	Tobit estimates (marginal effects)
Financing cost on assets	-9.162*** [8.93]	-31.579*** [5.75]	-29.153*** [5.53]	-2.584*** [11.33]
ROA	0.387 [0.94]	7.306*** [3.95]	6.430*** [3.87]	0.522*** [4.78]
Leverage	-0.522*** [3.26]	-0.991*** [5.04]	-0.946*** [4.92]	-0.129*** [7.93]
Size (log of total assets)	-0.123*** [6.98]	-0.812*** [4.64]	-0.763*** [4.59]	-0.059*** [12.66]
Collateral (bank-firm level)	0.112* [1.64]	-3.347*** [3.84]	-2.947*** [3.71]	-0.210*** [7.45]
Single (1 / 0)	1.898*** [18.37]	3.119*** [9.40]	2.982*** [9.69]	0.384*** [13.33]
Bank share	-2.561*** [25.98]	-5.858*** [6.97]	-5.434*** [7.16]	-0.628*** [23.97]
Scoring (1 / 0)	-0.046 [1.26]	-0.554*** [4.07]	---	---
Score_decision (1 / 0)	---	---	-1.482*** [4.18]	-0.124*** [7.93]
Score_monitoring (1 / 0)	---	---	1.861*** [4.08]	0.144*** [7.52]
Delegation (relative)	0.097 [0.50]	4.465*** [4.02]	1.762*** [3.52]	0.133** [2.16]
Soft information (1 / 0)	0.026 [0.80]	0.212*** [3.69]	0.315*** [3.91]	0.019** [1.98]
Incentive (1 / 0)	0.086 [1.96]	0.529*** [4.49]	0.704*** [4.31]	0.054*** [3.55]
Turnover	0.000 [0.01]	0.003** [2.01]	-0.002* [1.35]	-0.000 [0.99]
Distance	0.006 [0.60]	-0.142*** [3.62]	-0.132*** [3.48]	-0.017*** [5.89]
Small banks in groups	0.020 [0.46]	-0.038 [0.80]	-0.001 [0.03]	-0.026** [2.04]
Small banks	-0.071 [0.83]	0.200* [1.80]	0.076 [0.76]	-0.043 [1.49]
Cooperative banks	-0.083 [1.31]	1.056*** [3.56]	1.188*** [3.56]	0.024 [1.09]
Blamda1	---	-1.019*** [3.96]	-0.977*** [3.87]	---
Blamda2	---	9.329*** [3.98]	8.153*** [3.86]	---
Observations	9,117	9,117	9,117	29,491
R-squared	0.125	0.127	0.127	0.026

The regressions also include the constant as well as regional, sector and year dummies. Robust z statistics are in brackets. Standard errors are adjusted for clustering in firms. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

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## LOAN OFFICER AUTHORITY AND SMALL BUSINESS LENDING. EVIDENCE FROM A SURVEY

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### 1. Introduction

A large body of the literature has highlighted how large banks are less prone to lend to small firms (e.g. Berger *et al.*, 2005). An interpretation of the reluctance of large banks to lend to small firms is that these borrowers are opaque and can only be screened and monitored on the basis of *soft information* (Stein, 2002).

*Soft information* has two main characteristics that would make large banks less able to lend to opaque borrowers than small intermediaries. Firstly, *soft information* is gathered by a face-to-face interaction between lenders and borrowers which requires physical proximity. In principle, the proximity to borrowers may be achieved by both large and small banks by means of their branch networks. Banks would only need to delegate the acquisition of *soft information* to their branch managers. However, the second key characteristic of *soft information* – *i.e.* poor verifiability – gives rise to principal-agent problems when the production of information is delegated. According to Stein (2002), agency problems are particularly severe in complex organizations where the information has to be passed on through many hierarchical layers. By assuming that the size of the bank and the complexity of its organization are closely linked, Stein's model also predicts that large banks are less able than small banks to produce *soft information* and thus to lend to opaque borrowers.

The model proposed by Stein (2002) is based on the intuition that the ability of branch managers to credibly transfer *soft information* – *i.e.* the efficiency of the communication technology – depends on the organizational complexity of the bank. Therefore the efficiency of the communication technology is crucial for the functioning of the so-called internal capital market, by means of which internal financial resources are allocated by bank headquarters among branches. Loan officers collect information, both soft and hard, about potential borrowers and then compete for funds on the internal capital market. Naturally, bank headquarters can assess the quality of the projects that branch officers want to finance only on the base of verifiable information. This implies that, insofar as branch managers are unable to harden it, soft information is useless for capital budgeting purposes. Thus, branch manager incentives to exert effort in the production of soft information are positively related to their ability to show their headquarters that the projects they want to finance are creditworthy. The efficiency of the communication technology, by means of which information is passed on from branches to higher organizational layers, is then strictly related to the level of the loan officer's authority, that is the degree of control over lending decisions that branch loan managers have.

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Most of the extant empirical literature, investigating bank specialization in small business lending, is based on the hypothesis that organizational complexity is directly related to bank size. In particular, these contributions<sup>1</sup> assume that large banks are more hierarchical (*i.e.* the head office is less prone to delegate) and branch loan officers have less authority compared with small banks' loan officers. However, Albareto *et al.* (2008), by exploiting a very unique dataset on the organizational characteristics of Italian banks recently surveyed by the Bank of Italy, showed that there is some heterogeneity in bank organization even within banks of similar size. As a result, even if size is probably an important driver affecting bank organizational design, it is not the only influence and it is also important to look at the nature of the loan officer's authority.

In this paper, we test whether the branch loan officer's authority affects bank specialization in small business lending. Differently from previous contributions, we do not proxy the branch loan officer's authority with the size of the bank. Indeed, we exploit the recent Bank of Italy survey which has provided us with detailed information about the number of hierarchical layers involved in small business lending approvals, loan officer turnover, the use of credit-scoring techniques, the amount of money up to which branch loan officers are entitled to lend, and the type of loan officer compensation schemes. Furthermore, the availability of detailed and new information on the organizational structure of a very large sample of Italian banks gives us the opportunity to shed light on how the various characteristics of bank organization interact among themselves.

While the relation between the loan officer's authority and small business lending specialization is clearly stated in Stein's model (2002), it is not an easy task to test that link empirically. Firstly, following Aghion and Tirole (1997), one has to be aware that there is a distinction between *formal authority* (the right to decide) and *real authority* (the effective control over decisions), and econometricians may, at best, reasonably observe the formal authority of a loan officer while, if they want to test Stein's predictions, they need to observe the *real* authority. Secondly, loan authority and effort depend on many factors, such as: the maximum amount loan officers are entitled to lend on their own, their discretion in setting rates, the kind of loan officer compensation scheme, and so on. On the one hand, these factors interact among themselves in shaping the organizational design of the loan approval process within a bank; on the other hand, formal organizational features may impinge on the real authority of a loan officer in quite a complex way. For these reasons, instead of focusing on a specific organizational characteristic, we adopt an holistic approach and we include in the estimation different organizational variables which are presumably related to the real authority of the loan officer in order to investigate – bank size being equal – how different organizational solutions in modelling local officers incentives can affect bank portfolio choices. Thus, we contribute to the literature investigating the role of organization for bank lending specialization in two main ways. Firstly, by using a unique dataset including information about bank organizational features and lending techniques, we are able to go beyond the comparison between large and small banks. Secondly, we show that small business lending specialization is positively correlated with many bank organizational characteristics linked to a loan officer's authority; moreover, we support the idea that the link between formal and real authority may be quite complex.<sup>2</sup> In other terms, by using the survey on bank organization we are able to shed light on some features of the organizational "black box". However, we are aware that this is only the first step to understanding the way that box may actually work.

<sup>1</sup> A comprehensive review on banking organizational issues is summarized in Cerqueiro, Degryse and Ongena (2007).

<sup>2</sup> Our econometric specification is not able to avoid endogeneity problems and our results cannot therefore be interpreted as causal effects.

Another insight of the paper is that we verify how the distance between the borrower and bank headquarters (*functional distance*)<sup>3</sup> interacts with the organizational scheme, especially with the loan officer's authority, and then affects bank willingness to lend to opaque borrowers. Following Dell'Ariccia and Marquez (2004) and Hauswald and Marquez (2006), we argue that the ability of a branch loan officer to transfer soft information to higher hierarchical layers – which is closely related to the loan officer's authority – depends not only on the organizational complexity of the bank, as put by Stein (2002), but also on functional distance.<sup>4</sup>

Finally, we exploit geographical and sector heterogeneity across banks to compute our measure of specialization in small business lending for each bank at the province/sector level. This allows us to disentangle supply (bank organization characteristics) and demand factors (firm characteristics) and to control also for some lending relationship features, like the functional distance between bank headquarters and borrowers.

The main results of the analysis are the following. Firstly, our analysis confirms that large banks are generally less prone to lend to small firms than other banks. This is in line with previous empirical contributions, supporting the view that small banks are better able to lend to opaque borrowers compared with larger intermediaries.

Secondly, we show that bank size is only part of the whole story since, even after having controlled for it, bank organizational features help to explain differences across banks in small business lending. In particular, our analysis suggests that loan officer authority is positively related to small business lending activity. Indeed, we find the more loan officers are involved in loan approval decisions and/or in setting loan pricing, the more the bank is specialized in small business lending.

Conversely, the amount of money up to which loan officer may lend autonomously is negatively correlated with bank specialization in small business finance. This result is due to the fact that the amount of money loan officers are entitled to lend does not necessarily entail a greater authority for loan officers. Indeed, this result is consistent with the hypothesis that loan officers gain private benefits by expanding the overall amount of money they lend (the so-called empire-building hypothesis). Consequently, they can more easily expand their lending portfolio when they are entitled to grant a larger amount of money per each contract. In this way, they obtain the same overall branch target by lending to a smaller number of borrowers. Furthermore, by assuming that bank debt is a good proxy for firm size and opaqueness they can save on soft information-gathering efforts.

We also find that, banks which give greater importance to *soft information* in lending decisions are more willing to lend to small businesses, consistently with the view that small firms are opaque borrowers and that their creditworthiness assessment is largely based on proprietary information. Small business lending specialization is also negatively affected by loan officers' turnover. This result suggests that loan officers' efforts to gather *soft information* are less if they stay at a given branch for a shorter time.

In the same direction, our econometric analysis indicates that the distance between bank headquarters and borrowers (*functional distance*) affects the availability of lending to small businesses: the shorter the distance between dealing partners, the higher the bank specialization in small business finance. This is consistent with the hypothesis that functional distance lowers the

<sup>3</sup> To the best of our knowledge, Alessandrini *et al.* (2005 and 2008) were the first to use this definition, in opposition to the physical proximity between borrowers and bank branches (the so-called *operational distance*).

<sup>4</sup> Mistrulli and Casolaro (2008) provide some evidence concerning functional distance and loan rate setting, supporting the view that distance affects the ability of a loan officer to harden soft information. Jimenez, Salas-Fumas and Saurina (2008) investigate the relationship between functional distance and the use of collateral.

capability of branch loan officers to credibly pass on soft information to higher hierarchical layers of the bank, reducing their ability to compete for internal resources and, as a consequence, the specialization of banks in lending to opaque borrowers too.

The rest of the paper proceeds as follows. Section 2 describes the data and the econometric methodology. Section 3 presents the empirical findings. Section 4 concludes.

## 2. Data and methodology

### 2.1 Sources of data

In 2007 the Bank of Italy surveyed the lending practices in use by Italian banks at the end of 2006. More than 300 banks participated in the survey, accounting for 83 per cent of the overall Italian banking system's lending to firms. Leasing and factoring companies, branches of foreign banks, and consumer credit banks were not included in the survey since these intermediaries are highly specialized in specific segments of the credit market. The sample covers almost all Italian banks, except for the very smallest ones. The accuracy of the data collected is high. Firstly, preliminary interviews with some bankers allowed the questionnaire to be designed so as to avoid potential misunderstandings; secondly, *ex post* interviews helped fill missing information and clarify erratic answers.

Banks participating in the survey were questioned about lending to small enterprises: the number of hierarchical layers involved in the decision to grant a loan, the kind of information required in order to make a lending decision (*soft* versus *hard information*), and information about branch loan officers, such as the amount of money up to which they are allowed to lend autonomously, the speed of their turnover, and their compensation schemes (see Albareto *et al.*, 2008).<sup>5</sup>

Initial evidence for bank organization suggests that loan officer power delegation and turnover generally increase with bank size (Table 1), but a certain variability in these organizational features persists within homogenous groups of banks sharing a similar governance scheme. Furthermore, the adoption of different lending techniques (e.g soft information or rating systems) also shows mixed solutions across groups of banks (Table 2).

We then match the information obtained from the survey with bank Supervisory Reports allowing us to compute a measure of specialization in lending to small businesses at both sector (23 sectors) and geographical level (103 provinces) for each bank participating in the survey. We also use bank balance sheet data to compute control variables to take into account bank-level characteristics affecting portfolio composition. After a cleaning procedure to detect outliers, 239 banks remain.

Since the main obstacle of the econometric exercise is to proxy the local officer's real authority, because this is not directly observable, we adopt a pragmatic approach. In particular, it is reasonable to assume that both loan officers' decisional power and their efforts depend crucially on organizational design (in term of decentralization and control). Thus, we use a set of bank organizational controls to capture local officers' authority.

<sup>5</sup> For a similar survey concerning US banks, see Udell (1989).

## 2.2 The research question and the econometric set-up

The main aim of the econometric analysis is to verify whether banks which delegate more real authority to their loan officers (that we approximate with various bank organizational features) are more oriented to small business lending, as suggested by Stein (2002).

Our baseline regression is a cross-section of the following type:

$$SHSE_{ijz} = f(\text{Organization}_i, \text{SoftInformation}_i, \text{CreditScoring}_i, \text{Disth}_{iz}, \text{Bank}_i, \text{Sector}_j, \text{Geography}_z)$$

The dependent variable (*SHSE*), which ranges between 0 and 1, is the outstanding amount of loans, granted by bank *i* to small businesses (with less than 20 employees) of sector *j* and headquartered in province *z*, as a share of the overall amount of lending to non-financial firms of sector *j* headquartered in province *z*, granted by bank *i*.

We have computed bank specialization in small business finance separately for each province/sector pair to which a bank lends. In this way we are able to disentangle loan demand factors – which vary at both sector and geographical level – and supply factors and in particular bank organizational characteristics – which vary at the bank level. To avoid eventual bias due to minimal amounts of lending, we drop all bank/sector/province observations accounting for less than 0.002 per cent of bank-level total loans.<sup>6</sup> Since the bank organizational characteristics are observed at the end of 2006, our measure of bank specialization in small business finance has been computed as the average of the four 2007 quarters. In this way we mitigate both endogeneity and seasonality problems. The econometric exercise is carried out by an OLS estimation and the results are checked with a tobit regression since our dependent variable is bounded between 0 and 1.

We investigate the impact of different factors on bank specialization in small firm finance.

Firstly, *Organization<sub>i</sub>* is our key set of variables, controlling for bank organization characteristics related to a loan officer's real decision-making power (see Table 3 for more details). In particular, we include in the estimation variables focusing on:

- the scope of the power delegated (*i.e.* the amount of finance up to which loan officers may autonomously lend, their discretion in setting interest rates or asking for collateral);
- the turnover policy adopted by banks;<sup>7</sup>
- whether loan officers play a relevant role in the loan approval process or not;
- the kind of reward scheme: some bank headquarters may place a greater emphasis on branch profitability, while others may be more oriented to pursue a loan volume target or risk mitigation.

Bank lending specialization could also be affected by the type of lending technologies adopted (Berger and Udell, 1995 and 2002). In order to control for their impact we use two dummy variables. On the one hand, *SoftInformation<sub>i</sub>* is a dummy that is equal to 1 if, according to the survey, bank *i* considers *soft* information as “crucial”, “very important” or “important” in lending decisions. Since this kind of information is difficult to verify, if banks require loan officers to base

<sup>6</sup> The value corresponds at the 10<sup>th</sup> percentile of the bank level total loan distribution. Alternative thresholds do not affect our main results.

<sup>7</sup> In some unreported regressions we have divided the level observed of a loan officer's delegation and turnover for bank *i* by the maximum computed over all the banks lending to small firms headquartered in province *z*, since we approximate the boundaries of local credit markets – the market relevant to small firms – with those of the 103 Italian provinces. In this way, following Degryse, Laeven and Ongena (2007), we aim to capture how bank *i*'s organization differs from that of its competitors (other bank lending to firms in province *z*). Our main findings are robust to the employment of these average measures of delegation and turnover.

their lending decisions on qualitative information or on personal knowledge, this implies that loan officers are largely autonomous. On the other hand,  $CreditScoring_i$  is a dummy that is equal to 1 if a bank has introduced a rating system mainly to monitor and control borrowers' creditworthiness.

Moreover, we also take into account that the distance between borrowers and bank headquarters can affect the ability of loan officers to pass information along the hierarchy, which then lowers the ability of loan officers to compete in the internal capital market. To this aim we compute a dummy variable ( $DISTh$ ) that is equal to 1 if the province<sup>8</sup> where borrowers are headquartered is the same province where the lending bank  $i$  has its headquarters. We have adopted a discrete measure for functional distance since most of lending relationships are concentrated within the province where both the lender and the borrower are located.

Finally,  $Bank_i$  is a vector of variables taking into account other bank-level characteristics, such as size, risk and cost efficiency, potentially correlated with portfolio composition, while  $Sector_j$  and  $Geography_z$  are respectively firm sector and province dummies, controlling for loan demand factors.

Descriptive statistics are reported in Table 3, which shows further information on the definition of variables employed in the econometric analysis.

### 3. Results

#### 3.1 Basic regressions

Results are reported in Table 4. In the first model (model  $a$ ) we have regressed our measure of bank specialization in small business finance over some bank and firm characteristics. In particular, after having controlled for loan demand factors, *i.e.* for the sector of activity and the province where the firm is headquartered (sector and province dummies), we find evidence supporting the view that **bank size** ( $Size$ ) affects lending portfolio choices. In line with many other papers (e.g. Berger *et al.*, 2005), our results show that large banks are less prone than small banks to lend to small firms. In particular, moving from the 25<sup>th</sup> percentile of the bank size distribution to the 75<sup>th</sup> percentile, the share of lending to small firms decreases by about 9 percentage points. In the first model, we also control for the **number of branches** a bank has in the province where the borrowers are headquartered ( $Branches$ ). We find that, other things being equal, banks are more prone to lend to opaque borrowers in local markets where their network of branches is larger. Our interpretation is that, since lending to small firms is mostly based on *soft information* and this information may be gathered only at a local level, a large branch network helps banks to collect *soft information*, thus making easier to screen and monitor opaque firms.

We also control for the **functional distance** between the borrower's and the lender's headquarters. In particular,  $Disth$  is a dummy which equals 1 if the firm is headquartered in the same province where the bank has its headquarters, 0 otherwise. We find that bank specialization in small business lending is higher when the lender and the borrower are functionally close.

The following equations add controls for **loan officer authority**. The main aim is to verify whether or not bank size fully captures all relevant organizational characteristics of banks affecting loan officer authority and then banks' lending choices. Briefly, we investigate whether, for any given bank size, additional controls for loan officer authority have some explanatory power for bank specialization in small business lending. If this is the case, that would imply that there is some

<sup>8</sup> Italy is divided into 103 provinces, 20 regions and 5 areas (North West, North East, Centre, South, Islands).

heterogeneity in terms of organizational structure among banks of the same size and that bank size does not capture all the significant characteristics of bank organization.

First of all we control for the scope of loan officer delegation (model *b*). In particular, *delegation\_approval* is a dummy variable which is equal to 1 if banks participating in the survey reported that the role of branch officers in loan approval is “important”,<sup>9</sup> and 0 otherwise. We find that compared with banks which delegate less power to their loan officers, banks reporting that loan officer power is “large” are more prone to lend to small businesses; in particular, their share is 2.9 percentage points greater. We consider this variable as crucial to capture the scope of the power delegated to loan officers that, within reason, goes beyond the strict approval decision. Indeed, it is reasonable to think about loan approval delegation as a pre-requisite for delegating the decision about specific loan contract covenants. For example some banks may place more emphasis than others on the discretion loan officers may have to set loan interest rates, while others may stress more the quantity of money loan officers are entitled to lend on their own initiative. Model *c*) then adds a measure of loan officers’ discretion in setting interest rates. The dummy *delegation\_price* equals 1 if price discretion is “important”,<sup>10</sup> 0 otherwise. We then interact this variable with *delegation\_approval*. Results suggest that, conditional on having being delegated the power to approve loans, branch officers’ incentives in gathering soft information and then in lending to small business are even greater when they have some discretion to set interest rates. In particular, the share of small business lending is on average 4.2 per cent greater for banks which delegate significant decision-making power to loan officers both in approving loan requests and setting interest rates.

Another component of loan officer authority might be the amount of finance up to which he/she is entitled to lend on his/her own initiative to each borrower. We then plug into the equation (model *d*) another control variable which is defined as the logarithm of the maximum amount of money loan officers are entitled to lend to any single borrower (*delegation\_loan*). We get a negative sign for the coefficient of *delegation\_loan*, which means that the specialization of banks in small business lending is decreasing in terms of the amount of money loan officers are entitled to lend on their initiative. To interpret this result one has to take into account three aspects of lending. First, there is a strict positive correlation between firm size and the size of the loan. Second, firm opaqueness correlates positively with the firm size. Third, the effort loan officers have to exert in order to screen and monitor firms is positively correlated with firm opaqueness. Thus, when loan officers are able to choose among a wider set of loan contracts – because their headquarters have defined a higher threshold for the amount loan officers may lend on their own initiative – they tend to finance a set of larger firms which therefore allows them to lend the same amount of money overall while exerting less effort in screening and monitoring borrowers compared with the case in which they lend to a set of smaller firms.<sup>11</sup> The negative coefficient for *delegation\_loan* indicates that loan officers tend to switch to less opaque borrowers when the amount they can lend to each of them increases.

### 3.2 Loan officer tenure and lending technologies

In this section, we test whether banks’ specialization in small business lending depends on loan officer turnover and the lending technologies adopted. We argue that both sets of variables may affect loan officer incentives: the tenure of loan officers at a given branch may affect their

<sup>9</sup> See Table 3 for many details on variable definition.

<sup>10</sup> See previous footnote.

<sup>11</sup> Note that, even if the variable *delegation\_loan* refers to SMEs, there is a positive and strong correlation between the maximum amount of money loan officers may lend to SMEs and the amount they may lend to larger firms.

ability to benefit from efforts to gather soft information, which requires a prolonged interaction with borrowers. Lending technologies may differ in the use of soft or hard information. When a bank puts more emphasis on hard information (e.g. by adopting credit scoring techniques), this may entail a reduction in the capability of loan officers to have control over lending decisions (*i.e.* loan officer's real authority) thus deterring soft information acquisition.

Model *a*) in Table 5 includes a control for the time spent by loan officers at a branch (***Loan Officer Tenure***). The coefficient for this regressor is positive and statistically different from zero, showing that banks which are more prone to lend to small firms allow a longer interaction of loan officers with the local credit market.<sup>12</sup> This result is consistent with the hypothesis that the investment in soft information requires a longer time to yield some return. As a consequence, loan officers have greater incentives to invest in soft information if their stay at the same branch is expected to be longer, otherwise their efforts will mostly benefit incoming loan officers.

Another aspect which may affect loan officer authority is the kind of information considered more important within the bank. Equation *b*) includes a dummy variable (***Soft Information***), which is equal to 1 if banks make greater use of *soft information* than *hard information* and 0 otherwise. We find that the coefficient for the prevalence of *soft information* is positive and significant too (the relevance of soft information increases the share of small business lending by more than 1 per cent), reinforcing the interpretation that small business lending requires relationship lending technology. Similarly, by adding a control for the use of credit scoring techniques (*credit scoring*), we get a negative coefficient (the impact on small business lending ranges between 1 and 3 per cent) for this variable (model *c*), indicating that the use of hard information is negatively related to the specialization of banks in small business lending.

Finally, model *d*) includes only one measure of loan officer power delegation (*delegation*) while it keeps the control for loan officer tenure and the use of soft information. This more parsimonious specification is used in the rest of the paper as a benchmark (baseline) equation.

### 3.3 *Loan officer compensation schemes*

In this section we take into account the characteristics of the loan officer compensation schemes (Table 6). In particular, we add some variables which are related to the variable component of loan officer pay-off. Since in general loan officers get a bonus on the base of short-run portfolio performance, one has to keep in mind when interpreting the relative coefficients that these variables are short-run constraints. First, we plug a dummy variable (*loan portfolio size*) that equals 1 if the size of the loan portfolio held by loan officers is a stringent constraint, and 0 otherwise. In other words, we compare banks which put great emphasis on lending portfolio size targets (*loan portfolio size = 1*) with other banks which do not. Model *a*) shows that if loan portfolio size is a stringent constraint then loan officers are more prone to lend to small firms. For those banks, the share of business lending is 1.3 per cent greater. This result is consistent with the view that when loan officers are rewarded for the expansion of a loan portfolio *per se*, they are less worried about lending to opaque borrowers whose *ex post* profitability may depend on information which has been observed by them but that could not be transferred in a credible way to headquarters.

Model *b*) includes another control for the loan officer compensation scheme. In particular, the dummy *loan portfolio profitability* equals 1 if the profitability of the overall loan portfolio held by the branch manager is a stringent constraint, 0 otherwise. We find that the coefficient for

<sup>12</sup> Scott (2006) found similar results for U.S. Banks. Ferri (1997) investigated a similar issue for Italian banks.

profitability targets is negative (the impact on small business specialization is more than 3 per cent) indicating that lending to opaque firms requires an investment in soft information which yields some return in the medium-long run.

By interacting *loan portfolio profitability* and *loan portfolio size* (model *c*) we may also check whether the effect of loan portfolio profitability differs among banks which put a higher emphasis on the size of loan portfolio than other banks. The coefficient for this interaction term (model *c*) is positive, signalling that the effect of profitability constraints is smoothed by the quantity constraint. In other terms, the profitability constraint is less stringent when banks also emphasize quantity targets. Loan officers are therefore less concerned with generating returns in the short-run since they are also rewarded better if they expand their lending overall.

### 3.4 Robustness checks

In order to check the robustness of our main findings, we run some alternative econometric exercises on our baseline specification (Table 5, model *d*).

First, since our measure of bank specialization in small business lending is computed as a share (defined between 0 and 1), it can be considered as censored variable. Under this assumption, it would be more feasible to estimate our parameters using a tobit methodology. Secondly, we verify how our results are robust to a more severe measure of bank specialization in small business lending (e.g. firms with less than 5 employees). Table 7 (respectively, models *a* and *b*) shows that our baseline results are mostly confirmed and that findings are not affected by a different definition of our dependent variable or by different estimation techniques. In particular, the more important the role of the loan officer in loan approval process, the higher the bank specialization in small business finance. Moreover, banks which put much emphasis on the use of soft information in lending to opaque borrowers or which invest in loan officer tenure show a higher orientation towards small business finance.<sup>13</sup>

Even within banks of comparable size we observe wide heterogeneity in terms of organizational characteristics. Looking at Tables 1 and 2, it is possible to note some meaningful differences in organization and lending techniques between large and small banks, especially for banks not belonging to groups. In particular, large banks exhibit on average higher loan officer turnover and delegation in lending to small firms; furthermore, large intermediaries usually assign less importance to soft information and make greater use of credit scoring systems in loan approvals. We then investigate whether our results are driven by some non-linear effect related to bank size. In order to confirm that our results, once we have controlled for size, are capturing this “within group” heterogeneity, we run our baseline regression only for the sub-sample of small banks. Table 7 (model *c*) shows that our results are robust also in a more homogenous group of banks by size; this evidence allows us to be confident that our main results are not just driven by a non linear-size effect.

<sup>13</sup> It is important to point out that when we consider bank orientation towards very small firms (those with less than 5 employees), the distance between lenders and borrowers negatively correlates with a bank’s specialization in lending to this kind of firm. At the same time, organizational variables related to loan officers’ authority seem to be less important in supporting small business lending. This may be due to the fact that these firms are so opaque that it is so hard for loan officers to channel information through the bank’s higher hierarchical levels. As a consequence, organizational solutions may be of little help to induce loan officers’ efforts to gather soft information.



#### 4. Conclusions

In this paper we investigate whether bank organization characteristics affect bank specialization in lending to small firms. By using a unique dataset based on a survey of Italian banks, we are able to go beyond the traditional large versus small banks comparison. We also exploit detailed data on lending activity at province level to investigate how the “functional distance” between bank headquarters and borrowers affects bank specialization.

Our main findings are the following. In line with previous results, we support the idea that bank size negatively affects bank specialization in small firm finance due to small banks’ comparative advantage in investing in *soft information* gathering and assessing opaque borrowers’ creditworthiness. Moreover, we argue that, apart from size, a bank’s organizational features (loan officer-specific ones) play an important role in explaining its orientation to small business lending. In particular, we show that the higher the *real* involvement of the branch officer in the loan approval process, as well as in setting interest rates, the higher the bank specialization in financing small and opaque firms. In the same direction, we find that the longer the local officer stays at the same branch, the more banks are focused on small business finance; experience gained over time can improve a loan officer’s ability to establish long-lasting and informative relationships with opaque borrowers. We also find that the amount of money up to which loan officer may lend autonomously is negatively correlated with bank specialization in small business finance. This result is consistent with the hypothesis that loan officers gain private benefits by expanding the overall amount of money they lend (the so-called empire building hypothesis). In this way, they obtain the same overall branch target by lending to a smaller number of borrowers, thus saving soft information gathering effort.

Bank specialization in small business lending depends crucially on lending technologies, too. Banks more involved in *soft information* gathering exhibit a greater share of credit granted to small firms, while the improvement of internal rating systems (mainly to monitor borrowers’ creditworthiness) negatively affects small business lending orientation, giving a prominent role to hard information.

Finally, we show that banks are less prone to finance small firms in those provinces that are far from their headquarters. This is in line with Hauswald and Marquez’s study (2006) and Mistrulli and Casolaro’s findings (2008), showing that functional distance is a proxy for lender-borrower asymmetric information problems.

All in all, our results suggest that, consistently with Stein’s model (2002), an increase in a loan officer’s authority is positively correlated with bank specialization in small business lending. However, in line with Aghion and Tirole (1997), we are aware of the distinction between loan officer’s *formal authority* (the right to decide) and *real authority* (the effective control over decisions). Indeed, we control for a rich set of formal rules (loan officer’s tenure, the power delegated to loan officers, both in terms of the size of the loan and the interest rate charged, the structure of loan officers’ compensation scheme, etc.) that all contribute to shape a loan officer’s real authority.

**APPENDIX**

**Table 1**

**Bank size, delegation and loan officer (“LO”) turnover (1)**  
(thousand of euros and months)

	Maximum amount of money LOs are allowed to lend autonomously				Months LO stays in a branch			
	mean	p25	p50	p75	mean	p25	p50	p75
Large and medium-sized banks	458	108	200	380	32	26	32	36
Small banks in banking groups	211	80	125	250	40	30	36	48
Stand-alone small banks	112	44	90	150	48	36	40	60
Cooperative banks	114	10	30	100	49	36	48	60
Total	176	18	71	150	45	33	38	60

(1) According to the size classification provided by the Bank of Italy, small banks have total assets of less than 7 billion euros.

**Table 2**

**Bank size, loan pricing and lending technology (1)**  
(units)

	Loan officers allowed to lower interest rate by more than 25 b.p.		Importance of soft information (2)		Credit scoring crucial in lending decision (3)	
	YES	NO	YES	NO	YES	NO
Large and medium-sized banks	2	12	20	17	30	6
Small banks in banking groups	3	38	38	36	32	19
Stand-alone small banks	0	14	10	10	8	9
Cooperative banks	12	91	108	76	45	41
Total	17	155	176	139	115	75

(1) According to the size classification of the Bank of Italy, small banks have total assets of less than 7 billion euros. – (2) This classification is based on a dummy variable that is equal to 1 (YES) for those banks that ranked face-to-face relationships with the entrepreneur or the usage of non-traceable information as “crucial” or “very important”. – (3) In this case YES is used for banks using credit scoring and/or internal rating systems for SME finance, whose score index is crucial for the assessment of credit.

Table 3

## Descriptive statistics on the estimation sample

Variables	Description	Mean	Median	Std. Dev.	Expected sign
<i>Dependent variable</i>					
Specialization in small business lending	Share of credit granted by each bank $i$ to sole-proprietorships and other non-financial enterprises with less than 20 employees operating in province $z$ (103 provinces) and sector $j$ (23 economic activities).	0.34	0.18	0.37	
<i>Bank characteristics</i>					
Size	Log of total assets.	22.89	23.03	1.74	-
Risk	Bad loans on total loans (percentage).	3.31	2.64	2.57	-
Cost-to-income ratio	Operational costs divided by gross income (percentage).	61.42	60.17	11.41	+/-
Branches	Number of branches of each bank $i$ in each province $z$ .	8.32	2.00	20.05	+
<i>Bank organization</i>					
Soft information	The dummy is equal to 1 if bank $i$ ranked face-to-face relationships with the entrepreneur or the usage of non-traceable information in the first three places (“crucial”, “very important” or “important”).	0.53	1	0.50	+
Delegation_approval	The dummy is equal to 1 if the LO has a “crucial” or “very important” role in loan approvals.	0.89	1	0.31	+
Delegation_price	The dummy is equal to 1 if the LO has a “crucial” or “very important” interest rate discretion.	0.60	1	0.49	+
Delegation_loan	This index is the log value of the maximum loan that a local officer can autonomously grant to SMEs.	5.19	5.11	1.47	+/-
Loan Officer’s length of tenure	The index is calculated as the logarithm of months the LO of bank $i$ stays in the same branch.	3.53	3.58	0.37	+
Credit Scoring	The dummy is equal to 1 if for a given bank the internal rating system is “crucial” or “very important” in monitoring SMEs’ creditworthiness.	0.56	1	0.50	-
Loan portfolio profitability	The dummy is equal to 1 if the LO’s pay-off is related in a significant way (“crucial” or “very important”) to the loan portfolio profitability.	0.74	1	0.44	-
Loan portfolio size	The dummy is equal to 1 if the LO’s pay-off is related in a significant way (“crucial” or “very important”) to the size of the loan portfolio (volume targets).	0.87	1	0.34	+
<i>Functional distance</i>					
Disth	This dummy is equal to 1 if SMEs are headquartered in the same <u>province</u> where bank $i$ has its headquarters.	0.08	0	0.28	+

**Table 4**

**Loan Officer authority and small business lending: Basic regressions**

	<b>Model a</b>	<b>Model b</b>	<b>Model c</b>	<b>Model d</b>
<i>Bank Characteristics</i>				
Size	-0.0326*** [0.0009]	-0.0325*** [0.0009]	-0.0320*** [0.0009]	-0.0214*** [0.0011]
Risk	-0.0037*** [0.0006]	-0.0038*** [0.0006]	-0.0032*** [0.0006]	-0.0026*** [0.0006]
Cost-to-income ratio	0.0018*** [0.0001]	0.0020*** [0.0001]	0.0017*** [0.0001]	0.0014*** [0.0001]
Branches	0.0012*** [0.0001]	0.0011*** [0.0001]	0.0011*** [0.0001]	0.0010*** [0.0001]
<i>Lender-borrower distance</i>				
Disth	0.0088* [0.0049]	0.0119** [0.0049]	0.0135*** [0.0049]	0.0109** [0.0049]
<i>Loan Officer authority</i>				
Delegation_approval		0.0296*** [0.0047]	0.0039 [0.0052]	0.0111** [0.0051]
Delegation_approval*Delegation_price			0.0363*** [0.0030]	0.0317*** [0.0030]
Delegation_loan				-0.0229*** [0.0012]
Constant	0.7440*** [0.0289]	0.7030*** [0.0301]	0.7098*** [0.0301]	0.6034*** [0.0302]
Observations	62,763	62,763	62,763	62,763
R <sup>2</sup>	0.18	0.18	0.18	0.19
The dependent variable, ranging between 0 and 1, is the outstanding amount of loans granted by bank <i>i</i> to small businesses (firms with less than 20 employees) of sector <i>j</i> and headquartered in province <i>z</i> , as a ratio of the overall amount of lending to non-financial firms of sector <i>j</i> headquartered in province <i>z</i> , and granted by bank <i>i</i> . Sector and province dummies are always included. Robust standard errors are reported in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.				

Table 5

**Loan Officer authority and small business lending:  
Loan Officer turnover and lending technologies**

	Model a	Model b	Model c	Model d
<i>Bank characteristics</i>				
Size	-0.0193*** [0.0011]	-0.0195*** [0.0011]	-0.0194*** [0.0011]	-0.0261*** [0.0010]
Cost-to-income ratio	0.0014*** [0.0001]	0.0015*** [0.0001]	0.0015*** [0.0001]	0.0020*** [0.0001]
Risk	-0.0029*** [0.0006]	-0.0030*** [0.0006]	-0.0031*** [0.0006]	-0.0044*** [0.0006]
Branches	0.0010*** [0.0001]	0.0010*** [0.0001]	0.0010*** [0.0001]	0.0011*** [0.0001]
<i>Lender-borrower distance</i>				
Disth	0.0106** [0.0048]	0.0107** [0.0048]	0.0112** [0.0048]	0.0121** [0.0049]
<i>Loan Officer authority</i>				
Delegation_approval	0.0166*** [0.0052]	0.0200*** [0.0053]	0.0184*** [0.0053]	0.0369*** [0.0048]
Delegation_approval*Delegation_price	0.0303*** [0.0030]	0.0316*** [0.0030]	0.0312*** [0.0030]	
Delegation_loan	-0.0215*** [0.0012]	-0.0211*** [0.0012]	-0.0192*** [0.0013]	
Loan Officer's tenure	0.0318*** [0.0045]	0.0308*** [0.0045]	0.0296*** [0.0045]	0.0413*** [0.0045]
<i>Lending technologies</i>				
Soft information		0.0153*** [0.0028]	0.0131*** [0.0028]	0.0100*** [0.0028]
Credit scoring			-0.0135*** [0.0032]	-0.0325*** [0.0030]
Constant	0.4294*** [0.0384]	0.4211*** [0.0384]	0.4229*** [0.0384]	0.4209*** [0.0385]
Observations	62,763	62,763	62,763	62,763
R <sup>2</sup>	0.19	0.19	0.19	0.19
The dependent variable, ranging between 0 and 1, is the outstanding amount of loans granted by bank <i>i</i> to small businesses (firms with less than 20 employees) of sector <i>j</i> and headquartered in province <i>z</i> , as a ratio of the overall amount of lending to non-financial firms of sector <i>j</i> headquartered in province <i>z</i> and granted by bank <i>i</i> . Sector and province dummies are always included. Robust standard errors are reported in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.				

Table 6

**Loan Officer authority and small business lending:  
Loan Officer compensating schemes**

	<b>Model a</b>	<b>Model b</b>	<b>Model c</b>
<i>Bank characteristics</i>			
Size	-0.0200*** [0.0012]	-0.0200*** [0.0013]	-0.0196*** [0.0013]
Cost-to-income ratio	0.0023*** [0.0002]	0.0000 [0.0002]	0.0002 [0.0002]
Risk	-0.0057*** [0.0007]	-0.0022** [0.0010]	-0.0036*** [0.0011]
Branches	0.0011*** [0.0001]	0.0010*** [0.0001]	0.0010*** [0.0001]
<i>Lender-borrower distance</i>			
Disth	0.0055 [0.0057]	0.0174*** [0.0063]	0.0170*** [0.0063]
<i>Loan Officer authority</i>			
Delegation_approval	0.0634*** [0.0062]	0.0373*** [0.0070]	0.0374*** [0.0070]
<i>Loan Officer's compensation schemes</i>			
Loan portfolio size	0.0132*** [0.0048]	0.0382*** [0.0053]	0.0185** [0.0078]
Loan portfolio profitability		-0.0383*** [0.0039]	-0.0690*** [0.0102]
Loan portfolio size* Loan portfolio profitability			0.0384*** [0.0117]
Loan Officer's tenure	0.0440*** [0.0051]	0.0128** [0.0057]	0.0102* [0.0058]
<i>Lending technologies</i>			
Soft information	0.0078** [0.0032]	0.0236*** [0.0037]	0.0257*** [0.0038]
Credit scoring	-0.0307*** [0.0034]	-0.0313*** [0.0038]	-0.0359*** [0.0041]
Constant	0.4173*** [0.0435]	0.4891*** [0.0486]	0.4987*** [0.0488]
Observations	49,074	39,768	39,768
R <sup>2</sup>	0.19	0.19	0.19

The dependent variable, ranging between 0 and 1, is the outstanding amount of loans granted by bank  $i$  to small businesses (firms with less than 20 employees) of sector  $j$  and headquartered in province  $z$ , as a ratio of the overall amount of lending to non-financial firms of sector  $j$  headquartered in province  $z$ , and granted by bank  $i$ . Sector and province dummies are always included. Robust standard errors are reported in brackets. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Table 7

## Loan Officer authority and small business lending: Robustness checks

	Model a) Tobit estimation: whole sample (marginal effects)	Model b) OLS estimation: very small firms	Model c) OLS estimation: small banks
<i>Bank characteristics</i>			
Size	-0.0105*** [0.0006]	-0.0177*** [0.0009]	-0.0395*** [0.0027]
Cost-to-income ratio	0.0014*** [0.0001]	0.0011*** [0.0001]	0.0008*** [0.0002]
Risk	-0.0029*** [0.0004]	-0.0019*** [0.0005]	-0.0013 [0.0009]
Branches	0.0009*** [0.0001]	0.0006*** [0.0000]	0.0004** [0.0002]
<i>Lender-borrower distance</i>			
Disth	0.0187*** [0.0030]	-0.0171*** [0.0038]	0.0146** [0.0070]
<i>Loan Officer authority</i>			
Delegation_approval	0.0203*** [0.0034]	0.0259*** [0.0040]	0.0138** [0.0070]
Loan Officer's tenure	0.0269*** [0.0027]	0.0243*** [0.0037]	0.0589*** [0.0061]
<i>Lending techniques</i>			
Credit scoring	-0.0166*** [0.0018]	-0.0066*** [0.0025]	-0.0107** [0.0045]
Soft information	0.0057*** [0.0018]	0.0040* [0.0024]	0.0345*** [0.0044]
Constant	- -	0.2493*** [0.0308]	0.7147*** [0.0761]
Observations	62,763	62,763	31,193
R <sup>2</sup>	0.10	0.17	0.16
<p>In the tobit estimation (model <i>a</i>) the dependent variable, ranging between 0 and 1, is the outstanding amount of loans granted by bank <i>i</i> to small businesses (firms with less than 20 employees) of sector <i>j</i> and headquartered in province <i>z</i>, as a ratio of the overall amount of lending to non-financial firms of sector <i>j</i> headquartered in province <i>z</i>, and granted by bank <i>i</i>. In the OLS estimation in model <i>b</i> the dependent variable, ranging between 0 and 1, is the outstanding amount of loans granted by bank <i>i</i> to very small businesses (firms with less than 5 employees) of sector <i>j</i> and headquartered in province <i>z</i>, as a ratio of the overall amount of lending to non-financial firms of sector <i>j</i> headquartered in province <i>z</i>, and granted by bank <i>i</i>. In the OLS estimation in model <i>c</i> the dependent variable, ranging between 0 and 1, is the outstanding amount of loans granted by small bank <i>i</i> to small businesses (firms with less than 20 employees) of sector <i>j</i> and headquartered in province <i>z</i>, as a ratio of the overall amount of lending to non-financial firms of sector <i>j</i> headquartered in province <i>z</i>, and granted by bank <i>i</i>. Sector and province dummies are always included. Robust standard errors are reported in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.</p>			

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## DISCUSSION

*Angelo Baglioni\**

The paper by Infante and Rossi focuses on the role played by foreign banks in Italy. The authors document the increasing presence of foreign banks over the last fifteen years, with a transition from wholesale to retail business. To summarise the main findings, foreign banks have had a significant impact on competition only as far as households are concerned, particularly for mortgage loans; this impact has been reflected in customer mobility, interest rates and collateral requirements. The impact on competition has been much less significant as far as firms are concerned. The authors' interpretation is that foreign banks have focused on the sectors where informational asymmetries play a minor role and credit services are more standardised, while domestic banks have focused on sectors where opacity and customer relationships enable them to enjoy some market power.

I find the analysis of the paper interesting and convincing. It is consistent with the theory of banking, in particular some contributions of the early nineties, showing the competitive advantage of the incumbent banks over new entrants, which is due to essentially two factors that limit the contestability of the market for business lending: *(i)* the entrant necessarily has to screen a sample of potential borrowers, drawn from a population of firms that has already been screened by the incumbent; *(ii)* an incumbent bank has typically established customer relationships with some firms, giving it an informational advantage.

The presence of foreign banks in Italy may be traced back to the Second EU Directive on Banking, which introduced cross-border liberalisation from 1992. Previously, many scholars and practitioners in the banking sector had forecast a rapid increase of foreign banks' presence in Italy from that date, but this did not happen. For a number of years the business of foreign banks was limited and basically restricted to the wholesale segment. Only in recent years have we witnessed a significant increase in their retail business. This suggests substantial difficulties for foreign banks interested in entering the Italian banking market. I believe that the reasons for this difficulty differ between firms and households.

While in the case of firms the problem may related to informational asymmetries, this factor is not so relevant for households, since business in this segment consists mainly of collateralised loans (mortgages) and deposit-taking. The relevant explanation, for households, is the switching costs incurred by depositors owing to the location of bank branches and the bundling of several financial products, such as asset management and payment services. Italian banks have been quite active in supplying such bundles of services tied to deposits, in order to increase switching costs and so develop market power vis-à-vis households. This may be seen as a reaction to the fall in the profitability of the traditional deposit-taking and lending business following liberalisation. In this regard, the analysis of the competitive impact of foreign banks in the collection of deposits and in provision of asset management services seems to be a promising line of future research (I am afraid that the impact has been rather weak so far).

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Actually Italian banks have tried to limit their customers' mobility in the mortgage loan sector as well, where the competitive challenge from the foreign banks has been stiffest. For instance, in May 2008 they signed an agreement on the renegotiation of variable rate mortgages, inducing borrowers to ask for a loan renegotiation with their present bank rather than look for a better alternative at another bank. Moreover, the Italian anti-trust authority has found some irregular behaviour in the application of the mortgage loan portability rule.

Finally, a more technical comment on the use of the Herfindahl index is in order. This measure of concentration produces ambiguous results: greater concentration in the mortgage loan market is correlated both with greater customer mobility (suggesting more competition) and with higher interest rates (suggesting less competition). These unsurprising findings reveal the weakness of the structure-conduct-performance approach as applied to the banking industry. The approach works well in industries with only a few producers, but the number of banks currently operating in Italy is quite large, especially in Milan where most of the foreign banks are present. The limits to competition, rather than in the concentration of the market structure, are to be found in the market segmentations mentioned – due to informational asymmetries and switching costs – and to collusion, either explicit (through agreements like those related to payment services) or implicit (leading to a coordination in the provision of some services).

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## DISCUSSION

*Paola Bongini\**

The two papers *Loan officer authority and small business lending. Evidence from a survey* by Benvenuti, Casolaro, Del Prete and Mistrulli and *Debt restructuring and the role of lending technologies* by Micucci and Rossi take a unique perspective on the role of organizational forms and lending technologies in explaining differences in bank behavior that cannot be fully captured by *bank size*.

Since the authors have done a good job of explaining: *a)* the rich and unique dataset they rely on; *b)* the advanced econometric techniques implemented; and *c)* the basic results, which reveal a deep knowledge of both the theoretical background and banking practice, I won't review their specific empirical findings. Instead, I want to discuss what we can learn from the results and what questions still remain open.

Both studies deal with a topic that has become relevant in recent academic research, that is banks' internal organization and the use of lending technologies. Although the papers focus on two different moments of the lending activity – the former on the decision to lend to SMEs; the latter on the decision to restructure claims on distressed SMEs – they both take the same approach of considering *heterogeneity* in banks behavior. Such heterogeneity goes beyond the traditional dualism between “large and small banks” or “bank debt versus public debt”: instead, heterogeneous behavior is to be found within homogeneous groups of banks. Thus not every large bank is necessarily little inclined to lend to SMEs, nor should every bank be willing to restructure its loans to financially distressed firms just because bank debt is easier to renegotiate than market debt.

What is more relevant, as the authors state, is the way in which banks shape their internal organization and which lending technologies they use to screen and monitor loans to SMEs.

Let us analyze the first issue, *i.e.* banks' organization. A recent strand in the literature, both theoretical and empirical, has highlighted the role of organization in shaping bank-firm relationships, in particular with SMEs. Relationship lending is bound up with the specific role and authority of the local branch manager, in terms of : *a)* his/her autonomy in extending credit to SMEs ; *b)* the number of hierarchical layers involved in small business loan approval; *c)* the bank's policy on bank manager tenure and turnover; *d)* the compensation scheme used to reward bank manager performance.

The study by Benvenuti *et al.* suggests that banks are more willing to lend to small business when:

- a)* the loan officer is more involved in the approval decision and/or in setting loan pricing. Conversely the amount of money up to which loan officers may lend autonomously is negatively correlated with bank specialization in small business finance;
- b)* the loan officer' tenure at the local branch lengthens;
- c)* the loan officers' compensation is linked to the size of the lending portfolio

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In the study by Micucci and Rossi, banks are more prone to restructure outstanding debt in case of distress when:

- a) the loan officer is delegated more power, in terms of the amount of loans to SMEs that he can extend autonomously with respect to the amount the CEO of the bank can extend;
- b) the loan officer receives some performance-related compensation.

On these findings I have two main comments.

First, the internal organization of a bank represents, for both studies, a key variable in defining the type of bank-firm relationship that the bank intends to institute with SMEs (transactional or relationship lending). However, the two studies deliver different results with respect to the specific features that such organization should have. Two questions are of special interest. First, why are these results not aligned, given the use of similar data-sets? Second, how do the authors justify the fact that banks that are more willing to lend to SMEs are the very same banks that are less prone to restructure small business debt?

Second, a flourishing new stream of theoretical literature (Stein, 2002; Berger et al, 2005) has highlighted how the hierarchical distance – or number of layers – between the bank's headquarter and the local branch could be one the main causes keeping large and organizationally complex banks from lending to small, opaque borrowers. However, this thesis has been subjected to little empirical testing due to the difficulty of measuring the hierarchical layers in a bank's organization by means of publicly available information. One exception, for the US system, is Rajan and Wulf (2006): using a detailed database of managerial job descriptions in over 300 large U.S. firms, they find that firm hierarchies are becoming flatter, with increasing delegation of authority to divisional managers. Similar data was available to the authors of the papers discussed here, in that the two studies exploit a Bank of Italy survey on banks' organizational aspects that also provides detailed information on the number of hierarchical layers involved in loan approval. Unfortunately neither one uses this variable in its econometric tests, which would have offered important support to the thesis that large banks are more inclined to interact with SMEs when they have a flat organization.

The second factor that can crucially differentiate banks' behavior is the role of lending technologies. The term "lending technologies" was introduced by Berger and Udell in their extensive work on relationship banking. According to Berger and Udell (2006), each "lending technology" is a unique combination of the primary information (hard or soft), screening and underwriting policies/procedures, structure of the loan contracts, and monitoring strategies and mechanisms. Thanks to these combinations the traditional pairs "relationship banking-opaque firms" and "transactional banking-transparent firms" can be superseded.

Both studies proxy the concept of "lending technologies" by means of a dummy variable indicating:

- a) whether a bank has adopted credit scoring techniques in small business lending;
- b) whether a bank considers qualitative information an important factor in assessing the creditworthiness of SMEs.

They find similar results: banks that assign greater importance to soft information in lending decisions – even when credit scoring techniques are implemented – are more willing to lend to SMEs and to restructure their debt.

Such results are not surprising given the importance of qualitative (soft) information in screening and monitoring opaque borrowers, which most SMEs are; they are also consistent with the relevance of the loan officer's authority in the lending process: the acquisition of soft information needs to be delegated to the branch managers, who have an incentive to do so properly

only if they can use such information in their lending decisions. In other terms, soft information is closely related to the extent of the loan officer's authority.

Rewarding the acquisition and use of soft information requires face-to-face interaction between the lender and the borrower, which was initially conceived in terms of physical proximity of the branch to the borrowing firm. More recently, geographical distance has been supplanted by a new concept, namely the "functional distance" between the bank's headquarters and the borrowing firms, which also considers social and cultural factors that help determine the distance between the bank and its customers. In line with this new notion of distance, both the studies discussed here analyze the importance of functional distance in explaining banks' specialization in lending to SMEs or their propensity for debt restructuring. Functional distance is proxied by :

a) a dummy variable which takes the value 1 if the borrower and bank have their headquarters in the same province (Benvenuti *et al.*);

b) the distance (log of kilometers) between the bank's headquarters and the location of the borrowing firm (Micucci and Rossi).

Both proxies are statistically significant and positively correlated with the bank's decision to support SMEs. For the study by Benvenuti *et al.* this result is somewhat troubling, in that their proxy implies that a firm with headquarters in the province of Milan is as just as "distant," functionally, from, say, the UBI group (headquartered in Bergamo) as a firm headquartered in a region far removed from Lombardy, where both the group and the firm are located. The clear implication of the statistical significance of this proxy for distance is that geographical proximity is a binding constraint for successful small business lending. This would offer additional support for the thesis that only small banks, especially mutual banks, have a propensity to lend to small borrowers.

How to define and measure a bank's proximity to its borrowers is not a trivial question. It is an important concern for the top management of large banks and the subject of what has become a substantial body of academic research.

Research in the eighties addressed the issue of "optimal bank size," producing policy implications that corresponded to the substantial concentration of the banking sector over the past fifteen years. In the nineties, mainstream research focused on "value creation": the answer was "business and revenue diversification", which also meant, especially for large banks, a shrinkage of traditional lending business. In the first decade of the new century, the main issue was how to combine being global with acting locally. The answer was to "separate production from distribution" as the issue was analyzed mainly with respect to banking activity in the securities industry. Today, following the global financial crisis, the main issue in banking is how to define a bank's proximity to its customers, given that such proximity seems to represent the key variable in a successful bank-firm relationship. The answers appear to lie in the specific design of the bank's organization and its lending techniques. The studies by Micucci and Rossi and Benvenuti *et al.* are good examples of timely empirical research in this field.



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