

# Authority and Information\*

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# Authority and Information

## **Abstract**

Authority often relies on information whose collection and transmission by subordinates its very exercise discourages. In this paper, we study how the allocation of authority affects the production, transmission, and strategic use of subjective intelligence relying on exhaustive data on credit decisions. Exploiting the exogenous variation in branch-headquarters distance we find that the center is more likely to delegate authority the further away line units are. Consistent with economic theory, more autonomous branches produce more soft information; conversely, the more information they produce, the more real authority they enjoy. Our findings also identify incentives to strategically use soft information in response to local competition as a further channel through which the delegation of authority affects investment success. Finally, we provide strong evidence that in equilibrium the delegation of authority helps to overcome distance related obstacles to corporate-decision making through subjective intelligence.

# 1 Introduction

One of the most vexing problems in organizations is that those in power often lack the requisite knowledge to make informed decisions. To mitigate the resulting inefficiencies, firms have adopted a variety of solutions, in which management essentially cedes part of its authority to subordinates closer to the ground. Although senior managers retain the right to intervene and overturn their subordinates' decisions, i.e., exercise formal authority in the sense of Aghion and Tirole (1997), they often refrain from doing so, thereby delegating real authority, i.e., effective control over decisions, to lower ranks with better access to the pertinent information. However, such "empowering" of employees might also entail a loss of control, which subordinates might exploit for their own private benefits. The allocation of effective authority then depends on the nature of the requisite information. If it is primarily "soft" delegating authority is the best course of action; if it is primarily "hard," firms should adopt a more centralized approach to decision making with more intervention by supervisors (see, e.g., Aghion and Tirole, 1997; Dessein, 2002; or Stein, 2002).

Although the theoretical implications of authority are well understood there exists little empirical work on how its allocation affects the production and transmission of information within organizations. In particular, there is a dearth of evidence on the role of subjective intelligence in corporate decision making posited by the theoretical literature, in part because its inherently ambiguous nature does not easily lend itself to study. Its defining attributes - it is not readily transferable, verifiable, or interpretable - imply that it is difficult to identify, measure, and analyze in practice. However, recent innovations in one particular industry - lending to small, informationally opaque firms - allow us to overcome these analytic challenges and to provide direct evidence on the effect of authority on the collection and communication of soft information. Not only do banks quantify all aspects of their credit assessments in the form of credit scores, which permit us to extract meaningful measures of their soft information, but lending to small firms crucially relies on borrower-specific subjective intelligence.

Our unique data consist of all credit decisions involving small businesses by a major U.S. bank over a 15-month period. In addition to the ultimate lending decision and preceding credit-review process, we know the location (local branch or headquarters), rank, and identity of the decision maker. Furthermore, we have the results of the bank's internal credit-screening process (proprietary

credit score), which comprises a soft element supplied by loan officers through subjective score adjustments. To isolate this private component of credit assessments, we first orthogonalize the lender's internal score with publicly available estimates of credit quality, which yields a clean measure of the employee's subjective impression of a firm's creditworthiness. Finally, we know whether the loan officer attached detailed text notes - the quintessential form of communicating soft information (see Petersen, 2004) - to the credit file to justify the recommendation upon being asked to review a particular application.

We follow our data provider's internal loan-approval process by estimating discrete-choice models of the headquarters' request for a review, the loan officer's choice to provide soft information as part of the credit recommendation, and the headquarter's delegation of real authority to the branch in the final credit decision. Finally, we assess the respective success of exercising formal and real authority by studying borrower retention in the face of local competition and the delinquency of booked loan in terms of intervention by supervisors. For identification, we rely on the exogenous variation in distance between headquarters and branch offices. Since soft information is less easily transferable geographic dispersion not only might impede its flow (Landier *et al.*, 2007). Similarly, distance erodes headquarters' ability to independently gather information about local economic conditions and applicant prospects. Both effects make it harder for headquarters to assess the particular circumstances of credit requests. Hence, branch offices further away should enjoy more autonomy (real authority) to provide appropriate incentives for the collection, analysis, and hardening of subjective intelligence in credit decisions through individual credit-score adjustments.

We find that requests for soft information, its production, and the real authority of local loan officers all increase in the branch-headquarters distance. The better their access to soft information through established lending relationships, the more real authority branches enjoy over credit decisions and, correspondingly, the more information they produce. Similarly, the better the track record of loan officers in generating and hardening soft information through subjective score revisions, the more authority the center delegates and the more review notes branches produce. At the same time, we find evidence for local favoritism in the form of a systematic bias in score adjustments and credit decision in favor of better credit risks. Our results also provide strong evidence for the prediction in Dessein (2002) that recently acquired units enjoy considerable more autonomy and, therefore, generate more soft information.

Taken together, our findings show that distance indeed inhibits the flow of soft information. However, hierarchical superiors balance such information losses against the loss of control in their exercise of formal authority to encourage the local production and use of subjective intelligence. When we study the success of investment decisions in terms of borrower retention and delinquency we find that, in equilibrium, the optimal allocation of authority actually negates these distance-related informational losses. Headquarters acquiesce in biased credit recommendation resulting from, e.g., local favoritism as the price necessary to provide incentives for loan officers to produce and strategically use subjective intelligence in the face of local competition for borrowers. In consequence, we identify a third channel in addition to information production and transmission through which the delegation of authority improves corporate decision: incentives for the strategic use of subjective intelligence.

Our main contribution consists in providing direct evidence that delegating real authority provides strong incentives for the collection, transmission, and strategic use of soft information. Consistent with theoretical predictions, we find that the more important subjective intelligence is, the less formal authority headquarters exercises. In contrast, credit decision primarily relying on hard or hardened soft information are much more subject to assertion of formal authority. Similarly, the more independent branches are, the more willing they appear to communicate soft information to headquarters. We also find evidence for local favoritism by loan officers which headquarters tacitly accepts to improve the quality of information and branches' strategic decision making. To the best of our knowledge, this study is the first empirical one to show how the allocation of authority shapes line units' incentives and helps to overcome inefficiencies in investment decisions in equilibrium stemming from the difficulty to credibly communicate and act on subjective intelligence.

Our empirical tests investigate competing, but not mutually exclusive theories of authority in organizational design. Aghion and Tirole (1997) view the allocation of authority in terms of ex ante incentives for the production of information by subordinates. Similarly, Dessein (2002) investigates the consequences of delegating authority for the strategic transmission of soft information in a framework based on Crawford and Sobel (1982). In contrast, Stein (2002) argues that incentives for information collection stem from line manager's desire to expand their units through the internal allocation of capital. In our setting, this mechanism corresponds to the exercise of real authority by branches, which then obtain the necessary funds from headquarters, so that there exists an

equivalence between credit decisions and internal-capital allocation.

Stein (2002) argues that small firms are better at producing and using soft information than large organizations. Berger et al. (2005) test this prediction on the basis of cross-sectional banking data and provide evidence supporting this view. In contrast, our results show that once the allocation of authority endogenizes the consequences of inefficient decision making even large firms such as our bank can overcome the informational disincentives of hierarchical organization through operational policies aimed at delegating decision making to local units. Liberti and Mian (2009) report that the greater the hierarchical or geographic distance is between loan officer and supervisor, the more objective and the less subjective information content approved loans have. However, their analysis focuses on approved loans whose terms dictate the credit-decision process whereas the level of the initial credit recommendation is exogenous for our data. Using the same data Liberti (2005) studies how a foreign bank in Argentina transmits and uses hard and soft information. However, neither paper investigates the role of authority in the provision of incentives for the collection and transmission of soft information, which is central to our work.

The paper is organized as follows. The next section summarizes the theoretical literature and testable implications. Section 3 describes our data and estimation strategy. In Section 4, we analyze the allocation of real and formal authority and its effects on information production. Sections 5 investigates the success of delegating authority in terms of the firm's decision to accept the offered loan and the profitability of the credit decision in terms of delinquency. The last section discusses further implications and concludes. All tables are relegated to the Appendix.

## **2 Information and the Allocation of Authority**

The allocation of authority and its exercise is the central design feature of organizations. Going back to Coase (1937) and Alchian and Demsetz (1972) the literature initially equated authority with the right to contract with subordinates and to monitor them. More recently, Grossman and Hart (1986), Hart and Moore (1990), and Hart (1995) have defined authority in terms of control rights stemming from the ownership of tangible assets. However, as pointed out by Aghion and Tirole (1997), this formal right to intervene does not necessarily confer effective control over decisions. There exists a clear demarcation between formal authority, i.e., the right to overturn subordinates' decisions,

and real authority, i.e., effective decision making, especially in case of intangible assets such as information. According to this view, authority provides powerful incentives for its acquisition (Aghion and Tirole, 1997), its transmission (Dessein, 2002), or its use in investment decisions (Stein, 2002).

The crucial attribute of the information asset is its subjective nature because hard intelligence, often recorded in quantitative terms, is easily stored, transmitted, and interpreted by a third party (Petersen, 2004). Such soft information is at the center of investment decisions (Aghion and Tirole, 1997), especially in financial intermediation and credit decisions (Stein, 2002). Since it is primarily local (Agarwal and Hauswald, 2009) but difficult to transfer over greater physical distance (Landier *et al.*, 2007) we would expect headquarters, which holds formal authority, to be more likely to delegate its collection to branch offices, the farther away they are. Since it becomes ever more difficult for the center to gauge economic conditions and firm prospects outside its immediate vicinity requests for additional soft information should increase in branch-headquarters distance.

At the same time, Aghion and Tirole (1997) argue that real authority provides incentives for subordinates to collect and process information, especially soft information. Hence, the delegation of effective credit decisions to branches should spur them to produce more information. Conversely, the greater the amount of subjective intelligence produced the more real authority should branches enjoy. This mechanism further implies that the easier it is for subordinates to collect such information, the more real authority they should have, i.e., the less their superiors should intervene, and the more subjective intelligence they should produce. Since business ties facilitate the access to soft information both the collection of soft information and the real authority of branch offices should increase in the length and breadth of lending relationships. In contrast, if the requisite information is primarily hard and therefore easy to communicate the center should exercise more formal authority and, correspondingly, make more credit decisions (Aghion and Tirole, 1997).

The allocation of authority also has implications for the transmission of information. Building on the analysis of strategic information transmission by Crawford and Sobel (1982), Dessein (2002) argues that companies delegate authority to avoid inefficient centralized decision making stemming from noisy communication. If local knowledge is important the center needs to weigh the loss of information against the loss of control resulting from any bias in line units' objectives. If this bias is sufficiently small delegation dominates communication so that branches hold real authority and

communicate less. Conversely, communication is preferable to delegation if there is little uncertainty so that headquarters could make credit decisions primarily based on hard or public information. Since recently acquired units typically face the largest communication hurdles in terms of new or unclear reporting lines, differences in corporate culture, unaccustomed terminology, etc. the loss of information is typically greatest in their case. Hence, Dessein (2002) predicts that newly integrated branch offices should conserve significant more autonomy and communicate less than older, more established units.

Underlying the incentive view of authority is the problem that, in the absence of appropriate incentives or supervision, subordinates pursue private benefits whose curtailing requires formal intervention by the center. Branches and their employees might shirk in borrower screening, show favoritism in recommendations, try to enhance their social standing or otherwise curry favors with the local business community through biased credit decisions, etc. The extent of disagreement in objectives then allows us to test competing theories authority in terms of the production and transmission of information. If the center delegates authority to encourage the production of information the larger the misalignment in objectives, the less autonomy line should have and correspondingly produce less soft information. In contrast, Dessein (2002) predicts that branches should transmit more not less soft information, the larger is local bias, which, however, increases its noisiness.

Stein (2002), who studies one such bias - empire building - in the context of internal capital allocation, predicts that the more a large firm relies on soft information, the more it tends to be flat, i.e., decision making occurs within fewer layers of management. In distinction to Aghion and Tirole (1997), capital, i.e., loanable funds, rather than the delegation of authority provides incentives for soft-information production. Hence, the more important subjective assessments are the more capital should the center allocate to line units to reward the production of such intelligence. Furthermore, the more soft information branch offices produce the more loanable funds should they receive, i.e., the more credit should they be able to grant and the less should headquarters overrule their lending decisions.

If firms optimize their boundaries rather than their organizational structure Stein (2002) predicts that banks specialize in the type of information, which they use, and, hence, loan products. Small banks produce soft information and lend to small businesses whereas large institutions fo-

cus on products with hard information content. However, technological progress (credit scoring) together with appropriate organizational design (delegation of authority) allows even large firms such as our data provider to overcome the challenges inherent in the production and use of soft information through its hardening in the loan-approval process.

### 3 Data Description and Methodology

Our sample consists of all credit decisions on new loan applications over a 15-month span falling under the purview of small- and medium-sized enterprise (SME) lending as defined by the Basel I Accord (total obligation and sales below \$1 and 10 million, respectively) to the third largest small-business lender in the U.S. Our data provider ranks among the top five commercial banks and savings institutions in terms of deposits during the sample period, operates a total of 1,552 branch offices, and is the leading provider of SME loans in its area of operation (market shares of 30% to 50% by state). This segment of corporate lending is particularly well suited for an inquiry into the consequences of real authority because small firms tend to be informationally opaque so that the production and transmission of soft information are crucial for investment, i.e., lending, decisions (see Agarwal and Hauswald, 2009). Furthermore, banks quantify all aspects of their credit assessments in the form of credit scores, which allow us to extract meaningful measures of their private information.

#### 3.1 Credit-Decision Process

The loan requests behind our credit decisions originate from personal visits by the firm representatives (e.g., owner/manager) to one of our sample’s 1,536 branch offices, which always initiate the origination process and review an application as a matter of business policy in this market segment.<sup>1</sup> The randomly assigned local loan officer (essentially a queueing system) conducts an in-depth interview, transcribes the relevant information into electronic form, and matches it with credit reports for input into the bank’s proprietary credit-scoring and decision model (“the algorithm”).<sup>2</sup> Since our bank applies a uniform credit-scoring methodology to assess loan applications this internal

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<sup>1</sup>In particular, SME loan applications are never referred up the decision ladder as a function of the customer’s importance, the request loan terms, etc.

<sup>2</sup>In up to 8% of the cases, the branch will invite the applicant back to follow up on open questions, review discrepancies in submitted information with credit reports, discuss the prospects of the firm, etc.

credit score represents a meaningful measure of the bank’s proprietary information across applicants and bank branches. The algorithm, whose decision parameters are set by headquarters (i.e., the Head of Origination), then presorts loan applications into three categories: automatic rejects (16.91%) or accepts (8.92%), and reviews (74.17%), which are the focus of our study.

The review process starts with the loan officer who conducted the initial interview. Relying on existing or newly gathered information she can subjectively alter initial credit scores, which amounts to a recommendation to offer or to deny credit. By revising internal scores, loan officers essentially harden soft information because adjustments might differ across employees, whose explanations are necessary for a third party to interpret the final score. Hence, loan officers can attach review notes to the electronic credit file, explaining both their recommendation and grounds for the score adjustment on the basis of subjective criteria, such as impression of management quality, personal assessments of collateral value, own view of firm prospects, etc.<sup>3</sup> However, employees’ career prospects and remuneration depend on the overall success of their credit decisions,<sup>4</sup> and local “overrides” are closely monitored by the bank’s risk-management group. These notes and the corresponding subjective score revisions represent, respectively, the pure and hardened soft-information component of the bank’s internal credit assessment at the center of our analysis.

Each branch enjoys a considerable amount of autonomy in the assessment, approval, and pricing of loans but loan supervisors at headquarters can override the initial recommendation. In the process, supervisors rely on public information, the subjectively adjusted internal score, which is not subject to further changes outside the branch office, and the credit file with the review notes. Unless the file comes back to the branch manager for further review and, possibly, score revisions headquarters do not generate any new information on the application. Although the branch office holds real authority in offering credit headquarters do not always rubberstamp the initial recommendation but often exercise formal authority by actively overturning local decisions. From the Head of Origination/Small-Business Lending to the lowest ranking loan officers there are potentially seven decision layers with the first four representing headquarters and supervisors, the fifth one typically the branch manager, and the last two ranks simple loan officers.

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<sup>3</sup>Berger, Frame and Miller (2005) also report that banks using proprietary credit-scoring models often rely on additional discretionary information in the credit approval process.

<sup>4</sup>Bonus payments at our data provider comprise three components, which reflect the profitability of their unit (the branch office), their line of business (small-business lending), and the overall bank. The first two components insure that loan officers and supervisors have a direct stake in the profitability of their credit decisions.

### 3.2 Data Description

The sample consists of all 28,761 applications for new SME loans to our data provider from January 2002 to April 2003. We match these records with credit-bureau reports (Experian and Dunn & Bradstreet) on the application date to verify the supplied information and delete applications with missing data (e.g., Experian credit score) or other informational discrepancies. Since our data provider engaged in several M&A transactions affecting its branch network we trace the history of the 1,536 offices involved as of June 30, 2001, whose provenance we verify FDIC and SNL DataSource information, leaving 21,827 credit requests made in person to 1,214 branches. We omit all re-assigned loan records and those from the 322 untraceable or new branch offices which opened around the sample period when our lender experienced rapid expansion.<sup>5</sup> Table 1 summarizes our data as a function of real (branch decision) or formal (headquarters decision) authority and reports the  $P$ -values of  $t$ -tests for the each variable’s conditional mean.<sup>6</sup>

To capture the initial delegation of real authority to branches, we define a binary variable *Review*, which takes the value 1 if headquarters requests a review (74.17%) and initiates the collection and processing of additional information, and 0 otherwise. To record the actual exercise of real authority, we construct a binary variable *Branch*, which takes the value 1 if the final credit decision occurs at the branch and 0 if it occurs at headquarters. We also know the hierarchical level ranging from 1 (Head of Origination) to 7 (lowest ranking loan officer), at which the final credit decision was made. We measure the collection and transmission of soft information by branches in terms of a binary variable *Notes*, which takes the value 1 if the credit file contains substantial review notes by the local loan officer (81% of credit offers, 37.4% of rejections) and 0 otherwise. To capture each credit decision’s information content, we rely on the bank’s own credit assessment summarized by each application’s final, i.e., possibly revised, *Internal Score*, which does not depend on the requested loan terms.

To proxy for the ease with which headquarters can collect borrower-specific and, especially, soft information, and with which branches can transmit such information to headquarters, we use the aerial distance between the two (*Organizational Distance*). We also construct binary variables for

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<sup>5</sup>Including the 3,983 additional observation from the 322 new or untraceable branches in the analysis does not change our findings (results not reported).

<sup>6</sup>For confidentiality reasons, the data provider did not allow us to report further descriptive statistics because they could be used to “reverse-engineer” the composition of the loan portfolio.

branches acquired through mergers in 1999 (*Acquisition99*: 217 branches) or 2001 (*Acquisition01*: 371 branches) as opposed to our data providers 625 remaining original branches after divestitures for anti-trust reasons. We control for the importance of each branch in terms of the number of local loan officers and its fraction of total deposits. We proxy for the local loan officer’s tenure and experience in term of her *Rank*.

To assess the nature of the business relationship, which facilitates the collection of borrower-specific information,<sup>7</sup> we rely on the length of the lending relationship (*Months-on-Books*: 28 months) and define a binary variable *Repeat*, which takes the value 1 if there exists a prior lending relationship and 0 otherwise (38%). We also measure the breadth of the business relationship by defining a binary variable *Scope* in terms of the balance of the firm’s current account (at least \$5,000) together with the purchase of at least one other (non-credit) banking product (26.44% of applications). Regarding loan terms our data contain the requested *Amount* (mean of \$46,507), *Maturity* (mean of 6.68 years), existence of *Collateral* (55% of applications), and, in case of an offer, annual percentage rate (*APR*: effective borrowing cost). About 37% of credit requests were personally guaranteed. As a matter of business policy, our bank offers term loans only at fixed rates (28% of applications) and credit lines at variable rates so that our *Term Loan* binary variable also captures the interest-rate type.

We measure the ease and cost of personally transacting with the bank in terms of time and effort by the driving distance in miles between each firm and its branch office and the distance to the closest full-service branch of a competitor.<sup>8</sup> To control for the availability of public information and firm-specific attributes, we rely on firm age (*Months in Business*: 115.4), its monthly *Net Income* (\$110,367), and 38 industry dummy variables based on the applicants’ two-digit SIC codes (see Table 1). Similarly, we use state and quarterly dummy variables to account for regional and business-cycle effects. To control for the competitiveness of local credit markets, we rely on the number of bank branches and active lenders in a firm’s zip code from the FDIC’s Summary of Deposits data base by year. Since banks and their customers might choose to locate in certain areas based on local economic conditions, we include the Case-Shiller Home Price Index (see Case and Shiller, 1987, 1989) matched by application zip code and month.

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<sup>7</sup>James (1987), Lummer and McConnell (1989), and Elsas (2005) present evidence suggesting that banks gain access to private information over the course of the lending relationship.

<sup>8</sup>See Degryse and Ongena (2005) on the importance of transportation costs in credit markets.

### 3.3 Estimation and Identification Strategy

We first construct a clean measure of the branch’s private information. Since each firm’s final internal score (*IntScore*) as a summary statistic of its credit quality might also comprise publicly available intelligence we orthogonalize it with each applicant’s Experian Small Business Intelliscore (*XSBI*; see Experian, 2000) on the day of the credit request. Specifically, we estimate the following regression with branch fixed effects  $1_k$  (and clustered standard errors):

$$\ln(1 + IntScore_i) = \beta_0 + \sum_k \beta_k 1_k + \gamma \cdot \ln(1 + XSBI_i) + u_i \quad (1)$$

The  $R^2$  of the above regression is 0.73 and the XSBI coefficients are both positive and statistically significant at 1%.<sup>9</sup> The branch’s subjective credit-quality impression of firm  $i$  is then simply the residual  $\hat{u}_i$  of the preceding regression, which we label the *Private Branch Information* (“*PBI*”), which represents soft information hardened through subjective score revisions in the sense of Petersen (2004).

As a precaution, we then remove possible noise in the *PBI* by interacting it with our binary *Notes* variable for application  $i$  to obtain  $PBI_i \cdot 1_{Notes,i}$ .<sup>10</sup> To measure the total soft-information produced by each branch, we finally compute the standard deviation of  $PBI \cdot 1_{Notes}$  by branch  $\sigma_{-i}(PBI) = \sigma(PBI_j \cdot 1_{Notes,j} : j \neq i)$  while omitting each observation’s own  $PBI_i \cdot 1_{Notes,i}$  value. The estimation of Equation (1) also allows us to define a measure of any potential bias in the credit review such as customer favoritism by branches. We simply average all branch fixed effect throughout the network as  $\bar{\beta} = K^{-1} \sum_k \hat{\beta}_k$  and then define each branch’s *Bias* as the difference between its own fixed effect and the average  $\hat{\beta}_k - \bar{\beta}$ .

Our identification strategy relies on the exogenous variation in distance between branch offices and our lender’s headquarters. The farther away loan officers are from a supervisor, the less likely is the latter to have specific knowledge about local economic conditions, financial prospects of the applicant, etc. Similarly, the greater is the branch-headquarters distance, the harder it becomes to transmit soft information, if only because personal contacts, follow-up questions, and specific explanations take more time and effort. As a result, soft local information becomes more important

<sup>9</sup>For confidentiality reasons we cannot report any results for the orthogonalization. The log-linear specification best agrees with the nonlinear nature of Experian’s Small Business Intelliscore.

<sup>10</sup>We also used the raw *PBI* but the results (not reported) are virtually the same.

in *Organizational Distance* so that far away branches should have more autonomy, exercise more real authority, and, correspondingly, produce more soft information, i.e., review notes. At the same time, our data provider’s lending standards, approval process, and credit-assessment methodology are uniform across its branch network so that the only differences in the treatment of branches by headquarters stems from the exogenous variation in *Organizational Distance*.

In terms of specifications, we simply follow the loan-approval process starting with a logistic discrete-choice model of the bank’s decision to review a particular application followed by a branch’s (loan officer’s) decision to produce and transmit soft information in terms of detailed review notes. Headquarters move next and either delegate real authority by acquiescing in the branch’s credit recommendation or exercise formal authority by overriding it. We also analyze the investment success resulting from the allocation of authority along two dimensions. First, we study the competitive reaction to the exercise of formal and real authority in term’s of the firm’s decision to decline the loan offer and switch lenders. Given our hypothesis that the allocation of real authority affects the quality of investment decisions, we finally specify a logistic model of borrower delinquency.

We estimate all our discrete-choice specifications by full-information maximum likelihood and report their pseudo  $R^2$ , which is simply McFadden’s likelihood ratio index, whenever appropriate. To account for possible systematic variations in internal-score revisions, supervisory policies, and headquarters interference across branches, we rely on fixed (branch) effects and compute clustered standard errors, which are adjusted for heteroskedasticity across branch offices and correlation within.<sup>11</sup> Since several of the variables fit better in logarithms than levels we use the former whenever appropriate.

## 4 Real and Formal Authority

Consistent with theoretical predictions, headquarters exercise its formal authority in 25.83% of cases by automatically rejecting or accepting loan applications through the algorithm on the basis of internal credit scores which represents hard or hardened proprietary information. In the remaining 74.17%, the center initially delegates real authority to branch offices by requesting a review of the loan application and credit recommendation, which might give rise to the production, recording,

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<sup>11</sup>Testing for homoskedasticity we fail to reject the hypothesis for all specifications presumably because of the low upper bound on the size of the firms in our sample (\$10m turnover under the SME loan definition).

and transmission of soft information.

#### 4.1 Formal Authority

All specifications in Table 2 show that review requests significantly depend on branch proximity: the likelihood of asking for further information from and a personal credit recommendation by the initial loan officer increases in the *Organizational Distance* between the center and the line unit. This finding is all the more remarkable that, from an operational perspective, our data provider has automated the review decision through the internal scoring and presorting algorithm. However, it also suggests that the bank takes into account the information losses naturally occurring in a hierarchy and incorporates their consequences into the credit-decision process through the choice of review thresholds for the initial score, which might already contain hardened soft information. In line with Dessein (2002), the harder it becomes to communicate due to physical distance, the more willing supervisors appear to delegate authority. The likelihood of a review also increases in the distance between branch and firm (Specification 1). Agarwal and Hauswald (2009) have shown that the quality of loan officers' soft information deteriorates outside the vicinity of branches so that review requests might be an attempt to counteract this tendency.

In line with the algorithm, we next sort firms on the basis of their public Experian scores into three groups (top and bottom 20%, intermediate 60%) and add the corresponding binary variables to the model ( Specification 2 in Table 2) to control for credit quality. We see that borrower quality is by far the most important determinant for initiating a review request. However, the significant positive impact of *Organizational Distance* remains unchanged. Despite controlling for credit quality, the head of origination is more likely to ask for review the further away a branch is located from headquarters. In contrast, variables measuring the nature, length and scope of the lending relationships all reduce the likelihood of a review. The better a firm is known to the bank through prior business ties, the more opportunity the branch office has had to gather subjective impressions of credit quality so that additional soft information becomes less important.

Specification 3 verifies this interpretation by including our measure for the line unit's total soft-information production  $\sigma_{-i}(PBI)$ , which excludes each observation's own contribution, as an additional branch fixed effect. We see that, indeed, the more subjective intelligence a branch generates, the more real authority headquarters tends to delegate in a particular credit decision:

the marginal effect of  $\sigma_{-i}$  (*PBI*) is positive and statistically significant.<sup>12</sup> By contrast, our measure for local biases is statistically not significant. Adding our variables for branch origin (Specification 4) shows that newly incorporated units enjoy more autonomy and, correspondingly, receive significantly more review requests. This finding provides strong support for the prediction in Dessein (2002) that the delegation of authority is a substitute for the communication of soft information. The fact that the effect is twice as large for the branches most recently acquired in 2001 (log-likelihood test significant but not reported) further corroborates this finding.

The results in Table 2 further reveal that loan applications for term loans as opposed to credit lines are more likely to result in reviews. Given that term loans are fully disbursed up front and cannot be cut back in case of late payment their greater risk might explain the higher incidence of additional scrutiny. Similarly, headquarters is more likely to ask for reviews of SBA-guaranteed loan requests, which require additional documentation. In contrast, a personal guarantee reduces the likelihood of a review.

## 4.2 Information Production

We next estimate logistic models of the loan officer’s decision to provide detailed notes on the credit review, which justify score revisions and credit recommendations in the quintessential format of soft information: text. All specifications in Table 3 show that, consistent with the greater delegation of authority (Table 2), branches farther away are more likely to collect and record borrower-specific soft information. Similarly, the further away a firm is located from its branch office, the more likely the loan officer is to document the credit recommendation. This result is again consistent with the notion that the branch knows less well the economic circumstances of more distant borrowers and, therefore, engages in an additional effort to collect subjective intelligence and to justify its recommendation.

Specification 2 shows how lending relationships facilitate the collection of subjective intelligence. Returning borrowers, firms with long-standing banking ties, and buyers of other services facilitate access to confidential data, which, in turn, lowers the cost of acquiring subjective intelligence. In consequence, branches are more likely to record and transmit soft information for such customers.

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<sup>12</sup>To properly assess sign, marginal effect, and statistical significance of the interaction terms such as  $\sigma_{-i}$  (*PBI*)-*Organizational Distance* in nonlinear specifications such as ours, we follow Ai and Norton (2003).

This finding is consistent with Aghion and Tirole (1997) who predict that the production of soft information decreases in its cost. The provision of review notes also increases in the total amount of soft information gathered by a branch (Specification 3). Interacting this information measure with the branch-headquarters distance shows that organizational distance and information production are complements in the recording and transmission of subjective intelligence. The interaction variable is highly significant in statistical and economic terms.

When we analyze the production and transmission of soft information by newly acquired branches (Specification 4) we find that such offices, which by the force of circumstances enjoy the most autonomy, are significantly more likely to produce subjective intelligence. In fact, the effect is the larger, the more recently they were acquired, which provides further evidence that the delegation of authority provides strong incentives for the production of soft information.

### 4.3 Real Authority

Having established that the *ex ante* granting of real authority, i.e., requests for review, leads to more information production by loan officers *ex post* we finally investigate the exercise of formal authority. In particular, we test the hypothesis that more information production implies less intervention by estimating the likelihood that supervisors at headquarters follow the credit recommendation of local loan officers. Table 4 shows again that the greater the organizational distance, the more likely branches are to have the final say in credit decisions across all specifications. Branch importance as measured by the number of local loan officers and their rank also matter, especially the latter. The more senior a loan officer is in rank, which is a proxy for experience, the less likely headquarters are to overrule her credit decision. Similarly, the more competitive local credit markets are in terms of number of competitors, the more autonomy branches enjoy in credit decisions.

Positive hard information surprisingly raises the likelihood of intervention (Specification 2). The higher is the firm's public credit score, the more likely are supervisors to overrule the branch's credit recommendation. This result highlights how the exercise of formal authority trades off loss of control with information generation or transmission in equilibrium. Positive internal-score revisions for better credit risks in the review category are more likely to result in loan offers. To counteract any systematic local bias in favor of such applicants, supervisors closely scrutinize any score revisions and corresponding recommendations, which they are more likely to reverse by

exercising their formal authority. In contrast, no such concerns exist in the possibly biased rejection of low-quality applicants. In this case, headquarters and branch interests actually agree because rejecting marginal credit risks minimizes type II error in lending.

In this respect, the significantly positive *Bias* effect, which points to local favoritism for better borrowers, appears curious at first sight (Specifications 3 and 4). It suggests that loan officers, who systematically revise internal scores upwards, do so to preserve more real authority and can get away with it. However, in equilibrium the center trades off the disincentives for information production or transmission resulting from intervention with the inefficiencies created by such a bias. Optimal exercise of formal authority then implies that headquarters acquiesce in some bias in favor of local firms, which leads to a positive association of real authority and systematic distortions in score adjustments.

The ability to collect soft information through lending relationships greatly enhances loan officers' real authority (Specification 2). The large positive marginal effect of the *Repeat* variable shows that branch offices are significantly more likely to make the final credit decision for a returning customer. In contrast, the breadth and length of the business relationship have small negative, but significant effects on the real authority of branches. Presumably, loan officers have hardened the pertinent soft information over time so that the center can make a more informed decision, which raises the likelihood of an "overrule." Furthermore, the longer a branch and customer have interacted the more likely the loan officer might be to show favoritism toward the firm, which then leads to more intervention. Despite the potential for a positive bias in score revisions, Specifications 3 and 4 further establish that information production in all its guises raises the real authority of line units. Soft-information production, i.e.,  $\sigma_{-i}(PBI)$ , has by far the largest (positive) effect on branches' ability to independently make credit decisions.

However, we also see the importance of recording and filing review notes (Specifications 3 and 4). The large, significantly positive marginal effect of *Notes* shows that loan officers who document their score revisions and credit recommendations with additional soft information are significantly less likely to suffer a reversal of their initial credit decision. Interacting total soft-information production  $\sigma_{-i}(PBI)$  with the branch's frequency of review notes and its organizational distance from headquarters further enhances these informational effects on the line unit's ability to effectively control its credit decisions. In particular, the highly significant positive marginal effects of the

total-information-distance interaction term suggests that the combination of greater physical distance, which impedes the effective communication of soft information, together with a track record of successfully hardening subjective intelligence through score revisions raises the organizational independence of branches and their loan officers.

In Specification 4, we finally investigate whether recently acquired units enjoy greater independence in their credit decisions as suggested by their higher propensity to file review notes (Specification 4, Table 3). We find that, indeed, newly integrated branches have much greater autonomy in credit decisions than our lender’s own branches and that the effect is the larger, the more recently the acquisition took place. Taken together, three factors seem of overriding importance in a branch’s ability to effectively exert control over its own credit decisions: its distance from headquarters, which hinders both the transmission of soft information and monitoring by loan supervisors, its ability to produce information, which becomes a substitute for communication, and the degree of integration into the organizational structure, which affects informational losses in communication and incentives for information production.

Although the center exercises formal authority after the line unit gathers subjective intelligence in the loan-approval process the nonobservability of the informational effort means that both actions effectively take place at the same time, i.e., the Nash assumption applies. In consequence, both the loan officer’s decision to record soft information and the supervisor’s choice of intervention might be jointly determined in equilibrium, especially in a setting of repeated interaction such as ours. Hence, we also carry out joint estimations of the corresponding specifications in Tables 3 and 4 as a robustness test but do not report the results because they are virtually indistinguishable from the tabulated one. Similarly, replicating the analysis under inclusion of the loan applications to the 322 new or untraceable branch offices does not change the results so that we do not report them.

#### **4.4 Delegating Authority**

Since we also know the hierarchical level at which the final credit decision took place we can study the determinants of delegating decision rights to intermediate ranks. Aghion and Bolton (1997) argue that the delegation of formal authority to “manager,” i.e., loan supervisors with intermediate objectives between headquarters and branches in terms of congruence, represents a commitment to limit the cost of intervention to loan officers. Hence, intermediate allocations of authority strike a

balance between the loss of incentives to line units and loss of decision rights to the center.

We specify a linear model of the decision level ranging from 1 (Head of Origination/Small-Business Lending) to 7 (lowest rank for local loan officers), which we estimate by OLS with branch fixed effects and clustered standard errors that are adjusted for heteroskedasticity across and correlation within branch offices. We see in Panel A of Table 5 that organizational distance, soft information production, and recent integration significantly lower the effective decision level in the hierarchy, presumably because even intermediate intervention is too costly in terms of reduced incentives for information production. In contrast, variables associated with hardened and hard information such as the length and scope of the lending relationship, firm age or size, and the public credit score all raise the ultimate decision level as predicted by Aghion and Tirole (1997). When investment decisions primarily rely on existing or hard intelligence the benefits of intermediate delegation outweigh its costs so that higher ranks in the hierarchy exercise formal authority.

In Panel B, we investigate contingencies in the exercise of formal authority. To this end, we distinguish the degree of delegation by the credit decision's outcome because intervention might be contingent on the branch's initial recommendation, e.g., supervisors only review credit approvals but not rejections. Defining a binary variable  $1_{Offer}$ , which takes the value 1 for a loan offer (Accept) and 0 otherwise (Reject), we estimate the following specification:

$$Level_i = \mathbf{x}'_i \boldsymbol{\beta} + 1_{Offer} \cdot \mathbf{x}'_i \boldsymbol{\gamma} + \varepsilon_i = \begin{cases} \mathbf{x}'_i (\hat{\boldsymbol{\beta}} + \hat{\boldsymbol{\gamma}}) & \text{for } 1_{Offer} = 1 \\ \mathbf{x}'_i \hat{\boldsymbol{\beta}} & \text{for } 1_{Offer} = 0 \end{cases} \quad (2)$$

The strong positive loan-offer fixed effect shows that delegation is much more prevalent in the decision to grant than to deny credit. Similarly, branch-headquarters distance, information production, and, to a lesser degree, organizational independence due to recent integration lead to more decision making further down the hierarchy for loan approvals than denials. These results are consistent with the notion that the exercise of formal authority is contingent on the initial credit approval through veto powers over investment proposals.

Our findings strongly suggest that our lender is fully aware of the incentive effects of decision rights for information production. Indeed, the bank seems to allocate authority consistent with the notion that it attempts to overcome location-induced informational inefficiencies in investment decisions, which stem from the difficulty to communicate and interpret subjective intelligence over

greater distances. Delegating authority not only spurs local branches to collect more soft information and use it in credit decisions (Aghion and Tirole, 1997) but also acts as a substitute for transmitting such information when it is particularly noisy (Dessein, 2002), for instance for newly acquired line units. Taken together, our results provide strong support for theories that view real authority in terms of providing incentives for either information production or its transmission. Given that both views are not mutually exclusive, our findings point to complementarities in the production of information and its transmission in corporate decision making.

Several conclusions follow. The branches' soft information stems from its knowledge of the local economy which justifies the delegation of authority. Conversely, such delegation stimulates the collection, recording, and transmission of subjective intelligence. However, it is only valuable to the center because loan officer can harden it through subjective revisions of internal credit scores and thereby transmit it to their superiors. Without such a means of expressing and communicating personal impressions of credit quality large organizations such as our data provider could not be active in a market segment which heavily relies on soft information. Hence, technological progress in the form of credit scoring coupled with organizational design in terms of distance-related delegation of authority permits large banks to emulate the internal structure of smaller lenders and overcome the size-induced disadvantages observed by Stein (2002). In fact, it might also explain the particular success that large institutions have recently enjoyed in small-business lending.

## **5 Authority and Investment Decisions**

We next assess the success of real and formal authority in credit decisions by analyzing how the delegation of control over loan applications to branch offices affects the retention of customers in the face of local competition and the profitability of investment decisions in terms of credit delinquency.

### **5.1 Real Authority and Competition**

To investigate whether the allocation of authority has any bearing on borrower retention, we estimate logistic discrete-choice models of the firm's decision to decline the credit offer and to switch lenders while controlling for the party which made the final credit decision. By comparing credit offers to actually booked loans we identify 874 offers for which firms declined the bank's terms and

sought credit from another lender around the same time. Matching these observations with credit-bureau information indicates that 539 firms (61.7%) indeed accepted the competing loan offer. The remainder (335 firms: 38.3%) declined the competing offer to approach yet another lender, failed to agree on terms, or later withdrew from the market.

Table 6 shows that the firm’s credit quality, which is a good indicator for the likelihood of a competing loan offer, is by far the most important determinant of an applicants likelihood to switch lenders. Similarly, controlling for loan terms and, especially, the borrowing cost now becomes important contrary to the preceding analysis. In terms of organizational design, we find that more distant branches are less likely to suffer defections by borrowers. Our previous results suggest that this success might simply be due to their greater autonomy in credit decisions, which also allows them to individually adjust loan terms to specific local conditions. The strong negative effects of the relationship variables (Specification 2), the filing of review notes (Specification 3), or total information production  $\sigma_{-i}$  (*PBI*) by local loan officers (Specification 3) corroborate this interpretation. Close ties with customers permit branches to gain an intimate knowledge of firms and their prospects and to adapt loan offers to their competitive environment.

However, only real authority provides sufficient incentives for loan officers to collect the requisite soft information. Although the soft-information variables indirectly capture the incentives effects of effective control over credit decisions we nevertheless include our *Branch* binary variable, which indicates the location of the final credit. Specification 3 shows that real authority of local loan officers independently reduces the likelihood of firms seeking credit elsewhere. This result might be due to additional incentive benefits from delegating authority such as marketing and negotiation efforts to convince reluctant customers to stay with our lender’s initial or subsequently revised loan offer. A similar rationale might explain the large negative impact which the recent acquisition of branches has on the likelihood to decline credit. Given their greater autonomy, such units not only collect more information, which can better forestall defections, but might also try harder to keep potential customers on board.

The large, negative *Bias* effect offers a second explanation for our earlier finding that branches systematically distort score revisions in favor of better borrowers, which headquarters tolerate (Specifications 3 and 4, Table 4). Not only are such distortions optimal to preserve informational incentives in equilibrium but they also help to retain marginal borrowers in the face of local com-

petition. These results suggest a further channel through which real authority improves corporate decisions. In the presence of variation in local economic conditions and, especially, in the competitive environment, delegating authority might provide incentives for local employees to compete more effectively. Not only does effective control over investment decisions improve the collection of the soft information necessary for strategic behavior, but also will branch managers and loan officer be more diligent in customizing loan terms to counter competing offers, in negotiating with clients, and in providing customer service after the deal closes. Hence, variations in the competitiveness of local markets might provide an additional rationale for pushing authority down to line units and “empowering” local managers.

## 5.2 Real Authority and Delinquency

The results so far suggest that banks delegate authority to provide incentives for the collection, transmission, and strategic use of soft information. To the extent that the requisite intelligence is primarily local, we would expect that branches have a natural advantage in assessing credit risks. Hence, we can directly test whether real authority implies better credit decision through the local use of subjective intelligence by studying the determinants of borrower delinquency, i.e., the likelihood of lending to a bad credit risk (type II error), during the first 18 months after the loan’s origination. We choose this window so that the likelihood of a loan becoming overdue is more related to the initial credit assessment than subsequent economic events beyond the bank’s control. Our sample contains 227 loans out of the 8,609 reviewed and ultimately booked ones (approximately 2.6%) which became 60 days past-due and thereby conform to our bank’s internal definition of a non-performing loan.<sup>13</sup>

Table 7 reports the results from estimating a logistic model of credit delinquency. We see that, again, the ultimate success of credit decisions declines in the branch-headquarter distance. The further away loan officers are located from supervisors, the more successful their investment decisions become. At the same time, all variables measuring access to soft information and its production strongly decrease the likelihood of borrower delinquency. Hence, the distance effect is due to the positive correlation between organizational distance and real authority, which, in

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<sup>13</sup>Although the technical definition of default is 180 days past-due most lenders including ours take action after at most 60 days past-due, either writing off the loan, selling it off, or assigning it for collection. Over 90% of loans 60 days overdue eventually suffer default according to our data provider.

equilibrium, arises from the local collection of subjective intelligence. In contrast, delinquency increases in *Bias*, which not only confirms our interpretation of this variable but also reveals the cost of delegating authority in terms of loan losses. However, these costs are the price of providing incentives to branches for the collection and strategic use of inside information, whose benefits we saw in the analysis of borrower retention.

When branches have the last word in loan approval delinquency also falls but the effect is small in economic magnitude (albeit large in statistical significance). Similarly, the recent acquisition of branches greatly reduces the incidence of borrower delinquency. Their *de-facto* autonomy due to the ongoing integration process means that, in line with Dessein (2002), their greater control over investment decisions translates into more successful lending. These results reinforce our conclusion that the delegation of authority is a powerful incentive device for the gathering and strategic use of subjective, local intelligence.

### 5.3 Exercising Formal Authority

Although our results identify the need for incentives as the driving force behind the delegation of real authority in credit decisions it is unclear what motivates headquarters to exercise formal authority in equilibrium. Hence, we finally investigate whether intervention by the center reflects independent information or potentially randomized monitoring on the part of supervisors. Using the binary variable  $1_{Branch}$ , which takes the value 1 or 0 if the branch or headquarters, respectively, had the final say in a credit decision, we estimate the following model for borrower switching and delinquency ( $Y = 1$ ):

$$E \left[ \hat{Y}_i | \mathbf{x}_i \right] = \Lambda \left( \mathbf{x}'_i \hat{\beta} + 1_{Branch} \cdot \mathbf{x}'_i \hat{\gamma} \right) = \begin{cases} \Lambda \left( \mathbf{x}'_i \left( \hat{\beta} + \hat{\gamma} \right) \right) & \text{for } 1_{Branch} = 1 \\ \Lambda \left( \mathbf{x}'_i \hat{\beta} \right) & \text{for } 1_{Branch} = 0 \end{cases} \quad (3)$$

By estimating the differential impact of real and formal authority on the success of credit decisions, the preceding specification allows us to test several hypotheses about the rationale for intervention by headquarters. If supervisors intervene simply to keep branches on their toes (“monitoring hypothesis”) borrower switching and delinquency should decrease in organizational distances for branch decisions but increase in it for overrides by headquarters. In this case, intervention is a cost the center bears to curtail losses stemming from branches’ biased credit decisions in favor

of their clients. Alternatively, headquarters might intervene because it holds relevant information of its own (“information hypothesis”) so that borrower switching and delinquency decrease in organizational distance for both branch and headquarter decisions. In this case, we would expect headquarters to primarily pursue profitability rather than strategic objectives in its exercise of formal authority.

The results in Table 8 suggest that headquarters intervene for informational rather than monitoring reasons because the marginal effects of the branch-headquarter distance are (significantly) negative and very comparable across equations. Supervisors overrule local loan officers only when their information is deemed at least as good so that the likelihood of borrower switching and delinquency also decreases in *Organizational Distance* for credit decisions made by headquarters. The marginal effect of hard information in the form of the firm’s public credit score corroborates this interpretation. Although good credit risks are twice as likely to switch banks when headquarters make the credit decision they are also twice as likely to not suffer delinquency.

Supervisors simply pursue profitability in credit decisions and disregard the local competitive landscape which, however, induces branches to strategically revise credit scores and offer credit. The results for the *Bias* variable offer further support for this conclusion. In the decision to switch lenders (Panel A), its marginal effects are very comparable across equations but not so for borrower delinquency (Panel B), in which case they are twice as large in the headquarters equation as in the branch one. Taken together, our findings suggest that delegation of authority is so successful in equilibrium that *Organizational Distance* actually increases the success of investment decisions because it decreases the likelihood of borrower switching and delinquency.

## 6 Discussion

Our fundamental premise holds that investment decisions require soft, subjective information which is primarily of a local nature and hard to transmit or interpret over greater distances. We then test theories of authority and organizational design using unique data on credit decisions by a major US bank, which exploits the exogenous variation in branch-headquarters distance for identification purposes. Consistent with theoretical predictions, we find that the optimal allocation of authority can overcome information-induced inefficiencies in corporate-decision making by providing strong

incentives for the local production of subjective intelligence. In fact, granting real authority to line units negates the effects of organizational distance on informational losses through the provision of incentives to local loan officers for the collection and hardening of soft information in equilibrium.

Our results provide very strong support for theories of authority based on soft-information collection (Aghion and Tirole, 1997; or Stein, 2002) and its strategic transmission to supervisors (Dessein, 2002). Control over credit decisions motivates local loan officers to produce soft information which improves the success of investment decisions and justifies the delegation of real authority to branches. Similarly, the more autonomy line units have due to their recent acquisition the more likely are they to generate and transmit subjective intelligence. In contrast, the exercise of formal authority by supervisors crucially relies on hard public information or prior bank-internal intelligence which has been hardened and passed up the hierarchy over time. As a result, the center delegates the more real authority, the more soft-information production matters for investment decisions.

Furthermore, we identify a new economic channel through which the delegation of real authority helps to overcome inefficiencies in corporate decision making. Our findings suggest that headquarters also grant branches more authority to provide incentives for strategic competition in response to local competitive pressures. Given that far-away supervisors might not have the requisite information to successfully formulate loan-offer strategies in the face of local competition, they need to delegate this task to branch offices which then receive the requisite decision rights. However, our results also reveal that the center faces a tradeoff between internal and external strategic behavior in the provision of incentives for the collection and strategic use of subjective intelligence. Although the delegation of authority motivates local loan officers to compete more effectively for borrowers it also allows them to distort credit decisions in favor of local firms. In equilibrium, our lender balances the advantages of borrower retention with the costs of biased credit decisions in the form of delinquency through the exercise of formal authority.

Our results also suggest avenues for new theoretical and empirical work. In particular, the delegation of authority in organizations to provide incentives for the strategic use of information has not received any attention in the literature to our knowledge. Similarly, our results suggest that the precise allocation of authority between the center and line units is a function of subordinates' ability to successfully harden subjective intelligence. However, the appropriate incentives to harden

and transmit soft information might be different from those required to collect and strategically use it in the first place. Hence, it is important to understand how technological advances such as credit scoring interact with organizational design in the alignment of incentives between the center and line units. We leave these questions for future research.

Table 1: Descriptive Statistics

## Panel A: Key Variables

Credit Decision Variable	Headquarters			Branch Office			<i>t</i> -Test
	Mean	Median	Std Dev	Mean	Median	Std Dev	<i>P</i> -val
Organizational (aerial) distance branch-HQ	111.56	93.73	103.63	195.77	190.23	96.43	0.001
Hierarchical layer of decision (out of 7)	3.09	2.93	2.05	4.90	4.81	1.87	0.001
Internal credit score	698.55	657.12	20.15	1082.61	992.78	154.79	0.001
Public credit score ( <i>XSBI</i> )	626.53	617.77	54.69	608.75	601.74	46.92	0.001
Private Branch Information ( <i>PBI</i> )	0.08	0.00	0.06	0.72	0.53	0.61	0.001
<i>Bias</i> $\hat{\beta}_k - \bar{\beta}$	0.27	0.24	0.78	0.24	0.20	0.59	0.005
Total branch information $\sigma_{-i} (PBI \cdot 1_{Notes})$	0.07	0.06	0.03	0.27	0.26	0.17	0.001
Lending relationship (prior loan: Repeat)	0.26		0.41	0.33		0.44	0.001
Months-on-Books	37	35	43	26	24	39	0.001
Scope of banking relationship	17,239	12,738	71,921	12,748	9,038	25,720	0.001
Number of loan officers	4.27	3.72	2.32	4.81	4.47	1.92	0.001
Loan officer rank (proxy for tenure)	2.83	2.74	3.97	3.07	2.99	3.56	0.001
Branch deposits/bank deposits	0.01	0.00	0.06	0.01	0.00	0.05	1.000
Offered annual percentage rate (APR)	4.50	4.37	0.90	3.41	3.39	1.23	0.001
Spread over maturity-matched UST (bps)	219	215	55	199	185	57	0.001
Loan Amount conditional on offer	18,672	18,282	13,581	20,487	19,937	19,230	0.001
Maturity (years) conditional on offer	6.40	5.83	5.31	6.41	5.96	5.20	0.904
Term Loan (vs. Credit-Line)	0.27		0.44	0.27		0.43	1.000
Collateral	0.54		0.42	0.46		0.44	0.001
Personal Guarantee	0.35		0.42	0.32		0.45	0.001
SBA Guarantee	0.16		0.47	0.11		0.26	0.001
Months in Business	110	94	79	92	85	79	0.001
Firm's Monthly Net Income	104,287	88,056	206,956	84,665	80,381	347,250	0.001
Case-Shiller House Price Index	163	159	31	160	147	32	0.001
Firm-Bank Distance (miles by car)	8.66	8.37	20.26	9.80	9.61	23.93	0.001
Firm-Comp Distance (miles by car)	1.03	1.01	1.43	0.83	0.79	1.40	0.001
Number of competing branches	4.75	2.92	5.55	4.61	2.81	5.13	0.096
Number of competing institutions	3.52	2.97	3.44	3.25	2.87	3.13	0.001
Number of observations		7,164			9,024		16,188

## Panel B: Credit Decisions and Branch Origin

Credit Decision	Headquarters	Branch Office	Total
Algorithm decision vs. review of credit request	5,639	16,188	21,827
Accept	3,574	4,116	7,690
Reject	3,590	4,908	8,498
Review Notes	2,127	7,257	9,384
Decline offer (out of 7,690)	266	238	504
Delinquency (out of 7,186)	98	84	182
Original branches		625	
Branches acquired in 1999		217	
Branches acquired in 2001		372	
Total branches		1,214	

Panel A presents summary statistics for the variables described in Section 3 for our 16,188 reviewed loan applications (out of 21,827 total credit requests) as a function of the final credit decision's location, i.e., headquarters or the branch office where the firm initially applied. The last column indicates the *P*-values of a two-sided *t*-test for the equality of the variables' mean conditional on the effective control over the credit decision (wherever appropriate). Panel B summarizes the credit decision process, borrower retention and delinquency, as well as the composition of the branch network.

Table 2: **The Exercise of Real Authority**

Specification Variable	<b>1</b>			<b>2</b>			<b>3</b>			<b>4</b>		
	Coeff	<i>P</i> -val	Marg	Coeff.	<i>P</i> -val	Marg	Coeff.	<i>P</i> -val	Marg	Coeff.	<i>P</i> -val	Marg
Constant	-0.859	0.001		-0.007	0.001		-1.462	0.001		-1.729	0.001	
ln(1+Branch-HQ Dist)	0.524	0.001	2.34%	0.717	0.001	2.68%	0.704	0.001	2.67%	0.699	0.001	2.63%
Repeat				-0.065	0.001	-1.53%	-0.062	0.001	-1.47%	-0.063	0.001	-1.46%
ln(1+Months on Books)				-0.953	0.001	-1.72%	-0.937	0.001	-1.72%	-0.915	0.001	-1.73%
Scope				-0.166	0.001	-1.61%	-0.162	0.001	-1.58%	-0.162	0.001	-1.58%
Info Prod $\sigma_{-i}$ ( <i>PBI</i> )							1.039	0.001	1.74%	1.017	0.001	1.66%
$\sigma_{-i}$ ( <i>PBI</i> ) · ln(1+B-HQ Dist)							0.654	0.066	0.94%	0.632	0.066	0.90%
Bias							0.252	0.441	0.00%	0.249	0.435	0.00%
Acquisition99										0.400	0.001	1.69%
Acquisition01										0.565	0.001	3.33%
Loan Officer Rank	0.099	0.735	0.46%	0.098	0.723	0.44%	0.097	0.716	0.44%	0.095	0.718	0.45%
# Loan Officers at Branch	0.060	0.719	0.14%	0.060	0.734	0.14%	0.062	0.711	0.14%	0.059	0.706	0.14%
Branch/Bank Deposits	0.084	0.174	0.00%	0.081	0.172	0.00%	0.084	0.171	0.00%	0.083	0.169	0.00%
<i>XSBI</i> - Lowest 20%				-0.365	0.001	-7.28%	-0.365	0.001	-6.94%	-0.354	0.001	-7.15%
<i>XSBI</i> - Middle 60%				0.216	0.001	10.04%	0.218	0.001	9.53%	0.217	0.001	10.04%
<i>XSBI</i> - Highest 20%				-0.153	0.001	-5.99%	-0.147	0.001	-5.94%	-0.153	0.001	-5.75%
ln(1+Months in Business)	-0.085	0.716	-0.02%	-0.083	0.713	-0.01%	-0.081	0.742	-0.02%	-0.082	0.706	-0.02%
ln(1+Net Income)	-0.193	0.520	-0.43%	-0.194	0.520	-0.43%	-0.195	0.521	-0.44%	-0.189	0.496	-0.43%
Collateral	-0.449	0.171	-0.31%	-0.460	0.163	-0.31%	-0.443	0.166	-0.30%	-0.457	0.171	-0.31%
Personal Guarantee	0.666	0.001	2.06%	0.637	0.001	2.00%	0.640	0.001	2.03%	0.660	0.001	2.01%
SBA Guarantee	-0.468	0.057	-0.91%	-0.481	0.056	-0.90%	-0.469	0.057	-0.92%	-0.474	0.055	-0.90%
Term Loan	1.221	0.001	1.49%	1.218	0.001	1.47%	1.238	0.001	1.47%	1.264	0.001	1.48%
ln(1+Firm-Bank Dist)	0.043	0.031	1.65%	0.057	0.174	0.14%	0.056	0.167	0.14%	0.056	0.165	0.13%
ln(1+Firm-Comp Dist)	0.419	0.858	0.02%	0.210	0.914	0.08%	0.204	0.892	0.08%	0.201	0.903	0.08%
ln(1+Case-Shiller HPI)	-0.237	0.720	-0.16%	-0.240	0.688	-0.17%	-0.232	0.733	-0.16%	-0.232	0.706	-0.17%
# Competing Branches	0.343	0.167	0.00%	0.353	0.166	0.00%	0.361	0.162	0.00%	0.349	0.162	0.00%
# Competing Lenders	0.498	0.446	0.67%	0.498	0.436	0.68%	0.481	0.443	0.68%	0.497	0.443	0.69%
4 Quarterly Dummies		Yes			Yes			Yes			Yes	
8 State Dummies		Yes			Yes			Yes			Yes	
38 SIC Dummies		Yes			Yes			Yes			Yes	
Number of Obs		21,827			21,827			21,827			21,827	
Pseudo $R^2$		10.17%			30.02%			32.77%			34.90%	

This table reports the results from estimating a logistic discrete-choice model of credit reviews by full-information maximum likelihood with branch fixed effects and clustered standard errors which are adjusted for heteroskedasticity across branch offices and correlation within. The dependent variable is the algorithm’s, i.e., headquarters’, request for the initial loan officer to review a loan application ( $Y = 1$ : 16,188 observations). The explanatory variables are the organizational distance between branch and headquarters (abbreviated “HQ-B dist”), bank-borrower relationship characteristics, measures of the branch’s information production (abbreviated “Inf. Prod.”)  $\sigma_{-i}$  (*PBI*) and its decision bias, branch origin (acquired in 1999 or 2001), loan-officer rank as a proxy for tenure, branch characteristics, the firm’s credit-quality category as measured by quantiles of Experian’s Small Business IntelliScore (*XSBI*), firm attributes, and various control variables (see Section 3 for a detailed description of the variables).

We report the coefficients (“Coeff”), their  $P$ -values (“ $P$ -val”), and marginal effects (“Marg”) for the request to review a loan application ( $Y = 1$ ). We obtain the marginal effects by simply evaluating  $\frac{\partial \text{Pr}}{\partial x_j} = \Lambda'(\mathbf{x}'_i \boldsymbol{\beta}) \beta_j$  at the regressors’ sample means and coefficient estimates  $\hat{\boldsymbol{\beta}}$ . Since the probabilities of offering and denying credit sum to 1 the marginal effects for the decision to reject a loan application are simply the opposite of the reported ones. The pseudo- $R^2$  is McFadden’s likelihood ratio index  $1 - \frac{\log L}{\log L_0}$ .

Table 3: The Branch’s Decision to Provide Additional Soft Information

Specification Variable	1			2			3			4		
	Coeff	<i>P</i> -val	Marg	Coeff.	<i>P</i> -val	Marg	Coeff.	<i>P</i> -val	Marg	Coeff.	<i>P</i> -val	Marg
Constant	-0.620	0.001		-0.734	0.001		-1.024	0.001		-1.336	0.001	
ln(1+Branch-HQ Dist)	1.672	0.001	5.09%	1.378	0.001	4.79%	1.297	0.001	4.49%	0.899	0.001	4.12%
Repeat				1.258	0.001	1.34%	1.162	0.001	1.91%	1.217	0.001	1.74%
ln(1+Months on Books)				0.947	0.001	1.40%	1.498	0.001	1.10%	0.825	0.001	1.76%
Scope				0.317	0.001	2.56%	0.325	0.001	2.50%	0.213	0.005	2.07%
Info Prod $\sigma_{-i}$ ( <i>PBI</i> )							0.531	0.001	2.17%	0.316	0.001	2.78%
$\sigma_{-i}$ ( <i>PBI</i> ) · ln(1+B-HQ Dist)							0.567	0.001	3.87%	0.571	0.001	3.88%
Bias							0.308	0.457	0.01%	0.251	0.478	0.06%
Acquisition99										0.273	0.001	1.75%
Acquisition01										0.440	0.001	2.10%
Loan Officer Rank	0.016	0.688	0.00%	0.016	0.687	0.00%	0.016	0.685	0.00%	0.016	0.690	0.00%
# Loan Officers at Branch	0.420	0.725	0.21%	0.312	0.813	0.12%	0.113	0.880	0.09%	0.099	0.980	0.03%
Branch/Bank Deposits	0.030	0.887	0.17%	0.029	0.886	0.17%	0.029	0.889	0.17%	0.035	0.910	0.16%
ln(1+ <i>XSBI</i> )				-0.284	0.001	-1.29%	-0.182	0.001	-0.94%	-0.195	0.001	-0.54%
ln(1+Months in Business)	-0.372	0.795	-0.19%	-0.326	0.804	-0.10%	-0.269	0.815	-0.10%	-0.286	0.879	-0.13%
ln(1+Net Income)	-0.193	0.395	-0.78%	-0.056	0.871	-0.32%	-0.037	0.977	-0.07%	-0.041	0.979	-0.08%
Collateral	-0.769	0.431	-0.82%	-0.769	0.436	-0.82%	-0.763	0.432	-0.82%	-0.763	0.439	-0.82%
Personal Guarantee	-0.130	0.959	-0.03%	-0.130	0.972	-0.03%	-0.129	0.973	-0.03%	-0.133	0.980	-0.03%
SBA Guarantee	0.174	0.398	0.61%	0.175	0.397	0.61%	0.174	0.392	0.62%	0.179	0.390	0.62%
Term Loan	-0.048	0.365	-0.28%	-0.049	0.363	-0.29%	-0.048	0.360	-0.28%	-0.049	0.367	-0.28%
ln(1+Firm-Bank Dist)	0.755	0.020	2.97%	0.821	0.001	3.26%	0.885	0.001	3.16%	0.800	0.001	3.51%
ln(1+Firm-Comp Dist)	0.298	0.555	0.02%	0.203	0.520	0.08%	0.170	0.960	0.01%	0.154	0.947	0.01%
ln(1+Case-Shiller HPI)	-0.319	0.160	-0.89%	-0.314	0.160	-0.88%	-0.316	0.162	-0.89%	-0.318	0.164	-0.88%
# Competing Branches	0.243	0.312	0.00%	0.239	0.322	0.00%	0.237	0.326	0.00%	0.243	0.321	0.00%
# Competing Lenders	0.363	0.271	0.83%	0.363	0.271	0.85%	0.367	0.277	0.83%	0.364	0.268	0.85%
4 Quarterly Dummies		Yes			Yes			Yes			Yes	
8 State Dummies		Yes			Yes			Yes			Yes	
38 SIC Dummies		Yes			Yes			Yes			Yes	
Number of Obs		16,188			16,188			16,188			16,188	
Pseudo $R^2$		2.17%			4.02%			5.77%			8.90%	

This table reports the results from estimating a logistic discrete-choice model of the loan officer’s decision to attach review notes to the credit file ( $Y = 1$ : 9,384 observations) by full-information maximum likelihood with branch fixed effects and clustered standard errors which are adjusted for heteroskedasticity across branch offices and correlation within. The explanatory variables are the organizational distance between branch and headquarters (abbreviated “HQ-B dist”), bank-borrower relationship characteristics, measures of the branch’s information production (abbreviated “Inf. Prod.”)  $\sigma_{-i}$  (*PBI*) and its decision bias, branch origin (acquired in 1999 or 2001), loan officer rank as a proxy for tenure, branch characteristics, the firm’s Experian Small Business IntelliScore (*XSBI*), firm attributes, and various control variables. See Section 3 for a description of the variables and the notes to Table 2 for further details.

Table 4: **Formal and Real Authority in Credit Decisions**

Specification Variable	<b>1</b>			<b>2</b>			<b>3</b>			<b>4</b>		
	Coeff	<i>P</i> -val	Marg	Coeff.	<i>P</i> -val	Marg	Coeff.	<i>P</i> -val	Marg	Coeff.	<i>P</i> -val	Marg
Constant	-2.048	0.001		-1.845	0.001		-1.824	0.001		-1.800	0.001	
ln(1+Branch-HQ Dist)	0.439	0.001	8.20%	0.413	0.001	7.56%	0.397	0.001	7.14%	0.392	0.001	7.07%
Repeat				0.698	0.001	4.97%	0.677	0.001	3.95%	0.688	0.001	3.85%
ln(1+Months on Books)				-0.673	0.001	-0.82%	-0.635	0.001	-0.80%	-0.640	0.001	-0.84%
Scope				-0.115	0.001	-0.78%	-0.125	0.001	-0.81%	-0.116	0.001	-0.82%
Notes							1.221	0.001	4.71%	0.641	0.001	2.81%
Info Prod $\sigma_{-i}$ ( <i>PBI</i> )							0.634	0.001	9.79%	0.624	0.001	9.01%
$\sigma_{-i}$ ( <i>PBI</i> ) · Notes Freq										0.557	0.001	2.90%
$\sigma_{-i}$ ( <i>PBI</i> ) · ln(1+B-HQ Dist)							0.731	0.001	4.81%	0.618	0.001	4.67%
Bias							0.228	0.001	1.37%	0.179	0.001	0.37%
Acquisition99										0.091	0.029	5.61%
Acquisition01										0.288	0.001	8.85%
Loan Officer Rank	0.195	0.001	1.81%	0.141	0.001	1.67%	0.128	0.001	1.63%	0.118	0.001	1.60%
# Loan Officers at Branch	0.020	0.001	0.84%	0.020	0.001	0.82%	0.019	0.001	0.74%	0.019	0.001	0.75%
Branch/Bank Deposits	0.012	0.178	0.00%	0.013	0.170	0.01%	0.012	0.207	0.00%	0.011	0.189	0.00%
ln(1+ <i>XSBI</i> )				-0.249	0.001	-3.29%	-0.231	0.001	-3.08%	-0.229	0.001	-3.10%
ln(1+Months in Business)	-0.097	0.767	-0.14%	-0.092	0.764	-0.13%	-0.081	0.695	-0.12%	-0.083	0.685	-0.12%
ln(1+Net Income)	-0.067	0.496	-0.99%	-0.069	0.461	-0.91%	-0.062	0.431	-0.87%	-0.064	0.419	-0.86%
Collateral	-0.248	0.564	-0.60%	-0.243	0.501	-0.59%	-0.235	0.485	-0.53%	-0.228	0.491	-0.53%
Personal Guarantee	-0.042	0.921	-0.01%	-0.040	0.796	-0.01%	-0.038	0.811	-0.01%	-0.038	0.807	-0.01%
SBA Guarantee	0.090	0.084	0.74%	0.089	0.087	0.72%	0.081	0.083	0.67%	0.080	0.085	0.69%
Term Loan	-0.068	0.911	-0.08%	-0.069	0.898	-0.08%	-0.065	0.843	-0.07%	-0.063	0.835	-0.07%
ln(1+Firm-Bank Dist)	0.674	0.091	2.54%	0.281	0.415	0.61%	0.266	0.397	0.48%	0.267	0.386	0.38%
ln(1+Firm-Comp Dist)	-0.103	0.269	-0.79%	-0.072	0.601	-0.38%	-0.062	0.575	-0.35%	-0.066	0.574	-0.26%
ln(1+Case-Shiller HPI)	-0.095	0.751	-0.59%	-0.095	0.687	-0.62%	-0.090	0.680	-0.56%	-0.092	0.655	-0.55%
# Competing Branches	0.070	0.168	0.00%	0.065	0.156	0.00%	0.063	0.151	0.00%	0.062	0.151	0.00%
# Competing Lenders	0.112	0.001	0.96%	0.103	0.001	0.93%	0.097	0.001	0.83%	0.098	0.001	0.82%
4 Quarterly Dummies		Yes			Yes			Yes			Yes	
8 State Dummies		Yes			Yes			Yes			Yes	
38 SIC Dummies		Yes			Yes			Yes			Yes	
Number of Obs		16,188			16,188			16,188			16,188	
Pseudo $R^2$		16.21%			22.87%			31.88%			34.83%	

This table reports the results from estimating a logistic discrete-choice model of delegating authority to local loan officers. The dependent variable is *Branch*, which takes the value 1 if the branch makes the final credit decision (9,024 observations) and 0 if headquarters overrules its credit recommendation (7,164 observations). The explanatory variables are the organizational distance between branch and headquarters (abbreviated “HQ-B dist”), bank-borrower relationship characteristics, the existence of application-specific review notes, whose frequency by branch (“Notes Freq”) we interact with the total soft information locally produced, measures of the branch’s information production (abbreviated “Inf. Prod.”)  $\sigma_{-i}$  (*PBI*) and its decision bias, branch origin (acquired in 1999 or 2001), loan officer rank as a proxy for tenure, branch characteristics, the firm’s Experian Small Business IntelliScore (*XSBI*), firm attributes, and various control variables. See Section 3 for a description of the variables and the notes to Table 2 for further details.

Table 5: Intermediate Allocation of Authority

Panel A: Delegation of Authority to Intermediate Ranks

Specification Variable	1		2		3		4	
	Coeff	P-val	Coeff	P-val	Coeff	P-val	Coeff	P-val
Constant	2.807	0.001	2.728	0.001	2.587	0.001	2.533	0.001
Loan Offer (Accept)	0.384	0.001	0.371	0.001	0.374	0.001	0.371	0.001
ln(1+Branch-HQ Dist)	0.647	0.001	0.692	0.001	0.751	0.001	0.824	0.001
Repeat			0.370	0.002	0.446	0.001	0.364	0.001
ln(1+Months on Books)			-0.164	0.094	-0.128	0.155	-0.126	0.162
Scope			-0.109	0.006	-0.112	0.004	-0.108	0.005
Notes					0.641	0.001	0.582	0.001
Info Prod $\sigma_{-i}$ ( <i>PBI</i> )					0.590	0.003	0.565	0.001
$\sigma_{-i}$ ( <i>PBI</i> ) · Notes Freq					0.536	0.001	0.525	0.001
$\sigma_{-i}$ ( <i>PBI</i> ) · ln(1+B-HQ Dist)					0.692	0.001	0.592	0.001
Bias					0.210	0.001	0.166	0.011
Acquisition99							0.457	0.001
Acquisition01							0.785	0.001
Loan Officer Rank	0.038	0.234	0.038	0.232	0.038	0.223	0.039	0.231
# Loan Officers at Branch	0.018	0.002	0.019	0.001	0.018	0.001	0.018	0.001
Branch/Bank Deposits	0.011	0.153	0.012	0.099	0.011	0.190	0.011	0.236
ln(1+ <i>X SBI</i> )	-0.224	0.002	-0.227	0.002	-0.211	0.003	-0.208	0.006
ln(1+Months in Business)	-0.572	0.001	-0.446	0.001	-0.461	0.002	-0.427	0.002
ln(1+Net Income)	-0.059	0.313	-0.065	0.232	-0.057	0.255	-0.059	0.290
Number of Obs	16,188		16,188		16,188		16,188	
$R^2$	24.30%		25.07%		37.26%		40.38%	

Panel B: Contingent Delegation of Authority by Credit Decision

Specification Credit Decision Variable	1				2			
	Reject		Accept		Reject		Accept	
	Coeff	P-val	Coeff	P-val	Coeff	P-val	Coeff	P-val
Constant	1.721	0.001		0.001	1.700	0.001		0.001
Loan Offer (Accept)			0.386	0.001			0.392	0.001
ln(1+Branch-HQ Dist)	0.543	0.001	0.906	0.001	0.558	0.001	0.910	0.001
Repeat	0.294	0.003	0.366	0.002	0.288	0.003	0.367	0.002
ln(1+Months on Books)	-0.088	0.341	-0.128	0.195	-0.086	0.333	-0.130	0.195
Scope	-0.104	0.004	-0.111	0.008	-0.103	0.005	-0.111	0.007
Notes	0.511	0.005	0.593	0.002	0.527	0.004	0.594	0.001
Info Prod $\sigma_{-i}$ ( <i>PBI</i> )	0.439	0.006	0.630	0.001	0.434	0.005	0.622	0.001
$\sigma_{-i}$ ( <i>PBI</i> ) · Notes Freq	0.510	0.001	0.563	0.001	0.501	0.001	0.540	0.001
$\sigma_{-i}$ ( <i>PBI</i> ) · ln(1+B-HQ Dist)	0.527	0.002	0.611	0.002	0.524	0.002	0.612	0.002
Bias	0.114	0.075	0.176	0.014	0.109	0.074	0.174	0.012
Acquisition99					0.329	0.001	0.497	0.001
Acquisition01					0.751	0.001	0.808	0.001
Loan Officer Rank	0.038	0.235	0.096	0.122	0.038	0.226	0.098	0.120
# Loan Officers at Branch	0.015	0.001	0.020	0.001	0.015	0.001	0.019	0.001
Branch/Bank Deposits	0.009	0.283	0.011	0.263	0.009	0.277	0.011	0.250
ln(1+ <i>X SBI</i> )	-0.145	0.037	-0.218	0.009	-0.145	0.038	-0.216	0.009
ln(1+Months in Business)	-0.388	0.003	-0.473	0.001	-0.395	0.003	-0.453	0.002
ln(1+Net Income)	-0.057	0.263	-0.060	0.300	-0.056	0.261	-0.060	0.294
Number of Obs	16,188				16,188			
$R^2$	41.27%				41.31%			

Panel A reports the results from estimating a linear model of the hierarchical level, at which the final credit decision occurred (the dependent variable ranges from 1 = Head of Origination to 7 = lowest loan-officer rank), by OLS with branch fixed effects and clustered standard errors which are adjusted for heteroskedasticity across and correlation within branch offices. In Panel B, we further distinguish between the outcome of the credit decision by specifying separate equations for offers (Accept) and denials (Reject) for the last two specifications in Panel A, which we estimate simultaneously. For readability, we suppress the control variables for guarantees, loan terms, transaction costs, local economic conditions, as well as business cycle, state, and industry effects. See Section 3 and the notes to Table 2 for a description of the variables.

Table 6: **Borrower Retention**

Specification Variable	<b>1</b>			<b>2</b>			<b>3</b>			<b>4</b>		
	Coeff	<i>P</i> -val	Marg	Coeff.	<i>P</i> -val	Marg	Coeff.	<i>P</i> -val	Marg	Coeff.	<i>P</i> -val	Marg
Constant	-1.979	0.001		-2.008	0.001		-1.950	0.001		-1.926	0.001	
ln(1+Branch-HQ Dist)	-0.294	0.001	4.54%	-0.292	0.001	-4.07%	-0.294	0.001	-4.65%	-0.296	0.001	-5.39%
Repeat				-0.886	0.001	-5.58%	-0.962	0.001	-5.53%	-0.923	0.001	-5.48%
ln(1+Months on Books)				-0.952	0.001	-5.74%	-0.942	0.001	-5.71%	-0.947	0.001	-5.43%
Scope				-0.879	0.001	-7.57%	-0.888	0.001	-8.09%	-0.933	0.001	-8.12%
Notes							-0.100	0.001	-2.30%	-0.103	0.001	-2.30%
Info Prod $\sigma_{-i}$ ( <i>PBI</i> )							-0.301	0.001	-3.74%	-0.304	0.001	-3.05%
$\sigma_{-i}$ ( <i>PBI</i> ) · Notes Freq										-0.097	0.001	-1.34%
$\sigma_{-i}$ ( <i>PBI</i> ) · ln(1+B-HQ Dist)							-1.754	0.001	-1.17%	-1.792	0.001	-1.08%
Bias							-0.919	0.001	-3.96%	-0.914	0.001	-3.72%
Branch Decision							-1.697	0.001	-1.00%	-1.841	0.001	-1.17%
Acquisition99										-3.945	0.001	-3.10%
Acquisition01										-5.214	0.001	-3.81%
Loan Officer Rank	0.920	0.001	1.65%	0.854	0.001	1.33%	0.851	0.001	1.77%	0.875	0.001	1.65%
# Loan Officers at Branch	0.813	0.001	1.51%	0.901	0.001	1.35%	0.941	0.001	1.50%	0.937	0.001	1.22%
Branch/Bank Deposits	-3.941	0.001	-2.98%	-3.846	0.001	-3.04%	-3.682	0.001	-2.96%	-3.789	0.001	-3.01%
ln(1+ <i>XSBI</i> )				1.311	0.001	12.03%	1.296	0.001	12.17%	1.239	0.001	12.89%
ln(1+Months in Business)	-3.871	0.001	-3.02%	-3.799	0.001	-3.15%	-3.803	0.001	-3.06%	-3.714	0.001	-3.01%
ln(1+Net Income)	2.795	0.001	6.47%	2.706	0.001	6.22%	2.845	0.001	6.39%	2.688	0.001	6.08%
Collateral	0.156	0.001	2.61%	0.153	0.001	2.71%	0.157	0.001	2.48%	0.157	0.001	2.71%
Personal Guarantee	4.569	0.001	5.11%	4.485	0.001	4.91%	4.522	0.001	5.45%	4.827	0.001	5.38%
SBA Guarantee	0.192	0.548	0.51%	0.191	0.552	0.52%	0.196	0.513	0.55%	0.200	0.526	0.51%
Term Loan	-0.180	0.456	-0.16%	-0.175	0.491	-0.17%	-0.182	0.484	-0.15%	-0.179	0.476	-0.17%
APR	0.309	0.001	11.53%	0.298	0.001	11.15%	0.288	0.001	10.98%	0.296	0.001	10.83%
ln(1+Loan Amount)	-1.657	0.001	-3.71%	-1.783	0.001	-3.77%	-1.408	0.001	-3.99%	-1.838	0.001	-3.89%
ln(1+Maturity)	-0.101	0.001	-2.27%	-0.098	0.001	-2.23%	-0.098	0.001	-2.36%	-0.101	0.001	-2.39%
ln(1+Firm-Bank Dist)	2.511	0.001	5.48%	0.405	0.557	1.03%	0.387	0.579	1.07%	0.390	0.577	1.04%
ln(1+Firm-Comp Dist)	-0.968	0.001	-3.59%	-0.539	0.574	-0.04%	-0.509	0.573	-0.04%	-0.497	0.586	-0.04%
ln(1+Case-Shiller HPI)	0.002	0.428	0.22%	0.002	0.435	0.23%	0.002	0.465	0.23%	0.002	0.427	0.21%
# Competing Branches	-3.747	0.001	-3.20%	-3.991	0.001	-3.27%	-3.940	0.001	-3.08%	-3.722	0.001	-3.15%
# Competing Lenders	2.807	0.001	6.77%	2.897	0.001	6.53%	2.705	0.001	6.71%	2.903	0.001	6.39%
4 Quarterly Dummies		Yes			Yes			Yes			Yes	
8 State Dummies		Yes			Yes			Yes			Yes	
38 SIC Dummies		Yes			Yes			Yes			Yes	
Number of Obs		7,690			7,690			7,690			7,690	
Pseudo $R^2$		13.26%			16.52%			18.18%			20.19%	

This table reports the results from estimating a logistic discrete-choice model of the borrower’s decision to refuse the bank’s loan offer and seek credit elsewhere by full-information maximum likelihood (504 out of 7,690 successful reviewed applications) with branch fixed effects and clustered standard errors that are adjusted for heteroskedasticity across branch offices and correlation within. The explanatory variables are the organizational distance between branch and headquarters (abbreviated “HQ-B dist”), bank-borrower relationship characteristics, the existence of application-specific review notes, whose frequency by branch (“Notes Freq”) we interact with the total soft information locally produced, measures of the branch’s information production (abbreviated “Inf. Prod.”)  $\sigma_{-i}$  (*PBI*) and its decision bias, branch origin (acquired in 1999 or 2001), loan officer rank as a proxy for tenure, branch characteristics, the firm’s Experian Small Business IntelliScore (*XSBI*), firm attributes, loan terms, and various control variables. See Section 3 for a description of the variables and the notes to Table 2 for further details.

Table 7: **Borrower Delinquency**

Specification Variable	<b>1</b>			<b>2</b>			<b>3</b>			<b>4</b>		
	Coeff	P-val	Marg	Coeff.	P-val	Marg	Coeff.	P-val	Marg	Coeff.	P-val	Marg
Constant	-1.532	0.001		-1.619	0.001		-1.704	0.001		-1.751	0.001	
ln(1+Branch-HQ Dist)	-0.141	0.001	-2.90%	-0.132	0.001	-1.99%	-0.136	0.001	-1.97%	-0.140	0.001	-1.63%
Repeat				-2.978	0.001	-2.52%	-2.881	0.001	-2.47%	-2.709	0.001	-2.27%
ln(1+Months on Books)				-2.779	0.001	-3.28%	-2.863	0.001	-3.82%	-2.877	0.001	-3.08%
Scope				-0.778	0.001	-3.11%	-0.766	0.001	-3.82%	-0.775	0.001	-3.59%
Notes							-2.767	0.001	-2.19%	-2.915	0.001	-1.97%
Info Prod $\sigma_{-i}(PBI)$							-0.782	0.001	-2.04%	-0.771	0.001	-2.65%
$\sigma_{-i}(PBI) \cdot$ Notes Freq										-0.742	0.001	-1.78%
$\sigma_{-i}(PBI) \cdot$ ln(1+B-HQ Dist)							-0.994	0.001	-1.24%	-0.912	0.001	-1.44%
Bias							0.783	0.001	1.33%	0.735	0.001	1.14%
Branch Decision							-2.804	0.001	-6.85%	-2.991	0.001	-7.11%
Acquisition99										-0.982	0.001	-2.35%
Acquisition01										-1.847	0.001	-3.95%
Loan Officer Rank	1.027	0.001	2.23%	1.102	0.001	2.37%	1.059	0.001	2.36%	1.144	0.001	2.62%
# Loan Officers at Branch	-1.739	0.001	-1.55%	-1.726	0.001	-1.50%	-1.666	0.001	-1.51%	-1.769	0.001	-1.57%
Branch/Bank Deposits	-0.452	0.001	-1.03%	-0.411	0.001	-0.99%	-0.411	0.001	-1.04%	-0.424	0.001	-0.90%
ln(1+XSBI)				-1.135	0.001	-13.24%	-1.211	0.001	-13.21%	-1.209	0.001	-13.43%
ln(1+Months in Business)	-0.405	0.001	-3.89%	-0.435	0.001	-3.90%	-0.420	0.001	-4.04%	-0.444	0.001	-3.76%
ln(1+Net Income)	-1.758	0.001	-1.51%	-1.671	0.001	-1.53%	-1.753	0.001	-1.65%	-1.641	0.001	-1.61%
Collateral	-1.936	0.001	-3.17%	-1.894	0.001	-3.07%	-1.966	0.001	-3.01%	-1.999	0.001	-3.28%
Personal Guarantee	-2.815	0.001	-5.99%	-2.991	0.001	-5.69%	-3.057	0.001	-6.10%	-2.823	0.001	-6.02%
SBA Guarantee	6.413	0.001	4.47%	6.478	0.001	4.23%	6.142	0.001	4.48%	6.519	0.001	4.24%
Term Loan	0.095	0.001	3.80%	0.094	0.001	3.55%	0.101	0.001	3.67%	0.096	0.001	3.85%
APR	1.784	0.001	5.45%	1.795	0.001	5.74%	1.687	0.001	5.23%	1.718	0.001	5.19%
ln(1+Loan Amount)	-2.946	0.001	-10.10%	-2.940	0.001	-10.30%	-2.840	0.001	-9.85%	-2.920	0.001	-9.69%
ln(1+Maturity)	-0.196	0.602	-0.83%	-0.191	0.585	-0.92%	-0.193	0.584	-0.92%	-0.190	0.600	-0.85%
ln(1+Firm-Bank Dist)	0.145	0.001	1.00%	0.050	0.547	0.24%	0.055	0.518	0.17%	0.055	0.486	0.19%
ln(1+Firm-Comp Dist)	-0.086	0.001	-0.77%	-0.040	0.377	-0.14%	-0.038	0.480	-0.17%	-0.033	0.451	-0.12%
ln(1+Case-Shiller HPI)	-0.082	0.001	-5.46%	-0.087	0.001	-5.39%	-0.080	0.001	-5.25%	-0.087	0.001	-5.47%
# Competing Branches	-0.188	0.595	-0.15%	-0.181	0.555	-0.16%	-0.199	0.594	-0.20%	-0.185	0.591	-0.19%
# Competing Lenders	-0.187	0.564	-0.10%	-0.191	0.596	-0.11%	-0.199	0.585	-0.20%	-0.182	0.562	-0.16%
4 Quarterly Dummies		Yes			Yes			Yes			Yes	
8 State Dummies		Yes			Yes			Yes			Yes	
38 SIC Dummies		Yes			Yes			Yes			Yes	
Number of Obs		7,186			7,186			7,186			7,186	
Pseudo $R^2$		21.06%			29.16%			32.77%			35.81%	

This table reports the results from estimating a logistic model of the likelihood that an actually booked loan becomes 60 days overdue within 18 months of origination by full-information maximum likelihood. The dependent variable is the performance status of the loan during its first 18 months: at most 60 days overdue (corresponding to our bank’s internal definition of a delinquency  $Y = 1$ : 182 observations), or current ( $Y = 0$ : 7,002 observations). The explanatory variables are the organizational distance between branch and headquarters (abbreviated “HQ-B dist”), bank-borrower relationship characteristics, the existence of application-specific review notes, whose frequency by branch (“Notes Freq”) we interact with the total soft information locally produced, measures of the branch’s information production (abbreviated “Inf. Prod.”)  $\sigma_{-i}(PBI)$  and its decision bias, branch origin (acquired in 1999 or 2001), loan officer rank as a proxy for tenure, branch characteristics, the firm’s Experian Small Business IntelliScore ( $XSBI$ ), firm attributes, loan terms, and various control variables. See Section 3 for a description of the variables and the notes to Table 2 for further details.

Table 8: Investment Success and the Exercise of Authority

## Panel A: Borrower Retention

Specification Loan Type Variable	1						2					
	Headquarters			Branch Office			Headquarters			Branch Office		
	Coeff	<i>P</i> -val	Marg	Coeff	<i>P</i> -val	Marg	Coeff	<i>P</i> -val	Marg	Coeff	<i>P</i> -val	Marg
Constant	-1.966	0.001		-1.6913	0.0010	-1.27%	-1.934	0.001		-1.662	0.001	-1.28%
Branch Decision												
ln(1+Branch-HQ Dist)	-0.289	0.001	-4.66%	-0.2094	0.0010	-5.02%	-0.285	0.001	-4.74%	-0.208	0.001	-5.08%
Repeat	-0.838	0.001	-5.13%	-0.6115	0.0010	-4.67%	-0.829	0.001	-5.16%	-0.604	0.001	-4.76%
ln(1+Months on Books)	-1.133	0.001	-4.69%	-1.2229	0.0010	-4.71%	-1.122	0.001	-4.76%	-1.215	0.001	-4.72%
Scope	-0.786	0.001	-6.69%	-0.7080	0.0010	-7.18%	-0.780	0.001	-6.80%	-0.696	0.001	-7.19%
Notes	-0.104	0.001	-2.02%	-0.0752	0.0010	-1.09%	-0.104	0.001	-2.06%	-0.074	0.001	-1.10%
Info Prod $\sigma_{-i}$ ( <i>PBI</i> )	-0.328	0.001	-2.93%	-0.3590	0.0010	-1.56%	-0.322	0.001	-2.97%	-0.352	0.001	-1.56%
$\sigma_{-i}$ ( <i>PBI</i> ) · Notes Freq	-0.079	0.001	-1.26%	-0.0800	0.0010	-1.18%	-0.078	0.001	-1.26%	-0.079	0.001	-1.20%
$\sigma_{-i}$ ( <i>PBI</i> ) · ln(1+B-HQ Dist)	-1.501	0.001	-0.93%	-1.6598	0.0010	-0.92%	-1.488	0.001	-0.93%	-1.654	0.001	-0.93%
Bias	-0.725	0.001	-3.08%	-0.7681	0.0010	-3.60%	-0.725	0.001	-3.10%	-0.757	0.001	-3.61%
Acquisition99							-4.326	0.001	-3.02%	-4.726	0.001	-2.79%
Acquisition01							-5.044	0.001	-3.32%	-3.674	0.001	-3.64%
Loan Officer Rank	0.770	0.001	1.43%	0.7230	0.0010	1.46%	0.755	0.001	1.45%	0.709	0.001	1.49%
# Loan Officers at Branch	1.172	0.001	1.04%	1.1952	0.0010	1.04%	1.164	0.001	1.05%	1.176	0.001	1.04%
Branch/Bank Deposits	-3.638	0.001	-2.64%	-3.3474	0.0010	-2.59%	-3.636	0.001	-2.65%	-3.313	0.001	-2.62%
ln(1+ <i>X</i> <i>SBI</i> )	1.199	0.001	12.50%	0.7998	0.0010	5.68%	1.192	0.001	12.52%	0.784	0.001	5.75%
ln(1+Months in Business)	-4.041	0.001	-2.74%	-2.9163	0.0010	-2.54%	-3.972	0.001	-2.77%	-2.899	0.001	-2.55%
ln(1+Net Income)	2.273	0.001	5.71%	1.5354	0.0010	5.37%	2.272	0.001	5.77%	1.526	0.001	5.43%
Number of Obs	7,690						7,690					
Pseudo $R^2$	22.17%						22.40%					

## Panel B: Borrower Delinquency

Specification Loan Type Variable	1						2					
	Headquarters			Branch Office			Headquarters			Branch Office		
	Coeff	<i>P</i> -val	Marg	Coeff	<i>P</i> -val	Marg	Coeff	<i>P</i> -val	Marg	Coeff	<i>P</i> -val	Marg
Constant	-1.815	0.001					-1.811	0.001				
Branch Decision				-1.442	0.001	-5.19%				-1.430	0.001	-5.27%
ln(1+Branch-HQ Dist)	-0.146	0.001	-1.75%	-0.105	0.001	-1.49%	-0.145	0.001	-1.77%	-0.104	0.001	-1.50%
Repeat	-2.912	0.001	-2.32%	-0.544	0.001	-0.39%	-2.874	0.001	-2.35%	-0.544	0.001	-0.40%
ln(1+Months on Books)	-3.019	0.001	-3.15%	-1.116	0.001	-4.58%	-3.017	0.001	-3.18%	-1.105	0.001	-4.63%
Scope	-0.862	0.001	-3.79%	-0.781	0.001	-2.58%	-0.851	0.001	-3.82%	-0.767	0.001	-2.58%
Notes	-3.018	0.001	-2.09%	-0.074	0.001	-1.78%	-2.993	0.001	-2.11%	-0.073	0.001	-1.80%
Info Prod $\sigma_{-i}$ ( <i>PBI</i> )	-0.816	0.001	-2.76%	-0.348	0.001	-2.67%	-0.815	0.001	-2.80%	-0.344	0.001	-2.68%
$\sigma_{-i}$ ( <i>PBI</i> ) · Notes Freq	-0.792	0.001	-1.78%	-0.056	0.001	-1.19%	-0.788	0.001	-1.81%	-0.056	0.001	-1.21%
$\sigma_{-i}$ ( <i>PBI</i> ) · ln(1+B-HQ Dist)	-1.013	0.001	-1.49%	-1.004	0.001	-0.87%	-0.995	0.001	-1.49%	-0.985	0.001	-0.88%
Bias	-3.207	0.001	-7.19%	-0.675	0.001	-3.26%	-3.168	0.001	-7.33%	-0.663	0.001	-3.26%
Acquisition99							-1.029	0.001	-2.58%	-4.425	0.001	-2.56%
Acquisition01							-1.908	0.001	-3.95%	-4.413	0.001	-3.30%
Loan Officer Rank	1.202	0.001	2.66%	0.524	0.001	1.42%	1.194	0.001	2.70%	0.515	0.001	1.45%
# Loan Officers at Branch	-1.859	0.001	-1.58%	1.018	0.001	1.12%	-1.844	0.001	-1.58%	1.015	0.001	1.13%
Branch/Bank Deposits	-0.456	0.001	-0.96%	-2.967	0.001	-2.38%	-0.454	0.001	-0.96%	-2.942	0.001	-2.41%
ln(1+ <i>X</i> <i>SBI</i> )	-1.294	0.001	-14.40%	-0.868	0.001	-6.54%	-1.270	0.001	-14.48%	-0.859	0.001	-6.62%
ln(1+Months in Business)	-0.456	0.001	-4.02%	-3.376	0.001	-2.57%	-0.450	0.001	-4.05%	-3.330	0.001	-2.58%
ln(1+Net Income)	-1.732	0.001	-1.72%	1.264	0.001	5.13%	-1.699	0.001	-1.75%	1.261	0.001	5.23%
Number of Obs	7,186						7,186					
Pseudo $R^2$	36.49%						36.92%					

This table reports the results from estimating a logistic discrete-choice model of the borrower's decision to refuse the bank's loan offer and switch lenders (Panel A) and credit delinquency (Panel B) as a function of the final credit decision's location (headquarters vs. branch) in a simultaneous-equation framework. For readability, we suppress the control variables for guarantees, loan terms, transaction costs, local economic conditions, as well as business cycle, state, and industry effects. See Section 3 for a description of the variables and the notes to Tables 6 and 7 for further details.

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