Distance and Information Asymmetries in Lending Decisions*

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Abstract

Using a unique data set of loan applications by small businesses, we study the determinants of lending decisions and, especially, the roles of private information and physical distance between a bank and its borrowers. Although credit availability and the loan rate decrease in the bank-borrower distance and increase in the borrower-competitor distance, the inclusion of a proxy for the bank's proprietary information reduces these effects to the point of insignificance. Analyzing loan rates and borrowers' decision to switch lenders we find strong evidence for the informational capture of good credit risks consistent with adverse-selection problems. Our results shed new light on the importance of soft information in informationally opaque credit markets and show how borrower proximity facilitates the production of proprietary information that helps banks to exploit information asymmetries and locally carve out captive markets.

1 Introduction

Recent empirical work and much anecdotal evidence suggest that banks have significantly increased their geographic reach and that, in the process, they acquire ever more information.[1] However, given the rich class of models that rely on distance to characterize the nature of the bank-borrower interaction, it is by no means clear what economic role a customer's proximity plays in a bank's decision to grant or deny credit. Although economic theory has explained lending behavior and market structure in terms of information production and borrower location there is only limited empirical evidence on the strategies that banks and their customers follow in credit-market transactions. To gain a better understanding of these issues this paper investigates how borrower proximity, private information, and existing lending relationships affect a bank's and its customers' decision to transact.

Despite the high cost of gathering and processing information for loan applications by small firms, the distance between banks and small-business borrowers has steadily increased in recent times (Petersen and Rajan, 2002). Although banks with a local presence are usually deemed to have an advantage in assessing the creditworthiness of small, informationally opaque firms, advances in information technology, the development of sophisticated screening methodology for loan applicants ("credit scoring," see DeYoung *et al.,* 2004), and structural change in the US banking industry (see Berger *et al.*, 1999) have all conspired to allow banks to lend at greater distances. In particular, lenders' ability to "harden soft information" (Petersen, 2004) should affect their local competitive behavior and allow them to compete more aggressively outside core markets. At the same time, the economic consequences of this increase in lenders' market reach depend on the economic function ascribed to customer proximity because distance plays very different roles in models of transportation costs or product differentiation (e.g., Lederer and Hurter, 1986), *ex post* monitoring (Sussman and Zeira, 1995), or asymmetric information (Hauswald and Marquez, 2005). Hence, an empirical investigation of its function in loan transactions is important both from an academic and practical perspective.

To analyze the effect of borrower proximity and asymmetric information on credit-market transactions we collect a unique data set consisting of all loan applications by small businesses to a major

[1] See in particular Petersen and Rajan (2002) and Degryse and Ongena (2005) who identify the physical distance between banks and borrowers as an important but hitherto neglected determinant of loan pricing.

US bank over a 15-months period. In addition to the ultimate lending decision and loan terms we were able to obtain the results of the bank's internal credit-screening process (credit score) as a proxy for its firm-specific proprietary information that comprises soft, subjective information supplied by branch offices. By matching our data with credit-bureau information we can also identify firms refusing the loan to study a successful applicant's decision to decline the offer and switch lenders. We estimate discrete-choice models of the bank's decision to offer credit and the borrower's to accept the loan terms, and linear-regression models of the offered loan's all-in cost in terms of the distances from applicants to the bank and to the nearest competitor, the lender's proprietary information, and the nature of the lending relationship while controlling for borrower characteristics, loan terms, regional and business-cycle effects, and the prevailing interest-rate environment.

Consistent with models of spatial price discrimination, we find that the loans' all-in cost (annual percentage rate: APR) decreases in bank-borrower distance and increases in that between the borrower and the nearest competitor bank. Furthermore, these effects are statistically highly significant. Similarly, the decision to offer credit decreases in bank-applicant distance but increases in the borrower's distance to competitors. When we add the bank's internal credit score as a proxy for private information the distance variables become statistically insignificant whereas the credit score is highly significant. Consistent with models of lending under asymmetric information (e.g., Broecker, 1992 or von Thadden, 2004) the loan rate decreases in the applicant's perceived credit quality: the better a credit score, the lower the quoted APR. At the same time, we find that the closer a firm is to its branch the less does a higher score reduce the offered rate which is consistent with the informational capture of high-quality borrowers. By contrast, distance remains an important factor in explaining the prior decision to offer credit even in the presence of credit scores albeit with much reduced statistical significance and marginal effects.

While these results broadly confirm the pioneering work by Degryse and Ongena (2005), they do not allow us to conclusively determine whether the observed effects are due to the threat of adverse selection that limits competition (asymmetric information) or location-rent extraction (transportation cost). Since transportation-cost and, more generally, product-differentiation models with price competition predict that buyers should never switch providers we next analyze an applicant's decision to refuse a loan offer. We find that borrowers located further away are more likely to switch lenders, which suggests that distance erodes a bank's (local) information advantage and allows

competitors to more aggressively compete for borrowers as predicted, e.g., by Hauswald and Marquez (2005). Similarly, the higher the credit score, the more likely applicants are to switch lenders. Both effects are consistent with the notion that banks enjoy a local information monopoly that the exploit to create adverse selection problems for their competitors.

We also investigate the importance of location-specific soft information. Analyzing the incidence of distance on default we find that the further away a borrower, the more likely the bank is to make type II errors in lending. Similarly, the further away an applicant is located from a branch the more the bank discounts high credit-quality assessments in its decision to offer a loan. Interacting the credit score with variables measuring the length and scope of the lending relationship further reveals that the better the bank knows the customer the more importance it attributes to its proprietary information in lending decisions.

Our main contribution consists in showing how physical distance affects a lender's local informational advantage that allows it to extract rents based on firm-specific proprietary information. The results also support the view that "soft" information in lending is primarily local and verify the conjecture in Petersen and Rajan (2002) that technological progress in the form of credit scoring allows banks to overcome distance-related limits to lending through the hardening of soft information (Petersen, 2004). In this context, we not only identify the sources of lenders' local information advantages but also show how they strategically use subjective proprietary intelligence in loan transactions to locally carve out captive markets. At the same time, our findings provide strong evidence in favor of models of credit markets based on locationally differentiated information rather than on transportation costs or product differentiation.

Closest to our work are Degryse and Ongena (2005) who first established on the basis of Belgian data that distance is an important determinant of lending decisions and that banks actually engage in spatial price discrimination. However, our data allows us to considerably extend the scope of the analysis in several important dimensions. First, the geographic extent of our loan applications is much larger because the bank is active throughout the Eastern United States. Second, our data consists of all loan applications over the sample period, not just the booked loans as in Degryse and Ongena (2005), so that we can correct for any sample-selection bias that might arise as part of the credit-screening process. Third, we can directly test competing explanations of price differentiation in lending because we were able to obtain the outcome of the bank's internal credit assessment for

each loan application and know whether the applicant accepted the offered terms or obtained credit elsewhere. Last but not least, we can measure the lender's proprietary information permitting us to identify the effect of distance and lending relationships on location-specific soft information production.

Our results also shed light on how banks have increased the geographic reach of their lending activities first noticed by Petersen and Rajan (2002), who attribute the changes in lending practices to improvements in lender productivity. We find that such advances stem from technological progress in the sense that proprietary information used in credit scoring significantly enhances the value of local intelligence for lending decisions. Similarly, DeYoung *et al.* (2004) show that the probability of default on small-business loans increases in the distance between borrower and lender but that the adoption of credit-scoring techniques reduces this effect, which we also find. By contrast, using Swedish data Carling and Lundberg (2002) do not find any evidence that distance is a determinant of a loan's default probability.

The effect of physical distance on financial decision making has also attracted attention in other areas. Analyzing informational asymmetries as revealed by proprietary equity trading, Hau (2001) finds that traders located near a company's headquarter outperform their competitors in intraday trading. In the context of M&A, Ragozzino and Reuer (2005) report that the higher the perceived threat of adverse selection the closer acquirers are geographically to their targets so that the bidder presumably hold an informational advantage over more distant bidders. Similarly, Garmaise and Moskowitz (2004) find strong evidence in their analysis of commercial real-estate markets that buyers tend to be local when information asymmetries between the parties are severe and more remote otherwise.

The paper is organized as follows. In the next section we discuss the role of distance in models of credit-market competition and formulate our testable hypotheses. Section 3 describes our data and estimation strategy. In Section 4, we analyze the determinants of lending decisions and loan pricing. Sections 5 and 6 investigate the determinants of the borrower's decision to accept or reject the banks' loan offer and default behavior, respectively. In Section 7 we analyze how local information shapes the soft-information content of private information and how competition affects loan transactions. The last section discusses further implications and concludes. All tables are relegated to the Appendix.

2 The Role of Distance in Lending Decisions

Economic theory has identified two broad channels for physical distance to affect lending decisions. As Petersen and Rajan (2002) argue, local lenders who collect "soft" information on small firms over time have an informational advantage over more remote competitors who might not enjoy the same degree of access to local information.[2] Hauswald and Marquez (2005) make this notion precise by letting the quality of a bank's information-generation process be a decreasing function of the distance between bank and borrower to capture the varying degrees of informational expertise present in modern banking. In their framework, expected interest rates decrease in bank-borrower distance while the likelihood of a competing loan offer increases in distance. As distance erodes the better informed bank's informational advantage, less informed competitors face a reduced threat of adverse selection and can bid more aggressively (lower interest rates) and more frequently.

The second channel through which distance acts on lending decisions is transportation costs incurred by loan applicants and banks. Such costs might represent the time and effort spent by a potential borrower to personally interact with loan officers, branch managers, etc., or to look for a suitable loan. Similarly, banks might incur transportation costs in the assessment of borrowers and the monitoring of loans (Sussman and Zeira, 1995) that then affect loan terms. Traditionally, such models have focused on uniform loan pricing (e.g., Chiappori *et al.*, 1995; see Freixas and Rochet, 1997 for a survey). However, banks invariably know the address of their loan applicants so that they are able to engage in spatial price discrimination on the basis of bank-borrower distance. It is straightforward to show that a transportation-cost model of credit markets with discriminatory pricing (Lederer and Hurter, 1986) but without asymmetric information yields very similar empirical predictions on interest rates as a function of distance (see also Hauswald and Marquez, 2005).

The crucial empirical difference between transportation-cost models of lending and those based on asymmetric information revolves around a loan applicant's decision to switch banks. In transportation-cost models, spatial discrimination only takes place through loan pricing because all borrowers deemed creditworthy obtain credit from the closest bank and never have an incentive to switch lenders. In an asymmetric-information setting, banks can strategically use proprietary information to create a threat of adverse selection for their rivals, thereby softening price competition and in-

[2] See Berger *et al.* (2004) on the role of soft information in lending decisions and the ability of smaller banks that presumably have a more local focus to collect and process such intelligence.

formationally capture borrowers. At its periphery, however, a lender holds less of an informational advantage so that competitors can attempt to poach customers more aggressively.

In the presence of informational asymmetries we should therefore observe that borrowers located further away or of higher credit quality are more likely to switch lenders. By contrast, if transportation costs mainly drive lenders' credit decisions, distance and proprietary information should not influence an applicant's decision to switch lenders given that he must have applied to the optimally located bank in the first place. Last but not least, if lenders hold a primarily local information advantage we would expect them to make more errors in granting credit the further away an applicant is so that the likelihood of credit delinquency should increase in distance.

3 Data Description and Methodology

Our sample consists of all applications for new loans over a 15-month span by small firms and sole proprietorships to a large US financial institution with a particular regional focus on New England, the Mid-Atlantic and Florida. We selected only new loans because our bank follows a separate decision process for rolling over existing ones so that very different considerations drive the decision to grant or to renew credit. All loan applications fall under the purview of small- and medium-sized enterprise lending as defined by the Basel I Accord so that the total obligation of the applicant to the bank is less than $1 million and its sales are below $10 million.

We focus on small-business lending for several reasons. First and foremost, small firms tend to be informationally opaque and bound to their local economies so that both information asymmetries and transportation costs can affect lending relationships. Second, credit scoring is a particularly successful screening method in this segment of commercial banking. Since our bank applies a uniform credit-scoring methodology to assess each application we have high confidence that the internal credit score is a consistent and meaningful measure of the bank's proprietary information across applicants and bank branches. Last but not least, the product in question - outright loans or credit lines - is highly standardized and, hence, comparable and homogeneous across providers so that any product differentiation should come from information production, transportation costs, or pricing, if at all.

3.1 Sample Selection

We start with all 28,761 loan applications to our bank that conform to the Basel Accord's SME lending definition and that were made in person at one of its branches from January 2002 to April 2003. Matching these records with the applicants' address information and credit-bureau reports leaves approximately 26,028 complete observations.[3] Next, we verify the addresses of borrowers and bank offices and delete all observations that appear questionable leaving a total of 25,975 observations with full data availability whose addresses we cross-check with Google Maps.

To identify the nearest competitor for any loan applicant and to find the driving distances in miles and minutes between the firm, the bank branch, and the competitor's branch we rely on Yahoo's SmartView and Map services, respectively. SmartView has the dual advantage that it does not accept sponsored links and draws on the combined yellow-page directories of BellSouth and InfoUSA (Mara, 2004) providing objective and comprehensive bank-branch information.[4] Having located the nearest competitor branch for a given loan applicant through Yahoo!SmartView we simply look up the driving distance in miles and minutes from the firm to the bank branch and to the nearest competitor from Yahoo!Maps. Since the service also provides the geographic coordinates for any given address we can easily calculate the corresponding aerial distances between firm and bank branch and firm and competitor branch for robustness checks. We delete an additional 231 loan requests by applicants with PO Boxes, from rural addresses, or from recent subdivisions that do not allow us to uniquely identify driving and aerial distances.

We find that the driving distances between firms bank branches range from 0 to 3,102 miles, which is clearly too great to conform to standard motives of lending in spatial models. Hence, we drop outliers with a firm-bank distance in excess of 255 miles as a precaution to insure that our data is compatible with a wide range of locational explanations of credit markets. Removing these 257 observations (1% of the sample) leaves 25,487 observations that we now analyze.

[3] Our bank engaged in several M&A transactions affecting its branch network. We omit all re-assigned loan records.

[4] We also tried out Microsoft's MapPoint but found that the underlying yellow-page directory invariably produced only the branches of sponsoring institutions, i.e., lenders that paid for having their branches displayed on the map, and not necessarily the ones closest to the applicant.

3.2 Data Description

Table 1 provides summary statistics for our main variables as a function of the screening outcome (accept or reject the loan application) and reports the P-values of t-tests for the each variable's mean conditional on the bank's decision. We see that successful loan applicants are on average located 9.91 miles away from their bank branch while firms that are denied credit are 10.67 miles away; furthermore, the difference is statistically highly significant.[5] In terms of medians, our applicant-bank distances of 2.62 miles are about twice as large as the 1.40 miles borrower-bank distance reported in Degryse and Ongena (2005) which might simply be due to the lower population density of the Eastern US as compared to Belgium. By contrast, our distances are about half the 5 miles median distance that Petersen and Rajan (2002) find for loans made between 1990 to 1993 from the National Survey of Small Business Finance (NSSBF) that covers the entire US. In terms of driving times, loan applicants spend on average about 10 minutes (median: 7 minutes) and slightly more than two minutes to get to their banks and the nearest branch of a competitor, respectively.

Competitor branches are an average (median) distance of about 1.10 (0.55) miles away from successful applicants and 0.93 (0.48) miles from unsuccessful ones (Firm-Competitor Distance): borrowers do not turn to the closest bank branch but prefer to obtain credit from sources further away. The same is true for applicants that do not receive credit. Since pure transportation-cost models predict that customers chose the closest seller this statistic alone suggest that other factors determine loan applications, lending decisions, and, ultimately, price discrimination.

To analyze informational effects we rely on the outcome of the bank's creditworthiness assessment in terms of the internal credit score calculated for each loan application. While the methodology is proprietary and subject to confidentiality restrictions, the credit-screening procedure is consistent across all branches and applications, relies on the same approach, and uses a common set of inputs. In addition, the credit scores comprise a subjective element because local branches provide soft information through score adjustments that can over-ride automatic lending decision and centralized loan pricing. We rely on the final scores whose revisions follow bank-wide guidelines and require detailed justification by branch managers.[6] Analyzing periodic surveys of

[5] For confidentiality reasons, the provider of the data unfortunately did not allow us to report further descriptive statistics such as the minimum and maximum of the various variables because they could be used to "reverse-engineer" the composition of the loan portfolio.

[6] Loan decisions and pricing ultimately reside with branches. Local managers can alter credit scores on the basis

loan officers to assess the importance of subjective (soft) information in credit decision our bank estimates that, on average, 20% to 30% of our bank's scores consist of such intelligence (Personal Communication). Scores range from 0 (worst) to 1,850 (best) and means (medians) in our sample are 1,036 (1042) for successful applicants and 811 (847) for unsuccessful ones. As one would expect, applicants denied credit score significantly worse and exhibit a greater dispersion in credit scores than those who receive credit: the P-value of the t-test is 0.0000.

We also collect data on the nature of the lending relationship that might allow our bank to collect borrower-specific information.[7] Our first variable is the number of months that a particular loan applicant has been on the books of the bank, which measures the length of the lending relationship (Months on Book). We see that in our sample successful applicants have obtained a first credit product about 43 months prior to the loan application whereas unsuccessful applicants have been borrowers for only 18 months on average. Following Degryse and Ongena (2005) who define their main-bank variable in terms of current-account turnover and the number of banking products bought, we also construct our binary variable Main Bank in terms of the balance of the firm's current account together with prior borrowing and the purchase of other services to control for privileged lending relationships (Main Bank: 35.52% of loan offers, 25.38% of rejections).

In terms of loan characteristics our data contains the annual percentage rate (APR, i.e., the all-in cost of credit taking into account fees and commissions) that, like the credit score, branches can adjust in light of local conditions and information. The loan rate's mean (median) is 8.67% corresponding to an average (median) spread of 457 (429) basis points over maturity-matched US Treasury yields. 22.44% (33.73%) of all approved (rejected) applications are for term loans, the remainder is for credit lines. As a matter of business policy, our bank only offers term loans at a fixed rate and credit lines with variable rates so that our loan-vs-line binary variable also captures the nature of the interest rate. In addition, we know the requested loan amount (mean and median of \$46,507 and \$39,687, respectively, in line with typical small business lending), its maturity (mean: 6.68 years), and existence of collateral (about 60% approved vs.49% rejected

of a standard set of subjective criteria that the final score reflects. Similarly, they can adapt loan terms including pricing to the specific circumstances of the application. However, branch managers' career prospects and remuneration depend on the overall success of their credit decisions, and local overrides are being closely monitored by the bank's overall risk management.

[7] James (1987) and Lummer and McConnell (1989) present evidence suggesting that banks gain access to private information over the course of the lending relationship.

applications). Only a very small fraction of loan offers (0.56%) falls under the terms of the Small-Business Administration (SBA) program whereas 12.21% of denied credit applications do. About 34% (39%) of accepted (denied) credit applications were personally guaranteed by persons with a monthly income of $36,564 ($33,378).

To control for the availability of public information and firm-specific attributes we rely on the months a particular applicant has been in business (115 vs. 91 months for accepted and rejected loan applications, respectively), which is a good proxy for informational transparency, and the firm's monthly net income ($110,367 vs. $91,350 for successful and unsuccessful applicants, respectively) that captures size and profitability effects. We also use 38 industry dummy variables based on the applicants' two-digit SIC codes to account for any industry effects in the data. Table 1 shows that our sample represents a wide cross-section of industries, albeit with a particular emphasis on wholesale and retail trade, personal, business and professional services, and construction.

Since lenders and their customers might cluster in certain areas based on local economic conditions, we rely on the Case-Shiller Home Price Index (CSHPI: see Case and Shiller, 1987 and 1989) to control for potential endogeneities in the parties' choice of location. By matching each loan application with the index by zip code and month we also capture loan-transaction effects that are due to the local level of economic activity, differences in affluence across postal zones, and differential levels of urbanization or road infrastructure as reflected in local house prices. Given the strong regional emphasis of our bank on the North-East and Mid-Atlantic regions, we also employ dummy variables for the states with the most observations to account for possible geographic effects in its lending decision. To control for the interest-rate environment, we rely on the maturity-matched (interpolated) US Treasury yield on the loan date and the difference between the 5-year and 3-months US Treasury yield (Term Spread: yield-curve shape).

3.3 Methodology

We focus on the following key variables in our investigation of the role that physical distance plays in lending decisions: the applicant-bank and applicant-competitor distances, the internal credit score as a measure of the lender's private information, and the main-bank and months-on-book variables measuring the depth of the lending relationship. To assess the degree to which distance captures informational effects, we estimate our specifications first without the bank's internal score

(outcome of its credit assessment) and then include the variable in the same statistical model. We also include selected interaction terms to study how the local component of proprietary intelligence affects loan transactions.

In terms of specifications, we first investigate spatial discrimination and informational capture present in loan pricing by specifying a model of the loan's APR (all-in cost) as a function of distances, proprietary bank information, and control variables similar to Degryse and Ongena (2005). Since booked loans might suffer from sample selection bias, however, we also estimate the APR specifications with the Heckman correction taking into account that the bank only makes a particular loan offer after approving the applicant's request for credit. Hence, we also estimate a simple logistic discrete-choice model of the bank's decision to grant or deny credit that is instructive in its own right.

Furthermore, we explore the effect of distance on competition as revealed by applicants' decision to switch lenders. To this end, we specify a discrete-choice model of the applicant's likelihood to accept or to decline the bank's loan offer in favor of a competing offer as a function of our key distance and informational variables. Next, we specify a logistic model of borrower delinquency to assess the incidence of distance on the quality of the bank's private information in terms of type II errors in credit screens and lending decisions. Finally, we analyze the importance of pre-existing lending relationships for the production of proprietary information and the incidence of local competition on loan transactions.

We estimate all our discrete-choice specifications by full-information maximum likelihood and report their pseudo R^2 that is simply McFadden's likelihood ratio index whenever appropriate. The other estimations are by simple ordinary least squares. To account for possible systematic variations in internal-score revisions, credit policies, and loan pricing across branches we re-estimated all specifications with fixed (branch) effects. The results are, however, very similar so that we can exclude idiosyncratic variations in lending practices across branches beyond those that we control for. Hence, we do not report the fixed-effect results. As further robustness checks we also estimated all our specifications with driving minutes and aerial distances as the distance variables but do not tabulate the results because they closely resemble the reported ones. Since several of the variables fit better in logarithms than levels we use the former whenever appropriate.

4 The Role of Distance in Lending Decisions

This section summarizes our empirical findings for the bank's decision to grant credit and the resulting loan pricing.

4.1 Loan Pricing

To investigate spatial price discrimination in lending we start with a linear model of the offered loan rate (APR) as a function of our previously described explanatory variables. When we exclude the internal credit score from the estimation (see Specification 1 in Table 2) we find that the quoted all-in cost decreases in the firm-bank distance but increases in that between the firm and the nearest competitor branch. A reduction of the firm-borrower distance from 10 (the average) to 9 miles, for instance, increases the loan rate by 14 basis points. By contrast, an increase in the firm-competitor distance from 1 (the average) to 2 miles raises the quoted interest rate by 60 basis points. We interpret these two findings as strong evidence that banks engage in spatial price discrimination tempered by the physical proximity of their customers to competitors.

The ability to offer collateral or to personally guarantee the loan decreases the interest rate by about 230 and 90 basis points, respectively. This result is consistent with signaling and self-sorting explanations of collateral in which higher-quality borrowers offer (more) collateral and pay lower rates (see, e.g., Bester, 1985 or Besanko and Thakor, 1987). We also find that longer-dated loans carry slightly lower interest: a one-year increase in the maturity from the average of 6 to 7 years reduces the APR by about 3 basis point. Degryse and Ongena (2005) observe a similar effect in their data which they attribute to the short maturities of small-business loans. In terms of credit product, an outright (fixed-rate) loan is 39 basis points more expensive than a (variable-rate) credit line.

Larger or more profitable businesses pay less interest: an increase of \$1,000 in the applicant's average monthly net income reduces the APR by 3.5 basis points. Having obtained credit from the bank for a year more than the average 43 months decreases the offered rate by 63 basis points as does the purchase of additional products and maintaining a deposit account with the lender (Main–Bank variable: -176 basis points). However, when we interact these two relationship variables with the distance variables the corresponding coefficients come out statistically insignificant. These two

proxies for, respectively, the length and scope of the lending relationship do not seem to alter distance effects. This absence of interaction effects has been interpreted in the literature as evidence in favor of transportation-cost models of financial intermediation (see, e.g., Degryse and Ongena, 2005) but, as we will argue now, it might also be due the omission of variables that directly measure the bank's private information.

Including the bank's internal credit score as a direct measure of the bank's private information dramatically changes the results (Specification 2 in Table 2). In particular, the firm-bank and firm-competitor distance variables become statistically insignificant. An increase by 100 points in the average score of successful applicants decreases the quoted loan rate by 24 basis points. This finding provides the first hint that distance might captures informational effects rather than transportation costs or product differentiation. At the same time, other variables measuring the bank's ability to extract information from the lending relationship (Main Bank, Months on Books) retain their high statistical significance and impact on offered rates.

To investigate location-specific effects of the bank's private information we next interact the internal score with the firm-bank and firm-competitor distances (Specification 3 in Table 2). We see that, in absolute terms, the marginal effect of a higher credit score increases in the distance between the firm and the bank because the coefficients of the score and the score-firm-bank-distance interaction term are both negative. As a consequence, the closer the potential borrower is to her branch, the smaller the reduction in the APR becomes for a given increase in the credit score, which is consistent with informational capture. To put this effect into perspective, an increase in the score by 100 points reduces the APR by 26 basis points for an applicant located at the average firm-bank distance of 10 miles but does so only by 20 basis for those located next to the branch. The closer applicants are to their loan officers, the more trust the lender can place in its own information and the more aggressively it can compete by quoting higher loan rate *ceteris paribus* because competitors face a higher threat of adverse selection.

We also find that the farther away applicants are from competitor branches the less does an increase in perceived creditworthiness reduce the offered rate. For the same 20-basis-point reduction in the APR due to an increase in the internal score by 100 points, the offered rate increases by 12.5 basis points if the applicant is located the sample average (1 mile) from the nearest competitor branch. This second interaction effect provides further evidence for the informational capture of

high-quality borrowers because the farther away competitors are from loan applicants relative to our bank, the less likely competing loan offers become due to the threat of adverse selection so that lenders can quote higher interest rates.

To assess the degree to which a regression of booked loans might suffer from sample-selection bias, we re-estimate our loan-rate model with the Heckman correction, i.e., taking into account that the bank makes a prior decision to grant or refuse credit. A comparison of the specifications in Table 3 with the earlier results shows that this correction is particularly important when we do not include our proxy for proprietary information. In this case, the inverse Mills ratio (correction factor Lambda) is statistically significant. Correcting for sample selectivity also increases the effect of distance between applicant and competitor branch. However, once we include the internal credit score (P-value of Lambda close to 10%) and, especially, the score-distance interaction terms we find that the correction factor Lambda becomes statistically insignificant whereas the distance variables are statistically nonsignificant (Specifications 2 and 3 in Table 3).

We interpret these findings as evidence for a mild sample-selection bias arising from the bank's prior decision to offer or to deny credit. Since only those applicants that exceed minimal credit standards in terms of the bank's internal score obtain loan offers one can correct for the sample-selectivity issues that arise from only analyzing booked loans in two different ways. Either one includes the inverse Mills Ratio (Lambda) that is statistically highly significant in the absence of a proxy for private information, or one corrects directly by including the internal credit score and the Heckman-correction term becomes irrelevant. As a comparison of Tables 2 and 3 shows all other effects remain more or less unchanged.

4.2 Offering Credit

Our results for the bank's decision to offer or to deny credit confirm that distance is an important determinant of lending policies. Specification 1 in Table 4 shows that the likelihood of obtaining credit decreases in the distance between applicant and bank but increases in that between applicant and nearest competitor. The closer (further away) a firm is located to a bank branch (from a competitor) the higher the likelihood that a loan offer is forthcoming. Both effects are highly significant at the 1% level. Other key determinants are Months in Business and Months on Books, two variables that we associate with public and private information, respectively: applicants who

had a prior lending relationship with the bank increase their chances of obtaining credit by 25%. Similarly, the longer a business has been in operation the easier it becomes to borrow. Unsurprisingly, the existence of collateral and the presence of a personal guarantor also facilitates the access to credit for small businesses.

Adding the loan applicant's internal credit score to the specification again suggests that distance acts as a proxy for proprietary information (see Specification 2 in Table 4). The bank's credit score now has the largest marginal effect on the lending decision (41%) and, correspondingly, reduces the importance of distance in explaining the outcome of the loan application. At the same time, the statistical significance of both the firm-bank and firm-competitor distance fall as do their marginal effects. Since this reduction in significance and marginal effect is particularly pronounced for the firm-competitor distance (from 0.01% to 8.34% and 2.6% to 0.2%, respectively) the existence of proprietary information seems to weaken the effect of a competitor's proximity on the decision to grant credit. But this finding is consistent with the notion that private information can limit competition so that a competitor's proximity to the borrower becomes less important in lending decisions. Furthermore, the inclusion of the credit-score variable increases the marginal effect of other variables associated with proprietary information such as the Main-Bank indicator and the prior lending-relationship variable Months on Books.

However, contrary to the APR determinants (see Tables 2 and 3), the distance variables conserve their statistical significance even in the presence of the bank's internal credit score. To further explore the interdependence of private information and physical distance we next add the score-distance interaction terms to the model (Specification 3, Table 4). We find that greater firm-bank distance reduces the beneficial impact of credit quality on the likelihood of obtaining a loan (negative marginal effect of the score-firm-bank distance interaction term). The farther away applicants are located the more the bank seems to discount its own assessment of the firm's creditworthiness. The finding that lenders seem to doubt the quality of their own proprietary intelligence as their distance to loan applicants increases is consistent with the notion that the requisite soft information is primarily of a local nature. The fact that the distance variables become statistically insignificant in the presence of the interaction terms (Specification 3, Table 4) provides additional support for this interpretation.

We see that borrower proximity facilitates the access to credit through better information

production (Specification 3, Table 4) albeit at the price of informational capture (Specification 3 in Table 2). Taken together, our findings suggest that proprietary information indeed softens competition and leads to the extraction of information rents in informationally sensitive markets such as small-business lending. Proprietary information can create an adverse-selection threat that reduces the effect of a competitor's geographic reach on lending decisions and loan terms, a topic that we turn to next.

5 Spatial Competition and Choice of Lender

A key result of models in which the degree of information asymmetry decreases with distance is that transactions become more contested as the informational advantage of the better informed party falls. Since less precise credit screening decreases the threat of adverse selection, competitors can bid more aggressively by offering credit more often and at lower rates, thereby eroding the more informed bank's ability to earn information rents (see, e.g., Hauswald and Marquez, 2005). Hence, we would expect the competition for borrowers to increase with distance so that borrowers switch lenders more frequently the more distant they are to the bank. By contrast, in transportation-cost models borrowers receive at most one credit offer and, therefore, do not have any incentive to switch banks, which is clearly at odds with our data.

By comparing the 12,823 credit offers to actually booked loans (11,949) and matching the observations with credit-bureau information on competing loan offers we identify 874 borrowers that declined the bank's terms and obtained credit from a competitor around the same time.[8] Table 5 provides summary statistics in function of the borrower's decision to accept or to decline the offer. We see that, on average, the declined loan offers are very similar to accepted ones. In particular, there are no statistically significant differences between the two subsamples in terms of firm-bank and firm-competitor distances. However, borrowers who decline an offer have been 15 months less long in business and keep lower deposit balances. While such borrowers also appear to be better credit risks (higher score, more collateral, higher guarantor salary, higher net income) and better known to the bank (3 months longer on the books) these characteristics are not statistically different from those for applicants accepting the bank's loan terms.

[8] This decision is very different from borrower's choice of single vs. multiple banking relationships; see Detriagiache *et al.* (2000) and Farinha and Santos (2002).

Specification 1 in Table 6 shows that more distant applicants are more likely to decline the bank's loan offer. By contrast, potential borrowers located further away from the nearest competitor are less likely do refuse a loan offer, and both distance are statistically highly significant. Furthermore, the longer the lending relationship and presumably the better the borrower is known to the bank (Months on Books, Main Bank), the less likely she is to refuse a loan offer and switch lenders. Quoted interest rates also affect the applicants decision: the higher the APR the more likely the borrower is to decline the offer, presumably because she can get a better terms elsewhere. These findings are again consistent with informational capture, albeit tempered by competition that increases in distance. On the one hand, longer lending relationships increase the threat of adverse selection for competitors thereby reducing competition. On the other hand, attempts to extract rents through higher loan rates, especially over greater distances, facilitate the poaching of good credit risks by competitors as reflected in more frequently declined credit offers.

Once we include the bank's credit score (Specification 2, Table 6) distance becomes again statistically insignificant. At the same time, our proxy for the bank's proprietary information is highly significant and has the largest marginal effect on the borrower's decision. The higher the internal score and, hence, the perceived credit quality the more likely the applicant is to decline the loan offer. Not only is it easier for better credit risks to obtain competing loan offers, they are also the primary targets for rent extraction through loan pricing and, hence, have a larger incentive to switch lenders. When we add the score-distance interaction terms (Specification 3, Table 6) we see again how distance in the presence of competition affects the bank's use of proprietary information. Distance exacerbates the tendency of good credit risks to decline loan offers and seek credit elsewhere because the further away a successful applicant is from its branch, the more the likelihood of declining a loan offer increases in its credit score.

Our results are broadly consistent with strategic lending by intermediaries that use private information to informationally capture high-quality borrowers.[9] The better the bank's information, i.e., the higher the quality of its credit screen or the closer a borrower is located to a branch, the easier it becomes to extract rents because our lender has a larger informational advantage over its competitors.[10] Such attempts, however, fail at the bank's periphery in terms of geographic

[9] See also Sharpe (1990), Rajan (1992), or von Thadden (2004) on this point.

[10] For evidence on the winner's curse in banking see Shaffer (1998).

reach or applicant quality explaining our findings that the larger the firm's distance to the bank or the higher its credit score the more likely the applicant is to decline the credit offer. Taken together we interpret these results as strong evidence in favor of price discrimination based on private information and the threat of adverse selection.

6 Distance, Credit Screening, and Default

Underlying our analysis is the notion that banks can use proprietary information to create an adverse-selection threat that limits competition for high-quality borrowers and leads to information rents. The results so far suggest that our bank indeed creates a borrower-specific informational advantage whose crucial determinants are borrower proximity, the intensity of the lending relationship, and the quality of its credit screening. To the extent that soft information is primarily local (Petersen and Rajan, 2002) we would expect firm-bank distance to directly affect a lender's ability to successfully assess credit risks. Hence, the quality of the credit screen should decrease in the borrower-bank distance so that the likelihood of lending to a bad credit risk (type II error) increases (see also Hauswald and Marquez, 2005).

To investigate this hypothesis we now turn to the determinants of borrower delinquency during the first 18 months after the loan's origination. We choose this window so that the likelihood of a loan becoming overdue is still related to the initial credit assessment and not to subsequent economic events beyond the bank's control. Our sample contains 319 loans out of the 11,949 booked ones that are 60 days past-due which corresponds to our bank's internal definition of a non-performing loan. While the technical definition of default is 180 days past due most banks including ours take action after at most 60 days past-due either writing off the loan, selling it off, or assigning it for collection. As a result, we do not know which of the delinquent loans ultimately experience default although over 90% of loans that are 60 days overdue eventually do according to our bank.

Table 7 reports the results of a logistic model of credit delinquency as a function of our usual variables. We see that both the firm-bank and the firm-competitor distance enter significantly into explaining the occurrence of a nonperforming loan (Specification 1). The further a borrower is located away from the bank the more likely eventual default becomes which is in line with the specification of lending errors in Hauswald and Marquez (2005). This result is also consistent with

the evidence in DeYoung *et al.* (2005) who in their analysis of SBA-guaranteed loans find that default increases in the distance between bank and borrower zip codes.

The firm-competitor distance effect suggests an explanation based on the competitive dynamics of local credit markets: the further away the borrower is from a competitor the less aggressive a bank pursues this customer and therefore is less likely to make an error in offering credit. Both findings are again consistent with the idea that a lender's informational advantage results from local knowledge that the distance between firms and their banks erodes, offering support for the conjecture of Petersen and Rajan (2002). At the same time, the bank's status as a privileged lender (Main-Bank variable) and the length of the lending relationship (Months on Books), which are both indicative of the intensity of the lending relationship and scope for information production, strongly decrease the likelihood of credit delinquency. The better the bank knows a borrower and the greater the latter's proximity, the less likely default becomes in terms of marginal effects.

When we include the bank's internal credit score (Specification 2 in Table 7) the firm-competitor distance becomes statistically insignificant, but not the firm-bank one. Conditional on the lender's credit assessment, borrower proximity still plays a role in explaining type II error in lending decisions, which we interpret as further evidence in favor of the local-information hypothesis. Unsurprisingly, borrowers with higher scores are less likely to default. While the relationship variables retain their significance and marginal effects, the bank's proprietary information has by far the largest impact on predicting default: the lower the borrower's perceived credit quality the more likely she will experience default.

To disentangle borrower proximity from information effects we next interact the score and distance variables (Specification 3 in Table 7). As for lending decisions (Table 4), both the firm-bank and firm-competitor distance variables now are statistically insignificant: distance only matters insofar as it affects the quality of the bank's credit screen. We see that the further away the borrower, the smaller the marginal impact of lower credit quality becomes in terms of default probabilities. A 100 point reduction in the score increases the likelihood of default by 3.7% next to the branch as opposed to 1.5% at the mean bank-borrower distance of 10 miles. Since there is no reason to suppose that borrowers choose their location as a function of their creditworthiness, these results suggest that the scores' power to predict default diminishes in distance. When branches lend to borrowers outside their immediate proximity they are more likely to fall victim to erroneous

credit-risk assessment and, in consequence, to suffer from default. Hence, type II errors in screening and lending decisions indeed seem to increase with distance so that banks are right to discount higher scores for far-away borrowers.

These findings reinforce our conclusion that a bank's proprietary knowledge has a strong local component whose quality increases with borrower proximity so that distance acts as a proxy for private information.

7 Information Production and Competition

In this section we investigate the effect of soft information and local competition on lending decisions.

7.1 Gathering Soft Information

A bank's ability to generate borrower-specific information is typically thought to depend on the length, scope, and depth of the lending relationship. For our purposes, we measure the scope and length of the lending relationship respectively with the variables Main Bank and Months on Book that we interact with the bank's internal credit score to get a better sense how the depth of the bank-applicant relationship affects creditworthiness assessments .

Specification 1 in Table 8 reports the results from adding the two score-relationship interaction terms that are statistically highly significant to the second specification of the lending-decision model in Table 4. We see that both the length (Months on Books) and scope (Main Bank) of the lending relationship enhance the marginal impact of proprietary information reflected in the internal credit assessment (score) on the decision to offer credit. An applicant that keeps a current-account balance and has bought other services from our bank (Main Bank = 1) increases the effect of a higher score on the likelihood of obtaining credit by an additional 2.38 percentage points. Similarly, the longer an applicant has borrowed the more weight the bank attributes to the credit score in the lending decision increasing the likelihood of a loan offer by a further 1.68%.

Re-estimating the second APR regression (while correcting for sample-selection bias) with the score-relationship interaction variables shows that the longer and deeper the lending relationship the more important the internal score becomes in the pricing of credit, too (Specification 1, Table

8). The better the bank (branch) knows the customer the more does a higher score reduce the quoted loan rate. Including the interaction terms in the logistic model of loan default confirms the importance of soft information for credit scoring: a higher score reduces the likelihood of credit delinquency even further the longer (Months on Books) or deeper (Main Bank) the lending relationship is.

These results not only provide strong evidence for the importance of soft information in credit markets they also suggest that physical distance erodes a bank's ability to gather such proprietary intelligence. While credit-scoring techniques have helped banks to increase their market reach and overcome geographic barriers in information acquisition the soft component of lending decisions still depends on the collection and interpretation borrower specific information by branches as reflected in score adjustments. Such attempts to harden soft information (Petersen, 2004) therefore still depend on location and borrower proximity so that technological progress in credit assessments has not rendered obsolete the need for subjective information but rather changed the way how banks use such knowledge in lending decisions.

7.2 Local Competition and Market Concentration

We finally analyze the incidence of local competition on loan transactions. To this end, we collect the number of competitors in terms of financial institutions and branches active in each loan applicant's zip code by application date (on average, 3.5 institutions and 4.8 branches) from the FDIC Summary of Deposits database from which we subtract 1 if the lending branch is located in the same zip code. In addition, we rely on the Herfindahl-Hirschman indices of market share in terms of deposits (Deposit HHI, mean: 4,543) and branches (Branch HHI, mean: 3,730) by year and zip code to measure local competitiveness.[11] Since our applicants primarily borrow from lenders in their proximity we are confident that the concentration of the local deposit market is a good proxy for the that of the local credit market. Whenever we include an HHI variable we drop all applications originating in zip codes without local lenders from the sample because the indices are not defined in this case.

Table 9 reports the results from adding the competitiveness variables to the analysis of the

[11] We compute the Hirshman-Herfindahl index for branches as the sum of lenders' squared market share in terms of each institution's number of branches in a given zip code by year.

bank's lending and loan-pricing decisions (we only report the results for the most interesting, i.e., third specification). Starting with the former we see in Specification 1 that, conditional on credit quality, the more concentrated the local banking market is (higher Deposit HHI) the less likely the bank is to grant a loan.[12] This finding is also consistent with the well-documented fact that credit-market consolidation leads to a reduction in small business lending (see, e.g., Berger *et al.,* 1998). When we replace the HHI variable with the number of competing branches and institutions we find that only the latter is statistically significant (Specification 2, Table 9). The likelihood of offering credit increases in the number of active lenders confirming our earlier findings in terms of market concentration. By contrast, branch-proliferation effects seem unimportant for lending decisions.

Specification 3 in Table 9 reports the results from regressing the loan's all-in cost (APR) on the competitiveness and our usual explanatory variables with the Heckman correction for sample selectivity. They clearly reveal how the concentration of local credit markets translates into pricing power: a 1,000 point increase in the Deposit HHI raises the offered APR by 35 basis points whereas the same increase in the Branch HHI does so by 64 basis points (results not reported). By contrast, the number of competing institutions or branches do not have any explanatory power so that we do not report the results. Taken together we find that, conditional on credit quality, less competition implies a lower likelihood of obtaining credit and a higher loan rate as the bank uses its market power in local credit markets.

8 Discussion

This paper investigates the determinants of lending decisions and credit terms on the basis of a large sample of loan applications from small businesses to a major US financial institution. In line with earlier findings, our results provide evidence for price discrimination in loan pricing on the basis of firm-bank distance. A similar picture emerges for the bank's decision to offer credit: the closer an applicant is to its own branch but the further away from a competitor's, the more likely she is to obtain a loan offer. However, once we include the bank's internal credit score as a proxy for private information the distance effects become statistically insignificant. Instead, variables

[12] Using the Branch HHI gives very similar results so that we do not report them.

associated with asymmetric information determine lending decisions and loan pricing.

Our results reveal that physical distances between loan applicants and the bank and their competitors are excellent proxies for a bank's informational advantage. In addition, they also suggest a channel through which distance affects information acquisition and, hence, the degree of informational asymmetries. Since small businesses are intimately tied to their local economies we would expect that the bank's private information primarily consists in "soft" local information as conjectured by Petersen and Rajan (2002). Estimating our specifications conditional on the credit score significantly reduces the effect of distance on lending decisions. Given that credit scores sum up an intermediary's proprietary information, we interpret this finding as evidence that distance is a measure of the informational advantage that banks hold over their local competitors. But greater distance between a branch and its customers erodes this local information advantage making it easier for competitors to poach borrowers.

We also find support for the contention that technological innovations in the form of credit-scoring technology and the resulting increase in bank productivity drive the increase in banks' geographic reach. New methods to assess the creditworthiness of loan applicants allow lenders to overcome the lack of local information and push out the boundaries of their markets. Our results also provide strong evidence that the information collected in this endeavor allows a bank to extract information rents whose scope increases with borrower proximity.

At the same time, the threat of informational capture is a potent motive to switch banks as predicted by, among others, Hauswald and Marquez (2005). We find that at the periphery of a bank's (local) market competition reduces the success of informational capture because borrowers are more likely to obtain competing offers and switch lenders the further away they are from their bank branch and the higher the quoted loan rate is. We interpret our results as support for spatial models of credit markets based on asymmetric information rather than on transportation costs, especially in light of our findings on borrowers that decline loan offers.

A further important issue is the degree to which the competitive structure of the local credit market affects loan transactions. It is well known that banks can use private information to partially fend off competition for their core market (see, e.g., Gehrig, 1998). At the same time, increased competition erodes their ability to extract information rent and retain customers. Hence, it is unclear how the local competitiveness of loan markets influences lending decisions and borrower

behavior when banks use information strategically. We leave this question for future research.

Table 1: **Summary Statistics for All Loan Applications**

Loan-Application Outcome	Accept			Reject			t-Test
Variable	Mean	Median	Std Dev	Mean	Median	Std Dev	P-val
Loan Rate (APR: all-in cost of loan)	8.46%	8.12%	2.73%	N/A	N/A	N/A	N/A
Loan Amount	$46,507	$39,687	$42,754.59	N/A	N/A	N/A	N/A
Maturity (years)	6.68	6.14	5.39	N/A	N/A	N/A	N/A
Loan vs. Credit-Line Dummy	22.44%		47.02%	33.73%		47.28%	0.0000
Collateral Dummy	60.03%		48.30%	49.59%		49.07%	0.0000
SBA Dummy	0.56%		4.70%	12.21%		27.45%	0.0000
Firm-Bank Distance (miles by car)	9.91	2.62	21.44	10.67	2.98	28.94	0.0171
Firm-Comp Distance (miles by car)	1.10	0.55	1.59	0.93	0.48	1.48	0.0000
Firm-Bank Distance (min. by car)	10.25	6.79	21.39	13.35	7.93	22.99	0.0000
Firm-Comp Distance (min. by car)	2.18	1.16	4.99	2.12	1.09	4.51	1.0000
Firm-Bank Aerial Distance (miles)	7.68	2.00	23.55	8.49	2.41	17.23	0.0017
Firm-Comp Aerial Distance (miles)	0.74	0.38	1.58	0.68	0.34	1.15	0.0006
Main Bank	35.14%		44.03%	25.38%		43.52%	0.0000
Primary Guarantor Dummy	34.03%		47.23%	38.89%		48.75%	0.0000
Primary Guarantor Monthly Salary	$36,564	$33,011	$85,480	$33,378	$30,892	$92,475	0.0043
Months in Business	115.39	96.34	107.28	90.88	81.03	99.28	0.0000
Months on Books	43.17	30.50	56.68	17.66	14.38	29.74	0.0000
Firm's Monthly Net Income	$110,367	$94,724	$256,941	$91,350	$84,441	$375,803	0.0000
Monthly Deposit Account Balance	$16,983	$11,834	$62,777	$11,549	$10,035	$21,047	0.0000
Internal Credit Score	1036.35	1042.44	1393.24	810.72	846.89	1287.87	0.0000
Case-Shiller House Price Index	170.35	156.35	30.97	162.33	150.75	31.89	0.0000
State CT	13.50%		35.63%	12.04%		34.91%	0.0010
State MA	16.15%		36.80%	14.21%		34.91%	0.0000
State ME	3.62%		18.65%	2.61%		15.93%	0.0000
State NH	2.87%		16.69%	2.26%		14.85%	0.0019
State NJ	24.46%		42.97%	24.57%		43.05%	0.8391
State NY	32.83%		46.96%	38.06%		48.55%	0.0000
State PA	3.16%		17.48%	2.94%		16.90%	0.3008
State RI	3.32%		17.90%	3.07%		17.26%	0.2719
Other States	0.09%		3.05%	0.25%		4.98%	0.0026
Q1 2002	18.46%		39.18%	17.91%		38.35%	0.2592
Q2 2002	19.02%		39.69%	18.04%		38.46%	0.0454
Q3 2002	16.93%		37.18%	17.80%		38.26%	0.0662
Q4 2002	17.59%		37.49%	20.43%		40.32%	0.0000
Q1 2003	27.99%		33.77%	25.81%		32.73%	0.0000
SIC 0: Agriculture, Forestry, Fishing	3.32%		17.93%	2.68%		16.14%	0.0024
SIC 1: Mining, Construction	13.50%		34.17%	12.99%		33.62%	0.2265
SIC 2: Manufacturing (Consumer)	2.85%		16.63%	1.95%		13.81%	0.0000
SIC 3: Manufacturing (Industrials)	3.46%		18.27%	2.59%		15.89%	0.0001
SIC 4: Transport., Comm., Gas, Elect.	4.69%		21.14%	5.20%		22.20%	0.0617
SIC 5: Wholesale and Retail Trade	31.10%		46.29%	30.41%		46.00%	0.2285
SIC 6: Finance, Insurance, Real Estate	2.33%		15.09%	4.31%		20.31%	0.0000
SIC 7: Personal & Business Services	20.21%		40.16%	18.10%		38.50%	0.0000
SIC 8: Professional Services	17.04%		37.60%	9.31%		29.06%	0.0000
SIC 9: Administration	0.12%		3.40%	0.13%		3.63%	0.7071
5Y - 3M UST Yield Spread (bpts)	218.92	209.24	57.65	N/A	N/A	N/A	N/A
Maturity-Matched UST Yield	3.89%	3.83%	1.96%	N/A	N/A	N/A	N/A
Number of Observations		12,823			12,664		25,487

This table presents summary statistics for the key variables described in Section 3 for our full sample of 25,487 data points in function of the bank's decision to accept the loan application and offer credit (12,664 observations) or to deny credit to the applicant (12,487 observations). The last column indicates the P-values of a two-sided t-test for the equality of the variables' mean conditional on the bank's decision (wherever appropriate).

Table 2: **Loan-Rate Determinants**

Specification	1		2		3	
Variable	Coeff	P-val	Coeff	P-val	Coeff	P-val
Constant	12.0086	0.0001	12.4424	0.0001	10.6632	0.0001
ln(1+Firm-Bank Dist)	-1.5116	0.0001	-1.0438	0.1503	-1.4648	0.2892
ln(1+Firm-Comp Dist)	1.2493	0.0001	0.6312	0.1939	1.3311	0.4553
Main Bank	-1.7314	0.0001	-1.5151	0.0001	-1.3341	0.0001
ln(Score)			-2.4226	0.0001	-2.0835	0.0001
ln(Score)·ln(1+Firm-Bank Dist)					-0.2555	0.0001
ln(Score)·ln(1+Firm-Comp Dist)					0.1724	0.0001
Primary Guarantor	-0.9004	0.0001	-0.7953	0.0001	-1.1839	0.0001
ln(Months in Business)	-3.5955	0.0001	-2.7983	0.0001	-1.4728	0.0001
ln(Months on Books)	-2.2563	0.0001	-2.2266	0.0001	-1.4138	0.0001
ln(Net Income)	-3.7882	0.0001	-2.9642	0.0001	-1.1597	0.0001
Q1 2002	-0.0283	0.9934	-0.0459	0.9484	-0.0197	0.5603
Q2 2002	0.2269	0.5034	0.2061	0.5344	0.1393	0.3435
Q3 2002	0.0196	0.8844	-0.0441	0.8580	-0.0615	0.8348
Q4 2002	-0.5685	0.0001	-0.3383	0.0001	-0.6340	0.0001
State MA	-0.4722	0.0002	-0.4379	0.0003	-0.7522	0.0354
State ME	0.1718	0.7894	0.2048	0.5438	0.2634	0.3450
State NH	-0.2266	0.8347	-0.0879	0.8993	-0.1371	0.5832
State NJ	-0.1873	0.7346	-0.3147	0.5534	-0.0811	0.3519
State NY	-0.2536	0.0834	-0.3419	0.0022	-0.2720	0.0655
State PA	-0.1522	0.4458	-0.7202	0.5484	-0.1314	0.3443
State RI	-0.1513	0.7399	-0.2827	0.7892	-0.0757	0.7235
Other States	-0.7342	0.7650	-0.7738	0.6883	-1.0605	0.7054
ln(Case-Shiller HPI)	-0.4798	0.0001	-0.4693	0.0001	-0.4724	0.0001
Collateral Dummy	-2.2953	0.0001	-2.5697	0.0001	-2.6678	0.0001
SBA Dummy	0.5633	0.0001	0.6848	0.0001	0.2511	0.0001
Loan Dummy	0.3851	0.0001	0.5403	0.0001	0.4249	0.0001
Term Spread	0.5324	0.0001	0.5157	0.0001	0.6337	0.0001
UST Yield	0.3870	0.0001	0.4259	0.0001	0.3760	0.0001
ln(1+Maturity)	-0.2768	0.0001	-0.1198	0.0001	-0.2412	0.0001
38 2-digit SIC Dummies	Yes		Yes		Yes	
Number of Obs	12,823		12,823		12,823	
Adjusted R^2	17.24%		22.85%		22.01%	

This table reports the results from regressing the offered loan rate (APR: all-in cost of the loan) on the firm-bank and firm-competitor driving distances in miles, proxies for proprietary information, bank-borrower relationship characteristics, firm attributes, and various control variables. See Section 3 for a description of the variables.

Table 3: **Loan-Rate Determinants Correcting for Sample-Selection Bias**

Specification	1		2		3	
Variable	Coeff	P-val	Coeff	P-val	Coeff	P-val
Constant	11.9495	0.0001	11.9865	0.0001	12.3388	0.0001
ln(1+Firm-Bank Dist)	-1.7135	0.0001	-1.2081	0.1674	-0.7471	0.6877
ln(1+Firm-Comp Dist)	1.5475	0.0001	0.7601	0.2224	0.3539	0.7539
Main Bank	-1.3009	0.0001	-1.3003	0.0001	-1.2550	0.0001
ln(Score)			-3.6078	0.0001	-3.5935	0.0001
ln(Score)·ln(1+Firm-Bank Dist)					-0.1575	0.0001
ln(Score)·ln(1+Firm-Comp Dist)					0.0774	0.0001
Primary Guarantor	-0.8371	0.0001	-0.8302	0.0001	-0.9105	0.0001
ln(Months in Business)	-4.6102	0.0001	-4.4803	0.0015	-2.3418	0.0001
ln(Months on Books)	-1.7346	0.0001	-1.7031	0.0001	-2.5858	0.0001
ln(Net Income)	-2.8370	0.0001	-2.8184	0.0001	-2.7714	0.0001
Q1 2002	-0.1009	0.4458	-0.0985	0.6546	-0.6073	0.4703
Q2 2002	-0.3591	0.5490	-0.3579	0.3848	-0.5521	0.1808
Q3 2002	-0.5054	0.2854	-0.4905	0.3850	-0.2222	0.4711
Q4 2002	-1.2727	0.1445	-1.2672	0.0006	-0.3452	0.0001
State MA	-0.2109	0.0603	-0.2051	0.0003	-0.7063	0.0241
State ME	0.8871	0.2435	0.8733	0.0454	1.4214	0.0001
State NH	0.4167	0.2448	0.4009	0.3566	0.5487	0.8945
State NJ	-0.3644	0.3848	-0.3538	0.3560	-0.3007	0.5877
State NY	-1.0585	0.0834	-1.0556	0.0244	-0.3200	0.5834
State PA	-0.7818	0.1560	-0.7748	0.3556	-0.3552	0.3480
State RI	0.8075	0.4367	0.8063	0.3903	0.4470	0.6534
Other States	-0.6087	0.1145	-0.5991	0.2104	-0.0920	0.5658
ln(Case-Shiller HPI)	-0.4003	0.0001	-0.3871	0.0001	-0.4024	0.0001
Collateral Dummy	-2.0169	0.0001	-1.9503	0.0001	-2.8396	0.0001
SBA Dummy	0.2183	0.0001	0.2146	0.0248	0.8713	0.0001
Loan Dummy	1.0088	0.0002	0.9920	0.0256	1.0739	0.0001
Term Spread	0.7099	0.0872	0.6877	0.0001	0.5128	0.0001
UST Yield	0.5376	0.0001	0.5234	0.0001	0.7685	0.0001
ln(1+Maturity)	-0.0435	0.0001	-0.0434	0.0001	-0.0580	0.0001
Lambda	4.7572	0.0001	3.7972	0.0945	3.5985	0.1455
38 2-digit SIC Dummies	Yes		Yes		Yes	
Number of Obs	12,823		12,823		12,823	
Adjusted R^2	18.35%		22.24%		21.20%	

This table reports the results from regressing the offered loan rate (APR: all-in cost of the loan) on the firm-bank and firm-competitor driving distances in miles, proxies for proprietary information, bank-borrower relationship characteristics, firm attributes, and various control variables correcting for the prior decision by the bank to grant or deny credit to a loan applicant that might result in sample-selection bias. To correct for such problems we include Lambda, the inverse Mills ratio (hazard rate) for the logistic distribution, required by the Heckman procedure for sample-selection bias. See Section 3 for a description of the variables.

Table 4: **The Decision to Offer or to Deny Credit**

Specification	1			2			3		
Variable	Coeff	P-val	Marg	Coeff.	P-val	Marg	Coeff.	P-val	Marg
Constant	2.9349	0.0001		4.0865	0.0001		1.6179	0.0001	
ln(1+Firm-Bank Dist)	-0.1075	0.0001	-4.22%	-0.2245	0.0140	-1.32%	-0.7537	0.1223	-0.48%
ln(1+Firm-Comp Dist)	0.2749	0.0001	2.58%	0.6484	0.0834	0.20%	0.0665	0.1543	0.39%
Main Bank	0.8080	0.0001	1.08%	1.0604	0.0001	1.25%	0.6559	0.0011	4.77%
ln(Score)				1.3656	0.0001	40.78%	5.9313	0.0001	37.95%
ln(Score)·ln(1+F-B Dist)							-0.0004	0.0001	-1.58%
ln(Score)·ln(1+F-C Dist)							-0.0085	0.0001	-1.63%
Primary Guarantor	3.1899	0.0001	0.28%	2.6752	0.0001	0.89%	1.8821	0.0001	2.32%
ln(Months in Business)	0.4396	0.0001	14.24%	0.2501	0.0001	11.96%	0.0032	0.0001	8.03%
ln(Months on Books)	1.7634	0.0001	25.15%	2.7088	0.0001	28.17%	1.4214	0.0001	11.32%
ln(Net Income)	0.2304	0.0001	4.10%	0.6144	0.0001	5.36%	1.9975	0.0687	4.90%
Q1 2002	-3.1329	0.0001	-0.21%	-1.1278	0.0001	-0.49%	-2.2142	0.0001	-1.50%
Q2 2002	-2.9641	0.0001	-0.49%	-1.1752	0.0001	-0.65%	-1.5032	0.0001	-1.08%
Q3 2002	-1.2533	0.0001	-3.41%	-3.0204	0.0001	-4.90%	-1.3895	0.0001	-1.95%
Q4 2002	0.2684	0.0001	4.17%	0.9831	0.0001	4.01%	0.6300	0.0001	2.61%
State MA	0.2098	0.4287	0.13%	0.0667	0.7877	0.07%	0.0784	0.8363	0.04%
State ME	0.5435	0.0001	0.63%	1.5865	0.0001	0.55%	-1.8277	0.0001	-0.82%
State NH	0.5266	0.0638	0.13%	1.2798	0.0001	0.24%	-0.4241	0.0113	-0.57%
State NJ	-0.3111	0.0384	-0.07%	-0.3668	0.0001	-0.66%	0.3466	0.0230	0.47%
State NY	-0.2575	0.0010	-0.11%	-0.2059	0.0001	-0.20%	0.8735	0.0002	1.06%
State PA	-0.1250	0.4877	-0.02%	-0.1168	0.6785	0.00%	0.1613	0.3622	0.09%
State RI	0.1841	0.3984	0.05%	0.3412	0.2455	0.01%	-13.3618	0.2470	-0.06%
Other States	-1.5157	0.0966	-0.02%	-1.1746	0.1934	0.00%	1.2831	0.1345	0.02%
ln(Case-Shiller HPI)	0.0075	0.0001	3.41%	0.0069	0.0001	3.32%	0.0072	0.0001	3.37%
Collateral Dummy	0.4142	0.0001	12.91%	1.0508	0.0001	13.77%	0.4971	0.0001	10.61%
SBA Dummy	-5.8792	0.0001	-3.45%	-4.7876	0.0001	-3.87%	-4.7316	0.0001	-4.16%
Loan Dummy	-1.1123	0.0001	-1.15%	-1.6415	0.0001	-2.75%	-4.0940	0.0001	-2.28%
38 SIC Dummies		Yes			Yes			Yes	
Number of Obs		25,487			25,487			25,487	
Pseudo R^2		5.99%			9.06%			9.16%	

This table reports the results from estimating a logistic discrete-choice model of the loan application's outcome by full-information maximum likelihood for our full sample (25,487 observations). The dependent variable is the bank's decision to offer ($Y = 1$: 12,823 observations) or to deny ($Y = 0$: 12,664 observations) credit. The explanatory variables are the firm-bank and firm-competitor distances (abbreviated "F-B Dist" and "F-C Dist" in the interaction terms, respectively), proxies for proprietary information, bank-borrower relationship characteristics, firm attributes, and various control variables (see Section 3 for a description of the variables). We report the coefficients ("Coeff"), their P-values ("P-val"), and marginal effects ("Marg") for the decision to grant credit ($Y = 1$). 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. We obtain the marginal effects by simply evaluating $\frac{\partial \Pr_j}{\partial x_{jk}} = \Lambda'\left(\mathbf{x}'_{jk}\boldsymbol{\beta}_k\right)\beta_k$ at the regressors' sample means where Λ is the logistic distribution function $\Lambda\left(\mathbf{x}'_{jk}\boldsymbol{\beta}_k\right) = \frac{\exp\left\{\mathbf{x}'_{jk}\boldsymbol{\beta}_k\right\}}{\sum_k \exp\left\{\mathbf{x}'_{jk}\boldsymbol{\beta}_k\right\}}$. The pseudo-$R^2$ is McFadden's likelihood ratio index $1 - \frac{\log L}{\log L_0}$.

Table 5: **Summary Statistics for Accepted and Declined Credit Offers**

Loan-Offer Decision	Accept			Decline			t-Test
Variable	Mean	Median	Std Dev	Mean	Median	Std Dev	P-val
Loan Rate (APR: all-in cost of loan)	8.50%	8.11%	2.59%	8.46%	8.15%	2.72%	0.6843
Loan Amount	$46,485	$39,375	$42,624	$48,585	$40,790	$56,344	0.1702
Maturity (years)	6.20	6.13	5.36	6.42	6.18	5.34	0.2403
Loan vs. Credit-Line Dummy	21.93%		47.02%	29.35%		37.23%	0.0000
Collateral Dummy	61.35%		48.49%	60.89%		45.24%	0.7873
SBA Dummy	0.51%		4.50%	1.37%		3.43%	0.0000
Firm-Bank Distance (miles by car)	9.93	2.62	21.78	9.91	2.15	23.40	0.9806
Firm-Comp Distance (miles by car)	1.10	0.54	1.60	1.11	0.38	1.70	0.9142
Firm-Bank Distance (min. by car)	10.26	6.83	20.28	10.19	6.79	22.99	0.9267
Firm-Comp Distance (min. by car)	2.19	1.18	4.90	2.18	1.19	4.29	0.9334
Firm-Bank Aerial Distance (miles)	7.69	2.03	23.89	7.60	1.90	27.24	0.9216
Firm-Comp. Aerial Distance (miles)	0.75	0.39	1.57	0.64	0.36	1.90	0.0596
Main Bank	35.57%		43.63%	34.83%		41.25%	0.6246
Primary Guarantor Dummy	34.91%		47.67%	32.87%		45.24%	0.2216
Primary Guarantor Monthly Salary	$37,385	$33,445	$87,512	$39,646	$32,235	$83,586	0.4596
Months in Business	117.38	96.02	110.56	103.05	97.13	92.38	0.0002
Months on Books	43.39	30.23	58.00	45.87	30.92	47.89	0.2172
Firm's Monthly Net Income	$112,234	$94,329	$268,615	$114,821	$95,294	$175,624	0.7792
Monthly Deposit Account Balance	$17,913	$11,724	$65,236	$19,179	$11,899	$48,457	0.5737
Internal Credit Score	1034.78	1041.90	1401.33	1039.92	1048.98	837.67	0.9147
Case-Shiller House Price Index	169.89	154.98	32.99	174.39	159.34	28.92	0.0001
State CT	13.60%		36.82%	12.15%		19.66%	0.2492
State MA	16.17%		36.82%	15.86%		36.55%	0.8105
State ME	3.71%		18.90%	2.37%		15.22%	0.0403
State NH	2.92%		16.83%	2.27%		14.89%	0.2665
State NJ	24.15%		42.80%	28.63%		45.23%	0.0029
State NY	32.99%		47.02%	30.69%		46.14%	0.1615
State PA	3.06%		17.23%	4.53%		20.81%	0.0166
State RI	3.30%		17.87%	3.50%		18.39%	0.7501
Other States	0.09%		3.04%	0.10%		3.21%	0.9224
Q1 2002	18.63%		38.94%	23.58%		42.47%	0.0003
Q2 2002	19.43%		39.57%	21.73%		41.26%	0.0984
Q3 2002	16.01%		36.68%	26.16%		43.97%	0.0000
Q4 2002	16.78%		37.37%	18.85%		39.13%	0.1154
Q1 2003	29.14%		34.89%	9.68%		18.63%	0.0000
SIC 0: Agriculture, Forestry, Fishing	3.43%		18.19%	2.06%		14.21%	0.0297
SIC 1: Mining, Construction	13.72%		34.40%	10.81%		31.07%	0.0154
SIC 2: Manufacturing (Consumer)	2.92%		16.83%	1.96%		13.86%	0.0992
SIC 3: Manufacturing (Industrials)	3.55%		18.51%	2.27%		14.89%	0.0446
SIC 4: Transport., Comm., Gas, Elect.	4.74%		21.24%	4.12%		19.88%	0.4052
SIC 5: Wholesale and Retail Trade	30.99%		46.25%	32.54%		46.88%	0.3373
SIC 6: Finance, Insurance, Real Estate	2.32%		15.05%	2.47%		15.53%	0.7715
SIC 7: Personal & Business Services	20.41%		40.30%	17.82%		38.29%	0.0659
SIC 8: Professional Services	17.09%		37.65%	16.37%		37.02%	0.5849
SIC 9: Administration	0.08%		2.89%	0.51%		7.16%	0.0002
5Y - 3M UST Yield Spread (bpts)	214.35	206.24	54.57	239.89	210.92	60.39	0.0000
Maturity-Matched UST Yield	3.39%	3.31%	1.15%	3.80%	3.64%	1.03%	0.0000
Number of Observations		11,949			874		12,823

This table provides summary statistics for the key variables described in Section 3 as a function of the *borrower's* decision to accept (11,949 observations) or to reject (874 observations) the bank's loan offer. The last column indicates the P-values of a two-sided t-test for the equality of the variables' mean conditional on the applicant's decision.

Table 6: **The Decision to Decline Loan Offers**

Specification	1			2			3		
Variable	Coeff	P-val	Marg	Coeff.	P-val	Marg	Coeff.	P-val	Marg
Constant	-2.2322	0.0001		-2.5597	0.0005		-2.4772	0.0002	
ln(1+Firm-Bank Dist)	2.7908	0.0001	5.71%	1.5253	0.3958	0.64%	0.4132	0.5540	1.23%
ln(1+Firm-Comp Dist)	-1.0658	0.0010	-7.92%	-1.4311	0.5485	-0.91%	-0.6152	0.3995	-0.06%
Main Bank	-1.0275	0.0001	-8.98%	-1.4810	0.0001	-13.42%	-1.7198	0.0001	-9.88%
ln(Score)				5.8174	0.0001	18.14%	4.8228	0.0001	62.61%
ln(Score)·ln(1+F-B Dist)							0.7906	0.0001	2.45%
ln(Score)·ln(1+F-C Dist)							-0.1495	0.2450	-0.90%
Primary Guarantor	5.5393	0.0001	5.60%	5.3725	0.0001	7.54%	3.9895	0.0001	5.16%
ln(Months in Business)	-4.5688	0.0001	-3.69%	-1.5613	0.0001	-5.03%	-1.0624	0.0001	-13.44%
ln(Months on Books)	-1.0298	0.0001	-5.96%	-1.2815	0.0001	-6.46%	-0.9808	0.0001	-5.44%
ln(Net Income)	3.3640	0.0001	7.24%	4.3105	0.0001	6.81%	1.0571	0.0001	4.02%
Q1 2002	-1.2451	0.0034	-1.17%	-1.3078	0.2856	-0.79%	-0.6603	0.1843	-0.50%
Q2 2002	-1.5710	0.0003	-1.22%	-1.1348	0.2595	-1.07%	-0.4992	0.3384	-0.13%
Q3 2002	-2.3479	0.0001	-2.00%	-0.7371	0.0001	-1.70%	-0.5015	0.2540	-0.82%
Q4 2002	1.7025	0.0001	2.43%	1.0147	0.0001	2.88%	0.6341	0.0001	1.61%
State MA	0.1798	0.7895	0.04%	-0.2816	0.3666	-0.04%	-0.4913	0.2584	-1.22%
State ME	-1.1267	0.8438	-0.13%	-0.1620	0.3599	-0.05%	-0.0991	0.8034	-0.04%
State NH	-0.6675	0.4038	-0.07%	-0.8358	0.3566	-0.13%	-0.3876	0.8458	-1.24%
State NJ	1.1252	0.0385	0.07%	0.3355	0.3494	0.04%	0.6273	0.6583	0.37%
State NY	-0.2295	0.3349	0-.11%	-0.3138	0.3458	-0.09%	-0.3046	0.5475	-0.21%
State PA	0.7662	0.3546	0.26%	-0.2471	0.5599	-0.18%	-0.1144	0.4905	-0.29%
State RI	0.8262	0.6439	0.22%	0.0484	0.8904	0.06%	0.0689	0.8943	0.12%
Other States	-1.2530	0.4594	-0.06%	-1.6145	0.7048	-0.20%	-0.9824	0.9573	-0.60%
ln(Case-Shiller HPI)	0.0020	0.7439	0.24%	0.0023	0.7483	0.25%	0.0021	0.7783	0.27%
Collateral Dummy	0.1920	0.0001	3.00%	0.3506	0.5239	4.49%	0.2769	0.5488	1.14%
SBA Dummy	0.2447	0.5235	0.60%	0.4517	0.4289	0.45%	0.1362	0.9489	0.49%
Loan Dummy	-0.2021	0.4995	-0.19%	-0.0646	0.7392	-0.26%	-1.3238	0.5238	-0.02%
Term Spread	-1.6244	0.0001	-3.91%	-1.8371	0.0001	-0.84%	-1.7372	0.0001	-1.34%
UST Yield	1.1834	0.0001	10.51%	2.5312	0.0001	11.83%	0.3742	0.0001	4.43%
ln(1+Maturity)	-0.1237	0.0001	-2.55%	-0.1355	0.3801	-2.47%	-0.4840	0.0001	-1.03%
APR	0.3351	0.0001	12.13%	0.2831	0.0001	10.83%	0.7520	0.0001	11.53%
ln(Loan Amount)	-11.1187	0.0001	-4.41%	-7.3851	0.0001	-5.69%	-3.9935	0.0001	-3.88%
38 SIC Dummies		Yes			Yes			Yes	
Number of Obs		12,823			12,823			12,823	
Pseudo R^2		3.37%			3.79%			3.45%	

This table reports the results from estimating a logistic discrete-choice model of the borrower's decision to refuse the bank's loan offer by full-information maximum likelihood for the subsample of successful loan applications (12,823 observations). The dependent variable is the applicant's decision to decline ($Y = 1$: 874 observations) or to accept ($Y = 0$: 11,949 observations) the bank's offer. The explanatory variables are the firm-bank and firm-competitor driving distances in miles, proxies for proprietary information, bank-borrower relationship characteristics, firm attributes, and various control variables. F-B Dist and F-C Dist refer to the firm-bank and firm-nearest-competitor distances, respectively; see Section 3 for a description of the variables and the notes to Table 4 for further details.

Table 7: **The Likelihood of Credit Delinquency**

Specification	1			2			3		
Variable	Coeff	P-val	Marg	Coeff.	P-val	Marg	Coeff.	P-val	Marg
Constant	-5.6207	0.0001		-5.9157	0.0001		-5.9580	0.0001	
ln(1+Firm-Bank Dist)	0.1569	0.0004	1.12%	0.3151	0.0124	0.37%	0.6255	0.6746	0.34%
ln(1+Firm-Comp Dist)	-0.0976	0.0001	-1.98%	-0.5207	0.3737	-0.17%	-0.5957	0.1943	-0.77%
Main Bank	-0.8632	0.0001	-9.64%	-0.5557	0.0001	-12.18%	-0.6321	0.0001	-5.13%
ln(Score)				-3.7020	0.0001	-32.25%	-2.5252	0.0001	-37.98%
ln(Score)·ln(1+F-B Dist)							0.0736	0.0001	9.54%
ln(Score)·ln(1+F-C Dist)							-0.0330	0.0001	-0.05%
Primary Guarantor	-3.2810	0.0001	-6.39%	-5.3382	0.0001	-7.06%	-1.0010	0.0001	-5.08%
ln(Months in Business)	-0.4772	0.0001	-4.68%	-0.5564	0.0001	-5.75%	-0.5799	0.0001	-6.80%
ln(Months on Books)	-3.3580	0.0001	-8.36%	-3.8735	0.0001	-9.95%	-3.8283	0.0001	-3.78%
ln(Net Income)	-1.9685	0.0001	-1.73%	-2.9859	0.0001	-1.65%	-1.7836	0.0001	-8.93%
Q1 2002	-0.9439	0.0404	-0.04%	-1.0952	0.2474	-0.75%	-0.7433	0.2384	-0.79%
Q2 2002	-0.1243	0.9409	-0.21%	-1.8051	0.1494	-0.99%	-0.1218	0.6389	-0.44%
Q3 2002	0.7192	0.5589	0.47%	-0.3243	0.5740	0.35%	0.3059	0.6184	0.34%
Q4 2002	0.4290	0.0289	0.38%	0.5383	0.0001	0.91%	0.6523	0.2934	2.92%
State MA	0.1755	0.4399	0.02%	0.1985	0.3457	0.19%	1.1778	0.3809	0.19%
State ME	0.7504	0.4876	0.69%	0.4786	0.6873	0.36%	0.4319	0.3489	0.36%
State NH	0.4586	0.3467	0.23%	0.1229	0.6684	0.06%	-0.3745	0.7306	-0.29%
State NJ	0.0603	0.6677	0.20%	0.6680	0.3744	0.26%	0.6640	0.3374	0.18%
State NY	0.0196	0.6396	1.69%	0.5514	0.2657	0.02%	0.2830	0.7208	0.17%
State PA	-0.6041	0.4855	-0.10%	-1.1133	0.8484	-0.20%	-0.2849	0.6485	-0.21%
State RI	0.8346	0.0874	0.08%	0.2223	0.4477	0.36%	0.2185	0.5438	0.17%
Other States	-1.0372	0.6494	-0.43%	-0.9788	0.7575	-0.29%	-0.4246	0.4542	-0.05%
ln(Case-Shiller HPI)	-0.0899	0.0001	-6.65%	-0.0889	0.0001	-6.81%	-0.0893	0.0001	-6.87%
Collateral Dummy	-2.1999	0.0001	-3.76%	-3.3600	0.0001	-2.06%	-2.0703	0..0001	-4.27%
SBA Dummy	6.8633	0.0001	4.75%	4.4187	0.0001	5.16%	5.7273	0.0001	5.65%
Loan Dummy	0.1120	0.0001	4.51%	0.5488	0.0001	4.44%	0.4352	0.0001	4.24%
Term Spread	1.5815	0.0001	4.10%	1.8610	0.0001	4.20%	1.7352	0.0001	1.46%
UST Yield	0.3546	0.0001	2.53%	0.9689	0.0001	0.68%	0.2379	0.0001	0.50%
ln(1+Maturity)	-0.2294	0.5755	-0.94%	-0.1650	0.6567	-5.62%	-0.3826	0.2206	-5.38%
APR	2.0694	0.0001	6.18%	2.9698	0.0001	8.22%	2.3346	0.0001	7.96%
ln(Loan Amount)	-3.4944	0.0001	-11.58%	-2.3895	0.0001	-12.89%	-2.7049	0.0001	-15.49%
38 SIC Dummies		Yes			Yes			Yes	
Number of Obs		11,949			11,949			11,949	
Pseudo R^2		9.98%			13.19%			12.51%	

This table reports the results from estimating a logistic model of the likelihood that a loan becomes 60 days overdue within 18 months of origination by full-information maximum likelihood for the subsample of actual loans booked by the bank (11,949 observations). 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 nonperforming loan $Y = 1$: 319 observations), or current ($Y = 0$: 11,683 observations). The explanatory variables are the firm-bank and firm-competitor driving distances in miles, proxies for proprietary information, bank-borrower relationship characteristics, firm attributes, and various control variables. As before, F-B Dist and F-C Dist refer to the firm-bank and firm-nearest competitor distances, respectively; see Section 3 for a description of the variables and the notes to Table 4 for further details.

Table 8: **The Relationship Content of Credit Assessments**

Specification	1			2		3		
Variable	Coeff	P-val	Marg	Coeff	P-val	Coeff.	P-val	Marg
Constant	1.6179	0.0001		12.2202	0.0001	-5.9001	0.0001	
ln(1+Firm-Bank Dist)	-0.7611	0.1643	-0.45%	-0.7942	0.833	0.5838	0.6282	0.33%
ln(1+Firm-Comp Dist)	0.0621	0.2038	0.37%	0.3337	0.734	-0.6081	0.2043	-0.78%
Main Bank	0.6824	0.0011	4.97%	-1.3607	0.0001	-0.6139	0.0001	-5.08%
ln(Score)	6.0524	0.0001	39.51%	-3.3197	0.0001	-2.5509	0.0001	38.36%
Main Bank·ln(Score)	0.0400	0.0001	2.66%	-0.4674	0.0821	-0.1729	0.0001	3.83%
ln(MOB)·ln(Score)	0.0519	0.0001	1.65%	-0.3814	0.1305	-0.1327	0.0001	2.50%
Primary Guarantor	1.8278	0.0001	2.30%	-0.8758	0.0001	-0.9240	0.0001	-5.29%
ln(Months in Business)	0.0030	0.0001	7.88%	-2.2303	0.0001	-0.5978	0.0001	-7.01%
ln(Months on Books)	1.5560	0.0001	10.56%	-2.5341	0.0001	-3.8662	0.0001	-3.59%
ln(Net Income)	1.9587	0.0502	4.85%	-3.0023	0.0001	-1.7157	0.0001	-9.57%
Q1 2002	-2.2142	0.0001	-1.48%	-0.5896	0.4302	-0.7733	0.2351	-0.79%
Q2 2002	-1.5032	0.0001	-1.14%	-0.5635	0.1893	-0.1280	0.632	-0.42%
Q3 2002	-1.4034	0.0001	-1.97%	-0.2222	0.5722	0.3059	0.6102	0.34%
Q4 2002	0.6120	0.0001	2.66%	-0.3595	0.0001	0.6335	0.223	2.83%
State MA	0.0808	0.8238	0.04%	-0.6525	0.0244	1.2134	0.3109	0.19%
State ME	-1.9609	0.0001	-0.81%	1.4932	0.0001	0.4105	0.3239	0.36%
State NH	-0.4330	0.0132	-0.55%	0.5764	0.8002	-0.3784	0.7822	-0.29%
State NJ	0.3329	0.0212	0.47%	-0.3292	0.5309	0.6261	0.1284	0.17%
State NY	0.8735	0.0002	1.10%	-0.3016	0.5548	0.2721	0.7202	0.18%
State PA	0.1549	0.3287	0.08%	-0.3552	0.3509	-0.2632	0.7333	-0.21%
State RI	-0.3548	0.2182	0.06%	0.4470	0.6021	0.2251	0.5202	0.16%
Other States	1.2465	0.1191	0.02%	-0.0929	0.5202	-0.4120	0.423	-0.05%
ln(Case-Shiller HPI)	0.0070	0.0001	3.50%	-0.3789	0.0001	-0.0893	0.0001	-6.74%
Collateral Dummy	0.4971	0.0001	10.82%	-2.9567	0.0001	-2.2665	0..0001	4.18%
SBA Dummy	-4.6379	0.0001	-4.03%	0.9162	0.0001	5.4000	0.0001	5.27%
Loan Dummy	-3.9318	0.0001	-2.28%	1.1282	0.0001	0.4444	0.0001	4.08%
Term Spread				0.4826	0.0001	1.8798	0.0001	1.40%
UST Yield				0.7461	0.0001	0.2288	0.0001	0.52%
ln(1+Maturity)				-0.0551	0.0001	-0.3751	0.2292	5.12%
Lambda				3.6712	0.1930			
APR						2.2659	0.0001	8.36%
ln(Loan Amount)						-2.4731	0.0001	-15.33%
38 SIC Dummies		Yes			Yes		Yes	
Number of Obs		25,487			12,823		11949	
Pseudo R^2		9.16%			21.20%		12.51%	

This table reports the results from adding interaction terms of the bank's internal score and the relationship variables Main Bank and Months on Book ("MOB") to the discrete-choice model of the loan application's outcome in Table 4 (Specification 1: the dependent variable $Y = 1$ if the bank approves the application and $Y = 0$ otherwise), the loan-rate regression with the Heckman correction in Table 3 (Specification 2: the dependent variable is the loan's APR), and the default analysis in Table 7 (Specification 3: the dependent variable $Y = 1$ if the loan becomes nonperforming in the first 18 months after origination and $Y = 0$ otherwise) with the addition of the same competition variables. See Section 3 for a description of the variables and the respective Tables for further explanations.

Table 9: **The Effect of Competition on Lending Decisions**

Specification	1			2			3	
Variable	Coeff	P-val	Marg	Coeff.	P-val	Marg	Coeff	P-val
Constant	1.0733	0.0001		2.9697	0.0001		9.3281	0.0001
ln(1+Firm-Bank Dist)	-0.8722	0.1545	-0.32%	-0.8840	0.3394	-0.33%	-0.5095	0.6788
ln(1+Firm-Comp Dist)	0.0575	0.0943	0.13%	0.1172	0.0934	0.12%	0.2750	0.8834
Main Bank	0.4488	0.001	4.92%	0.9561	0.001	3.55%	-1.0416	0.0001
ln(Score)	4.6194	0.0001	28.94%	4.9595	0.0001	28.35%	-2.9577	0.0001
ln(Score)·ln(1+F-B Dist)	-0.0002	0.0001	-1.37%	-0.0002	0.0001	-1.06%	-0.1234	0.0001
ln(Score)·ln(1+F-C Dist)	-0.0063	0.0001	-1.05%	-0.0021	0.0001	-0.99%	0.1753	0.0001
ln(Deposit HHI)	-0.4733	0.0001	-3.05%				1.5637	0.0001
ln(1+no. branches)				0.4808	0.1834	0.34%		
ln(1+no. competitors)				0.0832	0.0387	2.83%		
Primary Guarantor	1.6030	0.0001	2.12%	1.1468	0.0001	3.64%	-0.8758	0.0001
ln(Months in Business)	0.0038	0.0001	5.53%	0.0003	0.0001	6.21%	-1.6546	0.0001
ln(Months on Books)	1.5267	0.0001	9.96%	1.2376	0.0001	10.22%	-1.3674	0.0001
ln(Net Income)	1.8820	0.0001	3.42%	1.9693	0.0001	3.78%	-1.7833	0.0001
Q1 2002	-2.1504	0.0001	-1.14%	-2.6788	0.0001	-1.11%	-0.5076	0.6844
Q2 2002	-1.3503	0.0001	-1.62%	-1.6735	0.0001	-1.62%	-0.3741	0.4757
Q3 2002	-1.2759	0.0001	-1.42%	-1.4694	0.0001	-1.59%	-0.1794	0.823
Q4 2002	0.4128	0.0001	1.91%	0.6770	0.0001	1.92%	-0.1248	0.0001
State MA	0.0339	0.8944	0.04%	0.0226	0.839	0.00%	-0.4508	0.0149
State ME	-1.4291	0.0001	-0.19%	-1.5931	0.0001	-0.27%	1.1162	0.0001
State NH	-0.3972	0.2233	-0.19%	-0.0173	0.2389	-0.24%	0.2100	0.9033
State NJ	0.1919	0.7475	0.27%	0.1141	0.7202	0.18%	-0.1298	0.4855
State NY	0.2955	0.0002	0.25%	0.5156	0.0002	0.20%	-0.2073	0.8445
State PA	0.1536	0.8034	0.03%	1.7206	0.8499	0.03%	-0.1237	0.6886
State RI	-0.1590	0.7745	-0.01%	0.0000	0.7202	-0.01%	0.1277	0.5783
Other States	0.7101	0.899	0.00%	0.9883	0.9128	0.01%	-0.0248	0.5345
ln(Case-Shiller HPI)	0.0047	0.0001	2.17%	0.0070	0.0001	2.02%	-0.1764	0.0001
Collateral Dummy	0.0319	0.0001	5.46%	0.0414	0.0001	5.25%	-1.2028	0.0001
SBA Dummy	-3.7187	0.0001	-4.11%	-3.1526	0.0001	-4.37%	0.6424	0.0001
Loan Dummy	-3.4624	0.0001	-3.22%	-3.9353	0.0001	-3.78%	1.1255	0.0001
Term Spread							0.3907	0.0001
UST Yield							0.5895	0.0001
ln(1+Maturity)							-0.0137	0.0001
Lambda							2.8152	0.3828
38 SIC Dummies		Yes			Yes			Yes
Number of Obs		15,954			25,487			7,331
Pseudo R^2		7.56%			8.27%			19.10%

This table reports the results from adding proxies for the competitiveness of local loan markets (HHI of deposit-market shares, number of competing lenders, number of competing branches) to the logistic discrete-choice model of the loan application's outcome in Table 4 (Specifications 1 and 2: the dependent variable $Y = 1$ if the bank approves the application and $Y = 0$ otherwise). Specification 3 (dependent variable: the loan offer's APR) summarizes the APR regression results in Table 3 with the addition of the same competition variables. See Sections 3 and **??** for a description of the variables.

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