Commercial Lending Distance and Historically Underserved Areas

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This version: May 4, 2007

Abstract: We study recent changes in the geographic distances between small businesses and their bank lenders, using a large random sample of loans guaranteed by the Small Business Administration. Consistent with extant research, we find that small borrower-lender distances generally increased between 1984 and 2001, with a rapid acceleration in distance beginning in the late-1990s. We also document a new phenomenon: a fundamental re-ordering of borrower-lender distance by the borrowers' neighborhood income and race characteristics. Historically, borrower-lender distance tended to be shorter than average for historically underserved (e.g., low-income and minority) areas, but by 2000 borrowers in these areas tended to be further away from their lenders on average. This structural change is coincident in time with the adoption of credit scoring models that rely on automated lending processes and quantitative information, and we find indirect evidence consistent with this link. Our findings suggest that there has been increased entry into local markets for small business loans and this should help allay fears that movement toward automated lending processes will reduce small business' access to credit in already underserved markets.

JEL Classification Numbers: G21, G28

Keywords: small business loans, borrower-lender distance, credit scoring.

* The views expressed here are those of the authors and do not necessarily reflect the views of: the Federal Reserve Bank of Atlanta, the Federal Reserve System, the Office of the Comptroller of the Currency, or the U.S. Treasury Department. The authors thank Robert Avery and Leora Klapper for helpful comments and discussions and an anonymous referee for suggesting additional improvements.

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1. Introduction

A great deal of policy attention has been paid in recent decades to small business credit access, especially for firms located in historically underserved (e.g., low- to moderate-income and predominantly minority) communities. Small firms are viewed as a critical component of the U.S. economy in general, as well as a particularly important avenue of advancement for individuals living and working in historically underserved neighborhoods. The public policy commitment to increasing credit access for small businesses operating in these areas is evidenced by a number of U.S. Small Business Administration (SBA) initiatives—such as the expansion of loan guarantee programs, enhanced access to government procurement channels, and special loan programs for minority-owned businesses—as well as by recent amendments to the Community Reinvestment Act (CRA) that required banks to report more information to regulators about their small business lending activities.

A major economic rationale for these policy interventions is the belief that small firms can find it difficult to find funding for creditworthy (i.e., positive net present value) projects because potential providers of funds lack of credible information about these firms.[1] Specifically, small businesses typically have neither certified audited financial statements nor publicly traded equity or debt. These informational asymmetries can result in problems of adverse selection, leading to credit rationing that excludes both good- and bad-credit risk firms from funding (Stiglitz and Weiss 1981). Local banks can be better situated to mitigate these informational asymmetries, through the formation of long-term relationships based on repeated interactions with the borrowers, their suppliers, and their customers.[2] Studies using data from the Federal Reserve's *National Survey of Small Business Finance* have demonstrated that small firms rely on bank finance as their primary source of credit (Elliehausen and Wolken 1990, 1992; Kwast, Starr-McCluer and Wolken 1997) and that close bank-borrower relationships

[1] Another important rationale is fairness and social equity, a topic that is tangential to our investigation.
[2] Indeed, theoretical work suggests that the very existence of banks and other financial intermediaries is predicated on the existence of information asymmetries (e.g., Diamond 1984, 1991; Ramakrishnan and Thakor 1984).

improve the availability and price of credit for small borrowers (Petersen and Rajan 1994; Berger and Udell 1995).[3]

In contrast, large centralized lenders may be less well equipped to serve small business credit markets because it is difficult to communicate nonquantitative, or "soft," information about small borrower creditworthiness within these complex organizational structures. Evidence suggests that large banks are at a comparative disadvantage in relationship lending due to diseconomies of scale in the transmission and processing of soft information (Stein 2002) as well as agency problems between loan officers and bank managers (Berger and Udell 2002).[4] Loan officer turnover is a relatively frequent occurrence at large, multioffice banks and some research suggests that this has a disruptive effect on credit availability at banks that use soft information to make credit decisions (Scott 2006).

Because it is costly to produce this soft information about borrowers, banks of all sizes may (illegally) use the demographic characteristics of small business owners (e.g., race, gender) and/or general demographic knowledge about the areas in which these businesses live and operate (e.g., average household incomes) as proxies for borrower creditworthiness and loan profitability. For example, a number of studies have documented large differences in loan denials and credit access between small firms owned by white men and other small firms (e.g., Cavalluzzo and Cavalluzzo 1998; Cavalluzzo, Cavalluzzo, and Wolken 2002; Blanchflower, Levine, and Zimmerman 2003).

Despite this, recent research suggests that small business credit markets may be in the early stages of transformation similar to that experienced in consumer credit markets during the 1980s and 1990s. Home mortgages, auto loans, and credit card receivables have essentially become financial commodities, produced and traded without regard to the geography of borrowers and lenders. This transformation from relationship lending to transactions lending has improved household access to credit and was made possible by advances in information technologies, innovations in financial markets, and geographic

[3] One exception to this rule is for small firms owned by women, which are less likely to use commercial banks for their financial services (Haynes and Haynes 1999; Cole, and Wolken 1995; and Scherr, Sugrue, and Ward 1993).
[4] Empirical evidence consistent with these findings is provided by Cole, Goldberg, and White (2004) and Berger, Miller, Petersen, Rajan, and Stein (2005).

banking deregulation. There is growing evidence of similar changes emerging in the production of small business loans. Using various data sources, several studies have documented a modest increase in the distance between U.S. small business borrowers and their bank lenders in recent years (Petersen and Rajan 2002; Hannan 2003; DeYoung, Glennon, and Nigro (forthcoming)). These findings are consistent with the technology-driven transformations of consumer credit markets, and may in large part be driven by the introduction of credit-scoring methods. One piece of evidence comes from Frame, Padhi, and Woosley (2004) who found that large banks using small business credit scoring (SBCS) engaged in more lending in 1997 than nonscoring large banks, and that this net increase in small business loans came from outside their local markets (coupled with a net decline in lending within their local markets).[5]

The SBCS approach to lending analyzes personal financial data about the owner of the firm (largely from his/her behavior as a consumer borrower), combined with relatively limited loan application and financial statement data from the firm, and then uses these data in statistical models that predict future credit performance (e.g., Mester 1997). Lenders appear to use SBCS either as a less-expensive alternative to other lending technologies or as a supplement to traditional underwriting approaches that improves information quality and decision-making (e.g., Berger, Frame, and Miller 2005). Hence, SBCS may be an important innovation for expanding small business credit access: It shrinks borrower-lender information gaps, lessens borrower's reliance on close bank relationships, and/or reduces banks' costs of screening and monitoring distant borrowers. Whether and how SBCS might affect lending differently in lower income and/or predominantly minority areas, however, is unclear. By mitigating the especially difficult asymmetric information problems in these markets, lenders may be less likely to rely on the physical location of the business (a.k.a. "redlining") or the racial identity of the loan applicant (discrimination) as crude proxies for loan risk.[6] In contrast, SBCS could impede credit flows to borrowers with limited

[5] A related paper by Brevoort and Hannan (forthcoming) reports that borrower-lender distance *within* nine U.S. metropolitan areas actually decreased between 1997 and 2001, consistent with relationship-dependent borrowers abandoning SBCS-based lenders in favor of relationship-based lenders.

[6] Ladd (1998) reviews both the theoretical motives and empirical evidence of racial discrimination in lending.

personal financial histories (i.e., thin credit files), which makes these borrowers less likely to fit a "cookie cutter" approach to lending like SBCS.

In this paper, we examine commercial lending distances using a large random sample of small business loans originated between 1984 and 2001 and guaranteed by the U.S. SBA. Our evidence suggests that recent innovations in small business lending markets have led not only to an increase in small business borrower-bank lender distance (consistent with contemporary studies), *but also to a fundamental reordering of these distances by income category and racial class.* In particular, we focus on inter-temporal differences in SBA lending distance for low- and moderate-income (LMI) areas (versus middle- and upper-income areas) and predominantly minority (versus predominantly nonminority) areas. We find that during the 1980s and most of the 1990s, lending distances were relatively stable, and borrower-lender distances for firms located in LMI and predominantly minority areas tended, on average, to be shorter than their counterparts in higher income and nonminority areas. By the late 1990s, average lending distances had increased substantially for all types of small businesses, and average borrower-lender distances for loans made to firms in LMI and predominantly minority areas tended to be *longer than their respective counterparts*. This reversal coincides with the increased use of SBCS as an underwriting tool, and although we cannot test this notion directly, we do find some corroborating evidence in the data consistent with this notion. In the end, we argue that credit scoring may be an important factor driving the increasing distance between small business borrowers and their bank lenders, and if so, that this effect may be stronger for small businesses located in historically underserved areas.[7]

[7] Changes made to the CRA also may have affected a change in borrower-lender distance in low-income markets. Beginning in 1995, CRA regulations required moderate-size and large retail financial institutions to report the number and volume of small business loan originations in the markets from which they have deposit-generating branch offices (i.e., their "assessment areas"). By making the lending patterns of banks more transparent—and thus, allowing inferences to be drawn about potentially discriminatory lending practices—these new reporting requirements may have increased the proclivity of banks to lend into low-income and minority neighborhoods. Indeed, according to the Federal Reserve, the share of small business loans made by financial institutions that were subject to the CRA did increase, from 66 percent in 1996 to 84 percent in 2000 (Gramlich 2002). However, because loans for which banks received CRA credit would, by definition, be located in these banks' assessment areas, this regulatory change is likely to have resulted in decreased, rather than increased, borrower-lender distances.

2. Data

The primary data used in this paper comes from the SBA's flagship 7(a) loan guarantee program. This program provides credit enhancements for small businesses unable to qualify for loans with similar terms in regular credit markets. SBA-endorsed lenders (usually commercial banks) select the firms to receive loans, initiate the involvement of the SBA, and then underwrite the loans within SBA program guidelines. The SBA extends a partial guarantee that absorbs some, but not all, of any loan losses on a *pro rata* basis.[8] As a result, lenders have (perhaps reduced) incentives to screen applicants for creditworthiness, monitor borrowers on an ongoing basis, and set appropriate loan interest rates and contract terms. SBA guaranteed lending is a nontrivial portion of the bank credit provided to small business borrowers in the United States. In 2001, which is the most recent year in our data set, the SBA reported a combined managed guaranteed loan portfolio of more than $50 billion.[9]

We start with a stratified random sample of 32,423 of the SBA 7(a) loans made by commercial banks each year between 1984 and 2001 with terms-to-maturity of three, seven, and 15 years.[10] These loans represent roughly 20 percent of the guaranteed loans made each year during that time period. We then eliminated all loans with incomplete or obviously erroneous information and/or were unable to successfully geocode, and retained only those loans made by commercial banks, arriving at a sample of 27,429 loans to small businesses originated between 1984 and 2001 by 5,081 different U.S. commercial banks.[11] Due to the growth in the SBA's 7(a) loan guarantee program over time, our sample is weighted toward more recent years. Table 1 shows the annual number of loans in our sample, along with the aggregate and average values of these loans in both nominal and real (2001) dollars. The average loan amount was relatively stable between 1984 and 1993, fluctuating between $194,000 and $225,000 in real

[8] We emphasize that the SBA guarantee does not represent a first-dollar-loss position. The SBA and the lender share proportionally the losses in the event of a default.

[9] In comparison, the portfolio of small business loans with principal less than $250,000 held by U.S. commercial banks in 2001 totaled about $120 billion. (The average SBA loan originated in 2001 was about $135,000.)

[10] The SBA 7(a) program underwrites loans with terms-to-maturity from one to 30 years, but the large majority of these loans are underwritten with either three, seven, or 15 years to maturity. We restricted our sample to these three terms to more easily control for the effect of loan maturity in the analysis below.

[11] Commercial banks have historically been the primary source of credit for small businesses generally and for SBA guaranteed loans particularly. However, in recent years, approximately 15 to 20 percent of SBA loans have been made by nonbanks such as finance companies, thrifts, and credit unions.

dollars. But real loan amounts began to decline on average in 1994, dropped to a sample low of $117,000 in 1996, and rose no higher than $147,000 after that. This reflects the 1994 introduction of a "low-doc" lending program for regular SBA lenders, which reduced the time needed to underwrite smaller loans (i.e., loans less than $100,000, raised to $150,000 in 1998) by requiring only minimal information from borrowers. The timing of this reduction in loan size also roughly coincides with the introduction of small business credit scoring models by large commercial banks—a loan production process that typically generates loans that are smaller than the average small business loan (e.g., Berger and Frame, 2007). Our data stops in April 2001, which accounts for the decline in the number of loans we observe in that year.

The SBA database includes borrower-specific information, such as the physical location of the borrower, standard industry classification (SIC) code, corporate structure, number of employees, and the age of the firm. The SBA data also identifies the name of the lender, the physical address of the office that wrote the loan, and the SBA lender certification type. Finally, the SBA data includes loan-specific information such as the size and maturity of the credit, the SBA guarantee percentage, and whether the loan was originated under the SBA's low documentation (low-doc) program. With both borrower location and lender location in-hand, we were able to calculate the straight-line (as the crow flies) geographic distance between the borrower and the lender in miles (DISTANCE).

Using the borrower location, we applied geographic mapping software to the data to create dummy variables for borrowers located in low- or moderate-income census tracts and for borrowers located in predominantly minority census tracts. Consistent with CRA definitions, a LMI census tract is defined as one with median household income less than 80 percent of that for its metropolitan area (urban areas) or its state's nonmetropolitan areas (rural areas). A predominantly minority tract (MINORITY) is defined as one in which more than half of the residents identify themselves as part of a minority population (African-American, Hispanic, Asian, Native American). Both of these definitions are constructed for the full sample using information from the 2000 Census. We use the variables LMI and MINORITY as a crude identifier of neighborhoods (census tracts) that have been historically underserved by financial institutions.

The annual time series' displayed in Figures 1 and 2 relate the median borrower-lender distances (DISTANCE) for loans made to borrowers in neighborhoods with different demographic characteristics. (The data supporting these graphs are displayed in Table 2.) In general, the four time series all have similar shapes—relatively stable borrower-lender distances during the 1980s, small annual increases during the early 1990s, and larger annual increases during the later years. This gradual acceleration in borrower-lender distance is consistent with patterns found in other studies using both these data (DeYoung, Glennon, and Nigro (forthcoming)) as well as data from other sources (e.g., Petersen and Rajan 2002). The ***relative*** increases in borrower-lender distance by demographic groups displayed in the figures, however, have not been observed elsewhere.

For example, from 1984 to 1998, the average small business borrower in a middle- or upper-income (MUI) neighborhood was consistently located further away from the lending bank than was the average small business borrower in an LMI neighborhood. (The phenomenon described here holds both for median averages, which are reported in Figures 1 and 2, and for mean averages, which are reported in Table 2.) This relationship is consistent with the information arguments stated above. Borrowers in low-income neighborhoods are less likely to have strong, quantifiable documentation of their creditworthiness, and as such those that are able to get credit are likely to rely on close-by banks. (Note: This is an especially interesting finding, given that low-income and minority neighborhoods tend to be less densely banked to start with and, hence, borrowers may have fewer close-by choices.) In contrast, borrowers in high-income neighborhoods are more likely to have strong, quantifiable documentation of their creditworthiness (i.e., thick credit files), and hence can use that documentation if necessary to secure credit from more distant lenders. But, after 1998, this relationship reverses—the figure shows clearly that the median DISTANCE for LMI borrowers began increasing quickly in 1996, and that, after 1998, the average LMI borrower was located ***significantly further away*** from its lender than the average MUI borrower. The data in Figure 2 show a similar juxtaposition for small business borrowers in MINORITY neighborhoods.

The trends identified in Figures 1 and 2 are compelling, as they suggest that changes in the lending environment during the mid- and late-1990s gave small business borrowers in historically underserved markets access to credit from more-distant lenders—all else equal, this implies that access to credit in these markets increased. However, these are univariate results that neither control for borrower or loan characteristics (which likely have systematically changed over time) nor account for the high correlation between LMI areas and predominantly minority areas (which in our data is 0.47 and statistically significant). We consider these factors in the multivariate analysis presented in Section 3.

Before proceeding, we must acknowledge some limitations of our analysis. First, our random sample of SBA loans is unlikely to be strictly representative of population of (nonguaranteed) small business borrowers. That being said, we note that geographic distance confers information-gathering frictions on both subsidized and nonsubsidized lenders alike (e.g., increased travel and monitoring costs, less-frequent in-person contact), and these frictions are arguably independent of cross-sectional differences in risk among borrowers. Moreover, as we discuss below, all of our regression results are derived after conditioning lending distance on the magnitude of the SBA loan guarantee. Second, our data and methodology allow us to comment on the determinants of borrower-lender distance, whether these determinants are different in lower-income and minority neighborhoods, and whether these determinants have changed over time. However, we cannot draw direct conclusions about cross-sectional and/or inter-temporal differences in credit access from our results because we observe only loans that were approved by the SBA, through the lending banks, and do not observe rejected loan applications.

Finally, we note that the SBA data have a number of advantages relative to other potential data sources of which we are aware.[12] The data covers a longer time period and is updated annually; it includes a variety of borrower characteristics and loan terms; and each loan can be linked to outside

[12] Previous examinations of commercial lending distance have used data from either the *National Survey of Small Business Finance* (NSSBF) or the CRA public use database. The former survey contains some limited loan-level data, but the survey is not conducted every year and lenders are not identified. The CRA data have been collected annually only since 1997, and these data are aggregated for each lender at the census-tract level, rather than at the individual loan-level.

databases containing detailed information about the lender, the local market, and borrower-lender distance.

3. Regression Analysis

In order to better assess the trends identified in Figures 1 and 2, we estimate several versions of an econometric model that evaluates the interrelationships among borrower-lender distance, the demographics of local markets and the passage of time. The first version of our model specifies time as a continuous variable:

$$\ln DISTANCE_i = f(TIME, LMI, MINORITY, LMI*TIME, MINORITY*TIME, \mathbf{Controls}) + \varepsilon_i \quad (1)$$

where the dependent variable is the natural log of (DISTANCE + 1), ε is a random error term assumed to be symmetric with mean zero, and the subscript *i* indexes loans.[13] **Controls** is a vector of variables describing borrower, lender, and loan characteristics at the time of loan origination and is discussed in detail below.

The main tests variables are LMI, MINORITY, and TIME. LMI is a dummy variable equal to one for borrowers located in low- or moderate-income census tracts; about 25 percent of the loans in our data were made to such borrowers. MINORITY is a dummy variable equal to one when the borrower is located in a census tract in which more than half of the population is considered to be minorities (e.g., African-American, Hispanic, Asian); about 18 percent of the loans in our data were made to such borrowers. (Note that LMI and MINORITY are not mutually exclusive categories.) Both of these variables appear by themselves in the regressions, and are also interacted with a linear time variable TIME, where TIME = 0 for loans originated in the first year of the sample, TIME = 1 for loans originated

[13] The natural log specification recognizes the fact that the cost of traveling between two geographic points includes a fixed component, and, as a result, increases at a decreasing rate with distance (Berger and DeYoung, 2001).

in the following year, etc. TIME also appears by itself on the right-hand side to capture the secular increase in borrower-lender distance observed both in our data and in previous studies discussed above. The coefficients on LMI and MINORITY allow us to test whether these borrowers were located systematically closer or further from their bank lenders than other SBA borrowers. The coefficients on the interaction variables TIME*LMI and TIME*MINORITY allow us to test whether borrower-lender distance has increased more quickly or more slowly than average for these two categories of borrowers.[14]

The second version of our model specifies time as a set of discrete annual dummy variables:

$$\ln DISTANCE_i = f(\mathbf{YEAR}, LMI, MINORITY, LMI*\mathbf{YEAR}, MINORITY*\mathbf{YEAR}, \mathbf{Controls}) + \varepsilon_i \quad (2)$$

where **YEAR** is a vector of dummy variables representing each year in the analysis.[15] This discrete specification of time is more flexible than its continuous time counterpart in equation (1), as it allows the estimated associations between distance and market demographics (LMI, MINORITY) to vary each year.

The third and final version of our model specifies TIME in two discrete segments based on the patterns observed in Figures 1 and 2. We model the apparent structural change in borrower-lender distance using a dummy variable D9601 that is equal to one for loans originated in 1996 or later:

$$\ln DISTANCE_i = f(D9601, LMI, MINORITY, LMI*D9601, MINORITY*D9601, \mathbf{Controls}) + \varepsilon_i \quad (3)$$

The interaction of D9601 with the LMI and Minority variables is meant to capture the apparent acceleration in distance for these borrowers during the late-1990s and early 2000s. Table 3 displays

[14] Introducing time as a stand-alone variable, and indirectly by interacting time with other key variables, is a method commonly used in the literature to capture the latent effects of technological changes.
[15] We thank an anonymous referee for this suggestion.

summary statistics for all of the regression variables. (Information on the YEAR and D9601 dummy variables can be gleaned from Table 2.)

We estimate equations (1), (2), and (3) using ordinary least squares (OLS) regression techniques and a 1992-2001 data sub-sample. Although we observe SBA loans originations in different years, we do not follow any of these loans through time, and, as such, our data is cross-sectional rather than a panel. Although we have data on SBA loans originated as far back beginning in 1984, we use the shorter 10-year time segment in our estimations for two reasons. First, the data in Figures 1 and 2 suggest a very stable relationship between borrower-lender distance, time, and demographic groups during the 1980s and early 1990s. Because we are testing for changes in these relationships, we accomplish little by including loans originated in these earlier years in our regression tests. Second, since the structural underpinnings of the banking industry (i.e., regulations, production processes, degree of competition) have been in flux throughout the 1980s, 1990s, and 2000s, using a shorter data window minimizes the impact of these changes on our estimated regression coefficients.[16]

The coefficients on the LMI and MINORITY variables could theoretically be either positive or negative, depending on the relative strength of two nonmutually exclusive phenomena. On one hand, low-income and minority census tracts are likely to be less densely banked or branched—that is, they are underserved markets—which would require borrowers to go further to find a lender, ceteris paribus. One might call this the "access to lenders effect." On the other hand, borrowers in a low-income or minority census tract are less likely to have fully documented financial histories, which would preclude them from getting loans at banks too distant to observe the soft information necessary to underwrite and monitor these loans. One might call this the "soft information effect." The estimated coefficients on LMI and MINORITY will be the net of these two effects. Furthermore, the weights of these two phenomena are likely to have changed during our sample period in the direction of greater borrower-lender distance.

[16] We did estimate all three regression equations using the full 1984-2001 data sample (results not shown here, available from the authors upon request). We found no substantial differences in results for equations (2) or (3). We found somewhat weaker results for equation (1) because using the 1984-2001 data spreads out the estimated impact of LMI*TIME and MINORITY*TIME over a longer number of years.

Innovations in information gathering, communications, and financial technologies have allowed lenders to "harden" soft information about borrower creditworthiness (e.g., credit scoring) as well as better mitigate the risk associated with these loans (e.g., larger and more diversified portfolios, loan securitization, credit derivatives). This likely increased the ability of more distant banks to profitably lend to small business borrowers, and especially to small business borrowers located in historically underserved markets. Thus, we expect a positive coefficient on the TIME variable (as well as on its counterpart variables in specifications (2) and (3)), and we also expect a positive coefficient on the interaction variables LMI*TIME and MINORITY*TIME (as well as on their counterpart variables in specifications (2) and (3)).

3.1 Control variables

We include five variables to control for borrower characteristics that might impact commercial lending distances. Our proxy for the size of the borrowing firm, EMPLOYMENT, is the number of full-time equivalent workers employed by the borrowing firm at origination. The typical borrower had about 12 employees.[17] Because this variable is highly skewed, we specify it in natural logs. CORPORATION and PARTNERSHIP are dummy variables equal to one, respectively, for borrowers organized as corporations (about 58 percent of the borrowers) and partnerships (about 6 percent of the borrowers). The omitted category is sole proprietorship. NEW BUSINESS is a dummy variable equal to one if the borrower is less than three years old; these young firms comprise about one-third of the loans in our sample. **SIC** is a vector of dummy variables indicating whether the borrower's main line of business falls within one of several especially well-populated Standard Industrial Classifications.

[17] A small number of borrowers (15) in our data reported greater than 500 employees, which is the traditional upper bound for the SBA definition of a small business. Removing these outlying observations from our regressions does not alter our results.

We include four variables to control for loan characteristics.[18] MATURITY3 and MATURITY7 are dummy variables equal to one, respectively, if the loan has a maturity of three years or seven years. These loans account for more than 80 percent of the loans in the data. The omitted loan maturity is the 15-year loan.[19] LOWDOC is a dummy variable equal to one for loans underwritten using the SBA's "low documentation" option that started in 1994 to reduce paperwork for loans less than $100,000; about 40 percent of the loans are low-doc loans. The SBA guarantee percentage, GUAR%, is the percentage of the dollar loss that the lender can put back to the SBA in the event of default; the mean loan guarantee was about 80 percent, but ranged from as low as 11 percent to as high as 90 percent. Over time, SBA loan guarantees have (a) declined on average and (b) exhibited increased variation across loans (DeYoung, Glennon, and Nigro (forthcoming)). We include this variable to control for the possibility that banks may lend at longer distances—that is, take more distance-related risk—for loans with higher amounts of default protection.[20]

We include two variables to control for lender characteristics. PLP LENDER and CLP LENDER are dummy variables equal to one if the lender is a "preferred loan provider" (15 percent of the sample loans) or a "certified loan provider" (13 percent of the sample loans). These lenders are experienced SBA lenders with good track records, and being recognized as such reduces their administrative burden. PLP lenders have the least-restrictive SBA documentation requirements; in exchange for these reduced administrative costs, however, their loan guarantee percentages are capped at a lower amount. The omitted category, which comprises all other lenders with SBA certification are called "regular" lenders.

[18] We also ran regressions that included the natural log of loan size (in dollars) as an additional control variable. The relationship between loan size and borrower-lender distance tended to be significant and positive, and including this variable had no effect on the remainder of the coefficient estimates.

[19] The 15-year loans are typically collateralized by real estate. The SBA also markets products with maturities other than three-, seven-, and 15-years, such as lines of credit, but loans with these three maturities represent the most substantial part of the SBA portfolio.

[20] We do not control for loan size in the regressions reported here: If credit scoring is responsible for the observed changes in borrower-lender distance, then longer distance loans will likely be smaller loans—that is, loan size would be an endogenous variable. However, we have included loan size in other versions of these regressions (results not reported here, available upon request) and the main results for LMI, MINORITY, and TIME are not materially affected.

4. Results

The regression estimates for equation (1), in which TIME is modeled as a continuous variable, are displayed in Table 4. The parameter estimates largely confirm our visual impressions from Figures 1 and 2. First, the estimated coefficients on the TIME variable are always positive and statistically significant, consistent with the general upward sloping trends in the figures, and confirming the stylized fact that borrower-lender distances have been increasing over time, on average.

Second, the coefficient on LMI is negative and significant, consistent with the "soft information effect" that information problems require borrowers in low- and moderate-income neighborhoods to be closer to their bank lenders. The magnitude of this effect is substantial and quite stable across regressions. Based on the estimates from the full specification in column [6], at the beginning of the 1992-2001 sample period (i.e., setting TIME = 0) the average small business borrower in an LMI neighborhood was located approximately 31 percent closer to its lender than was the average small business borrower in a MUI neighborhood.[21] The coefficient on MINORITY also tends to be negative and significant, but only in specifications that exclude the LMI variable. For example, based on the column [5] estimates, the average small business borrower in a MINORITY neighborhood was located approximately 18 percent closer to its lender than was the average small business borrower in a non-MINORITY neighborhood. However, this effect disappears when both MINORITY and LMI are included in the regression, suggesting that the soft information problems associated with low-income neighborhoods may dominate the soft information problems associated with minority neighborhoods.

We know that many low-income neighborhoods are also predominantly minority neighborhoods, so it is possible that colinearity between LMI and MINORITY is reducing the efficiency of our estimates. Indeed, the linear correlation between LMI and MINORITY is 0.47 in our data. We ran standard colinearity (variance inflation) diagnostic tests, but these tests rejected colinearity in all of the regressions

[21] Setting TIME = 0, the calculation is performed as follows: exp(-0.379) = 0.685, or an approximate reduction in distance of about 31 percent.

in which both LMI and MINORITY were present (including those in Tables 4, 5, and 6).[22] We also attempted to disentangle the effects of these variables by running regressions that included the interaction term LMI*MINORITY on the right-hand side, but the coefficients on the interaction terms were seldom statistically different from zero in these regressions. Unable to establish separate estimates of the impact of LMI and MINORITY on borrower-lender distance, we performed statistical tests to establish the joint significance of LMI and MINORITY (and also the joint significance of LMI*TIME and MINORITY*TIME). Essentially, this provides a test of whether borrower-lender distances are significantly different for *core* underserved neighborhoods, i.e., the combined effect of both minority and low-income populations. For example, in some regressions we cannot reject the individual nulls for both LMI and MINORITY (or for both LMI*TIME and MINORITY*TIME), but we can reject the null of joint significance (see Tables 5, 6, 7, and 8 below). In Table 4, we reject the null for joint significance in columns [3] and [6], even where one or the other of these two demographic variables is statistically non-significant by itself.

Third, as time passes in our dataset, the differential in borrower-lender distances between the average small business borrower versus small business borrowers in LMI and MINORITY neighborhoods tends to diminish. Again, based on the estimates in the column [6] regression, borrower-lender distance increased faster for borrowers in LMI areas (about 11 percent per year) than for borrowers in MUI areas (about 8 percent per year).[23] Similarly, borrower-lender distance increased faster for borrowers in MINORITY neighborhoods (about 12 percent per year) than for borrowers in non-MINORITY neighborhoods (also about 8 percent per year).

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[22] The Condition Index never exceeded a value of 16, well below the critical level of 30 typically used in such tests.

[23] Our model has the form ln(distance) = a + bx, which we can rewrite as $y = e^{a+bx} = e^{a}e^{bx}$. The relative change in distance is defined as $[1 - \frac{y_1}{y_0}] = 1 - \frac{e^{bx_1}}{e^{bx_0}}$. Setting LMI = 1 and recognizing that the mean of TIME is 4.59, the first calculation is performed as follows: [exp(.032*5.59)exp(.075*5.59)] / [exp(.032*4.59)exp(.075*4.59)] = 1.113, or an approximate increase in distance of 11 percent. Setting LMI = 0, the second calculation is performed as follows: exp(.075*5.59) / exp(.075*4.59) = 1.078, or an approximate increase in distance of 8 percent.

The regression estimates for equation (2), in which time is modeled as a set of discrete YEAR variables, are displayed in Table 5. While this specification is potentially more flexible than equation (1), the adjusted-R-square measures are improved only at the third decimal place: Comparing the column [6] regressions, adjusted-R-square is 0.1157 in Table 4 versus 0.1170 in Table 5. Several of the main results continue to hold, including (a) the general increase in borrower-lender distance over time, as evidenced by the increasingly positive coefficients on the YEAR dummies, (b) support for the soft information effect, as evidenced in the significant negative coefficient on the LMI variable (in contrast, the coefficient on MINORITY is never statistically significant here), and (c) an above-average increase in borrower-lender distance near the end of the sample period for borrowers in low-income and minority neighborhoods, as evidenced by the significantly positive coefficients on LMI*YEAR00, LMI*YEAR01, MINORITY*YEAR00, and MINORITY*YEAR01. This last finding either diminishes or disappears completely when both the LMI and MINORITY variables appear on the right-hand side—however, LMI*YEAR00 and MINORITY*YEAR00 do remain jointly significant. Importantly, although the coefficients on the LMI*YEAR and MINORITY*YEAR variables are seldom statistically significant in Table 5, these coefficients are ***always*** positive after 1996.

The regression estimates for equation (3), in which time is modeled in two discrete segments based on the convex shapes observed in Figures 1 and 2, are displayed in Table 5. Although this specification provides the lowest goodness-of-fit statistics of the three models, grouping the post-1996 time effects together (as opposed to specifying them individually as in equation (2)) generates statistically significant inter-temporal results. The coefficients on LMI*D9601 and MINORITY*D9601 are always statistically significant, both individually and jointly, in these regressions—further evidence consistent with our initial observation that small business borrower-lender distances accelerated faster than average in low-income and minority neighborhoods late in our sample period.

The estimated coefficients on the control variables are generally statistically significant, remarkably stable across Tables 4, 5, and 6, and tend to carry sensible signs.[24] The goodness-of-fit statistic nearly doubled with the addition of the control variables, indicating that a nontrivial amount of the variation in borrower-lender distance is attributable to the characteristics of the borrower, the lender, and the loan. Introducing or removing the control variables from the regressions has very little influence on the estimates for LMI, LMI*TIME, or MINORITY (for example, compare columns [3] and [6] in Table 4), although adding the control variables to the regressions caused nontrivial reductions in the magnitudes of the coefficients on TIME and MINORITY*TIME.

The distribution of our raw dependent variable DISTANCE is skewed to the right.[25] While rescaling DISTANCE in natural logs mitigates this problem to some extent, it remains possible that the estimated association between our main test variables and borrower-lender distance is overstated in our regressions. To test for this, we reestimated the column [6] regressions from Tables 4, 5, and 6 after truncating DISTANCE at both the 99th percentile (1,445 miles) and the 95th percentile (312 miles) of its sample distribution. The results of these robustness tests are displayed in Table 7, and they indicate little effect on our results. The signs and statistical significance of our main test coefficients are invariant to this truncation, although in a few instances the magnitudes of the coefficients are somewhat smaller.

Finally, having confirmed in a more rigorous fashion the inter-temporal relationships displayed in Figures 1 and 2, we are left with an important question: What environmental changes are responsible for the intriguing reordering of borrower-lender distance in those figures?

One possibility is that banking industry consolidation over the sample period resulted in fewer bank branches, especially in LMI and MINORITY areas. To investigate this issue, we examined the

[24] We do not discuss the signs and significance of coefficients on the individual control variables here, as they are not the main focus of our study. For an in-depth discussion of the determinants of small business borrower-bank lender distance, see DeYoung, Frame, Glennon, and Nigro (2006). However, we do point the reader's attention to the fact that the coefficient on GUAR% is negative, contrary to the idea that bank lenders take more distance-related risk for loans with higher levels of credit protection. We further investigated this by interacting GUAR% with LOWDOC and find that this coefficient is positive and larger than the still negative coefficient on GUAR%.

[25] For our 1992-2001 sample period, DISTANCE = 10 miles at the median of the data, DISTANCE = 30 miles at the 75th percentile of the data, and DISTANCE = 77 miles at the mean of the data.

FDIC's Summary of Deposits data for 1994 and 2001.[26] We find that for LMI census tracts, the mean number of bank branches increased from 7.77 in 1994 to 7.95 in 2001. (Comparable figures for non-LMI areas were 6.91 and 7.39, respectively.) For MINORITY census tracts, the mean number of branches rose from 8.06 in 1994 to 8.23 in 2001. Non-MINORITY areas saw an increase in the average number of branches from 6.93 to 7.39 during this time. Taken together, these figures suggest that our results are unlikely to be driven by a systematic reduction in access to banking offices in historically underserved areas.

The more likely candidate for the reordering of borrower-lender distance is small business credit scoring. We know that the SBCS loan production function is applied most often to smaller loans—so called "micro-small business loans" less than $100,000—with more traditional relationship-based, soft-information underwriting techniques applied to larger loans. Hence, we reestimated the column [6] regressions from Tables 4, 5, and 6 for three data sub-samples: micro-small business loans with principals amounts less than $100,000; loans with principals between $100,000 and $250,000; and loans with principal amounts greater than $250,000.[27]

The results are displayed in Table 8. First, the speed at which general (i.e., non-LMI, non-MINIORITY) borrower-lender distance increases over time actually accelerates with loan size; this can be seen by comparing the coefficients on TIME, the YEAR dummies, and the D9601 variable across the columns in Table 8. If credit scoring is indeed used primarily for micro-small business loans only, then this result suggests that some phenomena other than credit scoring is responsible for the increasing borrower-lender distances for large loans in nonminority, non-LMI neighborhoods. Second, borrower-lender distance for loans in predominantly minority neighborhoods increase faster-than-average for the small loan sub-sample, but not for the large loan sub-sample; this can be seen by comparing the coefficients on the MINORITY*TIME and MINORITY*D9601 variables across the columns in Table 8. Related to this result, the additional increase in distance over time for LMI and MINORITY tends to be

[26] The 1994 data represents the first time that the Summary of Deposits information is available from the FDIC in electronic form.)
[27] Since we are segmenting the data by loan size, we exclude the LOWDOC control variable from these regressions.

jointly significant for the smallest loans, but not for the largest loans. Hence, we find weak but suggestive evidence that credit scoring may be playing a part in the shifting distribution of small business borrower-bank lender distance, and if so, this effect is somewhat stronger for small businesses located in historically underserved areas.

5. Conclusions

Public policies have been adopted in the United States that encourage greater extension of credit to small firms, especially to those located in lower-income and predominantly minority areas. These policies are based in part on several perceptions: that informational frictions in small business credit markets discourage lenders from exploiting profitable lending opportunities; that large banking companies that command the lion's share of loanable bank funds are especially poorly equipped to serve this market; and that, because information on small business creditworthiness is costly to produce, some lenders may rely on the demographic characteristics of business owners and their neighborhoods as proxies for loan profitability. But recent research suggests that conditions in small business credit markets are changing—so depending on the impact of these changes, public policy toward lending into these markets may have to be reconsidered. This study examines whether and how the distance between small business borrowers and their banks lenders has changed over the past decade, and uses the results to make some tentative inferences about the impact of forces of change in this sector.

To date, studies have found modest increases in the distance between U.S. small business borrowers and their lenders, which suggests (among other things) that the average small business borrower is gaining access to a greater number of lenders. In this paper, we reexamine this phenomenon using a large random sample of SBA-guaranteed loans originated between 1984 and 2001, giving special attention to SBA borrowers in low-income and minority neighborhoods. After confirming that lending distances have also increased in recent years for the loans in our data, we demonstrate further that the observed patterns in borrower-lender distance depend crucially on the demographic makeup of the lending area. We find that, during the 1980s and most of the 1990s, lending distances were relatively

stable and that loans made to firms located in lower-income and predominantly minority areas tended to have slightly shorter distances. During the late 1990s, however, lending distances increased markedly, and by 1999 firms located in low-income and minority areas tended to have substantially longer lending distances.

This general acceleration in small business borrower-bank lender distances, as well as the re-ordering of borrower-lender distances across demographic areas that accompanied it, occurred coincidently with the implementation of small business credit scoring (SBCS) models. We find weak but suggestive evidence in our data linking the above average increases in lending distances for borrowers in low-income and minority neighborhoods to the implementation of SBCS models. These findings should allay fears that the growth of transactions-based lending processes—which make arms-length credit decisions based on hard information, rather than bankers' personal information about individual borrowers and local markets—will lead to reduced credit availability in already underserved markets. On the contrary, our findings of longer borrower-lender distances are consistent with increased competition to lend to these small businesses.

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Table 1
Average and Total Loan Amounts by Disbursement Year

Disbursement Year	Number of Loans	Disbursement Total		Average Loan Amount	
		Nominal $	2001 $	Nominal $	2001 $
1984	628	$99,567,336	$141,564,932	$158,546.71	$225,421.86
1985	442	$66,902,953	$92,834,809	$151,364.15	$210,033.51
1986	704	$112,574,917	$152,678,460	$159,907.55	$216,872.81
1987	690	$113,965,327	$150,880,838	$165,167.14	$218,667.88
1988	639	$107,014,706	$137,198,342	$167,472.15	$214,707.88
1989	771	$127,558,147	$156,705,340	$165,445.07	$203,249.47
1990	812	$135,671,710	$160,748,471	$167,083.39	$197,966.10
1991	894	$152,029,280	$173,946,544	$170,055.12	$194,571.08
1992	1087	$196,067,418	$219,151,361	$180,374.81	$201,611.19
1993	1341	$257,520,901	$284,448,713	$192,036.47	$212,116.87
1994	2144	$344,166,759	$376,550,065	$160,525.54	$175,629.69
1995	3785	$427,299,993	$457,821,421	$112,893.00	$120,956.79
1996	2305	$256,830,476	$271,299,798	$111,423.20	$117,700.56
1997	2801	$356,493,898	$375,520,258	$127,273.79	$134,066.49
1998	2619	$369,808,281	$386,021,170	$141,202.09	$147,392.58
1999	2507	$336,948,326	$345,942,839	$134,403.00	$137,990.76
2000	2462	$350,162,199	$354,894,120	$142,226.73	$144,148.71
2001	798	$108,390,580	$108,390,580	$135,827.79	$135,827.79

Note: Conversion to real 2001 dollars was performed using the Producer Price Index for finished goods excluding food and energy.
Note: The substantial decline in the number of loans in 2001 reflects the fact that our sampling ended in April 2001.

Table 2

Panel A. Mean and Median Distance by Income Category

	Medium- and Upper-Income Census Tracts			Low- and Moderate-Income Census Tracts		
Year	Number of Loans	Mean Distance	Median Distance	Number of Loans	Mean Distance	Median Distance
1984	453	32.90316	6.509887	175	15.49214	4.521385
1985	301	30.33144	5.997078	141	16.92694	5.137181
1986	517	18.12122	5.900665	187	10.82696	4.194113
1987	496	22.10763	6.793952	194	18.17069	3.923864
1988	447	15.60593	6.528291	192	10.81585	3.911706
1989	562	16.0087	7.274158	209	13.74822	4.844745
1990	571	25.65258	6.485765	241	17.88411	4.159116
1991	635	26.19148	8.205989	259	13.26557	5.096839
1992	797	20.57438	7.232289	290	21.31918	5.280787
1993	972	19.50277	7.685576	369	18.59559	5.427067
1994	1569	21.98141	8.264455	575	24.62733	6.710005
1995	2829	27.87952	8.886615	956	27.81215	5.681283
1996	1783	31.05839	9.805071	522	28.39449	5.93394
1997	2090	46.02044	11.53342	711	48.02328	8.497415
1998	1984	125.176	13.59954	635	117.9785	11.69613
1999	1870	146.9941	17.24617	637	152.5251	17.27472
2000	1849	157.2507	16.05324	613	206.8757	23.16412
2001	569	205.6401	17.64122	229	233.5038	33.7539

Panel B. Mean and Median Distance by Racial Category

	Nonminority Census Tracts			Minority Census Tracts		
Year	Number of Loans	Mean Distance	Median Distance	Number of Loans	Mean Distance	Median Distance
1984	529	30.04924	5.857058	99	17.37582	5.080296
1985	352	28.8849	5.819115	90	14.98862	5.595425
1986	582	17.46906	5.682479	122	10.0518	4.645927
1987	594	21.10335	5.597175	96	20.36567	5.193252
1988	538	15.06176	5.925328	101	9.398685	4.493974
1989	660	15.52521	6.522579	111	14.62728	4.37719
1990	673	23.00228	5.918475	139	25.01554	5.986342
1991	741	24.55505	7.4371	153	12.23583	5.625274
1992	901	20.33494	6.804592	186	22.8955	6.158276
1993	1101	19.98942	7.248644	240	15.87545	6.258402
1994	1756	22.46549	7.887899	388	23.7117	7.665068
1995	3099	27.6504	8.634888	686	28.82067	6.257397
1996	1953	29.06249	9.241861	352	38.18179	7.239817
1997	2324	44.31385	10.96619	477	57.3205	9.873879
1998	2136	120.4919	12.64448	483	136.428	14.29302
1999	2039	141.81	16.94704	468	177.109	19.8542
2000	1999	150.7424	15.87875	463	251.0526	23.99302
2001	658	188.6493	17.90484	140	331.074	44.70016

Table 3

Summary statistics, sub-sample (1992-2001). Data for 21,849 small business loans originated by U.S. commercial banks under the SBA 7(a) loan program.

Variable	Mean	Std. Deviation	Minimum	Maximum
DISTANCE	77.1839	321.9710	0.1000	7882.6000
ln(DISTANCE)	2.3943	1.9050	-2.3026	8.9724
Time	4.5929	2.4330	0	9
LMI	0.2534	0.4350	0	1
Minority	0.1777	0.3823	0	1
Employment	12.71	118.03??	1	9,999[28]
Corporation	0.5791	0.4937	0	1
Partnership	0.0629	0.2428	0	1
New Business	0.3338	0.4716	0	1
sic_A	0.0295	0.1693	0	1
sic_B	0.0025	0.0501	0	1
sic_C	0.0534	0.2248	0	1
sic_D	0.1174	0.3219	0	1
sic_E	0.0363	0.1870	0	1
sic_F	0.0783	0.2686	0	1
sic_G	0.3237	0.4679	0	1
sic_H	0.0145	0.1194	0	1
sic_I	0.3124	0.4635	0	1
Loan Size	$142,877	164,446	2,000	2,550,000
Maturity3	0.1551	0.3620	0	1
Maturity7	0.6627	0.4728	0	1
Low Doc	0.3946	0.4888	0	1
Guarantee %	0.7853	0.1037	0.1100	0.9000
PLP Lender	0.1504	0.3575	0	1
CLP Lender	0.1299	0.3362	0	1

Selected sample statistics for 21,630 small business loans, after omitting loans with DISTANCE > 99th percentile of the sample distribution (i.e., 1,444 miles).

Variable	Mean	Std. Deviation	Minimum	Maximum
ln(DISTANCE)	2.3404	1.8369	-2.3026	7.2755
DISTANCE	52.5623	146.5302	0.1000	1444.5400
LMI	0.2533	0.4349	0	1
Minority	0.1769	0.3816	0	1
Time	4.5657	2.4267	0	9

[28] There are 15 loans made to firms with greater than 500 employees, including one loan for $2.5 million to a firm that reported 9,999 employees. SBA loans to firms with more than 500 employees are made only under unusual circumstances. These loans will be omitted from our tests in the next draft of the paper.

Table 4 – Continuous Time Specification

Regression results for equation (1), estimated coefficients and standard errors. 21,849 SBA loans originated between 1992 and 2001. Dependent variable is ln(DISTANCE). ** and * indicate significance at the 1 percent and 5 percent levels.

	[1]		[2]		[3]	
Intercept	1.627**	0.031	1.575**	0.029	1.636**	0.032
Time	0.175**	0.006	0.174**	0.006	0.169**	0.006
LMI	-0.388**	0.061			-0.358**	0.068
LMI*Time	0.055**	0.012			0.029*	0.013
Minority			-0.279**	0.070	-0.089	0.078
Minority*Time			0.083**	0.013	0.068**	0.015
F(LMI,Minority)	--		--		21.65**	
F(LMI*Time, Minority*Time)	--		--		21.64**	
Adjusted-R2	0.0602		0.0605		0.0627	
	[4]		[5]		[6]	
Intercept	4.966**	0.163	4.889**	0.163	4.945**	0.163
Time	0.077**	0.007	0.080**	0.007	0.075**	0.007
LMI	-0.379**	0.059			-0.379**	0.066
LMI*Time	0.047**	0.011			0.032*	0.013
Minority			-0.205**	0.068	-0.006	0.076
Minority*Time			0.055**	0.013	0.038**	0.015
Ln(Employment)	-0.050**	0.013	-0.054**	0.013	-0.050**	0.013
Corporation	0.023	0.028	0.024	0.028	0.025	0.028
Partnership	0.015	0.053	0.020	0.053	0.019	0.053
New Business	0.071**	0.028	0.080**	0.028	0.074**	0.028
SIC_A	0.028	0.101	0.059	0.101	0.037	0.101
SIC_B	-0.134	0.252	-0.106	0.253	-0.117	0.252
SIC_C	-0.264**	0.089	-0.252**	0.089	-0.257**	0.089
SIC_D	-0.251**	0.080	-0.250**	0.080	-0.251**	0.080
SIC_E	-0.154	0.096	-0.152	0.096	-0.154	0.096
SIC_F	-0.288**	0.084	-0.298**	0.084	-0.294**	0.084
SIC_G	-0.370**	0.075	-0.361**	0.075	-0.365**	0.075
SIC_H	-0.326**	0.124	-0.328**	0.124	-0.333**	0.124
SIC_I	-0.279**	0.075	-0.270**	0.075	-0.276**	0.075
Maturity3	0.104*	0.044	0.096*	0.044	0.093*	0.044
Maturity7	0.126**	0.033	0.122**	0.033	0.121**	0.033
Low Doc	-0.189**	0.034	-0.182**	0.034	-0.185**	0.034
Guarantee %	-3.445**	0.166	-3.430**	0.166	-3.422**	0.166
PLP Lender	0.644**	0.039	0.639**	0.039	0.639**	0.039
CLP Lender	0.183**	0.041	0.183**	0.041	0.185**	0.041
F(LMI,Minority)	--		--		20.84**	
F(LMI*Time, Minority*Time)	--		--		11.88**	
Adjusted-R2	0.1146		0.1133		0.1157	

Table 5 – Discrete Time Specification

Regression results for equation (2), estimated coefficients and standard errors. 21,849 SBA loans originated between 1992 and 2001. Dependent variable is ln(DISTANCE). ** and * indicate significance at the 1 percent and 5 percent levels.

	[1]		[2]		[3]		
							F-test of Joint Significance with Similar Minority Variable
Intercept	1.859**	0.065	1.793**	0.061	1.848**	0.066	
d1993	0.069	0.088	0.091	0.083	0.082	0.089	
d1994	0.121	0.080	0.134	0.076	0.120	0.082	
d1995	0.222**	0.074	0.246**	0.070	0.240**	0.075	
d1996	0.323**	0.079	0.308**	0.074	0.322**	0.080	
d1997	0.514**	0.077	0.536**	0.072	0.511**	0.078	
d1998	0.869**	0.077	0.866**	0.073	0.843**	0.079	
d1999	1.116**	0.078	1.145**	0.074	1.108**	0.079	
d2000	1.175**	0.078	1.176**	0.074	1.135**	0.080	
d2001	1.406**	0.101	1.433**	0.094	1.386**	0.103	
LMI	-0.242*	0.126			-0.289*	0.137	2.22
LMI93	-0.018	0.169			0.035	0.188	0.25
LMI94	0.075	0.155			0.058	0.170	0.10
LMI95	-0.106	0.144			-0.024	0.158	0.99
LMI96	-0.162	0.156			-0.196	0.172	0.67
LMI97	0.152	0.150			0.101	0.165	0.50
LMI98	0.220	0.152			0.085	0.167	2.05
LMI99	0.234	0.152			0.182	0.167	1.16
LMI00	0.382**	0.153			0.210	0.167	5.21**
LMI01	0.381*	0.192			0.251	0.212	2.72
Minority			0.007	0.148	0.141	0.161	
minority93			-0.162	0.198	-0.154	0.220	
minority94			0.036	0.181	0.022	0.198	
minority95			-0.260	0.168	-0.223	0.184	
minority96			-0.078	0.183	0.057	0.202	
minority97			0.114	0.175	0.088	0.193	
minority98			0.333	0.175	0.302	0.192	
minority99			0.178	0.176	0.100	0.193	
minority00			0.522**	0.176	0.426*	0.192	
minority01			0.442*	0.227	0.329	0.251	
Adjusted-R2	0.0644		0.0647			0.0670	

Table 5 – Discrete Time Specification (continued)

	[4]		[5]		[6]		
							F-test of Joint Significance with Similar Minority Variable
Intercept	5.105**	0.174	5.026**	0.173	5.065**	0.174	
d1993	0.075	0.086	0.085	0.081	0.080	0.087	
d1994	0.150	0.078	0.146*	0.074	0.139	0.080	
d1995	0.440**	0.074	0.443**	0.071	0.449**	0.076	
d1996	0.234**	0.081	0.210**	0.077	0.232**	0.082	
d1997	0.306**	0.079	0.324**	0.075	0.308**	0.081	
d1998	0.501**	0.080	0.501**	0.076	0.481**	0.082	
d1999	0.599**	0.082	0.637**	0.078	0.601**	0.083	
d2000	0.638**	0.082	0.643**	0.079	0.612**	0.084	
d2001	0.664**	0.114	0.696**	0.109	0.665**	0.115	
lmi	-0.241*	0.123			-0.272*	0.134	2.09
lmi93	-0.012	0.165			0.007	0.183	0.05
lmi94	0.091	0.151			0.031	0.166	0.39
lmi95	-0.122	0.140			-0.072	0.154	0.69
lmi96	-0.178	0.152			-0.209	0.168	0.81
lmi97	0.093	0.145			0.082	0.161	0.16
lmi98	0.198	0.148			0.092	0.162	1.55
lmi99	0.220	0.148			0.205	0.163	1.02
lmi00	0.304*	0.149			0.175	0.162	3.31*
lmi01	0.265	0.187			0.186	0.206	1.31
Minority			-0.026	0.144	0.098	0.157	
minority93			-0.087	0.193	-0.066	0.214	
minority94			0.137	0.176	0.138	0.193	
minority95			-0.202	0.163	-0.141	0.179	
minority96			-0.084	0.178	0.057	0.196	
minority97			0.021	0.170	0.003	0.188	
minority98			0.276	0.170	0.240	0.187	
minority99			0.107	0.171	0.016	0.188	
minority00			0.398*	0.172	0.318	0.187	
minority01			0.282	0.221	0.203	0.244	
Ln(Employment)	-0.050**	0.013	-0.054**	0.013	-0.050**	0.013	
Corporation	0.020	0.028	0.020	0.028	0.022	0.028	
Partnership	0.015	0.053	0.020	0.053	0.019	0.053	
New Business	0.079**	0.028	0.088**	0.028	0.082**	0.028	
SIC_A	0.006	0.116	0.044	0.116	0.026	0.116	
SIC_B	-0.130	0.259	-0.100	0.259	-0.106	0.259	
SIC_C	-0.284**	0.105	-0.264*	0.105	-0.266*	0.105	
SIC_D	-0.271**	0.098	-0.260**	0.098	-0.259**	0.098	
SIC_E	-0.176	0.111	-0.166	0.111	-0.165	0.111	
SIC_F	-0.310**	0.101	-0.309**	0.101	-0.303**	0.101	
SIC_G	-0.384**	0.094	-0.366**	0.094	-0.366**	0.094	
SIC_H	-0.345*	0.136	-0.344*	0.136	-0.339**	0.136	
SIC_I	-0.298**	0.094	-0.279**	0.094	-0.282**	0.094	
Maturity3	0.091*	0.044	0.080	0.044	0.079	0.044	
Maturity7	0.128**	0.033	0.123**	0.033	0.123**	0.033	
Low Doc	-0.171**	0.037	-0.165**	0.037	-0.167**	0.037	
Guarantee %	-3.653**	0.172	-3.635**	0.172	-3.630**	0.172	
PLP Lender	0.662**	0.040	0.658**	0.040	0.658**	0.040	
CLP Lender	0.197**	0.041	0.194**	0.041	0.198**	0.041	
Adjusted-R2	0.1167		0.1156		0.1170		

Table 6 – Structural Change Specification

Regression results for equation (3), coefficients and standard errors. 21,849 SBA loans originated between 1992 and 2001. Dependent variable is ln(DISTANCE). ** and * indicate significance at the 1 percent and 5 percent levels.

	[1]		[2]		[3]	
Intercept	2.003**	0.024	1.953**	0.023	2.001**	0.024
D9601	0.687**	0.030	0.679**	0.029	0.661**	0.031
LMI	-0.275**	0.046			-0.285**	0.052
LMI* D9601	0.239**	0.060			0.096	0.067
Minority			-0.126*	0.053	0.024	0.060
Minority* D9601			0.401**	0.068	0.349**	0.077
F(LMI, Minority)	--		--		17.61**	
F(LMI*Time, MIN*Time)	--		--		3.73**	
Adjusted-R2	0.0381		0.0387		0.0408	
	[4]		[5]		[6]	
Intercept	5.976**	0.147	5.906**	0.147	5.953**	0.147
D9601	0.129**	0.036	0.138**	0.034	0.119**	0.036
LMI	-0.278**	0.045			-0.303**	0.051
LMI* D9601	0.186**	0.057			0.116	0.065
Minority			-0.094	0.052	0.065	0.058
Minority* D9601			0.235**	0.066	0.172*	0.074
Ln(Employment)	-0.056**	0.013	-0.060**	0.013	-0.056**	0.013
Corporation	0.037	0.028	0.037	0.028	0.038	0.028
Partnership	0.010	0.053	0.014	0.053	0.014	0.053
New Business	0.084**	0.028	0.093**	0.028	0.087**	0.028
SIC_A	-0.150	0.101	-0.120	0.101	-0.144	0.101
SIC_B	-0.331	0.253	-0.303	0.253	-0.318	0.253
SIC_C	-0.459**	0.088	-0.445**	0.088	-0.454**	0.088
SIC_D	-0.454**	0.079	-0.452**	0.079	-0.457**	0.079
SIC_E	-0.348**	0.095	-0.345**	0.095	-0.350**	0.095
SIC_F	-0.492**	0.083	-0.499**	0.083	-0.500**	0.083
SIC_G	-0.562**	0.074	-0.553**	0.074	-0.560**	0.074
SIC_H	-0.510**	0.123	-0.507**	0.123	-0.516**	0.123
SIC_I	-0.475**	0.074	-0.466**	0.074	-0.475**	0.074
Maturity3	0.094*	0.044	0.089*	0.044	0.085	0.044
Maturity7	0.146**	0.033	0.143**	0.034	0.141**	0.033
Low Doc	-0.105**	0.034	-0.099**	0.034	-0.101**	0.034
Guarantee %	-4.211**	0.167	-4.196**	0.167	-4.188**	0.167
PLP Lender	0.711**	0.040	0.705**	0.040	0.705**	0.040
CLP Lender	0.169**	0.041	0.168**	0.041	0.171**	0.041
F(LMI,Minority)	--		--		19.66**	
F(LMI*Time, Minority*Time)	--		--		7.92**	
Adjusted-R2	0.1083		0.1071		0.1093	

Table 7 – Dependent Variable Truncated at the 99th and 95th Percentiles

Full specification, selected regression coefficients. 21,849 SBA loans originated between 1992 and 2001. ** and * indicate significance at the 1 percent and 5 percent levels. The first F-test in each panel measures the joint significance of LMI and MINORITY. The remaining F-tests in each panel measure the joint significance of each interaction LMI term and each comparable interaction MINORITY term (e.g., LMI*TIME and MINORITY*TIME).

	[1] no truncation	F-tests	[2] 99% truncation	F-tests	[3] 95% truncation	F-tests
A. Continuous time						
Time	0.075**		0.064**		0.049**	
LMI	-0.379**	20.84**	-0.385**	21.55*	-0.393**	23.89*
LMI*Time	0.032*	11.88**	0.035**	7.39*	0.032**	3.07**
Minority	-0.006		0.019		0.054	
Minority*Time	0.038**		0.029*		0.003	
Adjusted-R2	0.1157		0.1008		0.0638	
B. Discrete time						
d1993	0.080		0.088		0.075	
d1994	0.139		0.141		0.119	
d1995	0.449**		0.431**		0.353**	
d1996	0.232**		0.228**		0.248**	
d1997	0.308**		0.303**		0.300**	
d1998	0.481**		0.412**		0.337**	
d1999	0.601**		0.525**		0.444**	
d2000	0.612**		0.544**		0.421**	
d2001	0.665**		0.623**		0.484**	
Lmi	-0.272*	2.09	-0.269*	2.15	-0.300**	3.12**
lmi93	0.007	0.05	0.003	0.08	0.027	0.07
lmi94	0.031	0.39	0.028	0.34	0.029	0.37
lmi95	-0.072	0.69	-0.086	0.90	-0.046	0.79
lmi96	-0.209	0.81	-0.200	0.82	-0.207	1.00
lmi97	0.082	0.16	0.089	0.22	0.117	0.33
lmi98	0.092	1.55	0.107	2.00	0.123	0.77
lmi99	0.205	1.02	0.226	1.15	0.167	0.64
lmi00	0.175	3.31*	0.181	2.28	0.203	1.26
lmi01	0.186	1.31	0.185	0.78	0.206	0.57
Minority	0.098		0.103		0.090	
minority93	-0.066		-0.074		-0.074	
minority94	0.138		0.124		0.120	
minority95	-0.141		-0.150		-0.157	
minority96	0.057		0.035		0.037	
minority97	0.003		0.012		-0.036	
minority98	0.240		0.262		0.086	
minority99	0.016		-0.022		-0.113	
minority00	0.318		0.218		0.041	
minority01	0.203		0.093		-0.055	
Adjusted-R2	0.1170		0.1027		0.0646	
C. Structural Change						
D9601	0.119**		0.093**		0.102**	
LMI	-0.303**	19.66**	-0.307**	21.57**	-0.314**	26.89**
LMI* D9601	0.116	7.92**	0.133*	8.13**	0.109	3.19*
Minority	0.065		0.060		0.041	
Minority* D9601	0.172*		0.150*		0.048	
Adjusted-R2	0.1093		0.0957		0.0607	

Table 8 – Subsamples by Loan Size

Full specification, but only selected regression coefficients are displayed.
** and * indicate significance at the 1 percent and 5 percent levels.

	[1] less than $100K N=13,902	F-test	[2] $100K to $250K N=5,038	F-test	[3] more than $250K N=2,902	F-test
A. Continuous Time						
Time	0.018**		0.115**		0.118**	
LMI	-0.371	11.03*	-0.395**	5.21*	-0.344*	4.04**
LMI*Time	0.021*	6.49*	0.053*	4.03**	0.042	1.35
Minority	-0.014		0.081		-0.087	
Minority*Time	0.049*		0.014		0.006	
Adjusted-R2	0.1186		0.1229		0.1204	
B. Discrete Time						
d1993	0.054		-0.013		0.101	
d1994	0.154		0.081		0.120	
d1995	0.502**		0.021		0.256	
d1996	0.058		0.268		0.228	
d1997	0.136		0.222		0.613**	
d1998	0.269*		0.431**		0.752**	
d1999	0.243*		0.676**		1.112**	
d2000	0.261*		0.811**		0.753**	
d2001	0.352*		0.979**		0.428	
Lmi	-0.325	1.37	-0.277	0.78	-0.222	0.62
lmi93	0.087	0.84	-0.019	0.00	-0.062	1.14
lmi94	0.160	0.18	0.014	0.03	-0.107	0.46
lmi95	-0.110	0.84	0.038	0.04	0.397	1.83
lmi96	-0.117	0.39	-0.346	0.54	-0.230	0.75
lmi97	0.178	0.13	0.278	0.42	-0.626	1.53
lmi98	0.111	0.44	0.135	1.62	0.119	0.21
lmi99	0.213	0.79	0.302	1.58	0.182	2.00
lmi00	0.085	2.11	0.278	0.72	0.466	0.84
lmi01	0.040	0.85	0.568	1.22	0.330	0.24
Minority	0.090		0.031		0.308	
minority93	0.116		0.033		-0.564	
minority94	0.224		0.064		-0.294	
minority95	-0.128		0.054		-0.743	
minority96	0.063		0.271		-0.349	
minority97	0.045		-0.203		0.123	
minority98	0.252		0.435		-0.265	
minority99	0.026		0.261		-0.831*	
minority00	0.495		0.074		-0.166	
minority01	0.388		-0.074		0.028	
Adjusted-R2	0.1234		0.1239		0.1257	
C. Structural Change						
D9601	-0.167**		0.465**		0.537*	
LMI	-0.344**	14.34**	-0.263**	3.51*	-0.169	2.54
LMI* D9601	0.109	4.92**	0.193	2.43	0.019	0.27
Minority	0.101		0.067		-0.112	
Minority* D9601	0.183*		0.114		0.071	
Adjusted-R2	0.1182		0.1130		.098	

Figure 1

Median Borrower-Lender Distance in Miles, by Tract Income

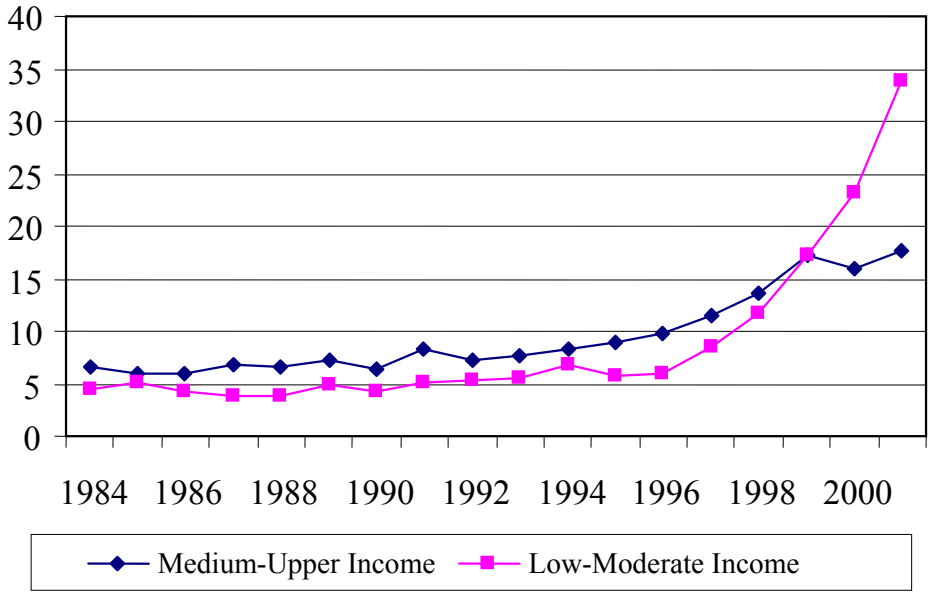

Figure 2

Median Borrower-Lender Distance in Miles, by Tract Race