Small Business Loan Turndowns, Personal Wealth and Discrimination

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ABSTRACT

Using newly available data from the Federal Reserve, we examine the impact of personal wealth on small business loan turndowns across demographic groups. Information on home ownership, home equity, and personal net worth excluding the business owner's home, in combination with data on the personal credit history of the principal owner, the business credit history of the firm, a rich set of additional explanatory variables, and information on the competitiveness of local banking markets, contributes to our understanding of the credit market experiences of small businesses across demographic groups. We find substantial unexplained differences in denial rates between African American-, Hispanic-, Asian-, and white-owned firms. We also find that greater personal wealth is associated with a lower probability of loan denial. However, even after controlling for personal wealth, large differences in denial rates across demographic groups remain. Further, consistent with Becker's classic theories (1957), we find some evidence that African American-denial rates increase with lender market concentration.

Introduction

Small businesses are an important part of the U.S. economy. They account for about half of private gross domestic output, employ more than half of the private sector work force, and provide three-fourths of net new jobs each year (Office of Advocacy, U.S. Small Business Administration, 1999).[1] Moreover, small businesses often rely on institutional sources to fund their activities (Bitler, Robb, and Wolken, 2001). It is a concern therefore, that recent evidence finds large differences in loan denials between small firms owned by white males and other demographic groups (Cavalluzzo and Cavalluzzo, 1998; Bostic and Lampani, 1999; Blanchflower, Levine, and Zimmerman, 2000; Cavalluzzo, Cavalluzzo, and Wolken, 2002).

An important criticism of the evidence on disparities in small business loan denials across demographic groups is that it fails to control for the business owner's personal wealth (Avery, 1999; Bates, 1999). Since small businesses often commingle personal and business assets, and because some of the small business' resources may include the wealth of the owner, many lenders consider information on the owner's personal wealth when determining the creditworthiness of the prospective borrower. To the extent personal wealth is correlated with denial rates and ownership demographics, excluding this information from the analysis could result in biased coefficient estimates.

Recent developments in underwriting practices for small business loans have made the owner's personal wealth an integral part of lending decisions in small business credit markets.[2] Information on personal wealth can improve underwriting decisions and lessen the extent of exposure for the lender. Personal wealth may serve as a signal of credit quality, potentially mitigating adverse selection problems common in lending decisions (Stiglitz and Weiss, 1981). Likewise, to the extent personal assets are at stake, greater personal wealth may alleviate moral hazard problems, thereby increasing the likelihood of loan repayment (Avery et al., 1998). If these arguments are correct, and personal wealth systematically

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[1] Small businesses are defined here as firms with fewer than 500 employees.

[2] See Mann (1998) for a discussion of these developments.

varies across demographic groups, failure to include this information when predicting loan turndowns could inaccurately portray the sources of differences in denial rates across demographic groups.

We use data from the recently released 1998 Survey of Small Business Finances (hereafter, SSBF98) to examine the role of personal wealth on small business loan denial rates across demographic groups. In addition to the rich set of variables used in prior work on small business loan turndowns, SSBF98 provides newly available information on the business owner's personal wealth, including home ownership, the extent of equity in the home, and the personal net worth of the owner excluding his home. We supplement these data with Dun and Bradstreet firm credit (risk) scores and information furnished by the Board of Governors of the Federal Reserve System on the level of bank concentration in the firm's local area.

The level of bank concentration in the firm's local area is of particular interest because small businesses tend to borrow locally, rather than nationally. It is important therefore to understand more fully the possible implications of high levels of concentration in local banking markets for this important class of borrowers. One reason that differences in access to credit across demographic groups could widen with lender concentration comes from Becker (1957), who showed that exercising prejudicial tastes can cut into firm profits. As such, one would expect highly competitive markets to eventually purge discriminatory behavior from the market place. In less competitive markets, however, prejudicial discrimination could be sustained in the long run. By controlling for the level of lender market concentration, we can test for *ceteris paribus* differences in denial rates according to the level of competition faced by lenders.

We find substantially higher denial rates among African American-, Hispanic-, and Asian-owned businesses, relative to those owned by white males. But only African American-denial rates increase with lender market concentration. We also find that personal wealth is important in the decision to extend credit to small businesses. In particular, home ownership is associated with approximately a thirty percent reduction in the predicted probability of loan denial. However, the amount of equity in the home and the personal wealth of the owner excluding the home appear to play

only a modest role in predicting loan turndowns. Even after including information on personal wealth in our analysis of loan turndowns, large differences in denial rates across demographic groups remain. Further, personal wealth does not dampen the positive association between African American-denial rates and lender market concentration.

In the final analytic section of the paper, we appeal to the techniques in Oaxaca (1973) and Fairlie (1999) to quantify the impact of differences in personal wealth, as well as in the endowments of the other variables in our analysis, on the differences in small business denial rates across demographic groups. Relative to the other variables in our analysis, personal wealth plays only a modest role in explaining the differences in African American- and white-owned small business denial rates. Differences in credit history explain most of the endowment effect between African Americans and whites. In contrast, variation in personal wealth accounts for a more substantial part of the difference in denial rates between Hispanic-/Asian-owned businesses and white-owned firms. However, coupled with the analyses in the previous sections of the paper, we conclude that information on personal wealth does little to explain the large disparities in loan turndowns observed across demographic groups.

II. The Data

We use data from the 1998 Survey of Small Business Finances to investigate the impact of personal wealth on small business loan denial rates between 1996 and 1998 across demographic groups. SSBF98 is among the most extensive public data sets available on small business finances. In addition to the rich set of explanatory variables on the creditworthiness of the firm and owner used in prior studies of small business loan denials, SSBF98 provides newly available data on the personal wealth of the principal owner. This information includes whether the owner owns his or her home, the amount of equity in the home, and the personal net worth of the owner excluding the home. The survey asks respondents to report on their borrowing experiences within the past three years. Of the 3,561

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firms in the sample, 948 firms applied for credit during this period: 197 minority-owned businesses (74

African American-, 73 Hispanic-, and 54 Asian-owned), and 751 white-owned businesses.[3]

In addition to the information on personal wealth, SSBF98 provides extensive information on

the firm and owner that we use to estimate loan turndowns. This includes the self-reported credit

history of the firm and its owner, financial and other characteristics of the firm, such as the firm's age,

geographic location, level of employment, industry, ownership and management characteristics, capital

structure, and income and balance sheet data. We supplement the data set with information from the

Board of Governors of the Federal Reserve System on the credit scores assigned by Dun and

Bradstreet to the small businesses in our sample and the Herfindahl-Hirshman index to measure the level

of lender market concentration in the credit markets used by these firms.[4]

Descriptive Statistics

Table 1, Panel A presents denial rates for all firms and by home ownership across demographic

groups.[5] Minority-owned businesses had significantly higher denial rates than whites. In particular,

African Americans were denied credit at more than 2 ½ times the rate of whites, while Hispanics and

Asians were denied credit at about twice the rate of whites. Denial rates for all demographic groups

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[3] Because our interest lies in understanding the impact of personal wealth on denial rates given the firm
has applied for credit, we restrict our analysis to the 948 firms that applied for credit. To extend the
analysis to include the data generating process of the denial data requires appealing to the non-linearity
of a selection equation, as SSBF98 does not provide any variables that theoretically should be
correlated with loan applications (the selection equation) but uncorrelated with loan denials. See
Cavalluzzo et al. (2002) for an example of such an approach.

[4] The HHI is based on FDIC summary of deposit data for commercial banks. Deposit data is a widely
used indicator of lender market power because the ability of firms to make loans is linked directly to the
level of deposits held. Both the Justice Department and the Federal Reserve use summary of deposit
data to construct the HHI in antitrust analyses for the banking sector. Markets are defined as the MSA
or non-MSA county where the firm's headquarters is located. See Bradford (2001) for a discussion of
the limitations of using the HHI to measure market concentration.

[5] All statistics presented in this study have been weighted to reflect differences in sample selection and
response rates. Test statistics use robust standard errors (White, 1980; 1982).

increased substantially without home ownership. Denial rates for firms whose principal owner did not own a home were about twice those of others.[6]

Panel B provides information on the business owner's personal wealth. Almost 9 out of 10 business owners owned their home. Home ownership rates were about the same for white and African American business owners. In contrast, about 72 percent of Hispanic and 73 percent of Asian business owners owned their home, significantly less than the percentage for whites.

Home equity and personal net worth also varied across demographic groups. Home equity and personal net worth were greater for white business owners than for other demographic groups. For example, the mean (median) value of personal net worth was $687,719 ($150,000) for white business owners compared to $159,962 ($80,000) for African American-owned firms.

Table 2 provides a variety of descriptive statistics on firm and owner characteristics, credit history, and information on relationships with financial institutions and suppliers for those firms that attempted to borrow over the sample period. Firm characteristics are contained in Panel A. With the exception of firm age, the firm characteristics tend to be skewed, as seen in comparisons of the mean and median. Within each subpopulation, there appear to be a few firms that were unusually large, more profitable, or with unusually high sales revenue relative to assets and profit relative to assets, as well as a few with an unusually high debt-to-assets ratio.[7]

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[6] We also analyzed denial rates by gender (not shown in Table 1). Unfortunately, the sample sizes of African American- , Asian- and Hispanic-female-owned businesses are very small (13, 17, and 12 respectively). Further, denial rates within demographic groups were remarkably similar across gender. The exception was Hispanic females who had lower denial rates than Hispanic males (37% versus 53%). Likewise, in many of the summary statistics that follow, there were no significant differences between male- and female-owned firms. As such, the tables report combined summary statistics. Summary statistics by gender are available from the authors on request. Also see Robb and Wolken (2002) who present descriptive statistics for white male- and female-owned businesses from SSBF98. To maintain consistency with prior literature, we include controls for gender in our empirical analyses.

[7] We tested the robustness of our results to several exclusionary conditions for extreme values of profit-to-assets, sales-to-assets, and debt-to-assets including dropping values greater than the 99th and 95th percentile values of these variables, and excluding all firms with less than $1,000 and $5,000 in assets. The reported results are robust to these alternative specifications.

A number of theories (e.g., Jovanovic, 1982) and empirical studies (e.g., Evans, 1987) suggest that firm behavior changes with firm size. Firms owned by white males were by far the largest, as measured by either total assets or sales.[8] African American-owned firms generated the highest sales (SALEASST) and profit (PROFASST) figures as a percent of assets, while firms owned by Hispanics were somewhat less profitable than those owned by white males, measured by the median profit-to-assets ratio. Use of the debt-to-assets ratio to evaluate firm risk is widespread among commercial banks (Gibson, 1983). Median debt-to-assets ratios were lowest among African American-owned firms (LIABASST).

Panel B provides information on the characteristics of the principal owner. The typical owner in our sample is middle aged with substantial managerial experience. Comparisons across demographic groups show that Asian and African American business owners were more educated than Hispanic and white owners (NOT_HS, COLLEGE). Minority owners were also less experienced than white owners (EXPER). About 20 percent of the firms were owned by females (GENDER). Ninety percent of the principal owners were also the manager in charge of the day-to-day operations of the firm (MANAGE). On average, the percentage of ownership by the principal owner was 80 percent (OWNSHR).

Summary statistics on the credit history of the firm and owner are contained in Panel C. The credit history variables indicate that African American-owned firms may have been considerably more risky than others. African American small business owners have bankruptcy rates that were more than five times those of other firms (BANKRUPT). African Americans were also far more likely to be delinquent on personal (PDELINQ3) or business (BDELINQ3) obligations, or to have legal judgments against their firm (JUDGMENT). African American firms also had lower credit scores (indicating greater credit risk) than other businesses (CREDIT_SCORE).

Strong relationships between banks and small businesses have been shown to increase the availability of funds and reduce the cost of capital to small businesses (Petersen and Rajan, 1994;

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[8] Because most of the larger firms in the sample are white-owned, we conducted a separate analysis of firms with less than $10 million in sales. The results were virtually identical.

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Berger and Udell, 1995). African Americans and Hispanics, but not Asians, reported considerably shorter relationships with their primary financial institution than did whites (REL_PRIM). The last two entries in Panel D are consistent with findings reported by other researchers who have found that small business owners tend to work with financial institutions in close proximity to the firm's headquarters (Kwast et al., 1997; Petersen and Rajan, 2000). Ninety-one percent of firms' primary financial institutions were located 30 or fewer miles from the small business' headquarters (PRIMLOCAL). The median distance between the firm and its primary financial institution was only three miles (PRIMDIST).

III. Empirical Approach

We estimate the probability that a firm was denied credit at least once during the last three years, given that the firm applied for new credit during the period. Consistent with prior research (see for example, Cavalluzzo et al., 2002) we control for the characteristics of the firm and owner, the owner's self-reported credit history, information on relationships with financial institutions and suppliers, geographic location, and industry classification. We include proxies for the level of local lender market concentration (the bank deposit Herfindahl-Hirshman index of the MSA or rural county in which the firm is headquartered) and a credit score obtained from Dun and Bradstreet. Table 3 presents all variables and definitions employed in our analysis.

We compare results from four specifications of the model. The first is a baseline model that includes all the information in Table 3 as well as bivariate demographic indicators, and the Herfindahl-Hirshman index (HHI) to control for the degree of commercial bank concentration in the local credit market. We call this a baseline model because it most closely resembles the type of model that traditionally has been reported in the literature on the economics of credit market discrimination. The second specification augments the first with interactions between demographic groups and market concentration. Denial rates that increase with lender market concentration at a greater rate for the

disadvantaged group than the favored group are consistent with Becker's (1957) fundamental theory of discrimination.[9]

Our third specification adds an indicator for home ownership (HOME). Home ownership may provide a signal of credit quality to lenders, potentially mitigating adverse selection problems common in lending markets. Additionally, to the extent lenders can lay claim to the personal assets of the owners (e.g., via explicit loan covenants, collateral or personal guarantees), home ownership may alleviate moral hazard problems associated with the decision to extend credit to small business owners.

Our final specification includes information on the extent of equity in the home and the net worth of the principal owner excluding the home. Because of the skewness in our personal wealth data (see Table 1), and to control for the difficulty respondents may have in accurately reporting their personal wealth, we estimate our models with indicator variables for the extent of home equity and personal net worth. We include three indicators for home equity (HEQ1-HEQ3): the business owner owns a home and home equity is less than $50,000 (HEQ1), $50,000 to less than $150,000 (HEQ2), and $150,000 or more (HEQ3). The excluded group is firm owners who do not own their home. We use four indicators to characterize personal net worth (NETW1-NETW4): personal net worth between $1 and

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[9] We investigated two alternative explanations for a positive association between concentration and denial rates. Neither was validated by the data. First, lenders may raise their credit standards for all loan applicants as concentration increases. If this is the case, and minority status acts as a signal for credit risk, then the gap in credit access could widen with market concentration as a result of omitted variable bias or statistical discrimination. To explore the extent to which lenders increased credit standards with lender market concentration, we regressed denial rates on the credit score, HHI, and the interaction of the credit score and HHI, along with the other variables in the analysis. We found no evidence (not shown) that lenders increased credit standards as HHI increased. Second, if white-owned firms have greater credit-market mobility than minorities, those firms located in more concentrated markets may be more likely to cross over into more competitive markets to obtain credit. Minority owners would be left behind to face tougher lending standards. We examined the extent to which white-owned businesses were more likely to leave their local area to obtain a loan than were minority-owned firms. We defined the dependent variable LOCAL equal to one if the firm's most recent loan application was within 30 miles of the firm's headquarters, zero otherwise, and regressed this variable on the set of demographic indicator variables. We found no evidence (not shown) that some groups were more likely than others to have left their local area to obtain a loan.

$49,000, \$50,000-\$249,999, \$250,000-\$999,999, and \$1,000,000 or more. The excluded group includes firm owners with zero or negative net worth.

IV. Results

Denial Analysis, Demographic Groups, and Market Structure:

Our analysis of the factors influencing loan turndowns is provided in Table 4. Column 1 presents our estimates from the baseline model excluding personal wealth and the Herfindahl interaction terms. The estimates, which incorporate 51 control variables, lead to large and highly significant coefficients across demographic groups. All else equal, minority-owned firms were almost twice as likely to be denied credit as their white male counterparts. The average predicted probability of credit denial at least once in the last three years is 51 percent if all firms are treated as African American-owned, compared to a mean prediction of 26 percent if the same firms had been owned by whites.[10] The mean predicted probability of credit denial at least once in the last three years is 42 (44) percent if all firms are treated as Hispanic- (Asian-) owned.

Other factors influencing the probability a firm was denied credit include the HHI (firms located in more concentrated markets were more likely to be denied credit), and the firm's credit history. In particular, the self-reported credit history variables (bankruptcy, personal and business delinquencies, and judgments) are all significant. In contrast, the credit score, which is insignificant, appears to be capturing much of the information already reported in the self-reported credit history variables. The credit score is significant at the five percent level when the other information on credit history is excluded from the estimation (not shown).

Owner characteristics (apart from demographic group), firm characteristics (apart from the firm's profit-to-assets ratio and national sales area) and information on relationships with financial

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[10] Probability estimates are computed for each observation in the sample, assuming the observation has the characteristic of interest. In this case, they are computed twice, first assuming every observation in the sample is a firm owned by an African American and second assuming every observation in the sample is a white-owned firm.

institutions and suppliers are unrelated to the decision to extend small businesses credit. These latter results were confirmed by Wald tests that were insignificant for the three groups of characteristics.

Column 2 augments the model in Column 1 with interactions between lender market concentration and demographic group. In this model, a specific race effect (e.g., African American) requires that the intercept dummy (e.g., AFAM) and its interaction with the HHI (AFAM*HHI) be jointly significantly different from zero. Using this criterion, there were significant African American, Hispanic, and Asian effects; the three demographic variables and their interaction with the HHI are jointly significant at the ninety-five percent level or better.

Consistent with Becker's theories, we find modest evidence that African American-denial rates increased with lender market concentration relative to those of whites. The coefficient on AFAM*HHI is positive and significant at the 10 percent level. Surprisingly, Hispanic denial rates decreased with lender market concentration. Additional analysis of this unexpected result indicated that it is driven by four Hispanic observations in concentrated markets that were never denied credit. The interaction between ASIAN and HHI is statistically insignificant, indicating that differentials between Asian- and white-owned businesses did not vary with lender market concentration.[11]

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[11] We estimated several alternative specifications to test the robustness of the results associated with lender market concentration. First, we estimated the models on the subset of firms located only in metropolitan statistical areas (MSAs). Although all our regressions include an MSA control variable, many researchers believe that MSAs represent better economic markets, as rural counties are often defined along political, rather than economic, characteristics. Excluding rural counties potentially provides a more homogeneous set of markets for analysis. However, it also has the effect of disproportionately removing the most concentrated markets from the analysis. Estimates using just MSAs (not shown) reduce the statistical significance of both AFAM*HHI and HISP*HHI below commonly accepted levels of statistical significance; however, the joint significance of both remains. We also estimated the models excluding firms with greater than $10 million in sales. Larger firms probably have greater financing options available to them, including being potentially more likely to be able to leave their local lending market if faced with difficulty obtaining credit. The results are virtually identical to those presented in Table 4. Finally, we varied the definition of the dependent variable to include only denials on the most recent application and only firms that were denied credit on all loan applications within the past 3 years. The joint significance of the demographic variables and their interaction terms remained, but the positive coefficient on AFAM*HHI was no longer significant at commonly accepted levels.

In order to get a sense of the role for lender market concentration on denial rates across demographic groups, Table 5, Panel A, presents the mean predicted probability of loan denial for each demographic group at different values of HHI, based on the model in Table 4, Column 2. At all levels of HHI, African American-, Hispanic- and Asian-denial rates exceeded those of whites. At the 25th percentile of the HHI distribution, African American- (Hispanic-, Asian-) denial rates were 18 (22,18) percentage points greater than those of white males. In contrast, at the 75th percentile of the HHI distribution, African American- (Hispanic-, Asian-) denial rates were 31 (9,17) percentage points greater than those of whites.

Denials Analysis and Personal Wealth:

Our next set of estimates investigates the impact of personal wealth on the denial differentials across demographic groups and lender market structure. Column 3 of Table 4 augments the estimates in Column 2 with an indicator for whether the business owner owns his or her home. Home ownership significantly reduces the probability a firm will be denied credit. The average predicted probability of denial assuming home ownership is 27 percent versus 39 percent otherwise. While home ownership plays a role in predicting loan turndowns, it has little effect on the demographic coefficients and their interaction terms. The joint effect of the demographic variables and their corresponding interaction terms maintain both magnitude and statistical significance.[12]

Column 4 includes variables describing the extent of equity in the home and the net worth of the owner. We find some evidence that home equity and net worth reduce the probability of loan turndowns. All seven of the coefficients for home equity and personal net worth are negatively signed and one (HEQ2) is statistically significant. A Wald test on the group of personal wealth variables is jointly significant at the ten percent level.[13]

One explanation for the modest role for home equity and net worth in predicting denials could be that much of the information may already be contained in other variables in the estimation. To see if

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[12] Estimates without the interaction terms (not shown) also provide evidence of a pervasive demographic effect at the one percent level of statistical significance for all demographic groups even after controlling for home ownership. We also interact HOME with each of our demographic variables to see if the influence of home ownership on denial rates varied across demographic groups. Home ownership significantly reduced the probability of denial for all groups except Asians. Additional comparisons indicate that home ownership significantly reduced Hispanic (but not other groups') denial rates more than it did those of whites.

[13] We examined several alternative specifications for equity and net worth. We modeled each as linear, log, quadratic, categorical with different cutoffs, and a combined home equity plus net worth variable. Home equity was significant for log, quadratic, and categorical representations. Personal net worth was insignificant for continuous functions of net worth, but was jointly significant for categorical representations. Results for other estimated coefficients, including the demographic coefficients, were similar to those presented.

this is the case, we reestimated the model in Column 4 without the self-reported credit history variables and credit score (not shown). In this analysis, all of the personal wealth indicator variables were statistically negative. Moreover, they were jointly significant at the one percent level.[14]

Despite the role played by personal wealth in estimating loan turndowns, the effect on the demographic coefficients is limited; the joint effect of all the demographic coefficients and the corresponding interaction terms maintains both magnitude and statistical significance. Moreover, the estimated probabilities of denial at different levels of market concentration are virtually identical, regardless of whether they include the information on personal wealth (see Table 5, Panel B).

V. Endowment Effects

In the preceding section, we found that credit history and personal wealth significantly influenced the probability of loan denial. Firm, owner, and financial relationship variables were less important. We also observed in the descriptive statistics section that there was substantial variation in many of these variables across demographic groups. In this section of the paper, we provide a quantitative assessment of the influence of the differences in endowments of our applicants on the differences in small business denial rates across demographic groups. By endowments, we mean the characteristics of the firms and their owners. We also measure the relative importance of the different types of information in the underwriting equation.

In the spirit of Oaxaca (1973), and similar to the approach discussed in McMillillen and Singell (1994) and Fairlie (1999), we decompose the univariate differences in denial rates into two pieces, one piece due to differences in endowments across demographic groups, and a second piece due to differences in the treatment of borrowers given those endowments. For non-linear equations such as Y = $F(X\beta)$, Fairlie (1999) presents the decomposition of the racial gap in the average value of the dependent variable, Y, between two groups W and B as:

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[14] It is also possible that personal wealth may be more important in predicting denials for firms with unlimited liability, as the personal assets of the firm are at stake. We find some evidence that this may be the case. The joint effect of the seven personal wealth variables was significant at the ten percent level among proprietorships and partnerships, but insignificant among corporations.

$$\overline{Y}^{\mathrm{W}} - \overline{Y}^{\mathrm{B}} = \left[\sum_{i=1}^{N^{\mathrm{W}}} \frac{F(X_i^{\mathrm{W}}\beta^{\mathrm{W}})}{N^{\mathrm{W}}} - \sum_{i=1}^{N^{\mathrm{B}}} \frac{F(X_i^{\mathrm{B}}\beta^{\mathrm{W}})}{N^{\mathrm{B}}} \right] + \left[\sum_{i=1}^{N^{\mathrm{B}}} \frac{F(X_i^{\mathrm{B}}\beta^{\mathrm{W}})}{N^{\mathrm{B}}} - \sum_{i=1}^{N^{\mathrm{B}}} \frac{F(X_i^{\mathrm{B}}\beta^{\mathrm{B}})}{N^{\mathrm{B}}} \right] \qquad (1)$$

where

$\overline{Y}^m$ is the average value of the dependent variable for group m

X_i^m is the characteristic vector for individual i for group m

and

β^m is the coefficient vector for group m

The first term of expression (1) represents the difference in the raw differential due to differences in the characteristics of borrowers between the two groups, assuming that banks treat all individuals as they treat group W. The second term represents differences in the treatment of those characteristics between the two groups. Because of the paucity of observations available from our minority groups, and thus the difficulty in estimating β^{B} with much precision, we focus our analysis and discussion on the first term in (1).[15]

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[15] As an alternative, one could decompose the differential assuming banks treat all firms as they treat group B. If this is the case, then we would get the following:

$$\overline{Y}^{W} - \overline{Y}^{B} = \left[\sum_{i=1}^{N^{W}} \frac{F(X_i^{W}b^{B})}{N^{W}} - \sum_{i=1}^{N^{B}} \frac{F(X_i^{B}b^{B})}{N^{B}} \right] + \left[\sum_{i=1}^{N^{W}} \frac{F(X_i^{W}b^{W})}{N^{W}} - \sum_{i=1}^{N^{W}} \frac{F(X_i^{W}b^{B})}{N^{W}} \right] \qquad (2)$$

Then the first term of expression (2) represents the difference in the raw differential due to differences in the characteristics of borrowers across the two groups, assuming each group is treated as group B, while the second term represents the difference in the raw differential due to differences in treatment across groups. Depending on the assumptions made about behavior in the absence of discrimination (Oaxaca, 1973; Newmark, 1988; and Robinson, 1993) equations (1) and (2) provide bounds on the differences due to differences in characteristics across the two groups and differences in treatment of

While estimation of the differences due to the entire set of characteristics using equation (1) is straightforward, additional effort is needed to estimate the effect of a difference for a single, or subset, of independent variables. For example, suppose X includes two variables, X_1 and X_2. We can express the independent contribution of X_1 to the racial gap as:

$$\frac{1}{N^B} \sum_{i=l}^{N^B} F(X_{li}^B \beta_1^W + X_{2i}^W \beta_2^W) - F(X_{li}^W \beta_1^W + X_{2i}^W \beta_2^W) \tag{3}$$

And the effect of X_2 as:

$$\frac{1}{N^B} \sum_{i=1}^{N^B} F(X_{li}^W \beta_1^W + X_{2i}^B \beta_2^W) - F(X_{li}^W \beta_1^W + X_{2i}^W \beta_2^W) \tag{4}$$

An obvious complication to the estimation of (3) and (4) is that X^W is of different length than X^B.[16] To match the distributions, we follow the approach employed by Fairlie (1999). We first estimate a logit regression using the white sample. This regression provides us with an estimate of $ß^W$. With $ß^W$ in hand,

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those groups, given their characteristics. Our limited minority representation precludes us from estimating equation (2).

[16] There are two subtle differences in our specification of the individual effects and those in Fairlie (1999). First, because many of our variables are categorical, we group them into several mutually exclusive classes. This simplifies the presentation by allowing us to talk about the overall effect of different classes of variables such as personal wealth or credit history. Second, Fairlie (1999) imposes a particular ordering on the variables to estimate individual effects. Each individual effect is calculated in succession, without restoring the original values for group W. He then calculates the total endowment effect as the sum of the individual effects (rather than by using equation (1)). Because part of our interest lies in comparing the relative effect of personal wealth to the other variables in the analysis, and because the order of the variables will affect the estimated effects, we calculate the endowment effect as the impact of varying the variable(s) of interest between the two groups, assuming all the other endowments have the white characteristics. Applying Fairlie's ordering approach provided similar results.

we next calculate predicted probabilities for all observations in the African American sample, and all observations in a randomly drawn (with replacement) sample of white observations of size N^B. We match these estimates to those of the African American observations based on the rank of the predicted probabilities for each group, and then calculate the average difference in predicted probabilities between white- and African American-owned firms. This matching process assigns a low probability African American denial with a low probability white denial, which will then be used in the calculation of (3) and (4). Because the estimates from this approach depend on the observations drawn from the white sample, we replicate the drawing process 1,000 times and report the resulting mean values as our estimate of the effect of variable(s) i.

Results

Total Endowment Effect:

Table 6 presents our assessment of the impact of differences in endowments on access to credit across demographic groups.[17] Panel A presents estimates from Equation (1) quantifying the total endowment effect. Assuming all firms are treated as whites, differences in endowments across demographic groups increase the predicted probability of denial for African Americans (Hispanics, Asians) by more than fifty (thirty, thirty) percent. However, differences in endowments explain only about a third of the original differential in denial rates for all groups relative to firms owned by whites. The remaining difference is due either to differences in treatment or error.

Marginal Endowment Effects:

Panel B contains our estimates of the impact of the differences in endowments for individual sets of characteristics on loan turndowns across demographic groups. We group the variables into five categories and then analyze the marginal endowment effect for each category of variables. The categories are personal wealth, credit history and credit score, firm characteristics, owner

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[17] The endowment effects are estimated using the variables in Table 4, Column 4 and coefficient estimates based on the white subpopulation. Coefficients from the white subpopulation are very similar to those reported in Table 4.

characteristics, and relationship characteristics. For example, personal wealth includes HEQ1-HEQ3 and NETW1-NETW4.[18]

Differences in personal wealth account for only a small percentage of the total differential between white- and African American-owned firms, but account for a much larger portion of the total differential between white- and Hispanic-/Asian-owned firms. Indeed, for Asians, differences in personal wealth appear to be the most important factor explaining the differences in denial rates between Asian- and white-owned businesses. The importance of personal wealth in explaining loan turndowns across demographic groups is consistent with the descriptive statistics in Table 1. Whites and African Americans had fairly similar home ownership endowments. Likewise, Hispanics and Asians had significantly lower home ownership rates than whites. The differences in home ownership observed in the descriptive statistics in Table 1 appear to go a long way towards explaining the variation in the importance of personal wealth between minority- and white-owned small businesses.

The most important factor explaining differences in denial rates between African American- and white-owned businesses, and the second most important factor for Hispanic- and white-owned firms, is the credit history and credit score of the firm and owner. Differences in credit history explain almost one third (thirteen percent) of the original differential between African American- (Hispanic-) and white-owned small businesses. Differences in credit history explain little of the differential for Asians.

Firm characteristics such as firm assets, profit-to-assets and debt-to-assets explain an important portion of the differences in denial rates for all demographic groups relative to whites. In contrast, relationship characteristics explain only a small portion of original differential, except for perhaps Asian-owned firms.

VI. Conclusions

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[18] Credit history includes BANKRUPT, PDELINQ1-3, BDELINQ1-3, JUDGMENT, and CREDIT_SCORE; owner characteristics include NOT_HS, COLLEGE, EXPER, MANAGE and OWNSHR; firm characteristics include LNASSET, LNTOTEMP, SALEASST, LIABASST, PROFASST, LNAGE, CCORP, SCORP, PARTNER, NATN, OUTSD, REG, and MSA; and relationship characteristics include REL_PRIM, SOURCES, TCUSE, CHECKING, SAVING, PRIM_FIN, and LOAN.

We found that personal wealth, especially as proxied by home ownership, is important for predicting loan turndowns. When quantifying the impact of personal wealth, we found that it explained more than ten percent of the original difference in denial rates for Hispanic-/Asian-owned firms relative to those owned by whites, but a much smaller portion of the difference between African Americans and whites. In contrast, credit history was far more important for explaining denial differences for African American-owned firms than for other groups. However, even after including this information in our analyses, large differences in loan turndowns between African American-, Hispanic-, and Asian-owned small businesses relative to those of whites remained. There was also some evidence that African American-denial rates increased with lender market concentration.

But does the evidence suggest unambiguously that prejudicial discrimination is the cause of the observed relationships? Although we have found some evidence that is consistent with prejudicial behavior, other factors could also explain these results. Omitted variable bias is always a concern for analyzing differences in treatment across demographic groups. Although our data set is extremely rich, our analysis is not immune to this criticism. In particular, our data set is obtained from the small businesses themselves, rather than from the lending institutions. We may therefore not have all the information available to the underwriter at the time of the loan application. Given the nature of the survey, some of the details of the firms' circumstances may differ between the time of application and the time the data were collected. Nor do we know the underwriting standards applied by each institution. Access to data from the lending institution should help reduce the unexplained differences between white and minority denial rates. However, it is less likely to influence the interaction terms between market structure and demographic group, since the additional information obtained from the lenders would have to be correlated with concentration in lender markets to have such an effect. We have no reason *a priori* to anticipate such a correlation.

The observed concentration effects could also arise from statistical discrimination if minority group signals greater credit risk *and lenders change their behavior,* raising the bar for all applicants in more concentrated markets. If this is the case, then demographic effects could work through the

concentration interaction term. But in a test for such behavior, we found no correlation between the credit score of white applicants who obtained loans and concentration, suggesting that lenders do not raise the bar across the board as concentration increases.

The gap in denials could also widen *if small firms change their behavior* as lender concentration increases. Suppose, for example, that it is more difficult to obtain credit in concentrated markets. Suppose too that white owners have greater credit-market mobility than minorities. Then whites who have businesses that are headquartered in concentrated lender markets might be more likely than others to cross into more competitive lender markets to obtain a loan. Minority owners would be left behind to face tougher lending standards. Since white-owned firms are older and larger, and language or cultural constraints may impede the mobility of minorities, such a scenario seems plausible. But our limited evidence of such behavior does not support the hypothesis. We found no evidence that some groups were more likely to leave their local geographic area to obtain a loan.

In sum, we observed substantial, *ceteris paribus* differences in denial rates between minority- and white-owned firms. We also found evidence of a role for market concentration in explaining some of the differentials. We found that information on personal wealth explained some differences between Hispanic-/Asian-owned businesses and those owned by whites, but almost none for African Americans. Nor did it lessen the influence of lender market concentration on the African American differentials. Although the evidence of disparate access associated with lender market concentration is mixed, and the cause of the observed disparities are ambiguous, we conclude that information on personal wealth does little to rule out discrimination as a potential explanation for the large differences in denial rates across demographic groups.

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Table 1

Small Business Denial Rates Across Demographic Group – Population Estimates

Panel A: Means (Number of observations in parentheses)

	All	White	African American	Hispanic	Asian
Percent denied credit	28.40 (948)	24.06 (751)	61.79*** (74)	49.74*** (73)	52.38*** (54)
Percent denied credit that own home	24.38 (861)	21.06 (697)	58.36*** (69)	35.45 (55)	47.63*** (43)
Percent denied credit that did not own home	59.18 (87)	51.60 (54)	100.00*** (5)	86.62*** (18)	65.13 (11)

Personal Wealth Data Across Demographic Group

Panel B: Means (Medians in parentheses)

	All	White	African American	Hispanic	Asian
Percent of owners that own their home	88.45	90.17	91.76	72.07***	72.86**
Amount of equity in home	143,918 (75,000)	151,490 (80,000)	77,227*** (50,000)	93,370*** (59,000)	113,938 (58,000)
Owner's personal net worth (excluding home)	620,919 (150,000)	687,719 (150,000)	159,921*** (80,000)	228,637*** (70,000)	295,255*** (100,000)

NOTES:

1. Population estimates weighted to reflect differences in sample selection and response rates (see Methodology Report, 2001).

2. An *, **, or *** signifies that the statistic is significantly different from the white-owned firm value at the 90th, 95th, or 99th percent level of confidence, respectively.

3. Four observations are counted in more than one race category; two observations in the Hispanic and Asian categories, and two in the Hispanic and African American categories.

Table 2

Descriptive Statistics: Means (Medians in parentheses)

	All Firms	White	African American	Hispanic	Asian
Panel A: Firm Characteristics					
Total Assets ($M)	0.61	0.67	0.14***	0.24***	0.50
	(0.10)	(0.12)	(0.04)	(0.06)	(0.08)
Sales ($M)	1.58	1.73	0.48***	0.59***	1.09*
	(0.25)	(0.29)	(0.11)	(0.10)	(0.20)
Employment	11.75	12.23	6.84***	8.25***	11.59
	(4.00)	(5.00)	(4.00)	(3.00)	(5.00)
Sales-to-Assets	8.25	7.23	29.83	6.99	8.63
(SALEASST)	(2.76)	(2.77)	(3.16)	(2.11)	(2.72)
Profit-to-assets	1.51	1.39	4.78	1.21	1.35
(PROFASST)	(0.23)	(0.23)	(0.62)	(0.20)	(0.39)
Debt-to-assets	2.04	1.49	6.24	1.44	9.27
(LIABASST)	(0.62)	(0.64)	(0.39)	(0.55)	(0.74)
Firm Age (years)	11.39	11.85	9.07***	8.19***	8.77
	(9.00)	(10.00)	(6.00)	(6.00)	(8.00)
Panel B: Owner Characteristics					
Owner age (years)	47.38	47.63	46.74	45.40	45.88
	(47.00)	(47.00)	(47.00)	(45.00)	(46.00)
Proportion not finishing high school *(NOT_HS)*	0.04	0.03	0.02	0.20***	0.00***
Proportion with some college *(COLLEGE)*	0.75	0.76	0.84*	0.59***	0.86*
Owner experience (years)	16.59	17.05	13.86***	13.66***	14.21**
(EXPER)	(15.00)	(16.00)	(13.00)	(11.00)	(13.00)
Proportion female-owned *(GENDER)*	0.20	0.20	0.20	0.29	0.26
Proportion owner-managed *(MANAGE)*	0.91	0.91	0.95	0.93	0.98***
Percent owned by primary shareholder *(OWNSHR)*	81.28	80.46	89.40***	86.84**	82.87
Panel C: Credit History and Credit Score					
Proportion declared bankruptcy within past 7 years *(BANKRUPT)*	0.03	0.02	0.11**	0.02	0.00***
Proportion delinquent on personal obligations (3 or more times) *(PDELINQ3)*	0.12	0.11	0.20	0.13	0.08
Proportion delinquent on business obligations (3 or more times) *(BDELINQ3)*	0.14	0.14	0.16	0.11	0.07*
Proportion with judgments *(JUDGMENT)*	0.05	0.05	0.12	0.02	0.09
D & B Credit Score	48.73	49.45	39.06***	45.34	48.31
(CREDIT_SCORE)	(46.00)	(46.00)	(34.00)	(39.00)	(52.00)

Table 2, Continued

	All Firms	White	African American	Hispanic	Asian
Panel D: Relationship Characteristics					
Length of relationship with primary institution (REL_PRIM)	6.37 (4.00)	6.70 (4.00)	3.58*** (2.00)	3.70*** (3.00)	6.33 (4.00)
Proportion using trade credit (TCUSE)	0.71	0.73	0.63	0.52***	0.71
Proportion with financial primary institution (PRIM_FIN)	0.97	0.97	0.98	0.94	0.89
Proportion with most recent loan within 30 miles	0.91	0.91	0.95	0.89	0.93
Distance (miles) between firm and primary institution	62.49 (3.00)	67.43 (3.00)	18.91*** (2.00)	24.29*** (3.00)	58.10 (1.00)
Panel E: Market Structure					
HHI	0.21 (0.18)	0.21 (0.19)	0.19 (0.17)	0.19 (0.15)	0.18** (0.15)

***, **, * indicate significance of difference from white sample at the one, five, and ten percent levels, respectively. Summary statistics are weighted to reflect differences in sample selection and response rates (see Methodology Report, 2001).

Table 3

Variables and Definitions

DEPENDENT VARIABLE	
DENIED	Set to one if the firm was denied credit anytime within the three years of the survey interview date, zero otherwise. Defined only for those firms that applied for credit in the past 3 years.

INDEPENDENT VARIBALES	
Personal Wealth	
HOME	Indicates whether the firm's principal owner owns his or her own home.
HEQ1 (2,3)	Owns home and equity $1 to $50,000 ($50,000 to $150,000;>=$150,000). HEQ0=does not own home (omitted).
NETW1 (2,3,4)	Personal net worth $1 to $50,000 ($50,000 to $250,000; $250,000 to $1,000,000; >=$1,000,000); NETW0 =1 for firms with zero or negative net worth (omitted).
Lender Market Structure	
HHI	Herfindahl-Hirshman bank deposit index of banking market concentration, 1999. Defined for the MSA or rural county of the firm's main office.
Credit History and Credit Score	
BANKRUPT	Indicates whether the firm's principal owner declared bankruptcy within the last seven years.
PDELINQ1 (2, 3)	Indicates whether the firm's principal owner was 60 or more days delinquent on personal obligations 1 time (2 times, 3 or more times) within the last three years (0 times omitted).
BDELINQ1 (2, 3)	Indicates whether the firm's principal owner was 60 or more days delinquent on business obligations 1 time (2 times, 3 or more times) within the last three years (0 times omitted).
JUDGMENT	Indicates judgments against the principal owner within the past three years.
CREDIT_SCORE	Credit score percentile, created by Dun & Bradstreet as of May, 1999.
Owner Characteristics	
NOT_HS (COLLEGE)	Indicates whether the firm's principal owner is a non-graduate of high school (some college).
EXPER	Number of years of experience the owner has owning or managing a business.
MANAGE	Indicates whether the firm is managed on a daily basis by the owner or a partner.
OWNSHR	Percentage of the firm that is owned by the principal owner.
Firm/Relationship Characteristics	
LNASSET	Natural log of total firm assets.
LNTOTEMP	Natural log of the total number of employees.
SALEASST	Sales / Total assets.
LIABASST	Total short and long term debts / Total assets.
PROFASST	Operating Profits / Total assets.
LNAGE	Natural log of firm age at the time of the survey.
CCORP (SCORP, PARTNER)	Indicates whether the firm was a c-corporation (s-corporation, partnership). Proprietorship omitted.
NATN (OUTSD, REG)	Indicates whether the firm's primary sales or delivery of products are throughout the United States (outside the United States, within the same geographic region, or in the same local area (omitted)) as the firm's main office.
MSA	Indicates whether the firm's headquarters are located in an MSA versus rural area.
REL_PRIM	Number of years the firm has been conducting business with its primary institution (set to zero if the firm has no primary institution). The primary institution is the source the firm reports as being its main or primary supplier of financial services.
SOURCES	Number of institutions that the firm uses for all its financial services.
TCUSE	Indicates whether the firm uses trade credit.
CHECKING	Indicates whether the firm had any checking accounts.
SAVING	Indicates whether the firm had any savings accounts.
PRIM_FIN	Indicates whether the firm's primary institution is a financial institution.
LOAN	Indicates whether the firm has loans other than the most recent loan.
Additional Controls	

The estimates also include indicators for demographic groups (AFAM, HISPANIC, ASIAN, GENDER), nine one digit SIC industry controls (primary manufacturing excluded) and 9 regional variables (New England excluded).

Table 4

Analysis of Denial Rates

Dependent Variable: Firm denied credit anytime over the past three years.

	(1)	(2)	(3)	(4)
Majority Ownership				
AFAM	1.441***	0.333[a]	0.488[a]	0.388[a]
	(3.443)	(0.407)	(0.601)	(0.470)
HISPANIC	1.010***	2.297***,[a]	2.157***,[b]	2.106***,[b]
	(2.536)	(3.026)	(2.860)	(2.742)
ASIAN	1.111***	1.268[b]	1.184[b]	1.127[c]
	(2.613)	(1.379)	(1.238)	(1.181)
GENDER	-0.216	-0.808	-0.885	-0.874
	(-0.718)	(-1.214)	(-1.330)	(-1.257)
Market Structure				
HHI	1.949*	1.874	1.864	1.437
	(1.880)	(1.602)	(1.602)	(1.172)
AFAM*HHI		5.938*	5.629*	6.043*
		(1.798)	(1.743)	(1.838)
HISPAN*HHI		-6.742**	-6.489*	-6.280*
		(-2.000)	(-1.932)	(-1.843)
ASIAN*HHI		-0.763	-0.336	-0.447
		(-0.188)	(-0.082)	(-0.109)
GENDER*HHI		2.871	3.359	3.233
		(1.106)	(1.294)	(1.185)
Credit History and Credit Score				
BANKRUPT	4.018***	4.065***	3.789***	3.839***
	(4.494)	(4.436)	(4.242)	(4.393)
BDELINQ1	1.112	1.118	1.108	1.032
	(1.563)	(1.590)	(1.609)	(1.583)
BDELINQ2	1.316***	1.358***	1.247***	1.176***
	(2.508)	(2.593)	(2.525)	(2.374)
BDELINQ3	0.668*	0.672*	0.620*	0.552
	(1.941)	(1.948)	(1.762)	(1.550)
PDELINQ1	1.346**	1.340**	1.338***	1.457***
	(2.274)	(2.236)	(2.354)	(2.587)
PDELINQ2	1.306***	1.283***	1.355***	1.311***
	(2.469)	(2.360)	(2.487)	(2.443)
PDELINQ3	1.065***	1.064***	1.105***	1.067***
	(3.302)	(3.297)	(3.415)	(3.301)
JUDGMENT	1.143***	1.150***	1.084***	1.073**
	(2.512)	(2.498)	(2.395)	(2.297)
CREDIT_SCORE	-0.003	-0.002	-0.002	-0.002
	(-0.630)	(-0.494)	(-0.372)	(-0.500)
Personal Wealth				
HOME			-0.746**	
			(-2.169)	
HEQ1				-0.531
				(-1.364)
HEQ2				-0.997***
				(-2.422)
HEQ3				-0.767
				(-1.611)
NETW1				-0.612

				(-1.172)
NETW2				-0.256
				(-0.512)
NETW3				-0.863
				(-1.547)
NETW4				-0.348
				(-0.531)
Owner Characteristics				
NOT_HS	0.274	0.307	0.340	0.256
	(0.477)	(0.535)	(0.570)	(0.437)
COLLEGE	0.243	0.212	0.191	0.261
	(0.829)	(0.714)	(0.633)	(0.849)
EXPER	-0.015	-0.014	-0.012	-0.010
	(-1.036)	(-0.960)	(-0.834)	(-0.667)
MANAGE	-0.591	-0.573	-0.538	-0.500
	(-1.383)	(-1.302)	(-1.210)	(-1.171)
OWNSHR	-0.001	-0.002	-0.002	-0.001
	(-0.188)	(-0.317)	(-0.282)	(-0.247)
Firm Characteristics				
LNASSET	-0.030	-0.043	-0.017	-0.003
	(-0.309)	(-0.439)	(-0.175)	(-0.028)
LNTOTEMP	-0.037	-0.028	-0.047	-0.031
	(-0.250)	(-0.186)	(-0.308)	(-0.204)
SALEASST	0.009	0.008	0.009	0.011
	(1.471)	(1.330)	(1.322)	(1.449)
LIABASST	-0.001	-0.001	-0.001	-0.002
	(-0.115)	(-0.158)	(-0.164)	(-0.225)
PROFASST	-0.048*	-0.046*	-0.048	-0.055*
	(-1.788)	(-1.686)	(-1.611)	(-1.684)
LNAGE	-0.205	-0.217	-0.204	-0.191
	(-1.232)	(-1.294)	(-1.216)	(-1.074)
CCORP	-0.442	-0.509	-0.464	-0.427
	(-1.214)	(-1.368)	(-1.242)	(-1.106)
SCORP	-0.434	-0.467	-0.379	-0.353
	(-1.262)	(-1.353)	(-1.090)	(-1.004)
PARTNER	-0.410	-0.459	-0.410	-0.470
	(-0.800)	(-0.869)	(-0.774)	(-0.846)
NATN	0.623*	0.623*	0.658*	0.628*
	(-0.250)	(1.757)	(1.829)	(1.749)
OUTSD	0.451	0.489	0.501	0.354
	(0.714)	(0.755)	(0.804)	(0.540)
REG	0.177	0.178	0.203	0.143
	(0.669)	(0.667)	(0.753)	(0.523)
MSA	0.532	0.577*	0.559*	0.473
	(1.623)	(1.739)	(1.690)	(1.467)
Relationship Characteristics				
REL_PRIM	0.014	0.015	0.016	0.016
	(0.882)	(0.920)	(0.933)	(0.991)
SOURCES	-0.074	-0.075	-0.071	-0.062
	(-0.959)	(-0.953)	(-0.910)	(-0.800)
TCUSE	-0.202	-0.153	-0.153	-0.156
	(-0.760)	(-0.572)	(-0.567)	(-0.590)
CHECKING	0.802	0.827	0.751	0.730
	(1.258)	(1.274)	(1.158)	(1.103)
SAVING	-0.054	-0.042	-0.058	-0.077
	(-0.201)	(-0.152)	(-0.210)	(-0.276)
PRIM_FIN	-0.841	-0.864	-0.868	-0.948

	(-1.327)	(-1.353)	(-1.376)	(-1.445)
LOAN	-0.137	-0.138	-0.085	-0.081
	(-0.513)	(-0.514)	(-0.314)	(-0.290)
Sample Size	948	948	948	948
Pseudo R-squared	0.303	0.312	0.318	0.332

See Table 3 for variable definitions. The models include all the variables in Table 3.

***, **, * indicate significance at the one, five, and ten percent levels, respectively.

[a], [b], [c] indicate the demographic indicator and its interaction with the HHI are jointly significant at the one, five, and ten percent levels, respectively.

	(-1.327)	(-1.353)	(-1.376)	(-1.445)
LOAN	-0.137	-0.138	-0.085	-0.081
	(-0.513)	(-0.514)	(-0.314)	(-0.290)

Table 5

Predicted Probabilities of Loan Denial by Lender Market Concentration

Panel A: Estimates based on the results in Table 4, Column 2 (i.e., excluding personal wealth)

Herfindahl-Hirshman Index	White	African American	Hispanic	Asian
10th Percentile (HHI= 0.11)	0.23	0.38	0.48	0.41
25th Percentile (HHI= 0.14)	0.24	0.42	0.46	0.42
Median (HHI= 0.18)	0.25	0.48	0.42	0.43
75th Percentile (HHI= 0.25)	0.27	0.58	0.36	0.44
90th Percentile (HHI= 0.33)	0.29	0.70	0.30	0.46

Panel B: Estimates based on the results in Table 4, Column 4 (i.e., including personal wealth)

Herfindahl-Hirshman Index	White	African American	Hispanic	Asian
10th Percentile (HHI=0.11)	0.24	0.40	0.46	0.40
25th Percentile (HHI=0.14)	0.24	0.44	0.43	0.41
Median (HHI=0.18)	0.25	0.49	0.40	0.41
75th Percentile (HHI=0.25)	0.26	0.59	0.34	0.42
90th Percentile (HHI=0.33)	0.28	0.69	0.28	0.44

Table 6

Endowment Effects

Panel A:
Total Endowment Effect[a]

	White	African American	Hispanic	Asian
Denial Rates (Sample means)	.241	.618	.497	.524
Mean Predicted Probability of Denial Based on the White Coefficient Estimates	.241	.367	.317	.317
Percent of difference explained by differences in endowments	n/a	33.5%	29.7%	27%

Panel B:
Endowment Effects by Individual Characteristics[b]

	African American	Hispanic	Asian
Personal Wealth	0.011 (2.92)[c]	0.030 (11.72)	0.033 (11.66)
Credit History and Credit Score	0.123 (32.63)	0.033 (12.89)	0.003 (1.06)
Owner Characteristics	0.008 (2.12)	0.010 (3.91)	0.004 (1.41)
Firm Characteristics	0.032 (8.49)	0.034 (13.28)	0.029 (10.25)
Relationship Characteristics	-0.003 (-0.80)	0.003 (1.17)	0.021 (7.42)

[a] The total endowment effect is calculated as:

$$\left[\sum_{i=1}^{N^W} \frac{F(X_i^W \boldsymbol{b}^W)}{N^W} - \sum_{i=1}^{N^M} \frac{F(X_i^M \boldsymbol{b}^W)}{N^M} \right]$$

such that X_i^M is the characteristic vector for firm i for group m and $\boldsymbol{b}^W$ is the coefficient vector for group W.

[b] The individual endowment effects are calculated using the boot strapping technique described in Section V. Personal wealth includes HEQ1-HEQ3 and NETW1-NETW4; Credit history includes BANKRUPT, PDELINQ1-3, BDELINQ1-3, JUDGMENT, and CREDIT_SCORE; owner characteristics include NOT_HS, COLLEGE, EXPER, MANAGE and OWNSHR; firm characteristics include LNASSET, LNTOTEMP, SALEASST, LIABASST, PROFASST, LNAGE, CCORP, SCORP, PARTNER, NATN, OUTSD, REG, and MSA; and relationship characteristics include REL_PRIM, SOURCES, TCUSE, CHECKING, SAVING, PRIM_FIN, and LOAN.

[c] Numbers in parentheses represent the percentage of the original difference in denial rates explained by that set of endowments.