The Case of Minority Small Business Owners: Empirical Evidence of Problems in Loan Financing

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Abstract

This academic research explores the availability of loan financing to minority-owned businesses and examines a potential relationship between the size of a loan and the characteristics of a business in the USA. It also investigates the possible impact of different characteristics and quantifiable criteria on credit loan denial across different demographic groups. Probit models are used to evaluate the potential existence of racial or ethnic discrimination in the availability and approval of credit. Regression analysis is used to assess the impact that the race of a small business owner has on the relative size of a denied loan, the size of portioned credit, or the size of the company. When other variables suspected of influencing credit approval and rationing are controlled, black-owned and Asian-owned businesses appear to be less likely to be approved for loans and more likely to experience significantly greater credit rationing than their white counterparts.

Keywords: Credit; ethnicity; loans; racial discrimination; small businesses

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1. Introduction

The Federal Reserve has conducted a Survey of Small Business Finances every five years since 1987 and has provided a series of rich datasets through 2003. These datasets have been used extensively by researchers investigating many aspects of banking practices with regard to small businesses. Many of these studies examined the issue of lending discrimination against women-owned and black-owned businesses and concluded that such discrimination does exist.

This study identifies several characteristics that affect the amount, approval and denial of loans and examines differences in these characteristics of minority-owned and white owned businesses and business owners.

The results support the conclusion of earlier research that lending discrimination exists for black-owned and minority-owned businesses.
2. Literature Review

Small businesses are vital drivers of the U.S. economy (Cavalluzzo & Wolken, 2002; Coleman, 2002; Hardee, 2007). According to The Facts about Small Business 1999 small businesses contribute up to 75 percent of new jobs. They are also substantial contributors to the private gross domestic product. However, small businesses have restricted access to the publicly traded capital markets. Thus, they often seek out loans to help meet their needs for capital. This results in their being very dependent on the financing of commercial banks (Hardee, 2007). Thus, financing of small business is an important issue for strengthening the economy and increasing the country’s gross domestic product. Discrimination against minority-owned businesses with respect to credit is thus somewhat problematic for a society that seeks to expand economic opportunities to minorities.

Loan financing to minority-owned businesses is typically less available than loan financing to white-owned businesses. Toussaint-Comeau & Rhine (2003) studied racial discrimination and credit rationing by examining small business start-ups in Chicago, Minneapolis and St. Paul Neighborhoods. They found that racial differences exist in the source and amount of start-up financing. According to these authors, white-owned start-ups used more bank loans than minority-owned start-ups. Cole (2009) investigated different variables influencing approval of credit lines utilizing data gathered in 1993, 1998, and 2003. Small privately held firms were classified based on credit need into one of four distinct groups. Significant differences were noted among these groups. “On-going borrowers” look very similar to the “approved borrowers”. While some of the characteristics of the “discouraged borrowers” strongly resemble “denied borrowers,” they were also significantly different in several aspects. “Discouraged borrowers” are those that choose not to apply because they expect their applications to be denied (Levenson and Willard, 2000). Cole’s (2009) most relevant conclusion for this research was that “black-owned firms were denied credit at a far higher rate than firms with owners who were white.” Coleman (2002) also concluded that it is less likely for companies with white ownership or management to be turned down for a loan than their black-owned or hispanic-owned counterparts.

Prior research has shown that loans were less available and rationed for minority-owned businesses. Blanchflower, Levine and Zimmerman (2003) used the data from the 1993 and 1998 Survey of Small Business Finances for their inquiry. The primary objective of this research was to examine racial discrimination broadly operating in credit markets affecting small businesses. They discovered that black-owned economic entities were significantly more likely to be turned down for a line of credit. The authors also concluded that inconsistencies exist in the credit availability for blacks. Furthermore, black owners of small businesses frequently reported issues related to the availability of credit in the past and that they expected this pattern would continue in the future. One surprising result was that they did not find additional evidence of such credit disparity for other minorities or for women. Finally, these authors conclude that the fear of being turned down due to prejudice or discrimination generally discourages black-owned companies from applying for loans. Coleman (2002, 2005) also discovered that black-owned firms are reluctant to apply for a line of credit due to the strong belief that it will be denied.

Restricted access to capital goes beyond the acceptance or rejection of loans as loan sizes can also vary. When restrictions are placed on the sizes of loans offered, they are said to be rationed. Park and Coleman (2009) attempted to
determine whether financial institutions are rationing credit to minority-owned firms by using data from the 2003 Survey of Small Business Finances. They found that the credit supply to black-owned firms is “even more severely constrained” than the credit supply to firms owned by other minorities.

There are many other covariates besides ethnicity that may influence the loan application process for small businesses: Size of the business, the organizational structure, the total assets, the total liabilities, and the total amount of the loan applied for, and so on. These also present a variety of challenges for owners of these companies. Kjenstady and Su (2012) claim that there is a strong disparity between the lender’s and borrower’s estimates of a loan’s total amount. Unsurprisingly, borrowers prefer to be considered for higher amounts at the stated interest while lenders prefer to offer a lower amount. Ardeni and Messori (1994) found that the strong presence of internal economies of scale or the transaction cost of a long indicated a higher quality for the financed project while the presence of external economies of scale or organizational costs signaled a lower quality. Overall, their model demonstrated that project quality, project return, and the total loan amount ultimately depended upon the organizational complexity of the project being financed. According to Syrneonidis (1996), very small firms do very little research and development and thus produce fewer innovations. He also stated that research and development seems to increase relatively proportionally with size, although there are variations to this pattern across industries, time periods and countries.

When the loan is within established parameters, however, then different variables play a role in the approval and the amount of the loan. In this case, the total amount of the borrowed funds could be pegged to the quality and nature of the project or program the monies are to support. At this stage of the process, prior research indicates that the ethnicity of the owners of the borrowing entity does not have a negative impact on approval.

This paper explores the availability of loan financing to minority-owned businesses and investigates the possible relationship between loan size and business’ characteristics. Of particular interest is the overall size of the economic entity applying for the loan. The first section has provided the reader with a short literature review. The second section describes the analysis methodology: Hypotheses, data acquisition, variables, and models. The third section presents the results of both univariate and multivariate statistical analyses. In the final section, the findings are discussed and conclusions are drawn.

3. Methodology

3.1. Hypotheses

This study intends to continue along the lines of prior academic research by investigating the possible existence of racial/ethnic discrimination in the availability and approval of credit. As such, “discouraged borrowers” will not be controlled for in our model as the lack of credit availability within this group brought on by the beliefs and actions of the borrower and not the lender. This study will examine firms with specific forms of ownership in specific time periods. Consequently, the first null and alternative hypotheses are:

H₀₁: The probability of credit approval is the same for small business owners of any race.
vs

$H_{1.1}$: The probability of credit approval differs depending upon the race of small business owners.

If sufficient evidence is found to reject $H_{0.1}$, then there is evidence of the possibility of racial discrimination taking place in the credit approval process.

The second set of hypotheses relate to the size of the loan. As prior research has indicated that this may be influenced by the perceived quality of the project and the total amount of credit applied for by the business, thus these characteristics must be considered as part of the analysis. Furthermore, the size of the loan and the overall impact of denial are correlated with company size. Thus, the amount of the rejected loan will be examined in relation to the race of small business owners. The literature provides many different ways to measure overall company size: Total revenues, total individuals employed, total assets, the level of multinationality, the number of divisions, and so on. For the purpose of this research, the size of the firm will be determined by the total amount of revenue generated in a given period of time. Consequently, the second null and alternative hypotheses are:

$H_{0.2}$: The race of a small business owner has no effect on the amount of credit denied relative to firm size.

vs.

$H_{1.2}$: The race of a small business owner has an effect on the amount of credit denied relative to firm size.

If sufficient evidence is found to reject $H_{0.2}$, then there is evidence of the possibility of racial discrimination taking place in the credit denial process.

3.2. Data Acquisition

The data utilized in this study came from the 2003 Survey of Small Business Finances. This database provided a nationally representative sample of small businesses in the United States and included a wide variety of variables. The research population is all for-profit non-financial non-agricultural non-subsidiary business enterprises. The selected companies employed fewer than 500 employees and were a going concern as of year-end 2003. The time coverage for this study is the years 2001-2003. The majority of the surveys in this database were completed during the latter half of 2004, with the cut-off period for the income statement and balance sheet being the firm’s fiscal year end. Those whose fiscal year ended between July 1 and December 31 were reported as companies with fiscal year ends of 2003. Those who ended between January 1 and June 30 were reported as companies with fiscal year ends of 2004.

The current study used a stratified random sample to ensure adequate representation of certain smaller subgroups within the population so that reliable estimates for these subgroups are possible. This technique is known as “oversampling.” The sample itself was drawn from 72 strata based on a cross-classification of three variables: total employment size, urban/rural status, and census division. These strata were formed into five groups with closely connected characteristics, known as “implicates,” which allow for the adjustment of the estimated standard errors and confidence intervals. As there were missing values within the dataset that had to be imputed, the use of implicates also allowed for the correction of additional variance that this process may have caused. Statistical tests on these imputed
variables were conducted according to the procedures in the 2007 update to the *Survey of Small Business Finances Technical Codebook, 2003*. Within each implicate, a sample of 4,240 firms was randomly chosen. The final dataset for this analysis consisted of 21,200 of the 6.3 million small business firms in the original dataset available for academic research.

### 3.3. Variables

Table 1 provides the full description of all of the variables utilized in the current study. “Approved” is an indicator dependent variable indicating whether the firm’s loan application was approved (1) or not approved (0) within the previous three years. Several independent variables were transformed through the use of the logarithmic function to reduce skewness: Wealth (LogWealth), return-on-equity (LogROE), debt-to-equity (LogD/E), and sales (LogSales).

The Wealth variable measures of the owner’s personal wealth and was used as an indicator of a company’s creditworthiness. Firms are considered more creditworthy when owners of that firm possess higher level of personal asset as those assets might be pledged as collateral against the firm borrowings.

Return-on-equity measures the profitability of the firm. It has been assumed that more profitable companies have a higher chance to be approved for a loan as they are in better position to pay that liability off due to their revenue stream (Coleman, 2001).

Debt-to-equity measures a company's financial leverage. The ratio indicates the proportion of debt and equity that the company is using to finance its assets and represents a company’s exposure to risk. In this study, a company’s total debt is increased by the amount identified in the loan application. Unfortunately, the *Survey of Small Business Finances 2003* provides no information about borrowers’ collateral and guaranties on their most recent applications. Prior research has utilized total equity divided by the total amount of credit requested as a proxy for the potential availability of collateral to support a loan. The current model excludes this variable as the debt-to-equity ratio is already adjusted by the value of loan applications and thus serves as a substitute for the cover ratio.

Total sales are used as a proxy for the size of a firm. Prior research discovered that larger firms have a better chance of getting a loan than their smaller counterparts (Coleman, 2005). This then raises the question of what is the appropriate measurement of firm’s size. Most recent fiscal year sales have been proposed by some scholars as the most appropriate indicator for a company’s size. Coleman (2004) asserts that expanding companies might be more attractive to lenders due to the constant growth of sales and revenues. According to Hardee (2007), more profitable firms with consistent annual sales growth are more likely to obtain credit. Therefore, the current study also controls for growth. This variable is calculated by comparing most recent annual total sales with those for the previous fiscal year.

According to prior research, a decline in dissipative costs of collateral or an increase in the loan size leads to a lower equilibrium collateral utilization (Boot, Thakora, and Udel, 1991). Jiménez and Saurina (2004) found a decreasing relationship between the size of the loan and the probability of default. They also indicated that financial institutions scrutinize loan characteristics more rigorously when lending larger amounts of money. However, Jacobson & Roszbach (2003) and Roszbach (2004) found that the total amount of the loan has no significant influence on the
default risk of a credit portfolio. In the current research, it is assumed that the possibility of the denial of an application might be impacted by a proportionately increasing risk correlated with the total amount of the most recently applied-for loan.

An additional variable that is known to strongly impact the probability of loan approval for small businesses in general is the relationship between the borrowing entity and the financial institution the entity is borrowing from. According to Robb & Wolken (2002), a firm that maintained a long-term relationship with a financial institution was most likely to get credit. Thus, “Relation” is a continuous variable representing the length of time in months of the relationship between a company and the financial institution that approved or denied the most recent credit application.

Coleman (2003) also suggested that organizational structure of the firm might have a strong relationship to the approval/denial of credit applications. He suggested companies organized as corporations have higher probabilities to get their loan applications approved since this form of organizational structure is more attractive to financial institutions. Organization type (Org) was included in the model as an indicator variable coded to indicate if the firm was organized as a limited liability corporation or partnership, or if it was an S-corporation or a C-corporation.

According to Becker (1957), greater loan-market competition indicated by a lower Herfindahl index should discourage taste-based discrimination. Therefore, an indicator variable (HHI) for Herfindahl index above 1800 has been included to measure loan-market competition. Firms located in urban areas might experience difficulties with securing debt capital due to red lining and the unwillingness of banks to locate in those areas (Coleman, 2005). Thus, another indicator variable (Urban) has been created to indicate whether a firm is located in a Metropolitan Statistical Area.

It is general practice for financial providers to consider a firm’s credit rating and the presence of bad credit in the decision-making process of loan approvals. An indicator variable (Risk) was created to indicate firms that are rated by Dun & Bradstreet as having “significant risk” or “high risk.” The indicator variable (Bad Cred) indicates either (a) firms or principal owners that have declared bankruptcy within the last 7 years, (b) the principal owner was delinquent on personal obligations within the past 3 years, (c) the firm was delinquent on business obligations within the past 3 years, or (d) judgments were rendered against the owner or firm within the past 3 years.

Some researchers have found a relationship between industry classification and access to debt capital (Coleman, 2002). Firms in non-asset intensive industries might have difficulty when providing collateral. To control for this, four indicator variables to indicate specific industries have been created: Transportation (Transp), insurance (Insre), retail (Retail) and construction or mining (Consmin). Due to the limited numbers of minority-owned firms in some industries, an indicator variable (Industry) indicating that a firm belonged to a manufacturing industry was used when considering credit rationing.

Owner characteristic may also influence a firm’s relationship with the bank (Coleman, 2003). Experience (Exp) is the weighted average of the owners’ experience in managing or owning a business. The age of the owners and the age of the firm have been excluded due to being highly correlated with experience. Education (Edu) is an indicator variable indicating that at least one-third of a firm’s owners have at least a college degree. As mentioned in the literature
review, some scholars have found that race might affect the credit application denial/approval, with black and Hispanic business owners experiencing higher denial rates than whites (Cavalluzzo & Cavalluzo, 1998, Cohn & Coleman, 2001). To measure the probability of the denial of loan application based on race, indicator variables were created to indicate at least 50% ownership by a Black (Black), a Hispanic (Hispan) or an Asian (Asian).

3.4. Limitations

The financial crisis of 2008 exposed weakness within the global financial system and added greater risk to credit markets. The chain reaction that resulted limited owners’ ability to secure less expensive credit for small businesses assuming they could secure any credit at all. As the data used in this study was taken from a survey completed before this crisis occurred, this paper does not consider the effect of the 2008 financial crisis and the resulting economic disruption on the ability for small businesses to borrow after the economy fully recovers.

3.5. Models

Both sets of hypotheses consider the impact of race once other potential confounding independent variables have been controlled. These variables, derived from studies on racial discrimination and credit denial, form the vectors of relevant firm and owner characteristics. In these vectors, race was separated into three indicator variables: Black, Hispanic, and Asian. The baseline state (Black = 0, Hispanic = 0, Asian = 0) indicates a firm that is not majority owned by persons of one of these particular races. The specific variables in these vectors are found in the appendices: X_1 in Appendix 3 and X_2 in Appendix 4 will be used to examine the first set of hypotheses, while X_3 in Appendix 5 will be used to examine the second set.

For the first set of hypotheses, each firm first needed to be evaluated based on whether it was likely to apply for a loan. As a firm either does so (Y_1 = 1) or not (Y_1 = 0), the dependent variable in this case is dichotomous. The probit selection model, as described by Cole (2009), is used for this. Probit models are a variation of regression that estimates the probability that an observation will be categorized into one of two groups based on the independent variables (Bliss, 1934). Specifically,

\[ Y_1 = \begin{cases} 
1 & \text{if } \beta'_1 X_1 + \varepsilon_1 > 0 \\
0 & \text{otherwise} 
\end{cases} \]  

(1)

where \( \varepsilon_1 \) are independent and identically distributed Normal(0,1). The parameters of this model were estimated by maximum likelihood and can be found in Appendix 3. As a selection model, those observations that have an estimated probability of applying for a loan that is greater than 0.5 were retained for the second stage for this evaluation. As a firm that applies is either approved (Y_2 = 1) or not (Y_2 = 0), the probit model is again used:

\[ Y_2 = \begin{cases} 
1 & \text{if } \beta'_2 X_2 + \varepsilon_2 > 0 \\
0 & \text{otherwise} 
\end{cases} \]  

(2)

where \( \varepsilon_2 \) are independent and identically distributed Normal(0,1). The parameters for this model were also estimated by maximum likelihood and can be found in Appendix 4. As equation (2) models the probability of a firm being
approved for credit, examination of the significance of the parameters related to the Black, Hispanic, and Asian independent variables for this model will establish the believability of $H_{1.1}$.

To test the second hypothesis about credit rationing, the dependent variable is now the amount of credit denied relative to firm size. As this is a ratio-scaled quantitative variable, ordinary least squares regression is used:

$$Y_3 = \beta_1 X_3 + \varepsilon_3$$

(3)

where $\varepsilon_3$ are independent and identically distributed Normal(0,1). As equation (3) models the amount of credit denied relative to firm size, the significance of the parameters related to the Black, Hispanic, and Asian independent variables for this model will establish the believability of $H_{1.2}$.

4. Results

4.1. Univariate Analysis

A univariate analysis was to compare businesses owned by whites with those owned by minorities. Differences between the means for continuous variables and between the proportions for dichotomous variables are shown in Tables 2A and 2B. These tables examine the differences for businesses that applied for a loan, businesses that did not apply for a loan, businesses that had a loan application approved, and businesses that were denied.

For businesses that applied for a loan in the last three years, there were significant differences between white and minority owned businesses for several variables. The average size of the loan applied for by minority owned businesses was only 63.1% of the average size of the loan applied for by white owned businesses. Generally speaking, minority owned businesses that successfully applied for loans were less profitable than those owned by whites. The average ROA for these minority owned businesses was 44.4% of the average ROA for white owned businesses.

The average net profit for minority owned businesses was 43.1% of the average profit for white owned businesses. Interestingly, a higher proportion of minority owned businesses experienced growth (0.56) than white owned businesses (0.49). However, some of this may be due to the fact that minority owned businesses that applied for loans appear to be smaller than those owned by whites. Average total assets for minority owned businesses were 77.7% of the average total assets for white owned businesses. Average total liabilities for minority owned businesses were 62.1% of the average total liabilities for white owned businesses. Average sales for minority owned businesses were 74.2% of the average sales for white owned businesses.

Minority owned businesses appear to be more exposed to risk with an average adjusted D/E ratio that was 145.2% that of white owned businesses. The proportion of minority owned businesses (0.62) rated as having significant or high risk was higher than that for white owned businesses (0.46). These differences may also be influenced by the variation in location and industry based on racial group. A higher proportion of white owned businesses were in urban areas (0.23) and in areas with lesser loan market competition (0.51) than minority owned businesses (0.04 and 0.31 respectively). White owned businesses were less likely to be in service (0.39) and more likely to be in insurance or real estate (0.06) or in construction and mining (0.18) than minority businesses (0.59, 0.03, and 0.08 respectively).
There were also significant differences in the owners’ characteristics. Average personal wealth for minority owners was 58.3% that of white owners. Minority owners had on average 5.5 years less experience than white owners. Minority owners had on average slightly more than 2 years less time in relationship with the financial institution. Interestingly, the proportion of businesses that had at least one-third of the owners with a college degree was higher for minority owned businesses (0.87) than white owned businesses (0.76).

In general, minority owned businesses that were successful in securing a loan were smaller, less profitable, carried more debt and were more risky than white owned businesses that borrowed successfully.

Many of the same significant differences were evident for businesses that did not apply for a loan during the last three years. The average Return on Assets (ROA) for minority owned businesses was 4.0% of the average ROA for white owned businesses. The average profit for minority owned businesses was 80.8% of the average profit for white owned businesses. Average total assets for minority owned businesses were 58.8% of the average total assets for white owned businesses. Average equity for minority owned businesses was 59.3% of the average equity for white owned businesses. Average total liabilities for minority owned businesses were 58.4% of the average total liabilities for white owned businesses. Unlike successful minority borrowers, minority owned businesses that did not apply for loans appear to be less exposed to risk with an average adjusted D/E ratio that was 18.4% that of white owned businesses. Despite the lower debt usage, the proportion of minority owned businesses rated as having significant or high risk was about the same as minority businesses that successfully secured a loan (0.62 for minority businesses compared to 0.44 for white owned businesses). White owned businesses (0.50) were more likely to be organized as a limited liability corporation or partnership, or as an S-corporation or a C-corporation than minority owned businesses (0.45). Also influencing these differences may be the variation in location and industry based on racial group. A higher proportion of white owned businesses were in urban areas (0.18) and in areas with lesser loan market competition (0.49) than minority owned businesses (0.09 and 0.35 respectively). The proportions of white owned businesses that did not apply for a loan were comparable to the white owned borrowing businesses, less likely to be in service (0.46) or retail (0.18) and more likely to be in transportation (0.04), insurance or real estate (0.08) or in construction and mining (0.11) than minority businesses (0.54, 0.22, 0.02, 0.05, and 0.05 respectively).

Owners’ characteristics for these non-borrowing businesses were similar to successful borrowing businesses. The average personal wealth for minority owners was 61.2% that of white owners. Minority owners had on average 4.0 years less experience than white owners. Minority owners had on average slightly more than 5 years less time in relationship with their financial institution.

For businesses that had the most recent loan approved, the pattern of differences between white and minority owned businesses again are similar to the businesses that secured a loan within the past three years or did not borrow. The average size of the approved loan for minority owned businesses was only 56.6% of the average size of the approved loan for white owned businesses. Generally speaking, minority owned businesses that had the loan approved were less profitable than those owned by whites. The average ROA for minority owned businesses was 28.8% of the average ROA for white owned businesses. The average profit for minority owned businesses was 58.4% of the average profit
for white owned businesses. Again, a higher proportion of minority owned businesses experienced growth (0.55) than white owned businesses (0.48). The minority owned businesses that had loans approved once more appear to be smaller than those owned by whites. Average total assets for minority owned businesses were 73.3% of the average total assets for white owned businesses. Average total liabilities for minority owned businesses were 70.4% of the average total liabilities for white owned businesses. Average sales, average adjusted D/E and the proportion of businesses with bad credit were, interestingly, not significantly different. A higher proportion of white owned businesses were in urban areas (0.24) and in areas with lesser loan market competition (0.48) than minority owned businesses (0.08 and 0.26 respectively). White owned businesses were less likely to be in service (0.38) and more likely to be in transportation (0.04) or construction and mining (0.16) than minority businesses (0.54, 0.02, and 0.09 respectively). There were again significant differences in the owners’ characteristics. Average personal wealth for minority owners was 69.4% that of white owners. Minority owners had on average 6.1 years less experience than white owners. Minority owners had on average slightly more than 3 years less time in relationship with the financial institution.

A similar pattern of differences was exhibited for businesses that had the most recent loan denied. The average size of the denied loan for minority owned businesses was only 38.4% of the average size of the denied loan for white owned businesses. No significant differences were noted with respect to the average profitability of the businesses. Yet again, a higher proportion of minority owned businesses experienced growth (0.62) than white owned businesses (0.44). The minority owned businesses that had loans denied were not significantly different from white owned businesses in terms of average sales, average total assets or average profit.

Average total liabilities for minority owned businesses were 31.9% of the average total liabilities for white owned businesses. White owned businesses (0.68) were more likely to be organized as a limited liability corporation or partnership, or as an S-corporation or a C-corporation than minority owned businesses (0.46).

The proportion of firms rated as having “significant risk” or “high risk” by Dun & Bradstreet were higher for minority owned businesses (0.80) than for white owned businesses (0.69). A higher proportion of white owned businesses were in urban areas (0.16) and in areas with lesser loan market competition (0.50) than minority owned businesses (0.03 and 0.39 respectively). White owned businesses were less likely to be in service (0.35) and more likely to be in construction and mining (0.13) than minority businesses (0.57 and 0.04 respectively).

Significant differences in the owners’ characteristics also occurred for those whose loans were denied. Average personal wealth for minority owners was 40.3% that of white owners. Minority owners had on average 5.4 years less experience than white owners. Minority owners had on average slightly more than 2 years less time in relationship with the financial institution. Again, the proportion of businesses that had at least one-third of the owners with a college degree was higher for minority owned businesses (0.78) than white owned businesses (0.73).
Regardless of whether or not a business has secured a loan, not borrowed or has been refused a loan, similar differences exist between minority owned and white owned firms. The complexity of the differences noted during the univariate analysis suggest that a multivariate analysis would be more appropriate for explaining these relationships.

4.2. Multivariate Analysis

As applying or not for a loan and being approved or not for a loan are both dichotomous response variables, probit models will be used to evaluate \( H_{0.1} \): The probability of credit approval is the same for small business owners of any race. Table 3 provides the results of the first stage evaluating the likelihood of application for a loan. Once the other variables potentially influencing this situation have been controlled for, it becomes apparent that black small business owners are no less likely to apply for credit than white small business owners. However, Hispanic and Asian small business owners are both significantly less likely to do so. Table 4 provides the results for the second stage, which performed a probit analysis on businesses that were evaluated in the first stage as likely to apply for a loan. This stage evaluated the likelihood of approval of the loan. Again, other variables potentially influencing the situation were included in the model to mitigate their effects. It is now apparent that a small business owner being either Asian or Black has a significantly negative effect on the probability of credit approval. Furthermore, the marginal effect of a small business owner being black has the greatest marginal effect of all of the variables under consideration. Sufficient evidence has been found to reject \( H_{0.1} \), thus there is evidence of the possibility of racial discrimination taking place in the credit approval process.

As the amount of credit denied relative to firm size is a continuous response variable, regression analysis will be used to evaluate \( H_{0.2} \): The race of a small business owner has no effect on the amount of credit denied relative to firm size. Table 5 contains the results of the regression analysis. Once other potentially influential variables have been included, such as whether at least one-third of the owners have at least a college degree, small businesses owned by Blacks and by Asians experienced significantly greater credit rationing. Sufficient evidence has been found to reject \( H_{0.2} \), thus there is evidence of the possibility of racial discrimination taking place in the credit denial process.

To follow up on these results, the regression was run twice with the dataset segmented into two groups: White small business owners and minority small business owners. These results are shown in Table 6. Once other potentially influential variables are controlled, two variables stand out significantly. As the level of leverage of a firm increased, the amount of loan denied relative to firm size also increased. When a firm had at least one-third of its owners having a college education, the amount of loan denied relative to firm size again increased.

The same two variables are significant when considering minority owners, however the marginal impact of these two have reversed in level of significance. Many more variables than for the white-only analysis also show significant marginal impact, reflecting both the characteristics of the owner and characteristics of the business. Interestingly, wealthier minority owners experienced greater credit rationing as did minority-owned businesses with greater ROA and those in the service industry.
5. Conclusion

Entrepreneurs and small businesses need access to capital, including debt capital. If small businesses are to play a role in leading economic growth, small businesses must be able to secure loans. If minority-owned businesses are to share in the economic opportunities available in a mature market economy such as the United States, full access to loans is necessary. The research presented here suggests that minority owned businesses are less likely to apply for loans as well as less likely to be approved for loans than their white counterparts. As such, these businesses are also subject to more serious capital constraints than white owned businesses and therefore, less likely to thrive and grow.

Further research is needed to determine how best to mitigate the effects of credit rationing to enable minority-owned businesses to meet their funding requirements. One focus of this research should be on the actions accountants, financial advisors, legislatures and other government policy makers should consider to help minority-owned businesses succeed in securing access to needed capital.

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