

## **A Test of Cultural Affinity in Home Mortgage Lending\***

by

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### Abstract

This paper assesses cultural affinity as a potential explanation for observed racial disparities in mortgage rejection rates. Two formulations of the theory have evolved in the literature. The taste-based cultural affinity hypothesis asserts that lenders have a blanket preference for members of the same race, while the common bond hypothesis asserts that cultural affinity allows lenders to better assess the credit quality of members of the same race. The analysis involves tests that focus on the experiences of applicants with marginal credit quality, as the two theories offer conflicting predictions regarding their application patterns and treatment by lenders. The results of these tests provide weak support for the existence of taste-based cultural affinity, but contradict the predictions of the common bond form of the theory.

## A Test of Cultural Affinity in Home Mortgage Lending

National data on the disposition of applications for home mortgages reveals wide disparities in rejection rates among racial and ethnic groups. Some have advanced race-based cultural affinity as a possible explanation for these disparities. The literature has developed two related, yet distinct versions of cultural affinity. In the taste-based form of the theory, lenders have a preference, or “taste,” for members of their race. In the common bond formulation, the affinity allows lenders to better assess the quality of members of their race. Each version of the theory yields a number of testable implications.

Most previous research has focused on the theoretical implications centering on differences in overall rejection rates for white and minority applicants for mortgages. Unfortunately, such tests are not always definitive, particularly regarding the common bond form of the theory. This paper proposes and conducts more definitive tests that focus on theoretical implications regarding the experiences of *marginal applicants* and rely on the assumption that affinities are race-specific. If this assumption is true, then the two formulations offer different implications regarding the application and rejection patterns that should be observed for marginal applicants across banks with different bank owner ethnicity. For example, the taste-based theory implies that marginal applicants of a given race will seek out banks of the *same* ethnic background. By contrast, the common bond form of the theory implies that such applicants will seek out banks of a *different* ethnic background. This is because marginal applicants will strategically capitalize on “errors” in the evaluation of their credit quality that are more likely to occur at banks of a different ethnic background. Similar conflicting implications can be derived regarding a lender’s accept/reject decision for a loan application from a marginal applicant.

This research empirically tests these hypotheses using a two-equation selection model that accounts for the fact that applicants choose the bank to which they will apply. The model is applied to a sample of applications to black-owned, Asian-owned, and white-owned peer banks. The results of these definitive tests can help produce a better understanding of the role of cultural affinity—both taste-based and common bond—in shaping outcomes in mortgage markets.

The results provide no evidence consistent with the common bond form of the theory. There are no cases that suggest that marginal applicants seek out lenders of a different ethnic background or that banks approve applications from opposite-race individuals with marginal credit quality more frequently. By contrast, there is some evidence consistent with the notion of taste-based cultural affinity, as we observe marginal applicants avoiding banks with a different ethnic background in three of the four sample years. These findings, which conform with those in other studies, are only weakly supportive of the taste-based theory, however, as they imply a shying away from opposite-race pairings rather than a seeking out of same-race pairings.

No evidence supporting the taste-based form of the theory is present in the accept/reject results, a finding that differs from those in Hunter and Walker (1996), the only other study to examine the experiences of marginal applicants. Hunter and Walker (1996) find evidence supporting taste-based cultural affinity in their analysis of accept/reject decisions, but do not incorporate the possibility of non-random applicant sorting among banks into their approach. The differing results suggest that the explicit consideration of the applicant's ability to select which bank to apply to in the empirical specification may be important for gaining a complete understanding of the mortgage lending process.

There are a number of potential shortcomings that may influence the results. First, the racial makeup of a bank's ownership might not be an appropriate signal of the type of affinity banks have with groups of applicants. In addition, data limitations necessitate the use of a rough proxy to identify applicants of marginal credit quality that may not adequately identify those on the margin. If either is true, the power of the tests is weakened.

The paper proceeds as follows. The theoretical foundations of the two cultural affinity hypotheses and the predictions that emerge from them are discussed in the next section. After that, the empirical approach and the data used to conduct the analysis are described. The results and conclusions follow.

## **1. Cultural Affinity - The Theory and Its Implications**

The theoretical literature on cultural affinity has developed two related but distinct notions of affinity. In both formulations, decision-makers have an affinity towards members of their own group ("same group members") and against members of other groups. However, the two differ in the way the affinity affects the decision-making process. This section describes the two types of cultural affinity and their main testable implications.

### *1.1 "Taste-based" cultural affinity*

The early literature on discrimination, first developed in Becker (1971) and later applied to lending by Peterson (1981), puts forth the notion that discrimination can occur if agents have a "taste" for discrimination, such that favoring same-group members or discriminating against other-group members is utility maximizing. This yields implication T1.

*Implication T1: Lenders will favor same-group applicants over other-group applicants.*

Clearly, taste-based cultural affinity will have its largest impact on applicants closest to the accept/reject threshold, who I define as “marginal applicants.” Regardless of whether they are a member of the same-group or other-group from a lender’s perspective, all applicants who are clearly qualified (unqualified) for a loan will be approved (rejected) by the lender. However, marginal applicants can benefit or be harmed by affinities. For example, the affinity could cause a lender to increase its assessment of same-group applicants whose quality is just below the established accept/reject threshold such that they are viewed to be creditworthy. Similarly, marginal other-group applicants of a quality just above the threshold could be penalized by such lenders, such that they are no longer deemed worthy of credit. Thus, a further implication of the theory is implication T2.

*Implication T2: Lenders will favor marginal same-group applicants over marginal other-group applicants.*

The taste-based cultural affinity hypothesis has an additional testable implication. If applicants recognize the presence of taste-based cultural affinity, one might expect that they would act strategically to maximize their likelihood of success. In particular, implication T2 suggests that marginal same-group applicants will strategically seek out same-group lenders in deciding where to submit an application, because the lender’s same-group affinity will make the applicant’s approval more likely.

*Implication T3: Marginal applicants will seek out same-group lenders.*

In practice, researchers have found identifying the existence of taste-based affinity to be extremely challenging, largely because data on the decisions of individual mortgage lending officers and their personal profiles is rarely available. Thus, explicitly demonstrating the

existence of an affinity along some dimension that favors one group and disadvantages another is quite difficult. As a result, researchers have sought other means for testing for taste-based affinity in lending. For example, implication T1 suggests that lenders with a taste for discrimination might impose more stringent underwriting requirements on other-group applicants. If the distribution of credit quality is the same for both groups, this would result in higher rejection rates for the pool of other-group applicants relative to the pool of same-group applicants. However, the theory also implies that the average credit quality of accepted other-group applicants should be higher than that of accepted same-group applicants. Thus, the accepted other-group applicants should have lower default rates. It should be noted that, if the same- and other-group applicants have very different risk profiles, average relationships may not reflect these expected relationships.

Many empirical studies have tested for these implications using race as the dimension of discrimination. The evidence on this matter is mixed, as research has found support for the first implication of the theory but has generally not regarding the second. For example, Munnell, et al. (1996), Black, Collins, and Cyree (1997), and others find that minority applicants for mortgages are rejected more frequently than comparable white applicants. On the other hand, the implication that default rates should be lower among black applicants is not borne out in a study of the FHA mortgage market by Berkovec, et al. (1994). In fact, the study finds that blacks default more often than comparable whites in FHA mortgage programs, which would suggest that taste-based racial affinities are not present in the FHA mortgage market.

## *1.2 “Common bond” cultural affinity*

More recently, a literature has emerged showing that results equivalent to those that would arise if taste-based discrimination existed can occur even when agents do not have tastes for discrimination. In the context of the debate on the presence of illegal racial discrimination, this argument is important because it introduces the possibility that observed racial differentials in denial rates represent justifiable and legal actions by dispassionate decision-makers rather than illegal activities by unscrupulous lenders.

Here, differential rejection rates are observed if two conditions are satisfied: (1) agents screen applicants before making a decision, and (2) because of their common bond with same-group members, agents can better distinguish between high- and low-quality same-group applicants than between high- and low-quality other-group applicants. Focusing on labor hiring decisions, Cornell and Welch (1996) (hereafter CW) develop a model with these features and show that “people will tend to hire others of their own type even when they have no innate preference for similar people and even when they (correctly) believe that the distribution of quality among people of their own background is no different from the distribution of quality among people of other backgrounds” (p. 544).

This is because the screening leads to the following rank-ordering of applicants: high-quality same-group applicants, all other-group applicants, low-quality same-group applicants. Because they are unable to distinguish between high- and low-quality other-group applicants, agents will assign the average quality of the other-group applicants to every other-group applicant. Since this average quality will necessarily be higher than the low-quality, all other-group applicants will be ranked higher than the low-quality same-group applicants.



CW refer to this “common bond” affinity mechanism as “screening discrimination.” For hiring, because the employer will likely hire only a small number of applicants (usually one), screening discrimination will almost always lead to exclusive hiring from among same-group members. More generally, if the cutoff for acceptance of an application is set above the average quality of the other-group applicants, the rejection rates for other-group applicants will exceed those for a comparable pool of same-group applicants. Note that this occurs independent of the number of same-group and other-group applicants.

Calomiris, Kahn, and Longhofer (1994) (hereafter CKL) develop a very similar model that is tailored to lending markets and, as did the research examining taste-based discrimination, focus on race as the dimension of discrimination. CKL assume that lenders (who are primarily white) can more accurately evaluate the credit quality of applicants with similar backgrounds and experiences than those with different histories, i.e. minorities. For minority applicants, then, lenders are forced to do one of two things: gather additional information at extra cost or rely on the less useful information from the application in making a decision. In either case, lenders will theoretically apply more stringent decision rules for minority applicants. CKL show that, in such an environment, denial rates and average default rates will be higher among minorities. Thus, observed rejection rate disparities can be reconciled with the presence of discrimination. CKL call the increased ability to evaluate the credit quality of applicants with similar backgrounds and experiences “cultural affinity.” CKL is one of a number of information-based theories, such as Lang and Nakamura (1993), developed in this context.

The CW and CKL models offer the same prediction regarding the predicted pattern of discrimination in lending, namely that white lenders will favor white applicants over minority

applicants. In the presentation of their model, CKL assume for simplicity that all lenders are white. However, given that lenders have different ethnic backgrounds, and if one assumes that affinity operates uniformly across ethnic groups, this result can be generalized as implication B1a.

*Implication B1a: Lenders will favor same-group applicants over other-group applicants.*

Implication B1a will hold if lenders establish an approval threshold that exceeds the average quality level of the other-group applicants. Longhofer (1996) shows that, if such a “common bond” affinity operates and the threshold for acceptance is below the average quality level of other-group applicants, lenders have an incentive to discriminate *against* same-group applicants. In the extreme case, where the threshold is set below the average quality for the other-group applicants but above the quality of the low-quality applicants, all high-quality same-group applicants and all other-group applicants are accepted and all low-quality same-group applicants are rejected. Thus, rejection rates are higher for same-group applicants than other-group applicants. This yields a result that is the opposite of implication B1a.

*Implication B1b: Lenders will favor other-group applicants over same-group applicants.*

Note that implications B1a and B1b are both consistent with the common bond cultural affinity theory. Both outcomes are possible, with the determining factor being whether the acceptance threshold is set above or below the average quality of the pool of other-group applicants. Thus, general evidence on how lenders treat other-group applicants relative to same-group applicants is not sufficient to determine whether the common bond hypothesis is relevant for lending markets. It can only yield information suggesting the relative positions of the acceptance threshold and the average quality of the other-group applicant pool.

As with the taste-based theory, common bond cultural affinity has implications for the treatment of marginal applicants. Given the rank ordering of applicants that the theory implies, another implication of the theory is implication B2.

*Implication B2: Lenders will favor marginal other-group applicants over marginal same-group applicants.*

To see this, recall that high-quality same-group applicants are preferred to all other-group applicants, who are in turn preferred to low-quality same-group applicants. Clearly, if lenders accept applicants beyond those they can clearly identify as high-quality, low-quality other-group applicants will be accepted before any low-quality same-group applicants. Unlike the evaluation of implications B1a and B1b, evaluations of implication B2 will provide evidence that will either support or refute the theory. If lenders do not favor marginal other-group applicants over marginal same-group applicants, this would suggest that the general framework laid out by CW, CKL, and Longhofer (1996) cannot be used to characterize mortgage markets.

As noted earlier, one would expect applicants to act strategically if they recognized the presence of cultural affinity. In particular, given implication B2, one would expect low-quality same-group applicants to seek out other-group employers or lenders to strategically capitalize on “errors” in the evaluation of their credit quality that other-group lenders make in deciding where to submit an application. This is because these applicants will recognize that same-group employers or lenders will be more able to identify them as lower-quality and thus be more likely to reject their application. For example, only an affinity lender might have negative information about an applicant’s experience with transaction accounts, such as patterns of account management (i.e., “bouncing” checks), that may have accrued from the applicant’s relationships

with the affinity bank. By applying to the other-group employer or lender, the low-quality applicant will, in effect, be moving from the lowest-ranked group from the perspective of the same-group employer or lender to the middle-ranked group from the perspective of the other-group employer or lender. This further implication of the common bond models of cultural affinity, involving strategic “errors,” thus yields implication B3.

*Implication B3: Marginal applicants will seek out other-group lenders.*

Like a test of implication B2, a test of implication B3 will provide evidence that can be used to evaluate the common bond theory. Evidence that marginal applicants apply more frequently to other-group lenders would provide strong support for the notion that common bond cultural affinity considerations are important for understanding observed mortgage market patterns. By contrast, evidence indicating that marginal applicants more often apply to same-group lenders would raise questions about the existence of strategic “errors” and, by extension, the appropriateness of this perspective.

## **2. Empirical Approach**

### *2.1 A two-stage model of the loan decision*

Munnell, et al. (1996) and others have documented that white lenders favor white applicants over minority applicants after controlling for many differences between the two groups. This evidence is consistent with the view that lenders have a taste for discrimination. Regarding the common bond theory, however, such results are inconclusive. As discussed, this evidence only has implications for where the acceptance threshold lies relative to the average quality of the minority applicant pool. Thus, the previous work is unable to identify the existence of common

bond cultural affinity and therefore cannot address the question of whether observed patterns are likely the result of illegal discrimination on the part of lenders, rational decision-making by lenders, or some combination of the two.

The methodology in this paper features more discriminating tests of the cultural affinity theories that examine the treatment and behavior of marginal applicants. As shown above, such a focus permits a relatively clean assessment of whether observed racial differentials arise from legitimate legal decision-making or illegal discriminatory behavior. The tests capitalize on the fact that, assuming that lenders of a given ethnicity have an affinity for applicants of the same ethnicity, the taste-based and common bond theories of cultural affinity have different implications for the approval (and thus rejection) and application patterns that should be observed for banks with different racial ownership.

To demonstrate this, assume that there are two banks – one white-owned and one minority-owned – that are identical in all other respects. Assume also that the two banks receive loan applications from identical pools of white and minority applicants. Consider the taste-based theory of cultural affinity. In this case, if lenders of a given ethnicity favor applicants with the same ethnicity, then one should observe (i) the marginal white applicants being approved more often than the marginal minority applicants at the white-owned bank, and (ii) the marginal minority applicants being approved more often than the marginal white applicants at the minority-owned bank.

The common bond theory of cultural affinity predicts that the bond will allow the white lender to more easily identify marginal white applicants. Thus, the marginal minority applicants will be approved more often than the marginal white applicants at the white-owned bank.

Analogously, the common bond theory predicts that, because of strategic “errors,” the marginal white applicants will be approved more often than the marginal minority applicants at the minority-owned bank. Using this same approach yields a comparable set of theoretical implications for the predictions T3 and B3 described above. These testable implications, summarized in Table 1, are the focus of the empirical analysis that follows.

This is not the first study to examine cultural affinity by examining the experiences of applicants with marginal credit quality. Hunter and Walker (1996) conduct a test of the hypotheses in table 1 associated with bank actions. They examine whether lenders appear to hold marginal black and Hispanic applicants to higher quantitative standards regarding credit quality and debt obligation ratios than similarly situated white applicants and find evidence that they do—evidence that supports the taste-based version of the theory. However, the single equation model employed by Hunter and Walker (1996) could produce biased estimates, and thus misleading inferences, if applicants do not randomly choose which bank to apply to. The current research considers the possibility for such selection directly and allows for an assessment of the relative importance of this issue.

Clearly, the two sets of hypotheses in table 1 are related, as they emerge from an explicit recognition that application patterns are likely to be influenced by the beliefs that applicants hold regarding their likely treatment by lenders of particular backgrounds. The appropriate empirical test should therefore, to the extent possible, reflect the linked nature of the applicant’s decision of where to apply and the lender’s decision of whether to approve the application and grant a loan. Tests that examine only the lender’s decision, such as those in Hunter and Walker (1996),

will suffer from a selection bias if applicants engage in either type of sorting behavior the theories imply.

The behavioral model underlying the empirical model has two stages. In the first stage, applicants select the bank to which they will submit their mortgage application. This decision is a function of characteristics of both the applicant and the bank. In the current context, the most important characteristics are the race and credit quality of the applicant and the racial background of the bank. In the second stage, given the applicant's decision about where to apply, the bank which receives the application decides whether to approve it or not. This second decision is a function of applicant and bank characteristics as well as locational factors which could impact the lender's ability to recoup losses in the event of a loan default. Again, the key

$$d_i = z_i' \gamma + v_i, i = 1, \dots, N$$

$$y_i = x_i' \beta + \varepsilon_i, i = 1, \dots, N$$

variables of interest for testing the implications of the cultural affinity hypothesis are the race and credit quality of the applicant and the racial background of the bank.

This framework is implemented using a standard two-equation selection model. The model has the form:

(1)

(2)

The first equation represents a reduced-form relationship capturing sample selection, in this case the applicant's decision of where to submit an application, where  $d_i$  is an indicator variable for

whether the applicant chose to apply to a bank,  $z_i$  is a vector of applicant and bank characteristics,  $\gamma$  is a vector of parameters, and  $v_i$  is an error term. The second equation represents the conditional choice relationship, in this case the bank's decision to accept or reject an application given that an application is submitted, where  $y_i$  is an indicator variable that equals 1 if the application was denied,  $x_i$  is a vector of applicant and neighborhood characteristics,  $\beta$  is a vector of parameters, and  $\varepsilon_i$  is an error term. Heckman (1976) has shown that, in the absence of an adjustment for selection, the standard errors from standard OLS or probit estimates of equation (2) will be inflated. To correct for this, equation (2) is estimated including the inverse Mills ratio,

(3)  
 as an additional independent variable, where  $\phi(\cdot)$  is the cumulative distribution function,  $\Phi(\cdot)$  is the standard normal density, and  $\sigma_v^2$  is the variance of  $v$  in equation (1). The two-equation system is estimated by full information maximum likelihood. While the current application of the selection model differs from the standard application in that different agents act at the two decision points, the econometric principles underlying the models are identical.

## 2.2 Modeling the applicant decision

In the first stage of the behavioral model, applicants must choose whether to apply to a minority-owned or white-owned bank. As discussed earlier, the cultural affinity hypotheses imply that this choice will depend importantly on the interaction of the applicant's race, the applicant's credit quality, and the bank's race. The  $z_i$  vector therefore includes eight interactive indicator variables crossing (i) the applicant's race, (ii) whether applicant was of marginal credit quality, and (iii) the bank's race. This specification allows for a direct comparison of the

$$\frac{\phi(z_i' \gamma / \sigma_v)}{\sigma_v \Phi(z_i' \gamma / \sigma_v)}$$



likelihood that marginal applicants choose to apply to banks of the same racial background as opposed to banks of a different racial background. The sign and significance of the coefficients on these variables will provide the evidence by which the predictions of the taste-based and common bond forms of the cultural affinity hypothesis can be evaluated.

Aside from the bank's racial character, the choice of where to apply will also depend on other bank characteristics. An important consideration is convenience, as banks located closer to an applicant may be more likely to receive the applicant's application. As will be discussed below, proximity is accounted for through the process by which the banks in the sample were selected. Aside from location, banks will differ in their "product accessibility." That is, some banks will be more active in the mortgage market than others and, as a result, will have a higher likelihood of being selected by prospective applicants. To capture these differences, regressors in the selection equation (2) also include a number of other bank characteristics, including loss reserves as a fraction of assets, mortgages as a percentage of assets, core deposits as a percentage of assets, and return on assets, as proxies for a bank's level of mortgage market activity.

### *2.3 Modeling the lender decision*

Given the applicant's decision of where to apply, the selected bank must decide whether to originate a loan or deny the application. As with the first stage decision, the cultural affinity theories suggest that the applicant's race and credit quality as well as the bank's race will be important factors. As with the bank choice equation, the empirical specification for the lender decision includes eight interactive terms that cross applicant race, applicant credit quality, and bank race. In this case, the specification allows for a comparison of how lenders treat marginal

applicants of different races and will form the basis of our evaluation of the decision-based predictions of the two cultural affinity theories.

A number of other factors can also influence such a credit decision, including various application and location-based characteristics. For credit granting decisions, a key application characteristic is the credit quality of the prospective borrower. Unfortunately, the data lack important applicant information, such as credit history, that has been shown to be reflective of applicant creditworthiness. Thus, the approach is unable to fully approximate the information set lenders have when making credit decisions. A scoring procedure (described below) to identify applicants as being of marginal credit quality is used to mitigate this shortcoming somewhat.

The  $x_i$  vector also includes five variables describing various aspects of the location of the property to be purchased. These include percent of units in the tract that are rental units, percent of units in the tract that are vacant, percent of tract residents with income below the poverty line, percent of tract residents who are minority (black, Asian, Hispanic), and the median age of the housing stock in the tract. Assuming property values are influenced by the condition of the surrounding neighborhood, these variables provide a measure of the likelihood that the property underlying the mortgage will retain its value, an important consideration for a bank if the loan defaults.

#### *2.4 Identifying marginal applicants*

For the tests of both stages, one must define a marginal applicant. Ideally, one would use an applicant's credit history, often represented by a credit score, as a measure of an applicant's quality. Unfortunately, credit scores are not typically available in public data and so a different approach is taken. All applicants are given a "score" representing their predicted probability of

rejection, and those applicants with relatively high scores are considered to be marginal.

Estimated probabilities of rejection are based on coefficients obtained from estimating

(4)

using a sample including all applications in a given year to all banks in the sample that were either approved or rejected. Fitted values (“scores”) are obtained for all applicants, regardless of whether the application was ultimately approved or rejected, and applicants are then ranked based on these values. The 25 percent of applicants with the highest scores are considered to be marginal applicants. To assess the robustness of this approach, the top 10 percent and the top 50 percent of scores are also used to define “relatively high” in separate runs. The results are qualitatively identical as when the top 25 percent were used.

$$REJECTED_i = \alpha + \beta_1 LOANAMT_i + \beta_2 (LOANAMT/INCOME)_i + \varepsilon_i,$$

### 3. Data

To construct the data, a sample of black-owned and Asian-owned banks is first identified using reports made by banking institutions to the U.S. Department of the Treasury. Only banks that had reported to the U.S. Department of the Treasury as being majority-owned by blacks or Asians are included in the sample. Using data from the Federal Reserve Board's National Information Center (NIC) and information on the location of bank branches included in annual Summary of Deposit filings, these black-owned and Asian-owned banks are matched with comparable white-owned banks (also called "peer" banks). To be included as a peer in the sample, the white-owned bank is required to have a head office or branch in the same state and county as the head office or branch of a minority-owned bank. Additionally, relative to the

minority-owned banks, the white-owned peer bank has to be similar in size, defined as having total assets between 50 percent and 200 percent of the minority-owned bank's assets. This relatively wide asset range is required to obtain a sample size that permitted econometric analysis, as only those minority-owned banks with at least one matching white-owned institution are included in the sample. For those minority-owned banks with multiple peer banks, only the three closest matches (by asset size) for a given minority-owned bank are included. One Asian-owned bank with peer banks satisfying our match criteria was omitted from the final sample because its extremely high denial rate for white applicants made it an obvious outlier. This bank subsequently was investigated for suspected violations of anti-discrimination laws.

The analyses are run separately for 1994 and 1995. For 1994, the final sample includes 35 minority-owned and 92 white-owned peer banks (table 2). The corresponding numbers for 1995 are 40 minority-owned and 106 peer banks. In both years, Asian-owned banks are concentrated geographically. The Asian-owned banks in the sample are from only 5 states, and nearly half of the banks in the sample operate in California. By contrast, the black-owned banks are more geographically distributed, as eighteen states are represented in the sample. Black-owned banks do, however, tend to be located in Southern states. There are 30 state-county office location matches in 1994 and 42 such matches in 1995 (not shown). For each year, about four-fifths of the minority-owned banks in the sample have three white-owned peers. (In some cases a single white-owned peer bank matches with more than one minority-owned bank.)

For this research, only conventional home purchase loans are considered. Loan application data for the minority-owned and peer banks, contained in the Home Mortgage Disclosure Act (HMDA) data records, comprise the baseline data. Passed in 1975 and most recently revised in

1995, HMDA requires that all covered depository institutions report specified information on all mortgage applications they receive each calendar year. The HMDA data include information on all applications for mortgage loans to purchase, refinance, and improve homes submitted to an institution over a given calendar year. This information includes selected characteristics of the loan application and of the borrower, as well as the disposition of the application. For more details on HMDA, see Canner and Smith (1991).

The other variables used in the analysis are from various sources. Bank characteristics are drawn from end-of-year 1994 and 1995 Reports of Condition and Income (Call Reports). Information on loan applications submitted to minority-owned and peer banks is obtained from the HMDA data. Data on census tract characteristics are obtained from estimates by the Department of Housing and Urban Development provided with the HMDA data.

The distribution of applicants and disposition of applications for conventional home purchase loans among minority-owned banks and their peers in the baseline samples for 1994 and 1995 are shown in table 3. The data indicate that, even after controlling for the fact that both banks have offices located in the same state and county, minority-owned banks draw their applicant pool from a very different segment of the population than their peer banks. As compared with their peers, minority-owned banks receive far more applications from minority applicants, neighborhoods with high minority concentrations, and lower income neighborhoods; to a lesser extent, they receive more applications from lower income applicants.

Table 3 also shows the denial rates for applicants with different characteristics. Minority-owned banks and their peers have similar patterns of application rejections. Black and Hispanic applicants, lower income applicants, and applicants from high minority or lower income areas

are more likely to have their applications rejected at both minority-owned and peer banks. Despite these similar general patterns, however, minority-owned banks have higher denial rates than peer banks in nearly every subcategory. Only among Asian applicants and applicants whose race was unidentified were denial rates higher at peer banks.

Differences between minority-owned banks and white-owned peer banks are also apparent when one considers the loan and location characteristics of the applications the banks receive. As shown in table 4, despite the fact that (by construction) the banks have similar asset, mortgage, and profitability profiles, their loans are quite different. On average, minority-owned banks originate smaller loans, extend loans for properties located in census tracts with higher rental rates, vacancy rates, poverty rates, and minority populations, and operate in census tracts with older housing stocks. Loans originated by black-owned banks have higher loan amount-to-income ratios than loans originated by peer white-owned banks. Asian-owned banks have the opposite relationship relative to their peers.

To estimate equations (1) and (2), the data are transformed to reflect each applicant's choice set prior to deciding which bank to submit an application. The data include one observation for each bank an applicant could have submitted an application to. Thus, an applicant to a minority-owned bank can appear up to four times in the data, once for the choice that was made and up to three times for the peer bank choices that were not made. Likewise, an applicant to a white-owned peer bank appears in the data multiple times, once for the bank where the application was submitted, once for the minority-owned peer that was not chosen, and once for each of the (up to two) other white-owned peers to the minority-owned bank that was not chosen.

#### 4. Results

Because one might expect different affinity effects depending on the race of the bank ownership, minority-owned banks are sorted according to the race of the owners and estimates of equation (1) are obtained separately for black-owned banks and comparable white-owned banks and for Asian-owned banks and comparable white-owned banks. The small numbers of Hispanic-, multiracially-, Native American-, and women-owned banks preclude their consideration in the analysis. The tests assume that, in the absence of cultural affinity, treatment of applicants is identical across banks with owners of different races.

The operating assumption for all the analyses is that lenders of a given ethnicity have an affinity with applicants of that ethnicity. Thus, by assumption, white-owned banks have an affinity with white applicants, black-owned banks have an affinity with black applicants, and Asian-owned banks have an affinity with Asian applicants. Alternatively, it could be argued that all banks have an affinity toward white applicants, given that whites make up the bulk of all applications. If so, then no differences would be expected in the treatment of white applicants across banks with different racial ownership. Regarding Hispanic applicants, having no prior expectations, I assume that Hispanics have no affinity with any of these groups; thus no differences in treatment are expected.

##### *4.1 Results for sample of Asian-owned banks and peers*

Table 5 shows the estimates of the two-equation system for Asian-owned banks and their peers. The first two columns in the table show the results using the 1994 data; the final two columns show estimates using the 1995 data. Non-white, non-Asian applicants who do not have marginal credit quality and who applied to a white-owned bank are the omitted category.

Beginning with the bank choice equation, there are two results of note. First, in 1994 marginal white applicants are less likely to apply to Asian-owned banks than other applicants. Such applicants are so disinclined to apply to Asian-owned banks that there are too few to permit estimation in the denial equation. Importantly, tests indicate that marginal white applicants in 1994 are significantly less likely to apply to Asian-owned banks than to white-owned peer banks ( $\chi^2=9.17$ ,  $p=0.003$ ). The second key finding involves the application patterns of marginal Asian applicants in 1995. Such applicants are significantly less likely to apply the white-owned banks than they are to apply to Asian-owned banks ( $\chi^2=5.36$ ,  $p=0.02$ ).

Recalling that the taste-based form of the theory predicts that one should observe more frequent same-race application patterns among marginal applicants (that is, marginal Asians applying relatively more frequently to Asian-owned banks and marginal white applicants applying more frequently to white-owned banks) while the common bond form predicts that, because of strategic “errors,” one should observe more frequent cross-race application patterns, these results suggest that, if any cultural affinity is at work, it is the taste-based form. The results of this analysis strongly contradict the predictions of the common bond theory. However, it is important to recognize that the evidence does not directly affirm the predictions of the taste-based formulation of the theory; none of the coefficients on the same-race application choice variables are statistically different from the coefficients on interactions that are not believed to involve any form of cultural affinity, although they are positive in 3 of 4 cases.

The results do indicate that creditworthy applicants are generally more likely to submit mortgage applications to banks with owners of the same ethnic background. Asian applicants of relatively good credit quality tend toward Asian-owned banks and away from white-owned



banks, and white applicants of relatively good credit quality tend toward white-owned banks and away from Asian-owned banks. While insufficient to draw conclusions about common bond cultural affinity, such a pattern is consistent with a taste-based view of cultural affinity.

Turning to the denial equation, the evidence suggests that banking institutions do not treat marginal applicants differently based on the similarity of the applicant's racial background. Although the coefficients indicating higher denial rates for marginal white and marginal Asian applicants at white-owned banks in 1995, the coefficients on the other marginal variables are also positive, resulting in our inability to conclude that there are race-based differences in treatment. Tests comparing the denial probabilities for marginal white and Asian applicants to white-owned banks show that they are statistically indistinguishable ( $\chi^2=0.25$ ,  $p=0.62$ ). Tests yield similar results for Asian-owned banks ( $\chi^2=0.11$ ,  $p=0.74$ ). The 1994 data show no significant differences along these dimensions. In short, the data on denials of marginal applicants do not offer support for either the taste-based or common bond formulation of cultural affinity.

#### *4.2 Results for sample of black-owned banks and peers*

Table 6 shows the results for runs of the same analysis using the black-owned bank and peer groups samples for 1994 and 1995. The bank choice results largely mirror those for the Asian-owned bank sample. There is evidence suggesting that marginal black applicants are more likely to apply to black-owned banks than to white-owned banks in 1994, as the difference between the coefficients on these two variables is statistically different from zero ( $\chi^2=6.78$ ,  $p=0.01$ ). This contrasts with the predictions of the common bond form of the theory. However, aside from this there is little support for either the taste-based or common bond forms of cultural affinity in the

bank choice equations. Marginal applicants do not have application patterns that are significantly different from populations not thought to be affected by cultural affinity. In addition, marginal white applicants have comparable likelihoods of applying to white-owned and black-owned banks in 1995 ( $\chi^2=1.15$ ,  $p=0.28$ ). Moreover, the 1995 estimates for marginal black applicants do not show the same significant difference in propensities to apply to black-owned and white-owned banks seen in the 1994 data ( $\chi^2=2.25$ ,  $p=0.13$ ).

In 1994, small numbers of marginal white applicants preclude the estimation of denial results at black-owned banks. Unlike the case for the Asian-owned bank sample in 1994, where marginal white applicants clearly chose not to apply to Asian-owned banks, the small number of marginal white applicants is due to the small number of marginal white applicants overall and does not represent an implicit selection mechanism. The point estimate for the likelihood that marginal white applicants choose to apply to black-owned banks in the bank choice equation is positive, although with a large variance.

The results for the denial equation are quite similar to those for the sample of Asian-owned banks and their peers in that the coefficients on the marginal applicant variables do not suggest that either form of cultural affinity exists. Applications from marginal applicants have comparable likelihoods of being denied, independent of the race of the applicant and the race of the bank. Rather, the results suggest that race is decidedly a non-factor. Only risk seems to be associated with differences in denial probabilities and in the expected way.

The results here differ somewhat from those of Black, Collins, and Cyree (1997), who find that black-owned banks are significantly more likely to reject black applicants. The analysis here suggests that risk may play a large role in driving their results, as differences are not

significant after accounting for risk using our rough scoring procedure. However, point estimates remain positive, suggesting perhaps that a more complete accounting of risk is needed before a firm conclusion can be drawn on this point.

#### *4.3 Control variables*

Although not the primary focus of the analysis, the coefficients on the variables used as control variables can provide information regarding the quality of the empirical specification. The control variables in the denial equations, while often having expected signs, do not tend to have significant effects. This could be a function of the limited number of variables available for use in the HMDA data. The signs on the coefficients for black bank sample estimates do generally conform to expectations though. Applications for properties in neighborhoods with high vacancy rates and high percentages of minorities tend to have higher likelihoods of rejection. Applications for older houses in the black bank sample also tend to have higher denial rates. In the bank choice equation, the evidence is generally consistent with expectations. Applicants tend to choose mortgage specialists, banks with higher returns and loss reserves, and banks for which core deposits comprise smaller percentages of bank assets.

The control variable results using the Asian bank sample are similar but a bit more idiosyncratic in some cases. As with the black bank sample estimates, few coefficients in the denial equations are statistically significant. Unlike that sample, though, the poverty and house age coefficients do not conform to expectations. In addition, the bank choice results for return on assets and loan loss reserves differ from 1994 to 1995.

## **5. Conclusion**

Cultural affinity has been put forward as a potential explanation for observed race-based disparities in denial rates for mortgage applications. The theoretical literature has developed two forms of cultural affinity, both of which feature decision-makers that have an affinity towards members of their own group, but which differ on how the affinity affects the decision-making process. In the taste-based formulation of the theory, the affinity benefits all same-group members; in the common bond formulation, the affinity benefits only high quality same-group members and disadvantages low quality same-group members.

Most previous tests for the existence of cultural affinity in mortgage markets have been unable to distinguish between the two types of cultural affinity and have yielded inconclusive results. By focusing on the behavior and treatment of marginal applicants of different racial backgrounds and recognizing that banks vary in their racial makeup, this paper conducts more discriminating tests that can better assess the importance of each type of cultural affinity for mortgage markets. The tests capitalize on the fact that, if affinities are race-specific, the theories predict that we should observe specific, and contrasting, application and denial patterns for marginal applicants across banks with different owner ethnic backgrounds. These tests are implemented using data on mortgage applications in 1994 and 1995 for a sample of black-owned and Asian-owned banks and comparable white-owned peer banks.

The results of the analysis provide no support for the common bond form of the theory. There are no cases that suggest that marginal applicants seek out lenders of a different ethnic background to capitalize on strategic “errors” or that banks approve applications from opposite-race individuals with marginal credit quality more frequently.

By contrast, there is some evidence consistent with the notion of taste-based cultural affinity. Marginal white applicants are found to be less likely to apply to Asian-owned banks than to white-owned peer banks in 1994, marginal Asian applicants are less likely to apply to white-owned banks than to Asian-owned banks in 1995, and marginal black applicants are less likely to apply to white-owned banks than to black-owned in 1994. However, in these cases, the estimates also generally show that the application propensities for same-race pairings are not significantly different from the application propensities for pairings not believed to have cultural affinity issues. Thus, the findings here regarding application patterns are only weakly supportive, as they imply a shying away from opposite-race pairings rather than a seeking out of same-race pairings.

The evidence from the denial equation estimates suggests no differences in application disposition for marginal applicants based on race, either that of the applicant or the bank, and thus offer no support for the taste-based form of the theory. In short, the denial rate equation findings offer little support for either the taste-based or common bond forms of cultural affinity.

An important *ex ante* assumption underlying the interpretation of the results is that underwriting standards for institutions operating in the same market do not vary with the race of the bank's owners. The evidence offers general support for this assumption. Applicants with similar characteristics received the same treatment on average, regardless of the characteristics of a bank's ownership. This is consistent with the notion that bank underwriting standards are based on objective measures of risk and that more subjective factors which might come into play, such as cultural affinity, do not significantly influence underwriting decisions.

The denial rate equation findings differ from those of Hunter and Walker (1996), who find evidence in denial-rate equations consistent with the view that taste-based cultural affinity exists. The divergence in results may arise for several reasons. Hunter and Walker (1996) use a single-equation estimation structure, which admits the possibility of selection biases associated with applicant decisions on which bank to apply to; such potential biases are absent in the current research. Indeed, an important contribution of the current research is the explicit recognition that application patterns can have an important effect on observed outcomes. In particular, in light of the results in Hunter and Walker (1996), the results here suggest that considering such patterns tends to reduce observed behavioral differences along the dimensions that yield the most compelling assessments of the theory.

There are other possibilities, however. Hunter and Walker (1996) examines activity in Boston in 1990. Relationships could differ over time and across geographies. In addition, the measure of credit quality in Hunter and Walker (1996) is more comprehensive than that used here; the current research may not adequately identify applicants of marginal credit quality.

In closing, I note several issues that could explain the observed results while preserving the notion that both formulations of the cultural affinity hypothesis operate in mortgage markets, at least in some circumstances. This study uses the race of the bank ownership as a signal of the affinity the bank will have with applicants. However, the race of the bank ownership need not correspond with the race of the loan officers and underwriters who interact with loan applicants and who ultimately make the decision on whether to lend. Thus, the relationships highlighted in the empirical approach may not capture the affinities that are the focus of the research.

Unfortunately, data on the racial composition of the staff of each bank in the sample, which

would be required to test this proposition, are not available. Research by Kim and Squires (1995) explores this issue directly for the Milwaukee area and finds a positive relationship between the proportion of black professionals at thrifts and approval rates among black mortgage applicants.

Another possibility is that the geographic matching procedure employed to identify white-owned peer banks is inadequate. Within a given county, the branches of minority-owned and peer banks may have very different distributions. In particular, minority-owned bank branches could be located in areas with high minority concentrations while peer bank branches could be located in other parts of the county. If true, minority-owned banks could have much greater access to minority populations than peer bank branches, which would explain the higher application rates from lower income areas with higher minority concentrations. While plausible, a key assumption required for this argument to be valid is that minority applicant mobility must be very limited. County-wide travel would have to be extremely difficult for such applicants. Otherwise, these minority applicants would indeed have access to the branches of the peer banks included in the study sample. In contrast to this hypothesis, previous research using these data finds that application rates from areas with high minority concentrations are not significantly different among minority-owned banks and peer banks (Bostic and Canner, 1998). Thus, the data do not suggest that mobility is particularly limited for minority loan applicants in general. It is possible, however, that within an ethnic group mobility could vary by income level and that lower income applicants could find traveling within a county difficult. Although this is unlikely, future research could shed light on this issue.

Another possibility is that the scoring methodology for identifying marginal applicants did not produce an appropriate ranking of applicants by their underlying credit risk. Among other variables, the HMDA data lack important credit history data, such as a credit score. If credit scores used in mortgage underwriting are not perfectly correlated with the score derived here, then the rankings used in the current tests may not align with the true risk-ordering of applicants in the sample. A result that points to this as a potential problem is the finding of race-based differences, both in application patterns and denial rates, among applicants with non-marginal credit quality.

Finally, activities by market participants, such as lenders, brokers, and real estate agents, could shape application patterns apart from any affinity effects that may exist. For example, to improve their Community Reinvestment Act performance ratings, lenders could have special lending or marketing programs designed to attract minority applicants who have lower incomes or reside in lower income neighborhoods. Similarly, brokers who often serve as the intermediaries between applicants and lenders may direct applications to lenders in systematic ways that produce the observed patterns. While not explored in the current study, such potential explanations have validity and should be empirically tested.



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**Table 1. Testable Hypotheses of the Taste-based and Common bond Cultural Affinity Theories**

This table shows the competing and testable hypotheses that emerge from the taste-based and common bond cultural affinity theories. “Marginal applicants” are defined as applicants for mortgages whose credit quality is near (either above or below) the accept/reject quality threshold.

Hypothesis	Implication of taste-based theory	Implication of common bond theory
Bank actions	<p><i>White-owned</i> banks approve marginal white applicants more often than marginal minority applicants</p> <p><i>Minority-owned</i> banks approve marginal minority applicants more often than marginal white applicants</p>	<p><i>Minority-owned</i> banks approve marginal white applicants more often than marginal minority applicants</p> <p><i>White-owned</i> banks approve marginal minority applicants more often than marginal white applicants</p>
Applicant actions	<p>Marginal white applicants apply more often <i>to white-owned</i> banks than to minority-owned banks</p> <p>Marginal minority applicants apply more often <i>to minority-owned</i> banks than to white-owned banks</p>	<p>Marginal white applicants apply more often <i>to minority-owned</i> banks than to white-owned banks</p> <p>Marginal minority applicants apply more often <i>to white-owned</i> banks than to minority-owned banks</p>

**Table 2. The Sample of Minority-Owned and Peer Group Banks, 1994 and 1995**

This table shows the number and distribution of the minority-owned banks in the 1994 and 1995 samples. Banks are grouped by the geographic region in which they operate. The table also shows the number of white-owned peer banks included in the sample. Peer banks are required to operate an office in the same state and county as a similarly-sized minority-owned bank. By construction, the distributions of peer banks mirror those of the respective group of minority-owned banks. The table concludes by showing the number of state-county combinations in which a minority-owned bank was matched to a white-owned peer bank. Data are drawn from the Federal Reserve Board's National Information Center and bank filings of the Summary of Deposits. In the table, Northeastern states include Massachusetts, New Jersey, New York, and Pennsylvania; Midwestern states include Illinois, Kansas, Michigan, Oklahoma, and Wisconsin; Southern states include Alabama, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, Tennessee, Texas, and Virginia; Western states include California and Hawaii.

	Year	
	1994	1995
Number of Black-owned banks		
Total	18	20
Northeast	2	3
Midwest	6	7
South	10	10
West	0	0
Number of Asian-owned banks		
Total	17	20
Northeast	1	1
Midwest	5	5
South	4	4
West	7	10
Peers		
Black-owned bank peers	47	52
Asian-owned bank peers	45	54
Total number of banks	127	146
Number of state-county office matches		
Black-owned banks	18	25
Asian-owned banks	12	17

**Table 3. Distribution of Conventional Loan Mortgage Applications and Denial Rates for Minority-Owned Banks and their Peers, by Applicant and Neighborhood Characteristics, 1994 and 1995**

This table shows how conventional mortgage loan applications to the minority-owned and white-owned peer banks in the sample for 1994 and 1995 were distributed across various applicant and neighborhood characteristics. The table also shows the denial rates for applications with particular applicant and neighborhood characteristics at the two types of banks. For relative income levels, "Low" is defined as less than 50 percent of the MSA median, "Moderate" is between 50 and 79 percent of the MSA median, "Middle" is between 80 and 119 percent of the MSA median, and "High" is greater than 120 percent of the MSA median.

<i>Characteristic of applicant</i>	Year and bank ownership							
	1994				1995			
	Minority		Peer		Minority		Peer	
	App. Pct.	Den. Rate	App. Pct.	Den. Rate	App. Pct.	Den. Rate	App. Pct.	Den. Rate
<i>Race</i>								
Asian	12.0	7.2	3.9	8.9	27.2	10.0	7.7	11.2
Black	20.4	31.9	5.2	14.2	23.6	34.5	6.6	17.2
Hispanic	49.8	16.3	40.7	13.7	26.8	16.4	27.7	12.8
White	13.9	9.0	45.6	8.4	10.0	12.3	50.3	8.7
N/A	3.8	16.4	4.6	13.4	12.4	3.7	7.7	17.5
<i>Income (as pct of MSA median)</i>								
Low	8.4	47.0	6.9	22.4	9.3	36.4	7.5	22.1
Moderate	15.7	27.8	14.2	20.2	16.9	24.5	16.0	16.4
Middle	17.2	20.0	17.7	13.7	18.6	21.3	17.6	11.6
High	56.8	8.9	59.0	7.1	44.5	11.9	55.9	7.4
N/A	1.9	30.0	2.2	5.3	10.8	1.8	40.1	21.8
<i>Minority Pct. of Population in Census Tract</i>								
Less than 10	3.0	4.2	11.9	9.1	2.7	7.3	16.8	7.9
10-19	8.3	15.0	15.3	8.0	10.0	16.1	17.9	10.8
20-49	15.2	12.3	23.1	9.1	23.3	15.3	28.8	11.9
50-79	20.6	11.2	26.6	10.9	31.3	11.4	22.3	11.9
80-100	52.9	22.3	23.1	16.5	32.7	24.6	14.1	13.5
<i>Median Income in Census Tract (as percentage of MSA median)</i>								
Low	7.4	40.7	2.8	4.8	17.8	10.9	5.3	15.9
Moderate	22.7	24.0	15.7	13.1	23.6	24.1	17.3	18.3
Middle	27.5	16.1	36.3	12.9	29.7	19.9	33.8	11.6
High	42.5	10.6	45.2	8.2	28.9	11.9	43.6	7.6
<i>Memo:</i>								
Total number of applications	1601		4360		1544		4074	

**Table 4. Sample means for black-owned banks, Asian-owned banks, and their respective peers**

This table shows sample means for selected characteristics of the banks included in the sample, the mortgage loan applications received by the banks in the sample, and the census tract where the home to be purchased is located. These variables are used as controls in the empirical analysis. Figures are presented for black-owned banks, Asian-owned banks, and their respective peer banks for both 1994 and 1995. The results of statistical tests for differences in the characteristic means for the minority-owned banks and their peers are also shown. Data for bank characteristics are obtained from Call Report filings of the institutions, for loan characteristics from HMDA report filings, and for location characteristics from HMDA Census data reports. “Percent rental” is the percent of units in a census tract that are rental units, “Percent vacant” is the percent of units in a census tract that are vacant, “Percent in poverty” is the percent of the residents in the census tract with incomes below the poverty line, and “Percent minority” is the percent of the residents in the census tract that are members of a minority group.

	Black-owned banks and their peers						Asian-owned banks and their peers					
	1994 Sample			1995 Sample			1994 Sample			1995 Sample		
	Black	Peer	t-stat	Black	Peer	t-stat	Asian	Peer	t-stat	Asian	Peer	t-stat
<i>Bank characteristics</i>												
Loss reserves/Total assets (percent)	0.380	0.576	-0.44	0.285	0.229	0.42	0.514	0.581	-0.19	0.388	0.264	0.82
Mortgages/Total Assets	0.209	0.193	0.34	0.200	0.195	0.13	0.123	0.164	-1.17	0.128	0.181	-1.48
Core deposits/Total Assets	0.280	0.264	0.51	0.284	0.252	1.02	0.217	0.254	-1.35	<b>0.212</b>	<b>0.261</b>	<b>-1.85*</b>
Return on assets	0.006	0.011	-0.82	0.010	0.013	-1.01	0.006	0.008	-0.39	0.011	0.013	-0.65
<i>Individual characteristics</i>												
Loan Amount (\$1000s)	<b>69.272</b>	<b>79.422</b>	<b>-1.72*</b>	62.501	87.493	<b>-5.86***</b>	93.921	152.504	<b>-6.62***</b>	143.466	157.838	<b>-1.96**</b>
Loan Amount/Income	<b>1.782</b>	<b>1.298</b>	<b>4.85***</b>	1.517	1.388	<b>1.79*</b>	1.741	2.007	<b>-2.72***</b>	2.081	2.277	-0.72
<i>Census tract characteristics</i>												
Percent Rental	<b>0.367</b>	<b>0.270</b>	<b>6.79***</b>	<b>0.373</b>	<b>0.265</b>	<b>9.21***</b>	<b>0.375</b>	<b>0.326</b>	<b>3.76***</b>	0.385	0.343	<b>3.63***</b>
Percent Vacant	<b>0.073</b>	<b>0.062</b>	<b>2.44**</b>	0.067	0.067	-0.15	<b>0.055</b>	<b>0.041</b>	<b>4.20***</b>	0.038	0.036	1.08
Percent in Poverty	<b>0.210</b>	<b>0.122</b>	<b>8.21***</b>	<b>0.206</b>	<b>0.131</b>	<b>8.56***</b>	<b>0.182</b>	<b>0.118</b>	<b>6.82***</b>	0.131	0.093	<b>6.43***</b>
Percent Minority	<b>0.668</b>	<b>0.232</b>	<b>17.90***</b>	<b>0.680</b>	<b>0.238</b>	<b>22.18***</b>	<b>0.600</b>	<b>0.424</b>	<b>8.72***</b>	0.516	0.391	<b>8.44***</b>
Median Age, Housing Stock	<b>33.629</b>	<b>29.199</b>	<b>4.20***</b>	<b>37.149</b>	<b>32.158</b>	<b>6.36***</b>	<b>27.812</b>	<b>26.000</b>	<b>1.82*</b>	28.740	25.467	<b>4.61***</b>

and 3) model a mortgage applicant's choice of which bank to submit an application to and the first equations (columns 2 and 4) model a bank's decision of whether to approve or deny an application for a mortgage. The first 2 columns use data on 1994 applications to a sample of Asian-owned banks and white-owned peer banks; the final 2 columns use data on 1995 applications. Robust standard errors are in parentheses. '...' indicates too few observations to permit estimation.

	(1)	(2)	(3)	(4)
	<i>Bank choice</i>	<i>Denial</i>	<i>Bank choice</i>	<i>Denial</i>
Non-marg. Asian applicant to Asian bank	0.737 (0.119)**	-0.977 (0.312)**	0.267 (0.076)**	-0.708 (0.168)**
Marginal Asian applicant to Asian bank	0.047 (0.143)	-0.059 (0.371)	0.086 (0.127)	0.216 (0.276)
Non-marg. white applicant to white bank	0.065 (0.062)	-0.249 (0.184)	0.270 (0.051)**	-0.624 (0.125)**
Marginal white applicant to white bank	0.009 (0.101)	0.298 (0.247)	-0.061 (0.101)	0.765 (0.223)**
Non-marg. Asian applicant to white bank	-0.418 (0.092)**	-0.429 (0.308)	-0.442 (0.060)**	-0.665 (0.150)**
Marginal Asian applicant to white bank	-0.056 (0.135)	-0.054 (0.407)	-0.256 (0.123)*	0.614 (0.306)*
Non-marg. white applicant to Asian bank	-0.345 (0.119)**	-0.637 (0.336)	-0.618 (0.093)**	-0.470 (0.261)
Marginal white applicant to Asian bank	-0.746 (0.254)**	...	-0.350 (0.249)	0.464 (0.731)
Marginal applicant	-0.078 (0.079)	0.142 (0.195)	0.084 (0.069)	-0.154 (0.160)
Percent minority in tract		0.521 (0.282)		0.189 (0.203)
Percent in poverty in tract		-0.001 (0.008)		-0.008 (0.006)
Median age of houses in tract		-0.009 (0.004)*		-0.000 (0.003)
Vacancy rate in tract		0.620 (1.755)		1.543 (1.158)
Asian bank	0.125 (0.090)	0.480 (0.216)*	0.282 (0.069)**	0.064 (0.146)
Bank return on assets	-9.149 (1.574)**		36.075 (2.876)**	
Bank deposits/assets	2.552 (0.258)**		0.272 (0.169)	
Bank loss reserves/assets	-16.526 (3.629)**		85.764 (4.354)**	
Bank mortgage loans/assets	3.875 (0.164)**		3.132 (0.131)**	
Constant	-2.301 (0.097)**	-1.223 (0.267)**	-2.677 (0.092)**	-0.556 (0.237)*

		(0.490)**		(0.493)**
Observations	8110	8110	12141	12141
Censored obs.		7093		10513
log likelihood		-2933.223		-4792.161

\* indicates significance at 5%; \*\* indicates significance at 1%.



and 3) model a mortgage applicant's choice of which bank to submit an application to and the second equations (columns 2 and 4) model a bank's decision of whether to approve or deny an application for a mortgage. The first 2 columns use data on 1994 applications to a sample of black-owned banks and white-owned peer banks; the final 2 columns use data on 1995 applications. Robust standard errors are in parentheses. '...' indicates too few observations to permit estimation.

	(1)	(2)	(3)	(4)
	<i>Bank choice</i>	<i>Denial</i>	<i>Bank choice</i>	<i>Denial</i>
Non-marg. black applicant to black bank	1.010 (0.209)**	0.845 (0.559)	1.297 (0.167)**	0.399 (0.412)
Marginal black applicant to black bank	-0.010 (0.346)	-0.604 (0.587)	0.055 (0.152)	-0.265 (0.298)
Non-marg. white applicant to white bank	0.210 (0.138)	-0.228 (0.253)	-0.008 (0.074)	-0.032 (0.193)
Marginal white applicant to white bank	-0.264 (0.338)	-0.853 (0.598)	-0.026 (0.134)	-0.186 (0.292)
Non-marg. black applicant to white bank	-0.816 (0.159)**	-0.542 (0.323)	-0.792 (0.094)**	-0.148 (0.259)
Marginal black applicant to white bank	-0.608 (0.382)	-0.926 (0.731)	-0.159 (0.158)	0.030 (0.371)
Non-marg. white applicant to black bank	-0.802 (0.225)**	-0.437 (0.657)	-0.436 (0.182)*	-0.990 (0.505)
Marginal white applicant to black bank	0.094 (0.391)	... ...	-0.003 (0.239)	0.284 (0.672)
Marginal applicant	0.137 (0.326)	1.364 (0.582)*	0.054 (0.118)	0.656 (0.259)*
Percent minority in tract		0.170 (0.195)		0.228 (0.172)
Percent in poverty in tract		0.006 (0.005)		-0.003 (0.004)
Median age of houses in tract		0.001 (0.004)		0.011 (0.003)**
Vacancy rate in tract		2.599 (0.970)**		0.923 (0.901)
Black bank	0.057 (0.234)	-0.406 (0.567)	-0.659 (0.158)**	0.415 (0.424)
Bank return on assets	22.349 (2.577)**		9.052 (2.111)**	
Bank deposits/assets	-1.048 (0.285)**		-2.302 (0.215)**	
Bank loss reserves/assets	18.659 (2.797)**		8.002 (8.345)	
Bank mortgage loans/assets	0.767 (0.159)**		1.402 (0.136)**	
Constant	-1.265 (0.165)**	-2.146 (0.271)**	-0.713 (0.095)**	-2.325 (0.239)**

		(0.583)**		(0.542)**
Observations	5010	5010	8813	8813
Censored obs.		4283		7581
log likelihood		-1977.100		-3477.293

\* indicates significance at 5%; \*\* indicates significance at 1%.