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**ACCOUNTING FOR RACIAL DIFFERENCES IN
HOUSING CREDIT MARKETS**

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ABSTRACT

The release of individual housing credit application data, combined with lender and neighborhood information required by amendments to the Home Mortgage Disclosure Act (HMDA) in 1989, has offered new opportunities to examine the roles of both neighborhood and individual race in credit availability. The extent to which objective lending criteria are responsible for observed differences in home mortgage credit denial rates, versus discrimination based on income, race, or neighborhood (redlining), has been the subject of considerable debate.

This paper provides a more detailed documentation of racial and neighborhood differences in denial rates than has previously been available. Using estimates from a fixed-effects linear probability model to decompose racial differences in application denial rates, the authors find persistent variations between white and minority applicants, particularly blacks. The variance is widespread and remains even after lender, neighborhood, and applicant economic characteristics are accounted for. While the HMDA data do not contain enough relevant information about the loan applications to draw any firm conclusions about the reasons for these differences, some possibilities include property location, credit or employment histories, loan-to-value ratios, or other factors considered in the loan evaluation process that are not included in the HMDA file.

Introduction

Despite the passage of several laws related specifically to racial differences in housing credit availability, data constraints have limited the number of studies of this issue.¹ Most existing studies use census-tract-level or lender-level data collected under the Home Mortgage Disclosure Act (HMDA) to infer racial differences. Although findings from such work are by necessity indirect, there is a persistent inference of substantial differences in the availability of mortgage and other credit across racial groups. Unfortunately, most of this work has been hampered by the inability to separate the effects of the race of the applicant from the racial composition of the applicant's neighborhood.² Studies that use detailed applicant-level information to examine the direct effects on mortgage denial rates of both property location and the race of the applicant are rare.³

The release of individual application data, combined with lender and neighborhood data as required by amendments to the HMDA in 1989, offers unprecedented new opportunities to examine the issue of the role of both neighborhood and individual race in credit availability. Early reports based on the 1990 HMDA data document differences in denial rates on home mortgage credit applications by race and income of applicants and by the average income and racial composition of neighborhoods (see Avery, Beeson, and Sniderman [1993a] and Canner and Smith [1991, 1992]). The extent to which objective lending criteria are responsible for these differences, versus discrimination based on income, race, or neighborhood (redlining), has been the subject of much analysis and debate.

In this paper, we provide a more detailed documentation of racial and

neighborhood differences in denial rates than has henceforth been available. For each of three loan products (home purchase, refinance, and home improvement), we use estimates from a fixed-effects linear probability model to decompose racial differences in application denial rates into five components reflecting the portion attributable to 1) economic characteristics of the applications reported in HMDA (income, loan amount, loan type, etc.), 2) overall denial rates of the lenders receiving the application, 3) the metropolitan statistical areas (MSAs), 4) census tract locations of the property, and 5) an unexplained residual. We then compare these components across MSAs, across neighborhood types grouped by income and racial composition, across types of lenders, and for central city and suburban areas. We also compare racial differences in denial rates across applications grouped by predicted denial rates based on all factors except race.

Our objective in conducting this analysis is twofold. First, we are interested in determining whether racial differences in credit approvals reflect activity in a small subset of markets or whether they are endemic to most markets. Although significant media attention has been paid to the issue of race and mortgage lending, preliminary studies using the HMDA data have been limited in scope and restricted to either individual cities or specific loan products. For example, in a study that has received wide media publicity (Munnell et al. [1992]), the Boston Federal Reserve Bank conducted an expanded survey of loan applications in the Boston area and concluded that even when an extensive list of individual applicant characteristics was controlled for, black and Hispanic applicants were significantly more likely to be denied than white applicants. This study, however, was limited to one loan product (home purchase loans) and one

city. Thus, it is not clear whether the authors' conclusions can be generalized or are specific to certain areas. Second, as stated above, we are interested in determining whether racial differences in lending stem from variations in applicant characteristics (other than race), differences in the neighborhoods in which properties are located, or racial differences that cannot be explained by these factors.

By way of preview, we find that denial rates for minority applicants are consistently higher than those for white applicants with otherwise identical attributes (as reported in the HMDA data) who are applying for loans with the same lenders, and for properties located in the same neighborhoods. We also find significant neighborhood effects that differ across racial groups: Blacks, in particular, are more likely to apply for loans for properties in neighborhoods with higher denial rates, *ceteris paribus*, than are white applicants. On average, these neighborhood effects are less pronounced than individual effects, although they are almost equal for home improvement loans. We find a remarkable degree of consistency in these conclusions across geographic markets and loan products, indicating that the observed racial differences in denial rates are widespread and cannot be attributed to a small subset of markets. Although our analysis reveals substantial and consistent differences in denial rates related to the race of the applicant, even after controlling for a number of applicant characteristics, we emphasize that the HMDA data do not contain enough relevant information about the loan applications to draw any firm conclusions about the reasons behind these phenomena. These residual differences may be due to credit histories, employment histories, loan-to-value ratios, or other factors considered in the loan evaluation process that are not

included in the HMDA file, or may be the result of differential treatment based solely on the race of the applicant.

The remainder of this paper is organized as follows. In the next section we present a simple framework for analysis. In section II we provide a brief description of the HMDA data and summary sample statistics. Section III summarizes our results, and concluding remarks are given in section IV.

I. Framework and Empirical Model

Consider the following simple, yet fairly general, framework in which to evaluate the empirical findings of this study. Assume that the risk of each loan application given all available ex ante information can be expressed as a risk score, RS . Further assume that each lender decides to approve or deny an application based on a comparison of its risk score and the lender's maximum acceptable risk. If the risk score is above a cutoff, c , the loan is denied; otherwise the loan is accepted. Note that this abstracts from the issue of price by assuming either that lenders price all loans equally or, because of problems of moral hazard and adverse selection, that lenders have a maximum risk acceptable at any price.

This model of lender behavior is deterministic, but in reality error is likely to enter the process. First, lenders may not know, or use, all available information in computing risk scores. In this case, RS would be their *estimate* of the applicant's risk given the information they use, and the loan-granting decision would still be made deterministically, but based on a different set of information. To a researcher attempting

to quantify lender behavior, this case seems identical to the full information case (assuming the researcher has access to all information used by the lender). A second potential source of error is more relevant for this paper. Lenders may use risk score (or their own estimate) and behave deterministically, but an external researcher may only observe the lender's assessment of risk with error. That is, researchers may observe a set of instruments for risk score for which they believe

$$(1) \quad RS = X'\beta + e,$$

where e is a stochastic error term. This implies that

$$(2) \quad \text{Denial} = 1 \quad \text{if } X'\beta + e > c, \text{ and}$$

$$\text{Denial} = 0 \quad \text{otherwise.}$$

To an external researcher, who does not observe e , the evaluation process appears to be probabilistic.

If only the lender action (accept/deny), and not the risk score, is observed, estimation of the parameters in equation (1) requires assumptions about the error term, e . If the error in (1) is assumed to be uniform, then the probability that a loan application will be denied, given X , is proportional to $X'\beta$ plus a constant, and the parameters in (1) will be estimable from a linear probability model. If e is normal, then equation (2) gives rise to a probit probability model; and if e is double exponential, then (2) gives rise to a logistic probability model. Although the scaling of parameters depends critically on the model form, the relative magnitude and signs of the parameters are likely to be robust with respect to the model form chosen.

Of particular interest for this paper is the robustness (and interpretation) of racial

shift factors that may appear in $X'\beta$. Racial shifts may appear for several reasons. First, race itself may be a predictor of future behavior and thus enter the risk score directly. This might occur, for example, because minorities face discrimination in labor markets and thus have more variable income. This would appear as different risk scores for otherwise equal applications of different racial groups, or as racial shifts in estimated β 's. Note that for reasons of cost, lenders may choose to use estimates of RS rather than fully computing it. In this case, race might be an instrument for the variables they do not use.

Second, lenders may practice overt discrimination, and set a lower cutoff, c , for minorities. To an observer who looks only at the accept/deny process, this case would be observationally equivalent to the first case. Overt discrimination may also take the form of lenders (or a subset of lenders) randomly denying a fixed percentage of minorities. This will also produce a racial shift.

Third, lenders may in fact not use race, and there may not be any racial shifts in the true risk scores. However, race may be correlated with the omitted variables in the error term, e , in equation (1). Minority applications could differ from others in the expectation of e given X . To the external researcher measuring RS with error, racial shifts would show up in estimated β 's, making this observationally equivalent to the first two cases, even though race is not used by lenders and does not enter RS. Note that the better that X is specified, the less this effect should matter.

We might also observe a combination of these effects. For example, only a subset of lenders might have lower risk thresholds for minority applications. In this instance,

racial shifts would represent the average lender effect. Moreover, they would also imply consistent residual differences across lenders in overall denial rates (we would expect differences across lenders for other reasons, such as price or preferences for risk). We might also observe combinations of different racial cutoffs and variations in the expected values of the omitted variables, ϵ . Again, the measured residual differences correlated with race would represent a combination of effects.

The important point to emphasize here is that each of these sources of racial shifts, with very different policy implications, is likely to produce observationally equivalent results. Moreover, the estimated shifts will be sensitive to the econometric model form chosen. Unfortunately, there is little other than computational convenience to argue for a particular form (we actually employ a linear probability model for this reason). Thus, despite the obvious value in quantifying racial shifts in denial functions, these estimates, regardless of what they are, will be incapable of distinguishing among competing causal models.

Empirical Model

Our empirical specification follows the framework set out above. We assume that each mortgage application's risk can be represented as a function of the economic characteristics (such as income), neighborhood, market, lender, and race of the applicant. As noted above, we have no basis with which to select a particular econometric model specification. However, the size of the data set dictates that in practice we assume a linear probability model specification. We thus estimate a model where the probability that a random loan application would be denied is linear in the following terms:

$$(3) \text{DENIAL}_{i\text{MTL}} = \beta_A \text{AC}_i + \beta_R \text{RACE} + \beta_M \text{MSA}_M + \beta_T \text{TRACT}_T + \beta_L \text{LENDER}_L + e_{i\text{MTL}}$$

where DENIAL is one if the i^{th} application using the L^{th} lender in the M^{th} MSA and T^{th} census tract is denied, and zero otherwise. MSA, TRACT and LENDER are dummy variables indicating which MSA, census tract, and lender the application relates to, and e is a residual. AC is a vector of application characteristics, other than race, reported in the HMDA data. AC includes gender, marital status, occupancy, income, loan amount, income-to-loan ratio, federal loan guarantee (Federal Housing Administration [FHA] or Department of Veterans Affairs [VA]). RACE is a dummy variable indicating the race of the applicant and co-applicant. The model is specified and estimated separately for *each* of three types of loan applications: home purchase, refinance, and home improvement.

To help minimize the possibility that the differences within and across neighborhoods we identify do not reflect nonlinearities in other effects that are correlated with location, we allow for a considerable degree of nonlinearity in the effects of individual characteristics in estimating equation (3). Income and loan amount are entered as linear spline functions with seven knots each, and the ratio of income to loan amount is entered as a series of six dummy variables. Moreover, a five-knot linear spline for income is interacted with a dummy variable indicating the presence of a co-applicant, and with dummy variables indicating that the application is for an FHA or VA loan. Similarly, a five-knot linear spline of loan amount, and the six dummy variables indicating ranges of values for the ratio of income to loan amount, are also interacted

with a dummy variable indicating applications for FHA or VA loans. We also include dummy variables for six applicant and two co-applicant racial categories, and the racial dummies interacted with FHA and VA loan dummies.

To reduce the computing requirements, the actual estimation was done in two stages. In the first stage, equation (3) was estimated with the individual application characteristics (AC) and separate intercepts for *each* lender-census tract combination included as single-component fixed effects.⁴ The MSA, lender, and tract effects are thus intertwined in these effects. In the second stage, an iterative procedure (equivalent to regressing the fixed-effects intercepts against MSA, census tract, and lender dummies) was used to identify the MSA, tract, and lender effects. By construction, the MSA effects were normalized to have overall sample means of zero, and within each MSA, lender and tract means were normalized to zero. In cases where lender and tract effects were not identified (a lender was the only lender in a tract and did all of its business there), the effect was assigned to the tract.

II. Data

All commercial banks, savings and loan associations, credit unions, and other mortgage lending institutions (primarily mortgage bankers) that have assets of more than \$10 million, make at least one mortgage loan, and have an office in an MSA are required to report on *each* mortgage loan application acted upon by the institution during the calendar year.⁵ They must report the loan amount, the census tract of the property (if in an MSA), whether the property is owner-occupied, the purpose of the

loan (home purchase, home improvement, or refinancing), loan guarantee (conventional, FHA, VA), action taken by the lender (loan approved and originated, application approved but withdrawn, application denied), the race and gender of the loan applicant (and co-applicant, if any), and the income relied upon by the lending institution in making the loan decision.⁶

In total, 9,333 financial institutions made HMDA filings for 1990 on 6,595,089 loan applications. Our analysis focuses on the 3,489,235 loan applications for 1-4 family properties in MSAs that were acted upon by the lenders.⁷ Of these loans, 1,984,688 were home purchase loans, 716,595 were applications to refinance existing mortgage loans, and 787,952 were applications for home improvement loans (generally second or third mortgages). These applications were received by 8,745 separate institutions operating in 40,008 census tracts in all 340 of the MSAs in the United States defined as of 1990. We define lenders at the MSA level: Thus, an institution reporting applications for two different MSAs is treated as two different lenders. There are 23,248 such lenders in our sample.⁸

Descriptive statistics for the applications reported in the 1990 HMDA are found in table 1. Statistics are given separately for home purchase, refinancing, and home improvement loan applications. Clearly, housing credit applicants are a select sample of American households. Household mean income (\$63,071) is substantially higher than that reported for all households in the 1989 Survey of Consumer Finances (\$35,700).⁹ The racial composition of the study sample also appears to differ from that of all U.S. households. Blacks constituted 6.9 percent of the housing loan applicants, yet were 7.4

percent of the homeowners and headed 11.2 percent of the households in 1990.

Similarly, Asians, native Americans, and others accounted for 5.6 percent of the housing loan applicants but only 2.1 percent of the homeowners and 3.0 of the households.

Hispanics were more evenly represented: 6.6 percent of the applicants, 4.1 percent of the homeowners, and 6.4 percent of the households.¹⁰

It is also apparent that denial rates differ substantially by race for all three types of loans (see table 2). Denial rates for black applicants are about twice as high as those for white applicants, and for Hispanic applicants the rate is about 50 percent higher than for whites. Other racial differences are also apparent, particularly with respect to black applicants. Black applicants are more likely to be single and are more likely to apply for federally guaranteed loans. In addition, a larger portion of loans originated to black applicants are subsequently sold, and credit history is given as a reason for denial more often. Furthermore, while the median income and loan amounts for black applicants are considerably lower than those for white applicants, the ratio of the two is fairly similar. In contrast, the ratio of median loan amount to median income is consistently higher for Hispanic applicants than for the other two racial groups.

III. Results

The parameter estimates for the denial rate regressions (equation [3]) are reported in tables 3, 4, and 5.¹¹ A positive coefficient can be interpreted as the expected increase in the probability that an applicant's loan would be denied resulting from a one-unit increase in the independent variable holding all other variables constant

-- specifically, the applicant's MSA, census tract, and lender. Thus, the coefficients on race, for example, represent the expected difference in the probability that a white and black applicant with the same income, gender, FHA/VA status, loan amount, MSA, census tract, and lender will have their loan application denied. Thus interpreted, the estimated black/white (.103), Hispanic/white (.040) and, to a lesser extent, the native American/white (.028) and other race/white (.030) differences for conventional home purchase loans are quite significant. Differences are similar for FHA loans (.116, .030, .028, and .040, respectively). There is little residual difference between Asian and white denial rates on home purchase loans (.008).

Significant racial differences also exist for denial rates on refinance and home improvement loan applications. Compared with home purchase applications, the black/white difference is somewhat smaller for conventional refinance (.070) and home improvement (.080) loan applications. The same is true of the native American/white differences. However, for Hispanic, Asian, and other race applicants, differences from white denial rates for refinance and home improvement applications are larger than for home purchase applications. Interestingly, while there is little residual difference between Asian and white denial rates on home purchase loan applications, the disparity is sizable for refinance (.039) and home improvement (.054) applications -- comparable to the Hispanic/white differences.

In the remainder of this section, we focus on aggregate racial differences in denial rates. Gross denial rate differences are expressed as the sum of components representing differences in applicant characteristics (AC), neighborhood (TRACT),

market (MSA), lender (LENDER), and an unexplained residual. In presenting figures for various applicant groups, components are averaged over all group members and expressed as percentages (by multiplying by 100) instead of fractions. By construction, these components must add up. Thus, for example, if 30 percent of an applicant group were denied, then the sum of the average AC, MSA, TRACT, and LENDER components and the average unexplained residual must equal 30 percent. Similarly, the difference in the percentage denial rates for two groups must equal the sum of the differences in their components.

Neighborhood, MSA, and lender effects are taken directly from the estimated components, TRACT, MSA, and LENDER. The component reflecting each applicant's economic characteristics, AC, is computed using the coefficients from equation (3), assuming his or her race is white. The unexplained residual is then computed for each applicant as the difference between the lender's action (DENIAL [1] or ACCEPT [0]) and the predicted lender action based on the sum of AC, MSA, TRACT, and LENDER. It should be remembered that MSA, TRACT, and LENDER are *normalized to have mean zero*. Since the applicant characteristics, AC, are formed assuming the applicant is white, these normalizations imply that the unexplained residual for white applicants will be approximately, but not exactly, zero due to nonrandom distributions of white applicants across tracts, lenders, and MSAs.

Racial Differences in Denial Rates -- All Neighborhoods

The average applicant, lender, MSA, neighborhood, and residual effects for black, Hispanic, Asian, native American, "other" race, white, and total applicants are

reported in column 1 of tables 6, 7, and 8. Because of the normalizations, these numbers by themselves are not particularly meaningful; it is the differences between the racial groups that are of interest. As summarized in table 1, for home purchase and refinance loan applications, the unexplained residual makes up most of the racial differences in percentage denial rates. The residual accounts for two-thirds of the 16.3 percentage-point difference between black and white percentage denial rates on home purchase loan applications, and six-tenths of the 12.4 percent difference for refinance applications. While the Hispanic/white percentage denial rate differential is smaller (9.0 and 9.2 percentage points on home purchase and refinances, respectively), the residual still accounts for a significant portion of the difference (four-tenths for home purchases and slightly over half for refinances). The same is true for the other racial groups. Census tract locations also contribute to the racial differences in percentage denial rates on home purchase and refinance applications, but the contribution is much less than the residual associated with the race of the applicant.

For home improvement loan applications, the picture is somewhat different. While the residual still accounts for over a third of the difference, disparities in applicant characteristics (including lender and MSA) account for a sizable portion of the difference between white percentage denial rates and those for blacks and Hispanics. Moreover, census tract location accounts for a large share of the black/white differential.

There are some other notable differences across the three types of loans. First, racial differences in percentage denial rates are least pronounced for refinance loan applications. Second, for black applicants, the home purchase residual is larger than the

refinance and home improvement residuals, while the opposite is true for Hispanic and Asian applicants. Finally, while the Asian percentage denial rate is virtually indistinguishable from the white percentage denial rate on home purchase applications, there are significant and largely unexplained differences between Asian and white percentage denial rates for the other loan products.

Racial Differences in Denial Rates by Neighborhood Income and Racial Composition

We now examine racial differences in percentage denial rates within and across census tracts, grouped on the basis of average applicant income: high income (mean income of all applications for loans in the tract of more than \$60,000), middle income (mean income between \$40,000 and \$60,000) and low income (mean income of less than \$40,000); and racial composition: primarily white (tracts with less than 10 percent nonwhite applicants), mixed (10 to 30 percent nonwhite applicants), and primarily minority (more than 30 percent nonwhite). Percentage denial rates by neighborhood income and by neighborhood racial composition for black, Hispanic, Asian, and white applicants are given in columns 2 - 10 of tables 6, 7, and 8. We report the percent of the applications, the actual percentage denial rate, the portion attributable to applicant characteristics, MSA, lender, census tract, and the unexplained residual, for each for black, Hispanic, Asian, native American, white, and other race applicants, in each of the nine types of neighborhoods.

These tables reveal a remarkable persistence in the unexplained residual. While the size of the residual varies somewhat across loan type and across tracts that differ in mean income and racial composition, it is always relatively large. For black applicants,

the unexplained residual for home purchase loans ranges from 9 to 14 percentage points across the nine types of neighborhoods; for refinance and home improvement, the range is only slightly lower --- 6 to 12 percentage points. For other minority groups, there is a comparable persistence across neighborhoods in the unexplained residual.

The tables also reveal a remarkable persistence in the census tract effects across racial groups. For all racial groups, applications for properties in predominantly minority and low-income neighborhoods have higher percentage denial rates than for those in predominantly white and high-income neighborhoods.

While the overall impression is one of consistency, a few systematic differences are evident. The difference between black and white percentage denial rates is lowest in primarily minority tracts, and in all neighborhoods the unexplained residual accounts for almost all of the difference, though there is a tendency for it to decline with neighborhood income. For Hispanics, on the other hand, the residual difference is slightly higher in the minority tracts and tends to increase with neighborhood income, though these patterns are weak. We tend to focus on minority-white comparisons, but there are also interesting differences across the minority groups. For example, in all but one type of neighborhood (low-income-mixed tracts), our model predicts a lower percentage denial rate for blacks than Hispanics. This lower predicted percentage denial rate, however, is swamped by the higher residuals for blacks, and as a result the overall percentage denial rates within each type of neighborhood are 5 to 10 percentage points higher for black applicants.

To examine the robustness of these results, a number of other comparisons were

made. The sample was restricted to center city areas (table 9) and non-center-city areas (table 10). The sample was restricted by lender type (tables 11, 12, and 13).

Neighborhoods were defined by the percentage of applicants that were black (table 14) and Hispanic (table 15). Data were also disaggregated by MSA, with results presented for the top 25 MSAs and grouped for smaller ones (tables 16, 17, and 18). In all cases, the results support the basic findings of tables 6, 7, and 8.

Despite the apparent thoroughness of these robustness tests, there remains a concern that the validity of each of these findings rests upon the appropriateness of the same basic denial model, and our assumption that the form of this model is linear. To examine this assumption, one final robustness test was employed. Observations were grouped according to their predicted probability of denial based on AC, MSA, and LENDER. This could be considered a nonparametric rank-ordering of observations by risk (except for race and neighborhood). Average differences in the black/white and Hispanic/white unexplained residual and tract effects were then computed for each predicted denial probability group and are presented in tables 19 and 20. By construction, within each group the sum of the other predicted characteristics is the same for blacks and whites (or Hispanics and whites), so the sum of the residual and tract racial differences *must* equal the differences in racial percentage denial rates.

The linear probability model assumption implies that the differences in racial denial rates (and the residual and neighborhood subcomponents) should be constant across risk groups. If the underlying model form were logistic or probit, then the differences would be increasing as the denial probability rose from zero to 50 percent.

The results presented in tables 19 and 20 suggest that whereas the residual and neighborhood group differences do rise when the denial probability increases from zero to 10 percent, they are fairly constant above that level. This suggests that the linear probability model specification is no less appropriate than the logistic or probit model form.

IV. Conclusions

We find a persistent difference in the denial rates of white and minority applicants, particularly blacks. These differences remain even after lender, neighborhood, and applicant economic characteristics (as best we can measure them with the HMDA data) are accounted for. Moreover, we find a remarkable degree of consistency in these conclusions across geographic markets and loan products, indicating that the observed racial differences in denial rates are widespread and cannot be attributed to a subset of markets or type of lender.

It is by now well known that the HMDA data do not contain enough relevant information about the loan applications to draw any firm conclusions regarding the reasons for these differences. We cannot determine whether these findings are generated by a process of lender discrimination against minorities, because our residual differences may be due to credit histories, employment histories, loan-to-value ratios, wealth, or other factors that lenders consider in the loan evaluation process but that are not included in the HMDA file. Because our analysis excludes these variables, we cannot conclude that the unexplained residual unambiguously stems from differential

treatment based solely on the race of the applicant. There is some evidence in the HMDA data that these variables may be correlated with race, as witnessed by the more prevalent citation of credit history as a reason for denial for minorities (table 2). Such a correlation could confound the estimation of the pure racial effect.

Despite this weakness of the HMDA data, our analysis does shed some light on the reasons for observed differences in denial rates across racial groups and neighborhoods. It has been argued that property location is an important source of racial differences in denial rates. Because house value appreciation tends to be lower in low-income and minority neighborhoods, these areas are considered to be more risky from the lenders' point of view. Moreover, some lenders argue that appraisals are harder to conduct and interpret in low-income and minority neighborhoods, because the housing stock is generally older and more heterogeneous, and because appraisers are less familiar with these neighborhoods.¹² Our analysis indicates that property location does contribute to racial differences in denial rates, but on average neighborhood effects are smaller than those stemming from applicant characteristics. Moreover, when comparing similar applicants, racial differences in denial rates still exist and are roughly the same size within neighborhoods, regardless of the type of neighborhood.

Since there are a number of potential explanations for the racial differences we find in our residual denial rates, further study will be necessary to pinpoint the causes. For example, one explanation could be that factors observed by the lenders but not contained in our data are driving the results. If so, one would expect larger residual differences for home purchase loan denials than for refinance and home improvement

loans, because the latter applicants are a select group that has already received at least one loan – the original home purchase loan. We find some evidence that this is the case: for black applicants, the residual denial rate is higher for home purchase loans than for refinances. Interestingly, this pattern does not hold for Asian and Hispanic applicants; their residual denial rates are greater for refinances than for home purchase loans. Moreover, for all minority groups there are sizable unexplained residuals for refinance and home improvement loan applications as well as for home purchase applications, suggesting that having once qualified for a new home loan brings little useful information to the regressions. Exactly what kind of process could generate these outcomes for different credit products requires more thought.

One possibly fruitful approach would be to pay more attention to the individual lenders and their characteristics. In several previous studies (Avery, Beeson, and Sniderman [1992, 1993b]), we demonstrate that lenders are quite heterogeneous in terms of the propensities to attract and approve minority applicants, and that there appears to be little consistency either within or between lenders in their actions toward minorities. Theories regarding the operation of housing credit markets should exploit these findings as part of a general explanation of the process generating the data.

Future studies of the relationship between race and risk outcomes would also appear to be particularly important in order to shed light on the reasons for observed racial differences in our residuals. If the patterns we observe are due to discrimination by lenders, and such discrimination takes the form of a higher risk threshold for minorities, then we would expect loans granted to black applicants to perform better

than those granted to whites, *ceteris paribus*. Given the findings of this study, such examinations would seem very important. At the same time, we are cautious about the power of such hypothesis tests. Several different explanations for significant racial intercepts can be observationally equivalent, making it very difficult to claim persuasively that any one process adequately accounts for the variations in the data. Accordingly, careful attention to distinguishing among competing hypotheses through choice of data and modeling strategies seems especially important.

ENDNOTES

1. See, for example, the Fair Housing Act of 1968 and the Equal Credit Opportunity Act of 1975, which prohibit lenders from discriminating against individual loan applicants on the basis of race or ethnic origin, gender, and other factors. The latter law also prohibits the explicit use of such variables in credit screening, *even if cost-related*. Also, the Community Reinvestment Act of 1977 requires that depository institutions help meet the credit needs of their communities, including low-income and minority areas, in a manner consistent with safe and sound banking.

2. Canner (1981), Avery and Buynak (1981), Avery and Canner (1983), and Bradbury, Case, and Dunham (1989) contrast the differences in mortgage credit originations between predominantly white and predominantly minority neighborhoods in various MSAs. These studies use either pre-1990 HMDA data or lien title data to infer from the neighborhoods' characteristics whether mortgage lenders treat neighborhoods differently depending on their racial composition. Calem (1992) contrasts the experiences of individual lenders participating in a Philadelphia area mortgage-lending plan with those who did not participate. His paper does document the existence of lender differences in the penetration of minority communities, but the primary focus is on the characteristics of the voluntary mortgage plan operated by a group of lenders. Avery (1989) notes the differences between studies based on lending in a neighborhood and the lending procedures adopted by individual lenders.

3. Two exceptions are King (1980) and Schafer and Ladd (1981), which find little evidence of neighborhood redlining but some evidence of higher denial rates for black and Hispanic applicants, after controlling for all available information on other factors, such as income and credit history, relevant to the lending decision. While quite informative, these studies are limited in their geographic coverage and in the number and types of lenders surveyed. In addition, there have been several studies that use household-level data without neighborhood effects. Canner, Gabriel, and Wooley (1991), Gabriel and Rosenthal (1991), and Duca and Rosenthal (1992) study racial aspects of credit rationing and market performance by using data from the Survey of Consumer Finances, which comprises information collected from a sample of households. These studies attempt to infer from the households' experiences and demographic characteristics whether lenders treat people differently as a result of their racial status. Canner and Lockett (1991) do not consider race, but do discuss factors associated with consumer and mortgage debt payment problems.

4. The model was actually estimated using deviations about the means, which is computationally equivalent to adding intercepts. For the new purchase sample, the 1,984,688 observations were located in 607,631 unique combinations of the 40,008 tracts and 20,695 lenders in the sample spread across 340 MSAs; thus, the average tract had about 15 lenders, each of whom served about 30 tracts per MSA. For the refinancing sample, the 716,595 observations were located in 326,535 unique combinations of tracts and lenders. For the home improvement loan sample, the 787,951 observations were located in 267,158 unique combinations of tract and lender.

5. Mortgage banks are considered to have an office in an MSA if they take five or more mortgage applications there. There is some evidence that a significant portion of applications to mortgage bankers, perhaps as high as 30 percent, may not have been reported in HMDA for 1990 and 1991 because firms fell below the \$10 million asset requirement. This may be particularly true for firms serving primarily as originators, selling loans in the secondary market. In November 1991, the Federal Reserve Board tightened the reporting requirements for mortgage banks, which should increase coverage.

6. Institutions with assets of less than \$30 million were not required to report race, income, and gender for loan applicants. In addition, the HMDA filings contained many errors and inconsistencies even after extensive editing by the receiving agencies. We dealt with missing and implausible data using a "hot deck" imputation procedure similar to that used by the U.S. Census Bureau. Applications with missing or implausible data were statistically matched to applications for the same type of loan in the same census tract that came closest to them in reported characteristics (race, loan action, income, and loan amount). Missing values were filled in using the variable value of the matched observation. Overall, income was imputed for 4.9 percent, loan amount for 1.5 percent, gender for 4.0 percent, and race for 5.6 percent of the study sample applications.

7. Applications were omitted from our sample for the following reasons: loans purchased from other institutions (1,137,741) because they did not require an action by the reporting lender; applications for properties outside the MSAs in which the lender had an office (1,523,429 loans) because of inconsistent reporting requirements; applications for multifamily homes and those that never reached the stage of lender action because they were either withdrawn by the applicant or closed for incompleteness (444,684).

8. The 8,745 financial institutions filing 1990 HMDA reports that had at least one loan in the study sample operated in an average of 2.7 MSAs. This translated into 23,248 study lenders when lenders were defined at the MSA level.

9. Household income of sample applicants may be higher than this figure, since the applicant's income used for mortgage qualification may not reflect all of the income received by the household.

10. The percent Hispanic in the HMDA sample is slightly higher than the overall U.S. population, due in part to the inclusion of Puerto Rico, and the percent black is slightly lower. U.S. figures are taken from the whole 1990 Census, which may differ somewhat from the coverage of the study sample, in that rural areas are included.

11. The reported standard errors in tables 3, 4, and 5 are those from a standard regression program. These may be biased due to heteroskedasticity stemming from the fact that the underlying model is a linear probability model.

12. See Lang and Nakamura (1993) for more discussion on this point.

REFERENCES

- Avery, Robert B. 1989. "Making Judgments about Mortgage Lending Patterns." *Economic Commentary*, Federal Reserve Bank of Cleveland (December 15).
- Avery, Robert B., Patricia E. Beeson, and Mark S. Sniderman. 1992. "Cross-Lender Variation in Home Mortgage Lending." *Working Paper* 9219, Federal Reserve Bank of Cleveland (December).
- _____ 1993a. "Home Mortgage Lending by the Numbers." *Economic Commentary*, Federal Reserve Bank of Cleveland (February 15).
- _____ 1993b. "Lender Consistency in Housing Credit Markets." *Proceedings, Conference on Bank Structure*, Federal Reserve Bank of Chicago, forthcoming.
- Avery, Robert B., and Thomas M. Buynak. 1981. "Mortgage Redlining: Some New Evidence." *Economic Review*, Federal Reserve Bank of Cleveland (Summer), pp. 18-32.
- Avery, Robert B., and Glenn B. Canner. 1983. "Mortgage Redlining: A Multicity Cross-Section Analysis." Unpublished *Working Paper*, Board of Governors of the Federal Reserve System, Washington, D.C.
- Bradbury, Katharine, Karl E. Case, and Constance R. Dunham. 1989. "Geographic Patterns of Mortgage Lending in Boston, 1982-1987." *New England Economic Review* (September/October), pp. 3-30.
- Calem, Paul S. 1992. "The Delaware Valley Mortgage Plan: An Analysis Using HMDA Data." *Working Paper* 92-3, Federal Reserve Bank of Philadelphia (February).
- Canner, Glenn B. 1981. "Redlining and Mortgage Lending Patterns." In *Research in Urban Economics*, edited by J. Vernon Henderson, Greenwich, CT: JAI Press, pp. 67-101.
- Canner, Glenn B., Stuart A. Gabriel, and J. Michael Wooley. 1991. "Race, Default Risk, and Mortgage Lending: A Study of the FHA and Conventional Loan Markets." *Southern Economic Journal*, vol. 58 (no. 1), pp. 249-262.
- Canner, Glenn B., and Charles A. Lockett. 1991. "Payment of Household Debts." *Federal Reserve Bulletin*, vol. 77 (April), pp. 218-229.
- Canner, Glenn B., and Delores S. Smith. 1991. "Home Mortgage Disclosure Act: Expanded Data on Residential Lending." *Federal Reserve Bulletin*, vol. 77 (November), pp. 859-881.

_____ 1992. "Expanded HMDA Data on Residential Lending: One Year Later." *Federal Reserve Bulletin*, vol. 78 (November), pp. 801-824.

Duca, John V., and Stuart S. Rosenthal. 1992. "Borrowing Constraints, Household Debt, and Racial Discrimination in Loan Markets." Unpublished manuscript.

Gabriel, Stuart A., and Stuart S. Rosenthal. 1991. "Credit Rationing, Race, and the Mortgage Market." *Journal of Urban Economics*, vol. 29 (May), pp. 371-379.

ICF, Incorporated. 1991. "The Secondary Market and Community Lending Through Lenders' Eyes." Paper prepared for the Federal Home Loan Mortgage Corporation (February).

King, A. Thomas. 1980. "Discrimination in Mortgage Lending: A Study of Three Cities." Working Paper No. 91, Office of Policy and Economic Research, Federal Home Loan Bank Board (February).

Lang, William W., and Leonard I. Nakamura. 1993. "A Model of Redlining." *Journal of Urban Economics*, vol. 33 (March), pp. 223-234.

Munnell, Alicia H., Lynne E. Browne, James McEneaney, and Geoffrey M. B. Tootell. 1992. "Mortgage Lending in Boston: Interpreting HMDA Data." *Working Paper Series 92-7*, Federal Reserve Bank of Boston (October).

Shafer, Robert, and Helen F. Ladd. 1981. *Discrimination in Mortgage Lending*. Cambridge, MA: MIT Press.

Table 1: Characteristics of Mortgage Applications, National Sample, 1990 HMDA

	Home Purchase			Refinance			Home Improvement		
	Percent Sample	Percent Loan\$	Denial Rate	Percent Sample	Percent Loan\$	Denial Rate	Percent Sample	Percent Loan\$	Denial Rate
<i>Race of Applicant</i>									
Native American	0.6%	0.6%	19.3%	0.6%	0.6%	21.2%	0.9%	1.0%	22.7%
Asian (or Pacific Islander)	4.6	6.8	14.4	4.9	7.2	21.3	2.5	5.4	27.7
Black	6.2	4.8	29.4	5.1	3.9	28.8	10.3	5.9	43.4
Hispanic	6.6	6.4	22.1	7.7	7.3	25.6	5.7	5.4	35.4
White	81.4	80.5	13.1	80.9	79.9	16.4	79.9	81.3	20.3
Other	0.7	1.0	19.8	0.7	1.0	26.8	0.8	1.0	35.4
<i>Race of Co-applicant</i>									
No Co-applicant	28.4	24.1	17.3	24.8	23.8	21.0	33.5	26.3	29.8
Same Race as Applicant	69.4	73.4	13.8	73.2	73.9	17.1	64.9	71.6	20.8
Different Race than Applicant	2.2	2.5	15.6	2.0	2.3	19.4	1.6	2.1	21.1
<i>Gender</i>									
Male Applicant, Female Co-applicant	64.0	68.2	13.4	67.7	69.2	16.8	58.0	65.8	19.7
Female Applicant, Male Co-applicant	4.3	4.2	18.6	4.9	4.2	21.4	6.9	6.1	28.6
Male Applicant and Co-applicant	2.0	2.3	16.4	1.6	2.0	19.6	0.8	1.0	27.8
Female Applicant and Co-applicant	1.2	1.2	18.1	0.9	0.8	20.2	0.8	0.8	28.1
Single Male Applicant	16.9	15.6	17.9	14.7	15.7	22.0	19.5	16.3	29.5
Single Female Applicant	11.5	8.5	16.5	10.1	8.1	19.6	14.0	9.9	30.1
<i>Owner-Occupied</i>	93.6	94.5	14.9	90.9	91.5	18.1	97.2	96.1	23.8
<i>Loan Type</i>									
Conventional	75.1	82.9	14.9	96.4	98.2	17.9	96.0	97.6	23.8
FHA	20.4	13.7	14.5	2.9	1.4	23.0	3.9	2.1	24.2
VA	4.5	3.4	15.8	0.7	0.4	21.3	0.1	0.3	22.0
FmHA	0.0	0.02	2.0	0.0	0.0	22.5	0.0	0.0	28.2
<i>Lender Action</i>									
Loan Denied	14.8	13.1		18.1	20.6		23.8	20.2	
Loan Accepted and Withdrawn	2.9	3.5		4.1	5.4		3.3	3.7	
Loan Originated	82.3	83.4		77.8	74.0		72.8	76.1	
Loan Kept by Originator (% of originations)	44.9	47.7		60.3	61.3		93.0	85.2	
Loan Sold to FNMA (% of originations)	14.5	14.4		13.4	11.8		2.0	4.7	
Loan Sold to GNMA (% of originations)	10.5	7.6		1.8	1.2		0.2	0.5	
Loan Sold to FHLMC (% of originations)	9.0	9.1		10.8	9.7		0.9	2.6	
Loan Sold Elsewhere (% of originations)	21.1	21.2		10.6	16.0		3.9	7.0	
<i>Reasons for Denial (of Loans Denied)¹</i>									
No Reason Given	32.0	29.5		26.7	25.8		36.2	42.6	
Debt-to-Income Ratio	16.0	17.7		17.8	17.2		20.2	16.9	
Employment History	4.2	3.1		2.3	1.8		2.4	1.9	
Credit History	26.0	22.1		25.3	22.1		29.7	19.5	
Collateral	8.2	8.9		14.3	16.4		9.2	9.3	
Insufficient Cash	4.0	4.1		1.6	1.9		0.8	1.0	
Unverifiable Information	2.8	3.8		3.7	4.5		1.5	1.8	
Application Incomplete	2.6	3.7		2.9	3.5		1.4	1.8	
Mortgage Insurance Denied	0.6	0.7		0.2	0.2		0.2	0.2	
Other	14.8	17.8		17.6	18.7		9.8	14.1	
<i>Memo Items:</i>									
Median Income (\$1,000s)		\$48			\$56			\$39	
Median Loan Request (\$1,000s)		\$77			\$83			\$10	
Number of Loans		1,984,688			716,595			787,952	

¹ Up to three reasons for denial could be given, and answers were voluntary. Each category gives the percent of all denials that gave that reason as one of the three.

SOURCE FOR ALL TABLES: Authors.

Table 2: Characteristics of Mortgage Applications by Race, National Sample, 1990 HMDA

	Home Purchase			Refinance			Home Improvement		
	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic	White
<i>Gender</i>									
Two Applicants	58.0%	80.0%	71.7%	64.6%	80.8%	75.2%	47.8%	71.2%	68.2%
Single Male Applicant	19.8	12.7	17.1	16.2	11.0	15.1	24.4	17.3	19.1
Single Female Applicant	22.2	7.3	11.2	19.2	8.3	9.7	27.8	11.5	12.7
<i>Owner-Occupied</i>									
	94.5	93.6	93.7	88.0	90.4	91.2	96.6	96.5	97.3
<i>Loan Type</i>									
Conventional	52.1	72.9	76.0	92.7	96.4	96.5	93.4	92.1	96.6
FHA	38.2	24.1	19.5	5.6	3.2	2.8	6.5	7.8	3.2
VA	9.7	2.9	4.5	1.7	0.4	0.7	0.1	0.2	0.1
<i>Lender Action</i>									
Loan Denied	29.4	22.1	13.1	28.8	25.6	16.4	43.4	35.4	20.3
Loan Accepted and Withdrawn	3.1	3.8	2.8	8.3	6.7	3.4	3.4	4.4	3.2
Loan Originated	67.6	74.1	84.2	62.9	67.7	80.1	53.3	60.2	76.5
Loan Kept by Originator (% of originations)	35.9	47.1	45.1	56.2	51.2	61.7	94.5	91.4	93.1
Loan Sold to FNMA (% of originations)	9.9	10.0	14.9	11.9	12.6	13.4	1.5	1.9	2.0
Loan Sold to GNMA (% of originations)	20.5	11.9	10.2	3.8	1.9	1.7	0.4	0.3	0.2
Loan Sold to FHLMC (% of originations)	6.4	13.4	8.5	10.7	19.2	10.0	0.8	1.9	0.7
Loan Sold Elsewhere (% of originations)	27.4	17.5	21.3	17.4	15.1	13.2	2.8	4.5	3.9
<i>Reasons for Denial (of Loans Denied)¹</i>									
No Reason Given	30.4	33.1	32.0	31.0	23.8	26.4	28.0	47.3	35.9
Debt-to-Income Ratio	13.5	15.9	16.3	15.4	17.1	18.3	21.2	16.8	20.6
Employment History	3.4	3.4	4.5	1.5	2.0	2.4	2.0	1.9	2.6
Credit History	37.9	24.2	25.1	31.8	28.0	25.0	40.9	23.5	28.3
Collateral	5.7	9.3	8.4	12.0	16.4	14.2	9.1	6.9	9.8
Insufficient Cash	3.9	4.1	4.1	1.2	1.3	1.7	0.5	0.7	0.9
Unverifiable Information	2.1	4.1	2.6	2.7	4.0	3.7	1.3	1.7	1.5
Application Incomplete	2.4	3.4	2.6	2.3	3.2	2.9	1.6	1.1	1.4
Mortgage Insurance Denied	0.5	0.6	0.7	0.2	0.2	0.3	0.2	0.1	0.2
Other	11.1	14.8	15.1	14.4	17.9	17.6	8.3	10.1	10.1
<i>Memo Items:</i>									
Median Income (\$1,000s)	\$36	\$44	\$48	\$47	\$50	\$56	\$27	\$35	\$40
Median Loan Request (\$1,000s)	\$61	\$85	\$76	\$71	\$100	\$79	\$5	\$11	\$10

¹ Up to three reasons for denial could be given, and answers were voluntary. Each category gives the percent of all denials that gave that reason as one of the three.

Table 3: Linear Probability Model of Loan Denial (1) or Acceptance (0), Home Purchase

	Parameter Estimate	Standard Error
<i>Race (Dummies, "White" Is Base Group)</i>		
Black Applicant	.10258***	.00403
Hispanic Applicant	.04018***	.00392
Native American Applicant	.02813***	.00569
Asian Applicant	.00801*	.00390
Other Race Applicant	.02987***	.00364
Mixed Race, Minority Co-applicant (Dummy)	.02410***	.00337
Mixed Race, Nonminority Co-applicant (Dummy)	-0.02690***	.00329
Owner-occupied (Dummy)	.00630***	.00132
<i>Income (\$1,000's)</i>		
Income	-0.00985***	.00034
Income Spline at \$20,000	.00606***	.00038
Income Spline at \$40,000	.00282***	.00015
Income Spline at \$60,000	.00063***	.00015
Income Spline at \$80,000	.00016	.00017
Income Spline at \$100,000	.00011	.00014
Income Spline at \$150,000	-0.00004	.00010
Income Spline at \$200,000	.00010	.00006
<i>Loan Amount (\$1,000's)</i>		
Loan Amount	-0.00193***	.00020
Loan Amount Spline at \$20,000	.00028	.00027
Loan Amount Spline at \$40,000	.00179***	.00018
Loan Amount Spline at \$60,000	-0.00018	.00016
Loan Amount Spline at \$80,000	.00033*	.00016
Loan Amount Spline at \$100,000	-0.00015	.00014
Loan Amount Spline at \$125,000	.00012	.00008
Loan Amount Spline at \$200,000	-0.00021***	.00003
<i>Loan-to-Income Ratio (Dummies, Less than 1.5 Is Base Group)</i>		
Ratio of 1.5 to 2.0	-0.01016***	.00105
Ratio of 2.0 to 2.25	-0.01168***	.00141
Ratio of 2.25 to 2.5	-0.01195***	.00163
Ratio of 2.5 to 2.75	-0.00737***	.00187
Ratio of 2.75 to 3.0	.00323	.00227
Ratio over 3.0	.05062***	.00207
<i>Applicant Gender (Dummies, Female Applicant, No Co-applicant Is Base Group)</i>		
Male Applicant, Female Co-applicant	-0.01886*	.00763
Female Applicant, Male Co-applicant	-0.00766	.00772
Male Applicant and Co-applicant	-0.00390	.00787
Female Applicant and Co-applicant	-0.01021	.00800
Male Applicant, No Co-applicant	.02834***	.00109
<i>Income, Interacted With No Co-applicant</i>		
Income	-0.00334***	.00042
Income Spline at \$20,000	.00516***	.00049
Income Spline at \$40,000	-0.00051*	.00024
Income Spline at \$60,000	-0.00137***	.00030
Income Spline at \$80,000	.00048	.00036

Table 3: (continued)

	Parameter Estimate	Standard Error
<i>Race and Marital Status, Interacted With VA Loan</i>		
Black Applicant	-0.00667	.01469
Hispanic Applicant	-0.00866	.01548
Native American Applicant	.04929*	.02208
Asian Applicant	.01699	.01765
White Applicant	-0.02033	.01428
Other Race Applicant	.02562	.02726
No Co-applicant	-0.00619*	.00311
<i>Race and Marital Status, Interacted With FHA Loan</i>		
Black Applicant	-0.01967	.01446
Hispanic Applicant	-0.04312**	.01445
Native American Applicant	.00429	.01701
Asian Applicant	-0.03294*	.01489
White Applicant	-0.03329*	.01425
Other Race Applicant	-0.02377	.01732
No Co-applicant	-0.01230***	.00164
<i>Income, Interacted With VA or FHA Loan</i>		
Income	-0.00169**	.00054
Income Spline at \$20,000	.00295***	.00058
Income Spline at \$40,000	-0.00032	.00024
Income Spline at \$60,000	-0.00129***	.00034
Income Spline at \$80,000	.00195***	.00052
Income Spline at \$100,000	-0.00157***	.00034
<i>Loan Amount, Interacted With VA or FHA Loan</i>		
Loan Amount	.00366***	.00053
Loan Amount Spline at \$20,000	-0.00256***	.00069
Loan Amount Spline at \$40,000	-0.00231***	.00034
Loan Amount Spline at \$60,000	.00066*	.00027
Loan Amount Spline at \$80,000	-0.00038	.00028
Loan Amount Spline at \$100,000	.00052	.00027
<i>Loan-to-Income Ratio, Interacted With VA or FHA Loan</i>		
Ratio of 1.5 to 2.0	-0.00333	.00222
Ratio of 2.0 to 2.25	-0.00511	.00299
Ratio of 2.25 to 2.5	-0.00612	.00347
Ratio of 2.5 to 2.75	.00029	.00397
Ratio of 2.75 to 3.0	-0.00449	.00475
Ratio over 3.0	-0.00681	.00492
<i>Memo Items:</i>		
Number of Observations	1,984,688	
Mean Denial Rate in Regression Sample	.148	
Number of Tract/Institution Dummies	607,631	
R squared (Including Tract/Institution Dummies)	.456	
R squared (Variation around Tract/Institution Means)	.022	

* Significant at the 5 percent level.

** Significant at the 1 percent level.

*** Significant at the 0.1 percent level.

Table 4: Linear Probability Model of Loan Denial (1) or Acceptance (0), Refinance

	Parameter Estimate	Standard Error
<i>Race (Dummies, "White" Is Base Group)</i>		
Black Applicant	.07044***	.00769
Hispanic Applicant	.04841***	.00740
Native American Applicant	.02556*	.01042
Asian Applicant	.03900***	.00751
Other Race Applicant	.03841***	.00703
Mixed Race, Minority Co-applicant (Dummy)	.00576	.00700
Mixed Race, Nonminority Co-applicant (Dummy)	-0.02336***	.00694
Owner-occupied (Dummy)	-0.00063	.00223
VA Loan (Dummy)	-0.01573	.00979
<i>Income (\$1,000's)</i>		
Income	.00136**	.00053
Income Spline at \$20,000	-0.00424***	.00063
Income Spline at \$40,000	.00215***	.00028
Income Spline at \$60,000	-0.00007	.00027
Income Spline at \$80,000	.00116***	.00031
Income Spline at \$100,000	-0.00036	.00024
Income Spline at \$150,000	.00015	.00016
Income Spline at \$200,000	-0.00016	.00009
<i>Loan Amount (\$1,000's)</i>		
Loan Amount	-0.00341***	.00030
Loan Amount Spline at \$20,000	.00285***	.00042
Loan Amount Spline at \$40,000	.00079	.00030
Loan Amount Spline at \$60,000	.00014	.00031
Loan Amount Spline at \$80,000	-0.00010	.00032
Loan Amount Spline at \$100,000	.00003	.00027
Loan Amount Spline at \$125,000	.00036*	.00015
Loan Amount Spline at \$200,000	-0.00055***	.00004
<i>Loan-to-Income Ratio (Dummies, Less than 1.5 Is Base Group)</i>		
Ratio of 1.5 to 2.0	-0.00218	.00200
Ratio of 2.0 to 2.25	.00451	.00266
Ratio of 2.25 to 2.5	.00700*	.00301
Ratio of 2.5 to 2.75	.01506***	.00324
Ratio of 2.75 to 3.0	.02567***	.00375
Ratio over 3.0	.08614***	.00326
<i>Applicant Gender (Dummies, Female Applicant, No Co-applicant Is Base Group)</i>		
Male Applicant, Female Co-applicant	-0.09269***	.01395
Female Applicant, Male Co-applicant	-0.08497***	.01416
Male Applicant and Co-applicant	-0.06650***	.01467
Female Applicant and Co-applicant	-0.08148***	.01513
Male Applicant, No Co-applicant	.02477***	.00251

Table 4: (continued)

	Parameter Estimate	Standard Error
<i>Income, Interacted With No Co-applicant</i>		
Income	-0.00496***	.00080
Income Spline at \$20,000	.00494***	.00100
Income Spline at \$40,000	.00077	.00055
Income Spline at \$60,000	-0.00011	.00062
Income Spline at \$80,000	-0.00063	.00068
Income Spline at \$100,000	-0.00001	.00035
<i>Interacted With VA or FHA Loan</i>		
Black Applicant	.11374***	.01851
Hispanic Applicant	.06567***	.01948
Native American Applicant	.06397	.04933
Asian Applicant	.02391	.02656
White Applicant	.07913***	.01269
Other Race Applicant	.03883	.05012
No Co-applicant	.00294	.00836
Income	.00005	.00009
Loan Amount	-0.00024	.00015
<i>Memo Items:</i>		
Number of Observations	716,595	
Mean Denial Rate in Regression Sample	.181	
Number of Tract/Institution Dummies	326,535	
R squared (Including Tract/Institution Dummies)	.552	
R squared (Variation around Tract/Institution Means)	.020	

- * Significant at the 5 percent level.
- ** Significant at the 1 percent level.
- *** Significant at the 0.1 percent level.

Table 5: Linear Probability Model of Loan Denial (1) or Acceptance (0), Home Improvement

	Parameter Estimate	Standard Error
<i>Race (Dummies, "White" Is Base Group)</i>		
Black Applicant	.08045***	.00682
Hispanic Applicant	.06441***	.00702
Native American Applicant	.01326	.00869
Asian Applicant	.05435***	.00734
Other Race Applicant	.08010***	.00639
Mixed Race, Minority Co-applicant (Dummy)	.00107	.00721
Mixed Race, Nonminority Co-applicant (Dummy)	-0.04042***	.00772
Owner-occupied (Dummy)	-0.00541	.00357
VA Loan (Dummy)	.23804***	.02287
<i>Income (\$1,000's)</i>		
Income	-0.00243***	.00038
Income Spline at \$20,000	-0.00133*	.00046
Income Spline at \$40,000	.00103***	.00024
Income Spline at \$60,000	.00215***	.00028
Income Spline at \$80,000	.00040	.00038
Income Spline at \$100,000	.00043	.00033
Income Spline at \$150,000	-0.00027	.00027
Income Spline at \$200,000	.00001	.00016
<i>Loan Amount (\$1,000's)</i>		
Loan Amount	.00035*	.00012
Loan Amount Spline at \$20,000	-0.00177***	.00023
Loan Amount Spline at \$40,000	.00202***	.00036
Loan Amount Spline at \$60,000	-0.00064	.00053
Loan Amount Spline at \$80,000	.00126	.00067
Loan Amount Spline at \$100,000	-0.00108	.00063
Loan Amount Spline at \$125,000	.00045	.00049
Loan Amount Spline at \$200,000	-0.00058***	.00016
<i>Loan-to-Income Ratio (Dummies, Less than 1.5 Is Base Group)</i>		
Ratio of 1.5 to 2.0	.02051***	.00406
Ratio of 2.0 to 2.25	.00433***	.00664
Ratio of 2.25 to 2.5	.02663*	.00922
Ratio of 2.5 to 2.75	.05256***	.00894
Ratio of 2.75 to 3.0	.08344***	.01260
Ratio over 3.0	.04087***	.00621
<i>Applicant Gender (Dummies, Female Applicant, No Co-applicant Is Base Group)</i>		
Male Applicant, Female Co-applicant	-0.10888***	.00815
Female Applicant, Male Co-applicant	-0.07293***	.00829
Male Applicant and Co-applicant	-0.04480***	.01018
Female Applicant and Co-applicant	-0.07792***	.01003
Male Applicant, No Co-applicant	.03575***	.00196

Table 5: (continued)

	Parameter Estimate	Standard Error
<i>Income, Interacted With No Co-applicant</i>		
Income	-0.00464***	.00048
Income Spline at \$20,000	.00430**	.00062
Income Spline at \$40,000	.00200***	.00045
Income Spline at \$60,000	-0.00116	.00065
Income Spline at \$80,000	-0.00073	.00084
Income Spline at \$100,000	.00024	.00047
<i>Interacted With VA or FHA Loan</i>		
Black Applicant	-0.17485***	.01180
Hispanic Applicant	-0.11894***	.01370
Native American Applicant	-0.08746*	.03701
Asian Applicant	-0.11298***	.02374
White Applicant	-0.09436***	.00898
Other Race Applicant	-0.06075	.04612
No Co-applicant	-0.02010	.00704
Income	.00025	.00012
Loan Amount	.00113	.00026
<i>Memo Items:</i>		
Number of Observations	787,952	
Mean Denial Rate in Regression Sample	.238	
Number of Tract/Institution Dummies	267,158	
R squared (Including Tract/Institution Dummies)	.473	
R squared (Variation around Tract/Institution Means)	.027	

* Significant at the 5 percent level.

** Significant at the 1 percent level.

***Significant at the 0.1 percent level.

Table 6: Difference in Average Percentage Denial Rates Attributable to Various Sources, Home Purchase Loans, by Neighborhood and Race, 1990 HMDA

	Total	High Income ¹			Middle Income ²			Low-Income ³		
		White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶
HOME PURCHASE										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	3.4%	7.7%	9.5%	5.0%	11.5%	21.8%	2.7%	8.5%	30.0%
Actual Denial Rate	29.4	22.6	24.1	26.0	26.4	27.2	26.7	32.1	36.6	33.6
Applicant Economic Characteristics	15.6	13.2	13.2	13.1	14.2	14.7	14.2	17.3	18.4	18.1
MSA Effect	0.0	-0.6	0.4	1.6	-0.8	-0.1	0.0	-0.2	0.6	-0.4
Overall Lender Effect	0.2	0.7	0.4	0.1	0.4	-0.2	-0.2	-0.2	1.9	0.2
Census Tract Effect	2.4	-1.6	-0.6	2.2	-0.7	0.6	2.8	0.8	2.2	5.0
Residual ⁷	11.0	11.0	10.7	9.1	13.3	12.2	9.9	14.3	13.5	10.8
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	3.4	13.9	26.5	3.3	10.1	22.0	1.3	3.7	15.8
Actual Denial Rate	22.1	17.4	19.1	20.0	19.6	20.5	22.1	24.6	27.8	28.9
Applicant Economic Characteristics	14.8	12.6	13.0	13.1	14.0	14.5	14.4	17.1	18.4	19.6
MSA Effect	2.0	0.8	1.9	3.0	-0.4	1.3	2.3	-0.3	0.6	1.7
Overall Lender Effect	0.1	1.6	0.6	-0.9	0.8	0.6	-0.8	1.0	1.5	1.4
Census Tract Effect	1.4	-1.5	-0.6	1.4	-0.4	0.6	2.8	0.8	1.6	3.0
Residual ⁷	3.7	3.8	4.2	3.4	5.6	3.4	3.4	6.0	5.8	3.2
<i>Asian Applicants</i>										
Percent of Asians	100.0	6.3	25.8	36.6	4.7	8.5	12.4	1.4	2.1	2.2
Actual Denial Rate	14.4	10.3	13.5	14.5	11.9	13.9	17.7	13.1	17.3	20.9
Applicant Economic Characteristics	13.0	12.1	12.6	12.7	12.8	13.1	13.6	16.3	16.4	16.7
MSA Effect	0.6	-0.4	0.9	1.0	-1.3	-0.1	0.9	-1.3	-0.2	0.2
Overall Lender Effect	-0.2	-0.2	0.2	-0.4	-0.6	-0.7	-0.0	-1.4	-0.4	-0.3
Census Tract Effect	-0.0	-1.9	-1.3	0.4	-0.5	0.0	2.2	0.0	1.2	2.1
Residual ⁷	1.0	0.7	1.2	0.8	1.6	1.6	1.0	-0.5	0.3	2.2
<i>Native American Applicants</i>										
Percent of Native Americans	100.0	13.1	20.6	10.0	16.2	12.3	7.2	8.8	7.1	4.8
Actual Denial Rate	19.3	14.9	14.6	19.3	17.3	19.3	24.6	22.9	26.6	33.3
Applicant Economic Characteristics	14.4	12.9	12.5	12.8	14.6	14.4	14.1	17.8	18.0	18.9
MSA Effect	0.3	-0.4	1.1	1.7	-1.1	0.1	1.4	-0.8	0.6	0.8
Overall Lender Effect	1.1	0.3	1.0	1.3	0.6	0.7	-0.2	1.3	2.8	4.3
Census Tract Effect	0.1	-1.7	-1.2	0.5	-0.6	-0.0	2.8	1.0	2.6	4.2
Residual ⁷	3.4	3.8	1.1	3.1	3.8	4.1	6.5	3.6	2.6	4.9

Table 6: (continued)

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶
<i>Other Race Applicants</i>										
Percent of Other Race	100.0%	10.9%	26.8%	15.8%	9.2%	11.9%	14.8%	3.0%	3.1%	4.5%
Actual Denial Rate	19.8	16.3	18.1	22.4	14.9	18.1	24.3	21.3	24.1	25.1
Applicant Economic Characteristics	14.0	12.5	12.9	13.4	13.3	13.8	15.7	16.3	17.3	18.6
MSA Effect	1.1	-0.1	1.3	2.2	-1.0	0.3	2.6	-0.7	-0.1	1.4
Overall Lender Effect	0.7	1.2	1.1	0.8	0.0	0.6	0.3	0.3	0.6	-0.4
Census Tract Effect	0.2	-1.6	-1.3	1.0	-0.6	0.2	2.5	0.8	2.2	3.3
Residual ⁷	3.8	4.2	4.0	4.9	3.2	3.1	3.1	4.6	4.1	2.2
<i>White Applicants</i>										
Percent of Whites	100.0	18.9	16.2	3.9	26.3	11.1	2.7	13.5	5.2	2.1
Actual Denial Rate	13.1	9.5	12.2	15.6	11.0	13.4	18.0	17.0	20.0	23.7
Applicant Economic Characteristics	13.6	12.0	12.4	12.6	13.3	13.5	13.5	16.6	17.1	17.3
MSA Effect	-0.2	-0.4	1.1	1.9	-1.3	0.2	1.0	-0.9	0.3	0.7
Overall Lender Effect	-0.0	-0.4	-0.1	0.0	-0.3	-0.4	0.5	0.6	1.2	1.3
Census Tract Effect	-0.3	-1.7	-1.2	0.6	-0.6	0.1	2.2	0.8	1.7	3.9
Residual ⁷	-0.0	-0.0	-0.0	0.5	-0.1	-0.1	0.7	-0.01	-0.4	0.5
<i>Total Applicants</i>										
Percent of Applicants	100.0	16.2	16.1	7.4	22.3	10.9	5.7	11.4	5.2	4.8
Actual Denial Rate	14.8	9.9	13.1	17.4	11.3	14.8	21.2	17.2	22.0	28.7
Applicant Economic Characteristics	13.8	12.1	12.5	12.8	13.3	13.7	14.0	16.6	17.3	18.1
MSA Effect	0.0	-0.4	1.1	1.9	-1.3	0.3	1.1	-0.9	0.4	0.5
Overall Lender Effect	0.0	-0.3	0.0	-0.3	-0.3	-0.3	-0.1	0.5	1.3	0.9
Census Tract Effect	0.0	-1.7	-1.1	0.9	-0.6	0.2	2.5	0.8	1.7	4.1
Residual ⁷	1.0	0.2	0.7	2.0	0.2	1.0	3.7	0.2	1.4	5.2

¹ Census tracts with mean applicant income of more than \$60,000.

² Census tracts with mean applicant income greater than \$40,000 and less than or equal to \$60,000.

³ Census tracts with mean applicant income of \$40,000 or less.

⁴ Census tracts with less than 10 percent minority applicants (native Americans, Asians, Blacks, Hispanics, or other).

⁵ Census tracts with 10 percent or more and 30 percent or less applications from minority applicants.

⁶ Census tracts with more than 30 percent of all loan applications from minority applicants.

⁷ The residual is defined as the average difference between the actual denial rate and the sum of the economic, MSA, tract, and lender effects.

Table 7: Difference in Average Percentage Denial Rates Attributable to Various Sources, Refinance Loans, by Neighborhood and Race, 1990 HMDA

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶
REFINANCE										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	3.1%	9.9%	27.4%	3.4%	5.9%	26.8%	1.7%	3.8%	18.0%
Actual Denial Rate	28.8	27.3	28.6	25.5	26.8	31.1	27.2	31.3	33.6	34.6
Applicant Economic Characteristics	18.0	17.4	18.5	18.1	16.5	17.1	17.7	18.2	18.3	18.6
MSA Effect	0.1	-0.4	0.4	0.5	-1.4	-0.1	0.6	-1.7	-1.0	-0.5
Overall Lender Effect	-0.4	1.5	0.6	-2.0	1.4	1.7	-1.7	1.6	1.0	1.8
Census Tract Effect	3.4	-1.5	-0.7	2.7	0.3	1.7	4.7	1.8	4.1	7.0
Residual ⁷	7.6	10.2	9.8	6.4	10.1	10.7	6.0	11.3	11.1	7.6
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	2.7	16.8	44.4	1.4	4.4	22.7	0.5	1.1	6.0
Actual Denial Rate	25.6	22.9	23.7	25.1	25.2	29.4	26.2	31.3	33.2	28.8
Applicant Economic Characteristics	17.9	17.9	18.3	18.0	15.8	16.8	17.7	17.9	18.1	18.8
MSA Effect	1.4	1.5	1.5	1.2	1.3	4.2	1.6	1.0	3.4	0.1
Overall Lender Effect	-0.3	1.7	0.4	-0.7	2.9	1.0	-0.8	2.6	1.6	0.8
Census Tract Effect	1.6	-2.2	-1.1	2.0	-0.3	1.7	2.7	1.8	3.2	4.5
Residual ⁷	4.9	4.0	4.7	4.8	5.5	5.7	5.0	7.9	6.8	4.6
<i>Asian Applicants</i>										
Percent of Asians	100.0	4.6	27.1	52.4	2.0	3.3	8.8	0.5	0.6	0.8
Actual Denial Rate	21.3	20.6	21.9	20.7	17.8	21.6	23.5	22.8	25.4	26.0
Applicant Economic Characteristics	18.3	18.2	19.1	18.3	15.8	16.5	16.9	17.0	17.4	18.1
MSA Effect	-1.0	-0.1	0.1	-2.0	-1.3	0.9	-0.1	-1.8	-0.3	1.8
Overall Lender Effect	-0.0	0.9	0.5	-0.3	0.4	-0.3	-0.3	0.5	0.9	-0.2
Census Tract Effect	0.2	-2.2	-1.8	0.8	-0.8	0.5	3.4	2.0	2.8	3.9
Residual ⁷	3.9	3.8	4.0	4.0	3.7	4.1	3.4	5.0	4.5	2.4
<i>Native American Applicants</i>										
Percent of Native Americans	100.0	12.7	28.9	19.4	11.0	8.1	8.4	5.6	3.3	2.6
Actual Denial Rate	21.2	18.9	21.8	22.1	17.2	21.0	25.4	19.4	21.7	26.1
Applicant Economic Characteristics	17.8	17.7	18.7	18.0	15.8	16.9	17.4	17.9	17.8	18.4
MSA Effect	0.4	0.4	0.9	0.4	-1.6	2.2	1.9	-1.9	-0.6	0.7
Overall Lender Effect	0.0	0.1	0.9	-0.4	-0.6	-0.8	-2.3	0.2	2.4	1.2
Census Tract Effect	0.3	-2.7	-1.1	0.8	0.0	1.4	3.5	2.4	3.2	5.9
Residual ⁷	2.7	3.4	2.4	3.3	3.6	1.4	4.7	0.9	-1.1	-0.0

Table 7: (continued)

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶
<i>Other Race Applicants</i>										
Percent of Other Race	100.0%	11.6%	33.8%	25.7%	6.6%	6.3%	11.2%	1.6%	1.3%	1.9%
Actual Denial Rate	26.8	27.0	27.3	28.4	18.2	22.9	28.7	21.4	22.5	32.7
Applicant Economic Characteristics	18.6	18.6	19.5	18.4	16.8	16.4	18.2	18.3	18.0	19.7
MSA Effect	0.4	0.4	0.4	0.0	-0.7	1.1	1.9	-0.9	0.4	0.9
Overall Lender Effect	2.3	3.4	3.9	1.7	2.5	0.7	-1.1	0.3	-0.6	0.1
Census Tract Effect	0.2	-2.6	-1.6	1.4	-0.5	1.6	4.1	1.6	4.9	4.8
Residual ⁷	5.3	7.1	5.0	6.9	0.1	3.2	5.6	2.1	-0.1	7.2
<i>White Applicants</i>										
Percent of Whites	100.0	20.6	23.8	8.2	22.0	7.6	3.1	10.1	2.9	1.5
Actual Denial Rate	16.4	15.0	18.0	19.5	13.2	18.2	21.8	15.0	19.6	24.3
Applicant Economic Characteristics	16.9	17.0	18.3	17.7	15.5	16.1	16.5	16.8	17.2	17.1
MSA Effect	-0.1	0.1	0.8	0.7	-1.4	1.4	1.7	-2.2	0.0	0.9
Overall Lender Effect	0.0	0.1	0.5	0.2	-0.4	-0.0	-0.2	-0.5	0.1	1.0
Census Tract Effect	-0.4	-2.1	-1.4	0.8	-0.5	1.0	3.1	1.0	2.6	5.3
Residual ⁷	-0.1	-0.0	-0.1	-0.0	-0.0	-0.2	0.5	-0.1	-0.4	-0.0
<i>Total Applicants</i>										
Percent of Applicants	100.0	17.5	22.8	14.3	18.3	7.1	6.2	8.4	2.7	2.7
Actual Denial Rate	18.1	15.3	19.0	21.8	13.4	19.4	24.4	15.3	21.1	28.7
Applicant Economic Characteristics	17.1	17.0	18.3	17.9	15.5	16.2	17.2	16.8	17.4	18.0
MSA Effect	0.0	0.2	0.8	0.3	-1.4	1.5	1.3	-2.2	0.1	0.3
Overall Lender Effect	0.0	0.1	0.5	-0.3	-0.3	0.1	-0.7	-0.5	0.2	1.2
Census Tract Effect	0.0	-2.2	-1.4	1.3	-0.5	1.0	3.4	1.1	2.7	5.7
Residual ⁷	1.0	0.2	0.7	2.6	0.1	0.7	3.3	0.1	0.7	3.4

^{1 2 3 4 5 6 7} See notes for table 6.

Table 8: Difference in Average Percentage Denial Rates Attributable to Various Sources, Home Improvement Loans, by Neighborhood and Race, 1990 HMDA

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶
<i>HOME IMPROVEMENT</i>										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	2.0%	4.1%	6.1%	3.4%	6.2%	15.7%	3.0%	6.7%	52.8%
Actual Denial Rate	43.4	30.4	32.8	36.9	32.2	35.5	43.8	34.2	37.1	48.3
Applicant Economic Characteristics	26.0	22.7	21.8	21.5	24.4	24.8	23.6	27.3	27.5	27.7
MSA Effect	1.6	0.6	3.7	5.5	-2.7	-0.8	4.6	-4.2	-4.1	1.7
Overall Lender Effect	1.5	0.1	0.5	0.2	0.7	0.5	1.8	0.7	0.9	2.0
Census Tract Effect	6.3	-3.7	-1.6	3.2	-1.8	0.8	6.6	0.2	3.0	9.5
Residual ⁷	8.0	10.8	8.4	6.4	11.6	10.3	7.1	10.1	9.8	7.4
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	2.6	11.8	21.4	3.1	8.1	19.0	1.8	4.1	28.1
Actual Denial Rate	35.4	27.8	30.7	32.4	27.9	34.7	38.5	29.1	38.9	39.2
Applicant Economic Characteristics	23.4	20.6	19.6	20.1	22.9	22.8	22.7	25.8	26.0	27.9
MSA Effect	3.9	3.2	4.9	5.6	0.4	4.7	5.9	-1.7	2.7	1.7
Overall Lender Effect	0.5	0.7	1.0	0.3	0.5	0.6	0.1	-0.2	0.4	0.8
Census Tract Effect	1.4	-2.7	-1.3	1.0	-2.3	0.1	2.6	-0.1	3.5	2.9
Residual ⁷	6.2	6.0	6.6	5.4	6.3	6.5	7.2	5.3	6.4	5.9
<i>Asian Applicants</i>										
Percent of Asians	100.0	4.7	24.7	43.2	4.1	6.4	10.3	1.7	2.1	2.7
Actual Denial Rate	27.7	22.6	27.2	24.6	25.3	30.8	36.0	29.3	34.2	48.4
Applicant Economic Characteristics	19.1	18.6	17.8	18.2	21.1	21.1	20.3	25.5	26.0	25.9
MSA Effect	1.6	2.0	3.8	0.3	-1.6	1.9	3.2	-3.7	-1.3	3.7
Overall Lender Effect	1.1	0.4	1.1	1.1	0.8	1.5	1.0	0.1	1.1	2.5
Census Tract Effect	0.1	-2.8	-1.6	-0.2	-1.7	0.4	4.5	-0.3	2.9	7.9
Residual ⁷	5.8	4.4	6.2	5.2	6.6	5.8	7.0	7.5	5.5	8.5
<i>Native American Applicants</i>										
Percent of Native Americans	100.0	9.6	20.8	10.5	15.8	13.0	5.7	11.1	7.7	5.9
Actual Denial Rate	22.7	14.0	20.8	21.5	18.4	22.8	31.6	20.5	30.4	41.7
Applicant Economic Characteristics	22.1	20.0	18.9	18.6	22.9	22.4	22.1	26.1	26.2	27.9
MSA Effect	0.8	1.4	4.2	4.5	-2.2	1.2	4.2	-4.5	-3.3	0.3
Overall Lender Effect	-1.4	-2.3	-2.9	-2.7	-0.7	-1.1	0.2	-1.1	0.2	1.5
Census Tract Effect	0.1	-3.3	-1.1	-0.1	-2.4	0.3	4.4	-0.3	3.4	8.5
Residual ⁷	1.0	-1.8	1.6	1.3	0.8	0.1	0.7	0.3	4.0	3.4

Table 8: (continued)

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶
<i>Other Race Applicants</i>										
Percent of Other Race	100.0%	9.0%	23.9%	14.7%	12.4%	12.9%	10.2%	4.9%	5.2%	6.8%
Actual Denial Rate	35.4	28.7	30.1	35.2	31.9	37.9	40.1	32.0	38.6	57.8
Applicant Economic Characteristics	21.9	20.2	19.3	19.2	23.1	23.3	22.6	25.4	26.8	27.6
MSA Effect	2.3	1.2	3.5	4.9	-2.1	0.9	5.7	-2.0	0.0	4.0
Overall Lender Effect	2.9	2.5	2.1	2.0	3.7	4.4	1.9	2.0	4.0	4.5
Census Tract Effect	0.4	-3.4	-2.2	0.8	-1.2	-0.2	4.7	0.1	3.6	9.5
Residual ⁷	7.9	8.3	7.3	8.3	8.5	9.6	5.2	6.5	4.1	12.2
<i>White Applicants</i>										
Percent of Whites	100.0	15.2	13.3	3.9	27.2	9.2	2.9	18.8	5.9	3.6
Actual Denial Rate	20.3	16.4	20.5	24.8	16.5	23.1	31.7	19.3	26.2	38.5
Applicant Economic Characteristics	22.0	19.7	18.6	18.9	22.2	21.9	21.7	25.1	25.4	26.0
MSA Effect	-0.6	0.8	4.1	4.6	-2.7	1.6	4.9	-4.8	-2.0	1.6
Overall Lender Effect	-0.3	-0.7	-0.4	-0.0	-0.7	-0.2	1.0	-0.3	0.2	2.5
Census Tract Effect	-0.9	-3.5	-1.8	0.5	-2.3	-0.0	4.2	-0.6	2.9	7.7
Residual ⁷	-0.0	-0.0	-0.0	0.8	-0.1	-0.2	-0.0	-0.0	-0.3	0.6
<i>Total Applicants</i>										
Percent of Applicants	100.0	12.8	12.7	6.3	22.6	8.8	5.4	15.6	5.8	10.1
Actual Denial Rate	23.8	16.9	21.9	27.6	17.0	24.9	37.0	19.7	28.2	44.1
Applicant Economic Characteristics	22.5	19.8	18.7	19.3	22.3	22.2	22.4	25.1	25.7	27.2
MSA Effect	0.0	0.9	4.1	4.1	-2.7	1.6	4.9	-4.8	-2.1	1.7
Overall Lender Effect	0.0	-0.7	-0.2	0.3	-0.6	-0.0	1.1	-0.3	0.3	2.0
Census Tract Effect	0.0	-3.5	-1.8	0.8	-2.3	0.1	4.6	-0.6	2.9	7.9
Residual ⁷	1.4	0.3	1.0	3.1	0.2	1.1	4.0	0.2	1.3	5.3

^{1 2 3 4 5 6 7} See notes for table 6.

Table 9: Difference in Average Percentage Denial Rates Attributable to Various Sources, Center City, by Neighborhood and Race, 1990 HMDA

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶
HOME PURCHASE										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	2.1%	4.7%	7.8%	3.3%	8.7%	20.7%	2.1%	8.5%	42.1%
Actual Denial Rate	31.2	26.2	28.3	28.8	27.0	28.1	29.5	30.6	33.7	33.5
Census Tract Effect	3.1	1.9	-0.2	3.3	-1.2	0.9	3.3	0.8	2.5	4.7
Residual ⁷	13.4	11.0	12.5	9.7	14.0	12.3	10.1	14.3	12.9	10.7
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	2.3	10.1	21.5	2.3	8.9	24.7	1.2	4.8	24.2
Actual Denial Rate	23.8	17.6	21.0	21.8	20.2	20.7	23.4	24.6	26.9	28.6
Census Tract Effect	2.2	-1.8	-0.5	2.8	-0.8	0.6	3.1	0.7	1.6	3.2
Residual ⁷	3.8	3.9	5.4	3.4	6.1	3.8	3.6	6.8	5.0	3.1
<i>White Applicants</i>										
Percent of Whites	100.0	15.3	15.6	4.7	21.2	12.5	4.2	14.1	8.3	4.3
Actual Denial Rate	13.9	9.8	13.1	16.6	10.6	13.5	18.2	16.3	19.5	24.0
Census Tract Effect	-0.1	-1.9	-1.0	1.5	1.1	0.2	2.7	0.6	1.8	3.8
Residual ⁷	-0.0	-0.1	-0.2	0.3	-0.1	-0.1	0.5	-0.1	0.3	0.8
REFINANCE										
<i>Black Applicants</i>										
Percent of Blacks	100.0	1.5	6.9	25.5	1.7	4.1	29.7	1.1	3.7	25.8
Actual Denial Rate	29.6	28.7	29.7	25.6	24.6	35.8	26.9	34.1	35.4	34.9
Census Tract Effect	4.2	-1.8	-0.9	3.3	-0.3	2.4	4.4	2.5	4.4	7.3
Residual ⁷	7.5	11.6	11.4	6.2	8.5	13.6	6.0	11.3	11.1	7.4
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	2.0	15.4	41.0	1.0	4.3	24.5	0.5	1.5	9.7
Actual Denial Rate	26.1	25.8	22.9	25.2	31.3	29.9	26.8	29.8	31.6	29.6
Census Tract Effect	2.6	-2.6	-1.1	3.5	-0.3	1.4	2.9	1.2	2.6	5.3
Residual ⁷	4.8	6.2	4.0	4.4	8.6	6.2	5.4	5.6	6.5	4.8
<i>White Applicants</i>										
Percent of Whites	100.0	16.3	25.4	10.1	16.5	9.1	5.1	9.1	5.0	3.4
Actual Denial Rate	17.5	14.8	18.6	20.3	12.9	18.1	21.7	16.8	21.0	25.1
Census Tract Effect	-0.1	-2.9	-1.4	1.9	-1.2	0.9	3.5	1.6	3.1	5.9
Residual ⁷	-0.1	-0.1	-0.1	0.1	-0.0	-0.4	0.3	-0.0	-0.3	0.0
HOME IMPROVEMENT										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	0.9%	2.4%	5.0%	1.5%	3.8%	14.0%	1.8%	5.6%	65.0%
Actual Denial Rate	45.1	31.5	34.5	38.6	31.4	35.3	42.4	35.3	39.2	48.4
Census Tract Effect	7.5	-3.2	1.1	4.4	-1.2	1.0	5.8	0.3	5.2	9.6
Residual ⁷	7.6	12.1	9.4	6.8	11.4	10.5	6.9	10.7	9.0	7.2
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	1.6	8.7	15.5	1.8	7.3	20.9	1.7	5.1	37.3
Actual Denial Rate	38.6	27.8	31.6	35.8	30.5	34.7	39.5	29.3	38.2	43.0
Census Tract Effect	2.5	-4.3	-1.9	3.4	-1.6	-0.4	2.7	0.5	3.4	4.0
Residual ⁷	6.5	7.7	7.5	5.9	6.7	7.1	7.4	4.1	6.5	5.9
<i>White Applicants</i>										
Percent of Whites	100.0	11.3	12.7	4.4	19.4	10.5	4.5	19.1	10.1	8.0
Actual Denial Rate	22.7	15.6	21.2	27.3	15.8	23.2	32.0	21.3	28.4	39.9
Census Tract Effect	0.5	-3.5	-1.9	2.5	-1.9	1.0	4.3	0.5	4.2	8.3
Residual ⁷	0.0	-0.1	-0.0	0.6	-0.1	-0.3	0.2	-0.0	-0.2	0.9

^{1 2 3 4 5 6 7} See notes for table 6.

Table 10: Difference in Average Percentage Denial Rates Attributable to Various Sources, Non-Center City, by Neighborhood and Race, 1990 HMDA

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶
HOME PURCHASE										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	5.2%	11.8%	11.7%	7.5%	15.5%	23.4%	3.5%	8.4%	13.0%
Actual Denial Rate	26.8	20.6	21.7	23.4	26.1	26.5	23.3	33.3	40.6	33.8
Census Tract Effect	1.5	-1.5	-0.9	1.2	0.4	0.3	2.2	0.8	1.7	6.2
Residual ⁷	10.9	9.6	9.6	8.5	12.9	12.1	9.7	14.4	14.4	11.2
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	4.5	17.9	31.6	4.3	11.3	19.3	1.3	2.5	7.1
Actual Denial Rate	20.2	17.3	18.0	18.8	19.2	20.3	20.3	24.6	29.8	30.3
Census Tract Effect	0.7	-1.4	-0.7	0.4	-0.2	0.6	2.4	0.8	1.4	2.4
Residual ⁷	3.6	3.8	4.2	3.4	5.3	3.2	3.1	5.1	7.2	3.7
<i>White Applicants</i>										
Percent of Whites	100.0	21.1	16.6	3.5	29.5	10.2	1.9	13.1	3.4	0.7
Actual Denial Rate	12.6	9.4	11.7	14.8	11.1	13.3	17.7	17.4	20.6	22.9
Census Tract Effect	-0.4	-1.6	-1.3	-0.1	-0.4	0.1	1.6	0.9	1.6	4.0
Residual ⁷	-0.0	0.0	0.0	0.6	-0.1	-0.1	1.0	-0.1	-0.6	-0.2
REFINANCE										
<i>Black Applicants</i>										
Percent of Blacks	100.0	5.3	14.1	29.9	5.8	8.5	22.8	2.5	4.0	7.1
Actual Denial Rate	27.6	26.7	27.8	25.4	27.7	28.0	27.8	29.6	31.3	33.1
Census Tract Effect	2.3	-1.3	-0.5	1.9	0.5	1.3	5.1	1.4	3.7	5.5
Residual ⁷	7.8	9.7	8.7	6.7	10.7	8.8	5.9	11.4	11.1	8.5
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	3.2	17.8	47.1	1.7	4.5	21.3	0.5	0.7	3.2
Actual Denial Rate	25.2	21.6	24.2	25.1	22.4	29.0	25.6	32.3	35.8	26.7
Census Tract Effect	0.9	-2.0	-1.1	1.0	-0.3	1.9	2.4	2.4	4.1	2.6
Residual ⁷	4.9	3.0	5.2	5.1	4.1	5.4	4.6	9.6	7.4	4.1
<i>White Applicants</i>										
Percent of Whites	100.0	22.9	22.9	7.3	24.9	6.9	2.1	10.7	1.9	0.6
Actual Denial Rate	15.9	15.0	17.7	18.9	13.3	18.3	21.9	14.3	17.6	21.9
Census Tract Effect	-0.6	-1.9	-1.4	0.1	-0.3	1.0	2.8	0.8	1.8	3.4
Residual ⁷	-0.1	-0.0	-0.1	-0.1	-0.0	-0.1	0.6	-0.1	-0.4	-0.2
HOME IMPROVEMENT										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	4.8%	8.6%	9.0%	8.4%	12.6%	20.3%	6.2%	9.7%	20.5%
Actual Denial Rate	38.8	29.9	31.5	34.3	32.6	35.6	46.3	33.4	33.9	46.8
Census Tract Effect	3.1	-4.0	2.0	1.5	-2.1	0.5	7.9	0.2	-0.3	9.1
Residual ⁷	8.9	10.1	7.6	6.0	1.7	10.0	7.6	9.7	10.9	8.8
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	3.8	15.3	28.3	4.5	9.0	16.8	1.9	2.9	17.5
Actual Denial Rate	31.7	27.8	30.1	30.3	26.7	34.7	37.0	29.0	40.5	29.6
Census Tract Effect	0.0	-1.9	-1.0	-0.5	-2.6	0.6	2.5	-0.7	3.6	0.0
Residual ⁷	5.8	5.2	5.9	5.1	6.2	5.9	6.8	6.5	6.2	5.8
<i>White Applicants</i>										
Percent of Whites	100.0	17.5	13.6	3.7	31.7	8.4	1.9	18.6	3.5	1.0
Actual Denial Rate	18.7	16.7	20.1	23.1	16.8	23.0	31.2	18.1	22.6	32.4
Census Tract Effect	-1.7	-3.4	-1.8	-0.8	2.4	-0.1	3.9	1.2	0.8	5.5
Residual ⁷	-0.0	0.0	-0.1	0.9	-0.0	-0.2	-0.4	-0.0	-0.4	-0.6

^{1 2 3 4 5 6 7} See notes for table 6.

Table 11: Difference in Average Percentage Denial Rates Attributable to Various Sources, Commercial Banks, by Neighborhood and Race, 1990 HMDA

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶
HOME PURCHASE										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	3.2%	6.1%	6.6%	5.2%	10.9%	21.8%	3.1%	9.2%	33.9%
Actual Denial Rate	31.8	23.6	26.3	33.3	28.0	28.7	29.1	35.0	35.3	35.5
Census Tract Effect	2.6	-1.7	-0.5	3.1	-0.6	0.6	2.6	0.8	2.1	4.7
Residual ⁷	11.4	10.9	10.9	10.9	12.6	12.4	10.0	14.6	12.5	11.5
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	3.6	11.8	17.7	4.3	10.7	19.8	2.1	5.3	24.5
Actual Denial Rate	28.8	19.1	25.7	29.1	22.3	25.9	29.9	30.2	31.0	32.6
Census Tract Effect	1.5	-1.3	-0.5	1.5	-0.2	0.4	2.7	1.2	2.0	2.7
Residual ⁷	5.7	5.0	6.3	6.6	6.5	5.8	5.6	8.5	6.7	4.3
<i>White Applicants</i>										
Percent of Whites	100.0	18.8	12.1	2.4	28.4	10.3	2.2	17.3	6.0	2.4
Actual Denial Rate	15.5	10.4	14.2	20.7	13.3	16.1	22.0	20.0	22.3	25.8
Census Tract Effect	-0.2	-1.8	-1.2	0.9	-0.6	0.1	2.2	0.9	1.8	3.7
Residual ⁷	-0.2	-0.4	-0.6	-0.0	-0.1	-0.1	0.9	0.0	-0.1	0.3
REFINANCE										
<i>Black Applicants</i>										
Percent of Blacks	100.0	3.8	9.7	17.4	5.4	8.4	21.5	2.9	6.5	24.3
Actual Denial Rate	35.1	28.7	32.1	38.1	28.5	33.2	36.6	25.9	31.2	37.8
Census Tract Effect	3.5	-1.2	-0.5	2.7	0.3	1.4	4.5	1.0	3.1	7.4
Residual ⁷	9.7	10.6	9.8	10.1	11.5	11.8	8.1	10.0	10.0	9.6
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	3.2	17.2	36.2	2.2	5.3	20.3	1.1	1.9	12.6
Actual Denial Rate	32.1	28.6	29.1	33.4	28.3	35.0	33.0	29.7	39.8	30.1
Census Tract Effect	1.5	-2.0	-1.6	1.6	0.0	2.0	2.2	1.2	5.0	4.5
Residual ⁷	6.7	7.7	5.3	6.9	9.5	7.9	6.8	7.8	9.9	5.9
<i>White Applicants</i>										
Percent of Whites	100.0	20.7	17.4	5.1	26.6	7.3	2.3	15.2	3.6	1.7
Actual Denial Rate	16.8	15.3	20.9	24.4	13.4	19.3	25.2	14.1	18.8	21.6
Census Tract Effect	-0.5	-2.4	-1.6	0.4	-0.4	0.8	2.7	0.7	2.2	5.1
Residual ⁷	-0.3	-0.3	-0.9	-0.4	-0.0	-0.3	0.8	0.0	-0.2	-0.5
HOME IMPROVEMENT										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	1.9%	3.9%	5.4%	3.3%	6.1%	14.3%	3.1%	6.9%	55.2%
Actual Denial Rate	44.6	31.7	34.9	39.8	34.2	36.6	44.5	35.4	37.9	49.1
Census Tract Effect	6.5	-3.6	-1.7	3.2	-1.8	0.8	6.3	0.2	2.8	9.7
Residual ⁷	8.5	10.7	9.3	7.7	12.4	10.5	7.9	10.5	10.4	7.8
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	2.5	11.4	20.3	2.9	7.7	17.8	1.8	4.1	31.4
Actual Denial Rate	36.3	29.9	31.2	33.4	28.1	37.2	39.9	31.2	42.0	38.7
Census Tract Effect	1.4	-2.7	-1.4	1.1	-2.1	0.3	2.9	0.1	3.8	2.3
Residual ⁷	6.3	6.3	6.3	5.5	4.6	7.1	7.9	5.5	6.3	5.8
<i>White Applicants</i>										
Percent of Whites	100.0	14.6	13.2	3.8	26.6	8.9	2.6	20.5	6.2	3.6
Actual Denial Rate	21.0	16.9	21.0	25.8	17.5	24.0	32.7	19.8	27.4	38.4
Census Tract Effect	-0.9	-3.7	-1.9	0.4	-2.3	0.1	3.8	-0.6	2.9	7.7
Residual ⁷	-0.1	-0.4	-0.3	0.6	-0.1	-0.3	0.3	-0.0	-0.1	0.6

^{1 2 3 4 5 6 7} See notes for table 6.

Table 12: Difference in Average Percentage Denial Rates Attributable to Various Sources, Thrift Institutions, by Neighborhood and Race, 1990 HMDA

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶
HOME PURCHASE										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	4.0%	9.9%	14.5%	5.1%	11.9%	21.8%	2.3%	8.2%	22.2%
Actual Denial Rate	28.4	23.0	23.9	22.0	27.6	28.4	25.1	31.3	41.5	33.8
Census Tract Effect	2.2	-1.7	-0.7	1.7	-0.7	0.7	2.9	0.8	2.2	5.2
Residual ⁷	10.9	12.0	11.1	7.8	15.3	13.3	9.4	15.4	14.5	9.8
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	3.4	15.2	33.3	2.8	8.4	22.4	0.8	2.6	11.0
Actual Denial Rate	20.0	17.5	17.2	17.9	19.7	19.3	20.1	22.8	28.1	29.1
Census Tract Effect	1.5	-1.6	-0.6	1.5	-0.5	0.7	0.3	0.5	1.2	3.7
Residual ⁷	3.1	3.5	3.5	2.8	5.3	2.4	3.0	5.6	5.7	2.9
<i>White Applicants</i>										
Percent of Whites	100.0	19.3	20.3	5.4	25.0	10.8	3.0	10.2	4.3	1.7
Actual Denial Rate	11.5	8.8	11.0	13.5	9.4	12.1	16.1	14.1	19.4	24.3
Census Tract Effect	-0.4	-1.7	-1.1	0.6	-0.6	0.2	2.4	0.6	1.7	4.2
Residual ⁷	0.1	0.2	0.3	0.8	-0.1	-0.4	0.7	-0.1	-0.8	1.4
REFINANCE										
<i>Black Applicants</i>										
Percent of Blacks	100.0	2.7	9.9	33.9	2.2	4.4	30.7	1.0	2.0	13.2
Actual Denial Rate	25.3	26.1	27.3	21.3	26.5	31.4	23.5	39.0	37.7	32.6
Census Tract Effect	3.4	-1.7	-0.8	2.7	0.3	2.4	4.7	2.2	5.3	6.7
Residual ⁷	6.4	9.8	10.3	5.1	9.4	10.9	5.1	16.6	12.0	5.6
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	2.5	16.1	48.0	1.1	3.8	24.0	0.3	0.6	3.6
Actual Denial Rate	23.3	20.9	21.8	22.6	25.0	29.4	23.8	37.0	32.2	27.7
Census Tract Effect	1.8	-2.1	-0.9	2.2	0.2	1.8	2.9	3.6	1.6	4.4
Residual ⁷	4.3	2.1	4.4	4.2	2.5	5.7	4.5	9.6	4.4	3.6
<i>White Applicants</i>										
Percent of Whites	100.0	20.6	28.1	10.4	18.9	7.8	3.8	6.7	2.3	1.4
Actual Denial Rate	16.2	14.4	16.9	17.7	12.9	18.2	20.6	16.6	22.0	27.7
Census Tract Effect	-0.3	-2.0	-1.3	1.0	-0.5	1.2	3.5	1.7	3.1	5.5
Residual ⁷	0.1	0.0	0.3	0.2	-0.1	-0.1	0.5	-0.2	-0.3	0.4
HOME IMPROVEMENT										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	2.3%	4.6%	8.7%	3.5%	6.0%	21.1%	2.4%	5.0%	46.5%
Actual Denial Rate	49.5	35.1	35.7	37.6	36.8	44.2	50.7	38.7	46.5	55.8
Census Tract Effect	6.3	-4.2	1.7	3.5	-1.6	0.8	7.5	0.9	5.0	9.4
Residual ⁷	7.5	12.6	7.6	5.2	13.0	13.8	5.7	10.9	9.4	6.9
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	2.9	13.3	27.8	3.1	7.6	25.0	1.2	2.6	16.6
Actual Denial Rate	38.1	25.3	33.4	31.1	34.6	39.4	38.3	33.0	46.7	54.3
Census Tract Effect	1.6	-3.6	-1.1	1.0	-2.6	-0.6	2.0	-1.0	4.4	6.8
Residual ⁷	6.9	4.0	8.8	5.3	1.2	7.5	5.7	8.8	10.2	8.4
<i>White Applicants</i>										
Percent of Whites	100.0	17.6	14.2	4.6	28.4	9.6	3.9	14.0	4.1	3.6
Actual Denial Rate	22.1	17.7	22.2	24.5	17.4	25.7	34.5	21.5	30.6	47.2
Census Tract Effect	-0.9	-3.2	-1.6	0.9	-2.2	-0.2	4.9	-0.5	3.2	8.2
Residual ⁷	-0.0	0.3	0.3	1.0	-0.5	-0.5	-0.7	-0.2	-0.4	2.0

^{1 2 3 4 5 6 7} See notes for table 6.

Table 13: Difference in Average Percentage Denial Rates Attributable to Various Sources, Mortgage Banks, by Neighborhood and Race, 1990 HMDA

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶
HOME PURCHASE										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	2.9%	7.4%	7.4%	4.4%	12.1%	22.2%	2.3%	6.9%	34.4%
Actual Denial Rate	25.6	18.9	20.4	24.9	20.2	22.4	24.3	25.1	30.7	29.0
Census Tract Effect	2.6	-1.5	-0.6	1.9	-0.8	0.6	2.7	0.5	1.9	5.1
Residual ⁷	10.5	8.5	9.4	9.7	11.3	9.9	10.5	12.2	14.5	10.2
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	2.8	13.5	20.8	3.2	14.4	24.9	1.0	4.0	15.3
Actual Denial Rate	16.4	12.6	15.7	17.2	12.9	15.1	16.4	10.1	19.6	18.2
Census Tract Effect	1.1	-1.8	-0.7	1.1	-0.6	0.6	2.4	-0.0	0.8	2.4
Residual ⁷	2.0	2.2	3.0	2.1	4.2	2.3	1.3	-1.4	3.5	1.0
<i>White Applicants</i>										
Percent of Whites	100.0	18.0	17.8	4.4	23.5	14.0	3.6	11.1	5.3	2.4
Actual Denial Rate	10.6	9.0	11.8	14.5	7.9	10.7	15.1	10.6	13.5	17.1
Census Tract Effect	-0.4	-1.6	-1.2	0.4	-0.7	0.1	2.0	0.4	1.3	3.6
Residual ⁷	0.1	0.5	0.0	0.2	0.1	0.4	0.7	-0.5	-0.5	-0.3
REFINANCE										
<i>Black Applicants</i>										
Percent of Blacks	100.0	2.8	12.2	25.6	2.7	5.0	23.5	1.3	3.2	23.7
Actual Denial Rate	30.2	28.2	26.5	31.4	25.0	23.7	29.8	40.0	36.4	31.9
Census Tract Effect	3.4	-1.4	-0.3	2.1	0.3	0.9	5.0	6.0	4.2	6.5
Residual ⁷	7.2	7.9	5.9	8.1	8.0	3.8	5.9	9.2	17.2	7.2
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	2.6	21.0	44.6	1.3	4.5	20.7	0.3	0.9	4.0
Actual Denial Rate	25.7	21.4	23.6	27.1	19.4	17.1	28.4	13.3	22.7	23.6
Census Tract Effect	1.0	-2.7	-1.2	1.3	-1.3	0.8	2.2	-0.5	2.7	5.0
Residual ⁷	4.0	4.3	5.2	4.2	4.3	1.1	3.8	-2.8	3.5	-0.1
<i>White Applicants</i>										
Percent of Whites	100.0	21.6	33.4	12.1	14.1	7.4	3.6	4.4	2.2	1.3
Actual Denial Rate	18.1	18.6	17.6	19.7	17.0	17.0	19.7	18.8	16.7	23.5
Census Tract Effect	-0.6	-2.0	-1.5	0.7	-0.4	1.2	2.6	0.5	2.8	5.4
Residual ⁷	0.1	0.9	-0.2	-0.2	0.7	-0.2	-0.9	0.3	-2.1	-0.3
HOME IMPROVEMENT										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	2.4%	9.4%	15.7%	2.0%	4.9%	24.4%	1.4%	3.3%	36.4%
Actual Denial Rate	29.9	41.7	27.1	31.3	10.0	24.0	21.0	14.3	41.2	36.8
Census Tract Effect	4.7	-2.7	-1.0	-0.5	-5.4	-0.2	6.8	1.1	2.4	9.1
Residual ⁷	3.0	13.5	3.6	-2.4	-1.4	4.3	-1.8	-1.5	14.4	7.0
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	3.4	16.4	38.4	1.6	7.4	21.0	0.4	1.8	9.6
Actual Denial Rate	34.4	29.4	30.5	43.8	0.0	16.2	39.0	0.0	22.2	18.8
Census Tract Effect	0.6	3.8	-3.0	1.1	-0.5	-1.7	-0.4	6.7	3.5	6.5
Residual ⁷	2.7	10.1	-4.3	5.5	1.4	-5.4	7.3	-1.8	-6.7	0.2
<i>White Applicants</i>										
Percent of Whites	100.0	17.4	26.2	11.3	15.8	10.7	5.1	6.1	4.5	2.9
Actual Denial Rate	24.6	25.1	28.2	35.6	19.2	20.0	25.3	18.3	14.7	20.6
Census Tract Effect	-0.5	-3.2	-0.9	1.0	-2.4	0.6	4.1	-0.9	3.0	5.8
Residual ⁷	0.6	1.0	0.9	2.2	0.3	0.8	-1.1	-0.9	-0.8	-1.7

^{1 2 3 4 5 6 7} See notes for table 6.

Table 14: Difference in Average Percentage Denial Rates, Neighborhoods Sorted by Percentage Black, 1990 HMDA

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Black ⁶	White ⁴	Mixed ⁵	Black ⁶	White ⁴	Mixed ⁵	Black ⁶
HOME PURCHASE										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	7.3%	8.0%	5.2%	5.4%	14.6%	18.4%	2.1%	9.7%	29.3%
Actual Denial Rate	29.4	23.0	25.2	26.4	26.3	27.4	26.5	30.5	35.4	33.9
Census Tract Effect	2.4	-1.1	0.5	2.9	-0.3	0.9	2.9	0.8	2.1	5.0
Residual ⁷	11.0	10.1	10.5	9.0	12.5	12.0	9.8	12.8	13.5	10.8
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	32.3	9.6	1.9	20.6	11.6	3.2	14.4	4.7	1.7
Actual Denial Rate	22.1	19.2	19.8	23.9	20.9	21.6	23.9	28.7	28.0	27.7
Census Tract Effect	1.4	0.0	1.4	4.4	1.2	2.4	4.6	2.2	3.0	5.0
Residual ⁷	3.7	3.9	3.2	3.6	3.8	3.2	4.0	3.8	3.9	3.7
<i>White Applicants</i>										
Percent of Whites	100.0	33.2	5.5	0.3	30.4	8.8	0.9	14.0	5.3	1.4
Actual Denial Rate	13.1	11.1	11.8	18.0	11.6	13.3	17.4	17.2	20.1	23.4
Census Tract Effect	-0.3	-1.4	-0.4	2.8	-0.5	0.4	3.1	0.8	1.8	4.4
Residual ⁷	-0.0	-0.0	0.0	1.7	-0.0	-0.1	1.1	-0.0	-0.3	0.3
REFINANCE										
<i>Black Applicants</i>										
Percent of Blacks	100.0	11.3	13.1	16.0	3.8	11.2	21.0	1.3	4.5	17.6
Actual Denial Rate	28.8	27.5	28.5	23.9	28.7	28.3	27.4	31.8	34.3	34.3
Census Tract Effect	3.4	-0.7	1.6	3.0	0.6	2.8	4.9	0.9	4.6	7.0
Residual ⁷	7.6	9.1	9.0	5.2	10.7	7.8	6.1	12.2	11.3	7.4
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	49.2	12.3	2.4	17.5	8.4	2.6	5.5	1.4	0.6
Actual Denial Rate	25.6	24.2	25.7	28.2	25.7	27.5	30.3	28.9	31.4	31.6
Census Tract Effect	1.6	0.4	3.0	4.4	1.4	3.2	5.9	3.5	6.1	5.2
Residual ⁷	4.9	4.8	4.0	6.7	4.8	5.3	6.7	5.6	2.7	6.8
<i>White Applicants</i>										
Percent of Whites	100.0	45.8	6.3	0.6	25.8	6.1	1.0	10.4	3.1	1.1
Actual Denial Rate	16.4	16.8	18.1	23.8	14.4	17.1	22.4	15.7	19.0	22.8
Census Tract Effect	-0.4	-1.7	0.4	4.0	-0.2	1.1	5.3	1.2	2.7	5.0
Residual ⁷	-0.1	-0.1	-0.1	2.6	-0.1	-0.1	0.8	-0.1	-0.3	-0.0

Table 14: (continued)

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Black ⁶	White ⁴	Mixed ⁵	Black ⁶	White ⁴	Mixed ⁵	Black ⁶
HOME IMPROVEMENT										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	3.6%	4.8%	3.8%	3.2%	8.4%	13.8%	2.1%	8.2%	52.1%
Actual Denial Rate	43.4	29.1	35.2	38.5	32.4	36.7	44.1	35.2	38.5	48.1
Census Tract Effect	6.3	-2.5	-0.2	4.0	-1.5	1.5	6.8	0.3	3.6	9.5
Residual ⁷	8.0	7.9	8.9	6.4	10.1	10.2	7.1	9.4	9.8	7.4
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	27.7	7.1	1.1	19.1	8.6	2.3	24.5	6.4	3.2
Actual Denial Rate	35.4	30.4	33.6	47.3	33.8	39.4	46.3	35.6	44.8	49.9
Census Tract Effect	1.4	-0.8	1.8	6.9	-0.1	3.3	7.2	0.9	5.9	11.0
Residual ⁷	6.2	5.9	5.1	9.7	6.7	6.9	8.7	5.9	6.3	5.1
<i>White Applicants</i>										
Percent of Whites	100.0	28.0	4.1	0.3	30.7	7.4	1.2	19.2	6.4	2.7
Actual Denial Rate	20.3	18.6	21.6	33.6	18.0	21.6	35.1	20.6	24.4	38.3
Census Tract Effect	-0.9	-2.6	-1.2	5.0	-1.9	0.2	6.0	-0.3	2.6	8.4
Residual ⁷	-0.0	0.1	0.1	1.4	-0.1	-0.4	0.6	-0.0	-0.3	0.8

¹ Census tracts with mean applicant income of more than \$60,000.

² Census tracts with mean applicant income greater than \$40,000 and less than or equal to \$60,000.

³ Census tracts with mean applicant income of \$40,000 or less.

⁴ Census tracts with less than 5 percent black applicants.

⁵ Census tracts with 5 percent or more and 25 percent or less applications from black applicants.

⁶ Census tracts with more than 25 percent of all loan applications from black applicants.

⁷ The residual is defined as the average difference between the actual denial rate and the sum of the economic, MSA, tract, and lender effects.

Table 15: Difference in Average Percentage Denial Rates, Neighborhoods Sorted by Percentage Hispanic, 1990 HMDA

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White	Mixed	Hispanic ⁶	White	Mixed	Hispanic ⁶	White	Mixed	Hispanic ⁶
HOME PURCHASE										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	10.9%	8.1%	1.6%	25.4%	10.8%	2.1%	34.3%	5.5%	1.2%
Actual Denial Rate	29.4	23.3	26.1	27.5	25.9	28.2	30.7	34.5	31.3	35.7
Census Tract Effect	2.4	-0.4	1.4	2.3	1.1	2.6	4.4	4.2	3.3	4.4
Residual ⁷	11.0	10.4	9.5	9.6	11.7	9.6	10.5	11.8	10.1	11.6
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	5.5	20.1	18.2	4.4	14.4	16.6	1.9	4.8	14.0
Actual Denial Rate	22.1	16.7	20.0	19.8	17.8	21.8	22.0	24.5	27.8	29.3
Census Tract Effect	1.4	-1.4	0.2	1.5	-0.1	1.3	2.9	1.4	2.3	2.9
Residual ⁷	3.7	4.6	4.0	3.1	4.3	3.9	3.2	5.1	5.1	3.2
<i>White Applicants</i>										
Percent of Whites	100.0	26.7	11.3	1.1	32.1	7.2	0.8	17.8	2.4	0.6
Actual Denial Rate	13.1	9.9	13.9	17.4	11.2	15.4	20.2	17.9	20.5	24.5
Census Tract Effect	-0.3	-1.6	-0.5	0.6	-0.5	0.5	2.5	1.2	2.0	2.7
Residual ⁷	-0.0	-0.0	-0.0	1.2	-0.1	0.1	1.0	-0.1	-0.0	0.3
REFINANCE										
<i>Black Applicants</i>										
Percent of Blacks	100.0	13.8	19.2	7.4	16.3	12.0	7.8	19.5	3.3	0.7
Actual Denial Rate	28.8	26.0	27.1	25.4	28.6	29.2	23.9	34.1	34.0	38.0
Census Tract Effect	3.4	0.1	1.6	4.2	2.6	4.6	4.8	6.0	6.9	6.9
Residual ⁷	7.6	8.4	7.6	5.7	8.9	6.8	3.9	8.7	6.4	11.4
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	5.5	27.8	30.6	1.9	7.2	19.4	0.7	1.6	5.3
Actual Denial Rate	25.6	21.2	24.5	25.4	24.9	29.5	25.7	31.0	32.9	28.4
Census Tract Effect	1.6	-2.1	0.1	2.4	0.1	2.6	2.5	2.5	3.1	4.7
Residual ⁷	4.9	3.9	5.0	4.6	5.5	5.6	4.9	6.7	7.0	4.4
<i>White Applicants</i>										
Percent of Whites	100.0	31.3	19.0	2.3	25.8	5.7	1.2	12.8	1.4	0.4
Actual Denial Rate	16.4	15.6	19.1	21.0	13.4	21.6	22.5	15.9	23.5	26.3
Census Tract Effect	-0.4	-2.2	-0.4	1.7	-0.3	2.0	0.9	1.5	3.3	5.7
Residual ⁷	-0.1	-0.0	-0.1	0.2	-0.1	-0.1	0.8	-0.1	-0.2	-0.1

Table 15: (continued)

	Total	High Income ¹			Middle Income ²			Low Income ³		
		White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶	White ⁴	Mixed ⁵	Minority ⁶
HOME IMPROVEMENT										
<i>Black Applicants</i>										
Percent of Blacks	100.0%	6.7%	4.3%	1.2%	17.6%	6.0%	1.7%	54.8%	6.4%	1.3%
Actual Denial Rate	43.4	33.4	35.2	37.8	39.3	43.0	39.5	46.0	48.7	51.0
Census Tract Effect	6.3	-0.9	1.6	4.2	3.4	5.5	5.3	8.2	9.5	9.0
Residual ⁷	8.0	8.8	6.9	5.4	9.2	7.8	3.9	7.8	7.5	7.2
<i>Hispanic Applicants</i>										
Percent of Hispanics	100.0	5.0	17.5	13.4	3.7	11.9	14.6	2.6	6.2	25.3
Actual Denial Rate	35.4	27.6	31.4	33.1	27.6	37.3	37.8	32.6	42.0	38.4
Census Tract Effect	1.4	-2.1	-0.3	1.0	-1.3	1.7	2.0	2.5	5.8	2.1
Residual ⁷	6.2	5.5	6.3	5.3	5.1	6.9	7.3	5.2	5.8	6.0
<i>White Applicants</i>										
Percent of Whites	100.0	21.8	9.7	1.0	32.4	5.9	0.9	24.7	2.8	0.8
Actual Denial Rate	20.3	17.3	22.4	25.9	17.4	27.4	29.8	21.6	32.6	36.8
Census Tract Effect	-0.9	-3.1	-0.8	0.3	-1.8	0.9	2.2	0.7	4.5	4.2
Residual ⁷	-0.0	0.0	0.1	0.8	-0.1	-0.1	-0.2	-0.0	-0.0	0.3

¹ Census tracts with mean applicant income of more than \$60,000.

² Census tracts with mean applicant income greater than \$40,000 and less than or equal to \$60,000.

³ Census tracts with mean applicant income of \$40,000 or less.

⁴ Census tracts with less than 5 percent Hispanic applicants.

⁵ Census tracts with 5 percent or more and 25 percent or less applications from Hispanic applicants.

⁶ Census tracts with more than 25 percent of all loan applications from Hispanic applicants.

⁷ The residual is defined as the average difference between the actual denial rate and the sum of the economic, MSA, tract, and lender effects.

Table 16: Neighborhood and Unexplained Denial Rate Residuals, Blacks, by MSA, 1990 HMDA

	Home Purchase				Refinance				Home Improvement			
	Percent Denial Black	Tract Rate	Residual Effect	Effect	Percent Denial Black	Tract Rate	Residual Effect	Effect	Percent Denial Black	Tract Rate	Residual Effect	Effect
All MSAs < 1 Million	5.0%	33.5%	2.4%	12.6%	3.2%	32.1%	3.6%	9.7%	7.5%	36.1%	4.5%	8.9%
All MSAs 1 - 2 Million	6.9	30.2	2.5	11.1	4.0	33.2	3.4	8.6	10.4	46.1	6.4	8.7
Anaheim	1.1	25.3	0.6	10.6	1.2	26.2	0.1	8.3	0.8	27.0	-0.4	4.6
Atlanta	16.8	31.9	5.7	12.7	7.8	31.8	2.5	8.0	19.2	39.0	4.7	10.7
Baltimore	13.9	17.8	-1.0	8.6	7.1	27.0	3.0	8.6	27.7	54.8	5.4	8.3
Boston	4.8	38.9	5.1	10.5	2.9	41.2	9.8	8.4	5.8	31.4	3.3	6.2
Chicago	9.5	25.9	4.2	10.8	8.0	36.4	7.4	7.1	20.6	47.2	8.4	6.1
Cleveland	7.5	29.5	4.9	10.7	6.8	44.7	12.6	9.5	17.6	39.7	6.4	5.6
Dallas	5.8	28.9	2.4	11.7	2.8	26.7	5.1	4.3	7.3	54.2	12.5	9.8
Detroit	8.5	22.7	1.0	9.1	4.1	32.4	8.6	7.7	30.1	46.6	10.3	7.7
Houston	6.1	36.1	2.8	13.5	3.5	27.0	2.9	6.0	11.0	63.7	10.7	11.7
Los Angeles	4.7	25.1	1.4	8.8	9.0	23.9	2.8	5.4	7.1	33.8	3.2	4.8
Miami	7.4	26.1	3.6	6.1	5.5	43.4	2.3	11.0	10.5	45.4	4.8	3.6
Minneapolis	1.7	25.1	3.1	12.7	.8	33.3	0.3	17.4	1.8	39.4	10.3	5.0
Nassau/Suffolk NY	7.1	32.1	4.8	9.8	6.9	26.7	2.8	5.7	6.2	38.3	4.5	6.9
New York	16.4	30.7	1.5	9.1	20.9	25.4	2.6	6.7	22.8	39.9	2.6	5.3
Oakland	5.5	20.8	2.1	7.3	9.7	25.0	3.2	6.9	6.7	33.9	3.9	8.4
Philadelphia	9.6	27.4	1.5	10.2	4.2	32.9	4.4	9.7	16.3	57.9	10.0	7.8
Phoenix	1.8	34.9	1.4	12.1	1.1	70.3	12.3	26.4	1.5	42.4	-5.7	-1.9
Pittsburgh	4.2	35.0	3.8	12.7	1.6	47.4	8.9	20.3	10.8	53.6	11.4	7.0
Riverside CA	4.5	24.2	0.2	9.1	4.0	29.0	0.8	7.5	3.3	35.0	0.3	7.6
St. Louis	9.2	34.0	6.5	12.4	7.3	25.0	3.9	9.1	20.2	49.7	9.8	9.4
San Diego	1.8	22.3	1.2	7.4	2.2	34.8	4.9	11.0	3.0	32.0	1.5	7.5
San Francisco	1.7	24.2	1.5	7.9	4.0	24.8	1.8	6.2	3.5	34.6	4.2	5.9
Seattle	1.3	21.8	0.2	7.8	1.9	29.9	2.7	13.0	1.6	33.0	5.0	8.8
Tampa	3.7	35.3	4.9	11.3	3.4	42.8	4.8	10.9	8.7	34.0	1.7	6.9
Washington	15.7	17.4	0.7	9.1	10.6	23.9	2.5	6.8	24.7	48.2	5.4	7.6
Total	6.2	29.4	2.4	11.0	5.1	28.8	3.4	7.6	10.3	43.4	6.3	8.0

Table 17: Neighborhood and Unexplained Denial Rate Residuals, Hispanics, by MSA, 1990 HMDA

	Home Purchase				Refinance				Home Improvement			
	Percent Denial Hispanic Rate	Tract Residual Effect	Tract Residual Effect	Tract Residual Effect	Percent Denial Hispanic Rate	Tract Residual Effect	Tract Residual Effect	Tract Residual Effect	Percent Denial Hispanic Rate	Tract Residual Effect	Tract Residual Effect	Tract Residual Effect
All MSAs < 1 Million	4.4%	25.7%	1.2%	4.2%	3.7%	26.9%	1.5%	5.5%	4.6%	31.6%	1.2%	6.7%
All MSAs 1 - 2 Million	5.1	24.2	1.8	3.9	4.7	26.4	2.8	4.9	4.6	42.4	3.4	7.4
Anaheim	12.9	20.4	1.8	3.6	10.7	23.8	1.7	4.5	7.6	27.2	0.2	5.1
Atlanta	1.0	13.7	0.3	-0.1	0.4	16.0	0.7	-2.7	0.7	32.7	0.5	10.0
Baltimore	0.9	12.6	-0.2	4.2	0.4	21.7	-1.0	10.7	0.5	46.8	3.2	9.6
Boston	2.1	22.5	2.6	4.8	1.9	25.9	3.2	7.6	2.3	38.3	6.0	8.9
Chicago	10.7	13.0	1.4	2.5	5.4	22.6	1.9	4.2	8.6	34.9	-0.5	4.7
Cleveland	0.8	20.8	3.8	3.7	0.4	30.0	-1.2	14.4	1.2	38.7	5.8	7.3
Dallas	6.1	20.9	2.4	2.4	3.3	27.3	3.9	6.9	5.5	50.9	6.2	13.6
Detroit	0.7	15.3	1.1	2.2	0.6	23.8	-0.4	7.5	1.1	30.2	0.1	2.1
Houston	8.7	29.1	2.6	6.0	3.5	18.9	2.5	4.1	9.8	54.4	6.0	10.5
Los Angeles	25.5	20.2	1.9	3.6	23.6	24.8	1.8	4.9	18.8	31.8	0.7	5.6
Miami	44.4	20.4	-0.2	3.1	44.7	32.0	-0.5	3.8	4.8	38.7	-1.3	6.3
Minneapolis	0.5	11.2	0.9	0.8	0.3	25.0	2.5	5.8	0.3	25.0	0.7	6.3
Nassau/Suffolk NY	4.8	23.9	1.9	4.5	2.8	23.4	1.4	2.2	4.0	36.8	2.5	4.9
New York	8.7	27.0	2.2	5.7	8.2	25.8	2.1	4.2	10.0	45.1	3.4	7.3
Oakland	8.1	15.7	1.7	2.5	7.8	20.4	1.2	4.2	6.6	25.1	1.1	3.7
Philadelphia	2.6	22.3	-0.7	4.9	0.8	23.6	2.2	1.3	3.1	53.8	7.9	5.6
Phoenix	9.2	30.1	3.7	3.5	5.7	48.5	5.3	9.6	12.7	50.5	-3.1	1.2
Pittsburgh	0.2	12.5	0.7	-2.8	0.2	20.0	-7.3	9.3	0.5	38.3	-0.9	5.6
Riverside CA	21.2	18.3	1.0	2.3	14.8	28.7	0.5	5.3	16.2	32.8	0.4	4.7
St. Louis	0.5	15.8	-1.1	2.9	0.4	20.0	3.1	5.7	0.4	24.5	0.6	-2.6
San Diego	10.5	19.2	1.5	3.9	8.2	27.9	2.7	5.0	9.3	29.6	0.7	4.1
San Francisco	7.3	21.6	2.6	6.0	9.2	21.0	1.4	4.0	6.1	28.8	2.1	4.1
Seattle	1.2	18.7	0.5	4.9	1.2	19.0	0.1	5.1	12.6	20.4	0.8	4.3
Tampa	6.9	24.0	1.4	2.2	5.9	28.8	0.4	1.6	6.3	29.7	-1.2	4.6
Washington	3.9	10.2	-0.2	3.3	2.0	15.6	-0.3	1.1	2.6	42.6	2.0	9.8
Total	6.6	22.1	1.4	3.7	7.7	25.6	1.6	4.9	5.7	35.4	1.4	6.2

Table 18: Neighborhood and Unexplained Denial Rate Residuals, Whites, by MSA, 1990 HMDA

	<u>Home Purchase</u>				<u>Refinance</u>				<u>Home Improvement</u>			
	Percent Denial White	Tract Rate	Residual Effect	Effect	Percent Denial White	Tract Rate	Residual Effect	Effect	Percent Denial White	Tract Rate	Residual Effect	Effect
All MSAs < 1 Million	87.4%	13.9%	-0.2%	-0.1%	90.0%	15.0%	-0.2%	-0.1%	85.3%	16.0%	-0.5%	-0.1%
All MSAs 1 - 2 Million	83.5	12.4	-0.3	-0.0	85.6	16.6	-0.4	-0.1	81.2	23.0	-1.0	-0.1
Anaheim	71.9	14.4	-0.4	-0.2	77.5	19.5	-0.3	-0.1	77.6	20.0	-0.0	-0.0
Atlanta	79.3	11.6	-1.2	-0.3	90.0	15.2	-0.2	0.0	77.2	17.1	-1.2	-0.7
Baltimore	81.8	9.0	0.2	0.3	90.3	12.7	-0.2	-0.1	69.6	28.6	-2.1	0.0
Boston	88.6	12.4	-0.4	-0.0	92.6	16.0	-0.4	-0.2	89.3	16.0	-0.4	0.1
Chicago	73.6	8.1	-0.7	0.1	82.3	12.9	-0.9	-0.0	67.9	21.1	-2.4	-0.1
Cleveland	89.6	9.0	-0.5	0.0	91.4	15.7	-0.9	-0.2	79.1	23.1	-1.5	0.4
Dallas	83.3	11.1	-0.3	0.1	91.7	17.4	-0.4	0.2	84.4	23.9	-1.4	-0.8
Detroit	88.4	11.0	-0.1	0.2	93.7	13.0	-0.4	-0.1	67.4	22.2	-4.6	0.2
Houston	75.5	14.6	-0.5	-0.3	88.3	11.6	-0.3	0.2	75.0	29.3	-2.3	-1.2
Los Angeles	52.0	16.3	-0.9	0.3	54.5	20.0	-1.1	0.1	58.6	23.5	-0.3	0.9
Miami	45.6	18.0	-0.4	1.5	48.2	28.4	0.2	0.3	36.6	32.9	0.5	0.6
Minneapolis	95.4	7.3	-0.1	0.0	97.7	13.7	0.0	-0.1	96.3	18.2	-0.2	0.0
Nassau/Suffolk NY	82.2	13.9	-0.5	0.2	86.9	18.7	-0.3	0.1	86.7	28.4	-0.4	0.1
New York	57.5	16.5	-1.0	0.3	61.4	20.1	-1.4	0.1	60.6	36.2	-1.8	1.0
Oakland	64.6	11.7	-0.5	0.1	66.8	15.5	-0.8	0.2	72.8	19.4	-0.5	0.4
Philadelphia	83.6	9.5	-0.1	-0.0	92.5	14.2	-0.2	-0.1	78.2	28.0	-2.4	-0.0
Phoenix	86.1	17.3	-0.4	-0.0	91.5	29.0	-0.4	-0.5	83.9	50.0	0.5	0.9
Pittsburgh	94.3	13.3	-0.1	-0.1	97.0	12.6	-0.3	-0.3	88.0	26.5	-1.4	-0.1
Riverside CA	65.1	16.0	-0.3	0.5	74.4	22.8	-0.1	-0.3	72.9	25.8	-0.1	0.1
St. Louis	89.0	13.3	-0.7	-0.1	90.8	11.0	-0.3	-0.1	77.9	19.5	-2.6	-0.5
San Diego	78.2	13.0	-0.2	0.0	82.5	19.3	-0.4	-0.1	76.2	21.1	-0.3	-0.1
San Francisco	63.9	12.9	-0.5	-0.3	66.7	16.7	-0.6	-0.2	72.0	21.2	-0.7	0.5
Seattle	86.4	13.1	-0.0	-0.1	90.5	12.6	-0.1	-0.1	87.2	15.4	-0.2	-0.1
Tampa	87.2	17.9	-0.3	0.1	89.3	26.1	-0.2	-0.0	82.7	24.6	-0.2	0.2
Washington	72.2	7.7	-0.1	0.2	81.9	13.4	-0.3	0.2	67.4	20.3	-2.0	-0.3
Total	81.4	13.1	-0.3	-0.0	80.9	16.4	-0.4	-0.1	79.9	20.3	-0.9	-0.0

Table 19: Black-White Residuals by Denial Probability, 1990 HMDA

Denial Probability (percent)	Home Purchase			Refinance			Home Improvement		
	Cumulative Distribution	Residual Difference	Tract Difference	Cumulative Distribution	Residual Difference	Tract Difference	Cumulative Distribution	Residual Difference	Tract Difference
Less than 0	6.9%	2.0%	1.5%	7.8%	3.5%	1.8%	7.4%	0.2%	4.8%
0	7.9	2.2	1.2	8.6	3.3	2.4	8.0	-0.6	4.0
1	10.6	3.9	1.7	10.4	1.6	2.3	9.3	1.2	4.6
2	13.7	4.6	1.4	12.4	2.9	1.5	10.8	3.5	3.9
3	17.2	5.3	1.9	14.6	3.8	2.3	12.3	2.9	4.9
4	21.1	6.0	1.9	16.9	3.1	2.7	14.0	3.5	4.0
5	25.4	7.9	1.9	19.4	3.7	3.1	15.9	4.2	3.4
6	30.0	7.6	2.1	22.1	4.1	3.2	17.8	1.9	5.0
7	34.4	8.2	2.4	25.0	5.0	3.4	19.7	3.6	3.8
8	38.8	9.1	2.4	28.0	3.6	3.7	21.7	4.2	4.1
9	43.5	9.0	2.3	31.2	2.7	4.1	23.7	4.8	4.4
10	48.1	11.0	2.3	34.5	5.4	3.3	25.7	5.7	3.9
11	52.3	10.4	2.4	37.9	5.5	4.1	27.8	4.7	4.7
12	56.2	12.2	2.5	41.3	7.7	3.8	29.9	6.3	5.0
13	59.8	12.8	2.8	44.7	9.6	4.1	32.0	9.6	5.5
14	63.1	13.3	2.8	48.0	7.4	3.6	34.2	6.2	5.9
15	66.2	13.6	3.0	51.3	10.1	4.4	36.4	7.5	5.5
16	69.0	15.4	3.2	54.3	7.3	4.0	38.5	8.2	5.9
17	71.8	15.0	3.2	57.3	10.5	3.5	40.7	8.9	5.9
18	74.3	14.7	3.6	60.1	11.1	3.8	43.0	9.0	6.0
19	76.6	15.5	3.4	62.7	9.6	4.7	45.2	8.4	7.3
20	78.6	15.2	3.9	65.2	13.0	4.2	47.5	10.6	7.0
21	80.4	15.0	3.6	67.6	11.5	4.2	49.8	9.6	7.0
22	82.0	14.5	3.6	69.9	11.0	4.1	52.3	9.6	7.4
23	83.6	15.6	3.1	72.2	10.0	5.3	54.7	9.6	7.8
24	85.0	14.9	3.4	74.3	10.7	4.7	57.1	8.6	7.5
25	86.4	16.6	3.1	76.3	13.0	4.7	59.4	10.8	8.7
26	87.5	16.0	3.5	78.2	11.2	3.8	61.7	8.9	8.1
27	88.6	15.2	3.2	80.0	11.9	5.2	64.1	10.5	8.9
28	89.6	15.5	3.9	81.6	10.2	4.0	66.3	10.4	8.3
29	90.5	13.5	3.8	83.2	12.7	3.9	68.6	8.1	8.2
30	91.3	17.1	3.3	84.7	10.9	5.4	70.7	10.5	8.1
31	92.0	16.6	3.2	86.1	7.2	4.1	72.8	9.6	8.0
32	92.6	13.4	3.0	87.3	7.8	4.7	74.8	12.0	8.4
33	93.1	16.1	3.8	88.4	9.9	3.6	76.7	9.2	9.1
34	93.6	12.1	3.2	89.5	13.0	4.0	78.4	8.9	8.4
35	94.0	12.6	3.9	90.5	7.2	5.2	80.0	9.3	8.3
36	94.5	14.8	3.1	91.4	7.1	4.5	81.4	10.2	8.6
37	94.9	13.9	3.5	92.2	5.9	3.4	82.8	8.1	7.8
38	95.2	13.1	4.7	93.0	6.2	5.0	84.1	10.0	7.3
39	95.5	14.2	3.3	93.7	9.8	3.8	85.4	8.6	8.7
40	95.8	13.1	2.2	94.3	14.7	5.9	86.6	8.6	8.5
41	96.0	10.1	3.4	94.9	9.8	5.5	87.6	7.5	8.6
42	96.2	13.2	3.5	95.4	10.9	3.6	88.6	10.3	8.6
43	96.5	10.1	4.5	95.9	5.0	5.0	89.6	10.8	8.4
44	96.7	13.3	3.6	96.3	13.1	5.9	90.4	10.4	8.5
45	96.8	12.6	3.5	96.7	5.7	2.8	91.2	9.1	8.5
46	97.0	14.8	4.0	97.0	5.3	4.7	92.0	9.4	8.4
47	97.2	11.3	3.7	97.3	11.8	2.5	92.6	7.3	8.3
48	97.3	18.3	4.1	97.5	15.1	3.6	93.3	6.4	8.0
49	97.5	9.0	3.9	97.7	9.4	5.2	93.8	8.6	8.4
50	97.6	12.7	4.2	97.9	9.1	1.7	94.4	7.4	8.3
More than 50	100.0	9.0	2.1	100.0	7.1	4.8	100.0	6.5	7.2

Table 20: Hispanic-White Residuals by Denial Probability, 1990 HMDA

Denial Probability (percent)	Home Purchase			Refinance			Home Improvement		
	Cumulative Distribution	Residual Difference	Tract Difference	Cumulative Distribution	Residual Difference	Tract Difference	Cumulative Distribution	Residual Difference	Tract Difference
Less than 0	6.9%	0.8%	0.9%	7.8%	2.4%	0.0%	7.4%	1.3%	1.7%
0	7.9	1.2	0.7	8.6	-0.4	1.3	8.0	1.5	1.4
1	10.6	0.6	0.9	10.4	2.0	1.3	9.3	0.0	3.0
2	13.7	0.9	1.1	12.4	2.2	1.4	10.8	0.7	1.0
3	17.2	1.3	1.3	14.6	3.1	1.4	12.3	1.4	1.8
4	21.1	1.4	1.4	16.9	2.4	1.9	14.0	2.5	2.3
5	25.4	1.9	1.8	19.4	0.5	2.5	15.9	2.7	1.4
6	30.0	2.3	1.9	22.1	1.5	1.9	17.8	2.9	1.7
7	34.4	3.7	1.7	25.0	1.3	2.1	19.7	2.3	1.6
8	38.8	3.5	1.9	28.0	2.0	2.5	21.7	4.9	4.4
9	43.5	3.4	1.9	31.2	4.1	2.6	23.7	2.4	1.2
10	48.1	3.0	1.8	34.5	2.6	1.9	25.7	1.7	2.3
11	52.3	2.8	1.8	37.9	4.2	2.5	27.8	3.3	3.9
12	56.2	2.9	1.8	41.3	5.4	2.4	29.9	5.1	2.5
13	59.8	3.6	1.8	44.7	6.0	2.4	32.0	5.5	2.2
14	63.1	4.3	1.8	48.0	5.0	2.4	34.2	4.2	3.1
15	66.2	3.9	1.6	51.3	5.9	2.4	36.4	6.5	2.4
16	69.0	4.4	1.8	54.3	7.0	2.7	38.5	8.9	3.1
17	71.8	4.1	1.6	57.3	6.4	2.1	40.7	6.0	2.9
18	74.3	5.1	1.7	60.1	4.8	2.9	43.0	8.1	2.5
19	76.6	4.5	1.8	62.7	6.7	2.1	45.2	9.5	3.0
20	78.6	4.3	1.8	65.2	6.7	2.7	47.5	8.6	3.1
21	80.4	5.3	1.9	67.6	7.0	2.2	49.8	6.8	2.4
22	82.0	4.5	1.6	69.9	3.4	2.3	52.3	4.3	2.3
23	83.6	4.8	1.7	72.2	6.3	2.1	54.7	7.0	1.8
24	85.0	4.9	1.7	74.3	6.6	2.2	57.1	7.8	2.1
25	86.4	7.0	1.7	76.3	2.6	2.3	59.4	9.5	1.2
26	87.5	5.8	1.4	78.2	4.3	1.7	61.7	10.1	1.1
27	88.6	3.5	1.8	80.0	4.4	2.2	64.1	8.2	1.2
28	89.6	7.0	1.6	81.6	8.1	2.4	66.3	7.8	2.1
29	90.5	8.5	2.0	83.2	7.1	2.2	68.6	5.2	1.2
30	91.3	9.7	2.2	84.7	9.1	2.1	70.7	6.8	1.2
31	92.0	3.6	1.7	86.1	5.3	2.3	72.8	8.0	1.8
32	92.6	5.1	2.5	87.3	8.1	1.8	74.8	7.1	1.8
33	93.1	6.2	1.8	88.4	6.3	2.2	76.7	6.1	2.5
34	93.6	6.2	2.4	89.5	8.0	2.0	78.4	9.4	1.8
35	94.0	9.9	2.3	90.5	8.8	2.4	80.0	9.1	2.6
36	94.5	8.9	2.8	91.4	2.7	2.1	81.4	10.8	1.6
37	94.9	5.4	3.1	92.2	5.0	2.0	82.8	7.6	2.7
38	95.2	5.4	2.4	93.0	4.6	3.3	84.1	8.2	2.7
39	95.5	4.8	2.1	93.7	6.4	1.7	85.4	7.4	2.8
40	95.8	4.8	1.6	94.3	5.7	1.2	86.6	6.7	2.9
41	96.0	7.2	1.7	94.9	8.3	2.3	87.6	5.0	2.8
42	96.2	2.5	2.2	95.4	7.6	1.5	88.6	13.9	2.7
43	96.5	6.3	1.4	95.9	6.8	1.4	89.6	10.7	3.4
44	96.7	3.9	2.5	96.3	9.4	2.4	90.4	5.4	3.2
45	96.8	5.7	2.0	96.7	9.1	1.1	91.2	4.6	3.4
46	97.0	7.7	2.0	97.0	9.5	1.7	92.0	6.9	2.9
47	97.2	-0.6	1.1	97.3	9.1	1.7	92.6	5.5	3.6
48	97.3	4.6	2.4	97.5	14.8	4.6	93.3	5.4	2.1
49	97.5	10.1	1.2	97.7	11.9	4.5	93.8	8.4	1.5
50	97.6	7.0	2.4	97.9	9.4	1.3	94.4	4.5	3.3
More than 50	100.0	4.2	1.5	100.0	4.3	1.6	100.0	5.1	2.1