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LENDER CONSISTENCY IN HOUSING CREDIT MARKETS

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ABSTRACT

Increased reporting requirements imposed by amendments to the Home Mortgage Disclosure Act (HMDA) have provided an unprecedented opportunity to compare lending patterns across markets and lenders. Most of the initial work released using data for the first amended HMDA reporting year (1990) has focused on market-level racial differences in denial rates for home mortgages. This study examines a different aspect: how and why individual institutions vary in their propensity to attract minority applicants and to approve applications from those customers.

In a 1992 paper, the authors studied differences among individual lenders in the rates at which they originate minority and low-income loans, concluding that most of the variation can be attributed to differences in application rates rather than to differences in treatment. Here, the authors extend the previous analysis to examine the relationship between various measures of lender-market and financial performance and minority loan originations. The investigation includes all housing credit loans--home purchase, refinancings, and home improvement loans--but is limited to minorities. The authors first determine each lender's propensities to attract minority customers and to approve them for credit, and then conduct regressions to examine whether various measures of lender performance and structure can explain cross-lender variation in lending patterns.

Remarkably little consistency is found in any of the residual patterns or across loan types, and lender structure and performance explain hardly any of the variations in minority loan applications or dispositions. The analysis reveals differences among lenders in their housing market activities, but the authors emphasize that the HMDA data do not contain enough relevant information about the loan applicants to draw any firm conclusions about the reasons behind the observed differences.

Introduction

Increased reporting requirements imposed by amendments to the Home Mortgage Disclosure Act (HMDA) in 1989 have provided an unprecedented opportunity to compare lending patterns across markets and lenders. Most of the initial work released using data for the first amended HMDA reporting year (1990) has focused on market-level racial differences in denial rates for home mortgages. Our study examines a different aspect of the situation, namely how and why individual institutions vary in their propensity to attract minority applicants *and* to approve applications from those customers.

This paper is the second in a series. In the first (Avery, Beeson, and Sniderman [1992]), we used data from the 1990 HMDA sample of home purchase mortgage loan applications to separate differences among individual lenders in the rates at which they originate minority and low-income loans into two components: (1) differences in the rate that they receive applications from minorities and low-income applicants; and (2) differences in their treatment of minority and low-income applications. We further decompose each of these sources of variation into portions stemming from applicant and location characteristics and "pure lender" differences. We conclude that most of the variation across lenders in minority and low-income origination rates can be attributed to differences in application rates rather than to differences in treatment. Somewhat surprisingly, we find that very little of the lender variation in *either* minority application rates or dispositions can be attributed to applicant economic characteristics, and while property location explains a nontrivial portion of the cross-lender variance in application rates, most of the lender variation is unexplained.

In this study, we extend the previous analysis to examine the relationship between various measures of lender-market and financial performance and minority loan originations. We expand our investigation to include *all* housing credit loans -- home purchase, refinancings, and home improvement loans -- but limit the analysis to minorities.

The analysis is sequenced in two steps. First, we develop a procedure that enables us to determine, after controlling for the economic and locational characteristics of its applicant pool, each lender's propensities to attract minority customers and to approve them for credit. The national 1990 HMDA applicant-level data is partitioned according to its three types of loan products. For *each* loan type, we estimate two linear probability regressions: (1) a model predicting an application's disposition, and (2) a model predicting the applicant's race. Among the independent variables included in the regressions are applicant characteristics such as income, loan amount, income-to-loan amount, loan guarantee status, and fixed effects (separate intercepts) for each lender/census tract combination. The fixed effects in these six equations yield six lender residuals for each firm. We also construct two overall lender residuals for each lender by aggregating the fixed effects associated with each of the lender's three loan products.

In the second step of the analysis, we use the six specific and two overall pure-lender residuals as dependent variables in regressions to examine whether various measures of lender performance and structure can explain cross-lender variation in lending patterns. Independent variables include the type of institution (commercial bank, savings and loan, etc.), the number of applications and market share of the lender,

the percentage of applications geared for loans guaranteed by the Federal Housing Administration (FHA) or Department of Veterans Affairs (VA), the percentage of loans sold to federally guaranteed mortgage pools (FNMA, GNMA, or FHLMC), and, for a subset of institutions, measures of profitability and aggregate loan performance.

Our analysis cannot explain very much of the cross-lender or within-lender variations in applications or dispositions. Remarkably little consistency is found in any of the residual patterns. We detect virtually no correlation between institutions' treatment of minority applicants (either absolutely or relative to nonminorities) and their propensity to attract minority applicants. Patterns across the three loan types are also weak, with correlations approximately 0.15 for attracting minority applicants and 0.05 for the accept/denial decision. Although overall patterns suggest that minority loan applicants are significantly more likely to be denied than nonminorities, it does not appear that this is caused by a small subset of institutions.

A second principal conclusion emerges: Lender structure and performance explain hardly any of the variations in minority loan applications or dispositions. Institutions with higher profitability and lower capital ratios are marginally more likely to attract black applicants; however, they are also marginally more likely to deny them. Institutions with higher percentages of loan originations sold to mortgage pools appear to attract fewer minorities; however, there is little impact on mortgage denials. And, even after the FHA/VA status of an individual borrower is taken into account, it appears that institutions receiving a higher percentage of FHA/VA applications are marginally more likely to attract minorities, but also marginally more likely to deny their applications.

Although our analysis reveals differences among lenders in their housing market activities, we do not attempt to draw conclusions regarding lender discrimination. We emphasize in our discussion that the HMDA data do not contain enough relevant information about the loan applicants to make any firm judgments about the reasons for observed differences in lender activities.¹

The remainder of this paper is organized as follows. In the next section, we discuss the methodology used to isolate the pure lender effects by controlling for applicant economic and locational characteristics. In section II, we provide a brief description of the data and the procedures used to prepare data for this study. Univariate sample statistics are also presented. In section III, we present the basic analytic results for the loan denial process. Similar analysis is presented for the loan application process in section IV. Finally, we provide a summary and concluding remarks in section V.

I. Empirical Model

The purpose of this paper is to identify lender characteristics associated with particular minority lending patterns. We seek to isolate true institutional differences; that is, differences that stem from specific strategies or procedures adopted by lenders rather than from the markets or applicants they serve. To identify these lender effects, we must first control for application characteristics (such as loan size, applicant income, loan type [FHA/VA, conventional], and property location) that may be correlated with race. We do this by using a two-stage estimation procedure. In the first stage, we

identify lender-specific differences in minority and nonminority application and denial rates that cannot be explained by characteristics of the application or location of the property. These lender residuals are then used as dependent variables in second-stage regressions relating these residuals to specific lender characteristics.

In the first-stage regression, we use individual application data to estimate the following fixed-effects linear probability models for each of three types of loan applications: home purchase, refinance, and home improvement:

$$(1) \text{DENIAL}_{i\text{MTL}} = \beta_{A1}AC_i + \beta_{R1}RACE_i + \beta_{M1}MSA_M + \beta_{T1}TRACT_T + \beta_{L1}LENDER_L + e_{1i\text{MTL}},$$

$$(2) \text{MINORITY}_{i\text{MTL}} = \beta_{A2}AC_i + \beta_{M2}MSA_M + \beta_{T2}TRACT_T + \beta_{L2}LENDER_L + e_{2i\text{MTL}},$$

where DENIAL is coded one if application *i* is denied and zero otherwise, and MINORITY is coded one if applicant *i* is a minority (Native American, Black, or Hispanic) and zero otherwise. AC is a vector of application characteristics reported in the HMDA data. AC includes gender, marital status, occupancy, income, loan amount, income-to-loan ratio, FHA or VA status, and interactions among these variables. RACE is one of eight variables indicating the race of the applicant or co-applicant; MSA, TRACT and LENDER are dummy variables indicating which metropolitan statistical area, census tract, and lender the application relates to; and *e* is a residual.

The parameter estimates from equations (1) and (2), together with characteristics of the applications received (AC, RACE, MSA, and TRACT), are used to predict minority application and minority denial rates for each lender. Lender minority application and minority denial residuals are measured as the difference between the

lender's predicted and actual minority application and denial rates. The minority application residual is then the lender's propensity to draw a higher or lower percentage of minority applicants than is typical for lenders active in its market, given the characteristics of the applications actually received by the lender. Similarly, the minority denial rate residual is the lender's propensity to deny a higher or lower percentage of minority applications than is typical for lenders active in its market (a similar residual can be formed for each lender's treatment of nonminorities).

In addition to constructing these two residuals for each of the three types of loans, we also construct an overall minority application residual and an overall minority denial residual as weighted averages of the residuals for each type of loan. For the minority application residual, total loan applications were used to form the weights; for the minority denial residual, minority applications were used. Thus, the first stage of the estimation yields eight separate lender residuals.

In the second stage of estimation, these eight lender residuals are regressed on various lender characteristics. The general form of the estimation is as follows:

$$(3) \text{ DENIAL RESIDUAL}_{L,j} = \gamma_{NMj} \text{NONMINORITY}_{L,j} + \gamma_{Mj} \text{MARKET}_{L,j} + \gamma_{Fj} \text{FINANCE}_{L,j} + u_{L,j},$$

$$(4) \text{ APPLICATION RESIDUAL}_{L,j} = \gamma_{Mj} \text{MARKET}_{L,j} + \gamma_{Fj} \text{FINANCE}_{L,j} + u_{L,j},$$

where for the L^{th} lender, the subscript j indicates the type of residual or market (home purchase, refinance, home improvement, or overall). MARKET is a vector of measures of each lender's activity in the overall mortgage market, the minority mortgage market, and government-sponsored mortgage lending programs. FINANCE is a vector of

measures of the financial performance of the lending institution. MARKET variables are available for all lenders in our sample, while FINANCE variables are available only for a subset of lenders. In some instances, therefore, equation (3) is estimated only for the subset of lenders for which the relevant data are available. Our particular interest is in the *relative* treatment of minority and nonminority applicants. Therefore, we also include each lender's nonminority denial rate residual, NONMINORITY, as a regressor in the minority denial residual equation (3).

II. Data

Mortgage Loan Application and Disposition Data

Data on individual loan applications and dispositions for 1990, used in the first-stage estimation, are collected under the 1989 revisions to the Home Mortgage Disclosure Act (HMDA). The amended HMDA data constitute one of the most complete sets of statistics on mortgage lending available in the United States. Virtually 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 and have an office in a metropolitan statistical area (MSA) are required to report on *each* mortgage loan application acted upon by the institution during the calendar year. Lenders must report the loan amount, the census tract of the property, whether the property is owner-occupied, the purpose of the loan (home purchase, home improvement, or refinance), loan guarantee (conventional, FHA, or 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.²

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.³ Of these loans, 1,984,688 were home purchase loans; 716,595 were applications to refinance an existing mortgage loan; 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 nation's MSAs defined as of 1990. For our analysis, 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.⁴

Descriptive statistics for the applications reported in the 1990 HMDA are given in table 1. Statistics are listed separately for home purchase, refinance, 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).⁵ 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.⁶ It is also apparent that denial rates differ substantially by race for all three types of loans.

Lender Characteristics Data

Data on the market and financial characteristics of lenders are drawn from two sources: the 1990 HMDA data, described above, and Reports on Income and Condition (call reports) filed by institutions with federal regulators on December 31, 1990. To link the data from the different sources, we first identified the lender's regulatory agency using information reported in HMDA. Once the regulatory agency was identified, the call reports were matched to HMDA lenders using institution names and MSA locations.

Measures of each lender's activity in the overall mortgage market, the minority mortgage market, and government-sponsored mortgage lending programs are constructed from the HMDA data. As stated previously, these variables are defined at the lender-MSA level. Variables reflecting the size of the lender in the mortgage market include categorical measures of the total number of mortgage loan applications received by the lender (less than 100, 100 to 500, more than 500); the lender's share of all applications made in the MSA; and three variables indicating the portion of total applications to the lender, which are for either home purchases, refinancings, or home improvements. The lender's participation in minority lending is measured by a categorical variable indicating more than 100 minority applications, and by the lender's share of all minority applications in the MSA. The lender's participation in federally sponsored mortgage

lending programs is measured by the share of each lender's home purchase mortgage applications received under the FHA or VA program, and by four variables indicating the share of each lender's home purchase mortgage originations subsequently sold to FNMA, FHLMC, GNMA, and other institutions.

Financial variables and type of institution are taken from the call reports. Six types of institutions are identified using the call report data together with the name of the institution: commercial banks, thrifts (savings and loans and mutual savings banks), credit unions, mortgage subsidiaries of commercial banks, mortgage subsidiaries of thrifts, and independent mortgage banks. Financial variables are measured for the whole institution, not lender-by-MSA, and are present for almost all commercial banks, thrifts, and credit unions (information on the parent institution is used for subsidiaries). However, we lacked such information for independent mortgage banks, as they are not required to file call reports. Financial variables used include the institution's capitalization rate (capital/assets), return on assets (earnings/assets), real estate loans relative to total assets, non-real estate loans relative to assets, and deposits relative to assets. Loan portfolio performance is measured by the share of total loans charged off in the previous year, the share of real estate loans charged off, the share of mortgage loans that were nonperforming (delinquent), and the share of mortgage loans that were repossessed in the previous year.

The distribution of applications and denial rates by these lender characteristics is reported by type of loan and race of applicant in table 2. The means and standard deviations for variables used in the second-stage regression (equation [3]) are reported

by type of lender in table 3.

III. Lender Characteristics and Minority Denial Rates

Parameter estimates for the first-stage regressions predicting the probability of denial (equation [1]) by type of loan are reported in appendix tables 1-3. Similar regressions predicting the race of applicant (equation [2]) are reported in appendix tables 4-6.⁷ As shown previously, these estimates can be used to form minority application and minority denial rate residuals for each lender. In this section we focus on the minority denial rate equations; and in the section that follows, on the minority application rate equations.

Second-stage regression results for minority denial rate residuals are shown in tables 4 and 5.⁸ In these estimations, we include the lender's nonminority denial rate as an independent (and highly significant) variable. Thus, a positive coefficient on other variables means that an increase in the value of the independent variable is associated with a rise in the lender's minority denial rate, *holding other characteristics of the loan application and the denial rate for nonminorities constant*.

Because all variables were not available for all lenders, several samples were used. All institutions were used in regressions excluding financial variables; separate regressions were run for credit unions, thrifts, and commercial banks (including subsidiaries) for which financial variables were available. In addition, separate regressions were run for home purchase, refinance, and home improvement loans, and for a sample restricted to large institutions (more than 100 total loan applications). In

each case, the sample was restricted to institutions that received at least one application from a minority during 1990.

In evaluating the regression results, it may be useful to organize the discussion around conjectures with respect to lender behavior that have been raised in the debate over potential mortgage lending bias.

Lender Consistency

Much of the judicial and regulatory effort in the area of mortgage lending oversight has been focused on identifying individual cases of lender bias. If overall patterns of differential treatment of minority and nonminority mortgage applicants stemmed from a few lenders with discriminatory practices or cultures, one would expect to see consistency in individual lender behavior across loan products. As shown in table 6, there does not appear to be strong evidence that is the case. This table shows the correlations of the absolute minority and relative minority (minority minus nonminority) denial-rate residuals across the three loan products.

Correlations among the absolute minority denial-rate residuals across the three loan products range from 0.153 to 0.230. However, most of this correlation appears to stem from the institution's overall "toughness"; the correlations among the relative minority denial-rate residuals range only from 0.046 to 0.064. This lack of persistence is evident if we examine the 2,814 lenders that received minority applications for all three loan types. Of these, 403 had relative minority denial rates that were less than predicted (negative residuals) for all three loan types. However, if there were no persistence across loan types, *by chance* we would predict that 305 of these lenders would have

negative residuals for all three loan products. Similarly, 511 lenders have higher relative minority denial rates than predicted for all three loan products, versus the 400 predicted by chance alone. To put this in perspective, if lender behavior were perfectly correlated across loan products, we would predict that 100 percent of the lenders would show consistent behavior. If behavior were completely unrelated across loan types, by chance alone, we would predict that 25 percent would show consistency. The actual figure, 32 percent, is much closer to the random prediction than that of perfect lender consistency.

Economies of Scale

It has often been argued (see ICF [1991]) that most underwriting guidelines are developed based on experience with standard, nonminority applications. Consequently, applications from minorities are more likely to require verification and processing efforts outside the lender's normal experience, and thus be more costly. If so, this might lead to higher lender denial rates for minorities either because lenders lack the expertise to evaluate them properly, or because lenders choose not to expend the extra effort.

If these arguments were true, then we would expect minority denial rates to be lower for lenders receiving more minority applications, since these lenders would have more of an incentive to invest in the expertise required to evaluate minority applications. Evidence on this score is mixed. In our results for all institutions (column 1 of table 4), we find no significant relationship between a lender's minority denial rate and either the absolute number of minority applications it processes or its market share (though the point estimates are negative). On the other hand, in differentiating among large lenders (column 7 of table 5), we find a significantly lower minority denial rate for lenders

processing a large share of the minority applications in their MSA. Answers to two commonly asked questions appear in the row labeled "Commercial Bank Types" at the bottom of table 4. We find a significantly lower minority denial rate for minority-owned institutions (column 7 of table 4), which presumably have particular expertise in dealing with minorities. On the other hand, banks that are part of a bank holding company, and thus apt to be more specialized, are significantly more likely to reject minority applicants than would be predicted.

Secondary Mortgage Market

Several conjectures have been raised about the impact of the secondary mortgage market on minority applicants. It has been argued (see ICF [1991]) that the need to sell, or potentially sell, a loan in the secondary market has led to adherence to more rigid, standardized underwriting standards. Minorities, it has been argued, may be hurt by this practice because minority loan applicants (and neighborhoods) tend to be more idiosyncratic and less likely to conform to standard "rules." If this is true, it should mean that large lenders, with potentially large diversified portfolios of their own and less need to sell, should bear less risk in making nonconformable loans. Thus, we might expect to see lower minority denial rates among such lenders. However, we generally find no relationship between the number of applications processed by a lender and the lender's minority denial rate. The exceptions are credit unions, and in differentiating among large lenders. However, in both of these cases, the minority denial rate is significantly higher for lenders processing a large share of the mortgage applications in their MSA.

It is also possible to examine the direct evidence of participation in the secondary

market on minority denial rates. We find no evidence that lenders who sell large portions of their loans in the secondary market have higher minority denial rates. In fact, the estimates in table 4 indicate that lenders who sell large portions of their loans in this market are in general *less likely*, not more likely, to deny minority applications. Thus, any negative impact on minorities resulting from more rigid underwriting standards imposed by the secondary market appears to have been more than offset by more favorable treatment resulting from the use of objective standards or in originators perceiving that risk can be passed on.

FHA/VA Loan Programs

The federally guaranteed loan programs, FHA and VA, are quite prominent in the mortgage lending bias literature. On the one hand, minority borrowers have traditionally favored FHA/VA loans, and FHA/VA lenders should have more experience in dealing with minorities, and thus give them more favorable treatment. On the other hand, lenders have argued that FHA and VA originators bear the risk of post-default recourse for nonconforming loans, which might harm minorities who are less likely to have conformable applications.

Again, the evidence is mixed. Lenders with a large share of FHA/VA loans tend to deny minority applicants at a higher rate than would be expected based on their nonminority denial rate and other application characteristics, including whether a specific application is for an FHA/VA loan. Though this effect is significant for FHA loans, the effect is quite small: a 10-percentage-point increase in FHA loans as a share of total home purchase loans increases the minority denial rate by less than half of 1 percent;

and if this loan is later resold to GNMA (the government-sponsored pool for FHA/VA loans), the effect is more than offset by the lower minority denial rates associated with resale to GNMA.

On the other hand, the direct effects of FHA/VA loans on denial rates, as reported in appendix tables 1-3, go in the opposite direction. Focusing on home purchase loans, which comprise most FHA/VA loans, the estimates in appendix table 1 indicate that FHA/VA loans are less likely to be denied than conventional loans, and that this effect is of the same order of magnitude for all racial groups (the probability of denial is reduced by 2 percent for blacks, 4 percent for Hispanics, and 3 percent for whites and Asians). This implies that the absolute denial rate for minorities would be lower, but that relative rates would be unaffected.

Financial Performance

A number of conjectures have been raised about the relationship between minority applicant treatment and loan performance (see Becker [1993]). Several apparently contradictory arguments have been made. One is that if lenders arbitrarily deny black loan applicants because they have a "taste" for discrimination, then in a competitive environment, such lenders would "pay" for these practices by showing lower profits and higher loan losses. On the other hand, some argue that if race is correlated with performance (perhaps because minorities suffer discrimination in other markets), then lenders who use race in underwriting (albeit illegally), and consequently deny a higher percentage of minority applicants, will show higher-than-average profits.

We find mixed results with respect to performance. Higher minority denial rates

tend to be associated with higher earnings for commercial banks (columns 7 and 8 of table 4), but also with higher nonperforming mortgage rates for thrifts. Moreover, most other measures of performance appear to be unrelated to the minority denial rates.

IV. Lender Characteristics and Minority Application Rates

In this section, we examine the relationship between lender characteristics and minority application rates. The parameter estimates are reported in tables 7 and 8. Since the dependent variables in these regressions are the differences between the actual and predicted application rates for each lender, a positive coefficient indicates that the lender characteristic is associated with disproportionately large minority application rates, controlling for the characteristics of the specific applications received by the lender, such as loan size, applicant income, FHA/VA loans, and property location.

As was the case with the minority denial-rate regressions, it may be useful to organize our discussion of the application rate equations around several conjectures that have been raised in the lending bias literature.

Lender Consistency

Table 9 presents the correlations between the minority application rate residuals for the three loan products and the correlations of these residuals with those of the denial rate equations. Clearly, there is evidence of more persistence among the three loan products in the application process than in the denial equations. Correlations among the application rate residuals range from 0.148 to 0.188. This conclusion is reinforced by an examination of the patterns of the lenders engaged in all three markets.

Of the 2,814 such lenders, 699 have application rates that are larger than predicted for all three loan types, compared with an expected number of 456, and 456 have application rates lower than predicted for all three loan types, compared with an expected number of 263 lenders. Overall, the 41 percent of lenders showing a persistent pattern is considerably larger than the 25 percent we would expect by chance, but much lower than the 100 percent implied by perfect correlation.

It is also interesting to examine the relationship between the minority application residuals and the absolute and relative minority denial-rate residuals. Overall, those institutions with higher-than-expected minority applications are associated with higher-than-expected absolute denial rates, but lower-than-expected relative denial rates. In all cases, however, the correlations are small (the largest is .041). In some ways this is a surprising result, because it suggests that minority applicants do not seem to be attracted to institutions that treat them better on either an absolute or a relative basis.

The overall levels of fit shown in tables 7 and 8 reflect a general lack of consistency and persistence. The R^2 's reported (ranging from 0.02 to 0.14) indicate that our lender characteristics explain very little of the cross-lender differences in minority application rates. Certain kinds of lenders (particularly mortgage banks) tend to process disproportionately large numbers of minority applications, even after controlling for cross-lender differences in propensities to process FHA/VA and low-income loan applications. Interestingly, both commercial banks and thrifts tend to process a disproportionately large share of their minority applications through their mortgage subsidiaries. We also find that banks that are part of a bank holding company process

disproportionately few minority applications, and minority-owned banks process disproportionately large numbers of minority applications.

Secondary Market and FHA/VA Loans

The presence of a strong secondary market has been raised with respect to the service of the minority community as well as with the treatment of minority applicants. The argument has been made that small "niche" lenders can serve the minority community only if they can sell loans to a diversified secondary market. Thus, while any large lenders with more efficient marketing and processing operations might attract their share of minority applications, the only small institutions that could do so would be those engaged primarily in originating for the secondary market. Indeed, we find that large institutions do process a disproportionate share of minority applications relative to smaller lenders (approximately 92 percent of minority applications compared with 89 percent of nonminority, as shown in table 2). However, this difference appears to be related to the racial composition of the geographic and product markets served by these different-sized lenders. After controlling for differences in loan applications such as income, loan size, FHA/VA, and property location, we find that large lenders process disproportionately fewer minority applications than do small lenders (column 1 of table 7). Only among the largest lenders do we find that increases in market share are associated with a rise in minority application rates.

On the other hand, lenders active in FHA/VA lending tend to receive a disproportionately large share of minority applications, *even after controlling for whether or not a specific application is for an FHA/VA loan*. That is, lenders active in FHA/VA

lending tend to attract more minority applications for conventional loans. While significant, the effect on minority application rates is quite small: a 10 percentage-point increase in FHA lending increases minority application rates by less than one-sixth of a percentage point. Also, recall that these lenders have higher minority denial rates. For home purchase applications, these two effects cancel out, and the net effect is that increases in the percent of FHA lending have no effect on the number of minority loans that are actually originated by the lender.

Conversely, lenders selling large portions of their loans in the secondary market process disproportionately *fewer* minority applications than do lenders who hold these loans in their own portfolios. Again, it is important to emphasize that this is after controlling for characteristics of the loan itself, which may increase the likelihood that it is sold, and controlling for other lender characteristics. In general, compared with nonminority applications, more minority applications are processed by lenders who sell more than one-third of the loans they originate.

Financial Performance

We find some interesting patterns of minority lending related to the financial variables. For commercial bank and thrift lenders, increases in either real estate or non-real estate loans as a share of their total assets are associated with larger minority application rates. These lenders also were found to have disproportionately low minority denial rates, indicating that institutions that focus on lending originate disproportionately large numbers of minority mortgage loans. We also determine that highly capitalized lenders (viewed as an indication that the institution is relatively conservative) have

disproportionately low minority application rates--but recall that there was no evidence that these lenders deny a disproportionately large share of their minority applicants.

Most interestingly, we find that commercial banks processing a larger-than-expected number of minorities have *higher-than-expected* earnings. However, such banks are associated with higher loan charge-off rates. Although thrifts show no relationship between minority applications and overall earnings, higher-than-predicted minority application rates are associated with higher-than-predicted rates of nonperforming or repossessed mortgages.

V. Summary and Conclusion

Increased reporting requirements imposed by amendments to the Home Mortgage Disclosure Act (HMDA) in 1989 have provided an unprecedented opportunity to compare lending patterns across markets and lenders. Most of the initial work released using data for the first HMDA reporting year (1990) has focused on market-level racial differences in denial rates for home mortgages. Our study examines a different aspect of the situation: how and why individual institutions vary in their propensity to attract minority applicants *and* to approve applications from those customers.

In this study, we extend the previous analysis to examine the relationship between various measures of lender-market and financial performance and minority loan originations. We expand our investigation to include all housing credit loans -- home purchase, refinancings, and home improvement loans -- but limit the analysis to minorities. First, we develop a procedure that enables us to determine, after controlling

for the economic and locational characteristics of its applicant pool, each lender's propensities to attract minority customers and to approve them for credit. We estimate a fixed-effects model and obtain six lender residuals for each firm. We also construct two overall lender residuals for each lender by aggregating the fixed effects associated with each of their three loan products.

In the second step of the analysis, we use the six specific and two overall pure-lender residuals as dependent variables in regressions to determine whether various measures of lender performance and structure can explain either cross-lender or within-lender variations in lender patterns.

Our analysis cannot explain very much of the cross-lender or within-lender variations in applications or dispositions. We find remarkably little consistency in any of the residual patterns. There is virtually no correlation between institutions' treatment of minority applicants (either absolutely or relative to minorities) and their propensity to attract minority applicants. Patterns across the three loan types are also weak, with only sparse evidence of consistency in lender behavior. Although overall patterns suggest minority loan applicants are significantly more likely to be denied than nonminorities, it does not appear that this is caused by a small subset of institutions. A second principal conclusion emerges: Lender structure and performance explain hardly any of the variations in minority loan applications or dispositions.

Although our analysis reveals differences among lenders in their housing market activities, we do not attempt to make judgments about lender discrimination. We emphasize in our discussion that the HMDA data do not contain enough relevant

information about the loan applicants to draw any firm conclusions regarding the reasons for observed differences in lender activities.

ENDNOTES

1. These data may be useful in conjunction with other data, such as those collected from regulatory audits. Regulators may find the information particularly helpful in signaling potential problem lenders. For a thorough discussion of both the issues and data, see Canner and Smith (1991, 1992) and Garwood and Smith (1993).
2. 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.
3. 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).
4. 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.
5. See Kennickell and Shack-Marquez (1992) for a description of the Survey of Consumer Finances. In the HMDA data, household income may be slightly understated, as it reflects only the portion of an applicant's income needed for mortgage qualification.
6. 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.

7. These equations were actually estimated in two steps. In the first step, individual application characteristics were used with separate intercepts for *each* lender-census tract combination (a single component fixed effect). The home purchase equation had 607,631 such intercepts; the refinance equation, 326,535; and the home improvement equation, 267,158. In the second step, an iterative procedure, equivalent to regressing the fixed-effects intercepts against the 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. The minority application residuals used in this paper are taken directly from these estimated lender effects. Since we wanted denial rate residuals separately for minorities and nonminorities, the other elements of the model (AC, RACE, MSA, and TRACT) were used to form a predicted denial rate for each applicant. The minority denial rate residual for each lender was formed by averaging the residuals from this prediction over each lender's minority applicants. The nonminority lender residual was formed similarly. We also should note that the reported standard errors in the appendix tables 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.

8. The reported regressions here, and in tables 7 and 8, are unweighted with lender as the unit of observation. Standard errors are those reported in a standard regression package, and thus are unadjusted for heteroskedasticity or for the fact that the dependent variable is a sample residual formed from another estimation. Weighted regressions were also run, with similar substantive conclusions.

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

| | Home Purchase | | | Refinance | | | Home Improvement | | |
|---|----------------|----------------|---------------------|----------------|----------------|---------------------|------------------|----------------|---------------------|
| | Percent Sample | Percent Loan\$ | Percent Denial Rate | Percent Sample | Percent Loan\$ | Percent Denial Rate | Percent Sample | Percent Loan\$ | Percent 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: Distribution of Mortgage Applications and Denial Rates by Lender Characteristics¹, 1990

| | Home Purchase | | | | Refinance | | | | Home Improvement | | | |
|---|----------------|-------------|-----------------------|-------------|----------------|-------------|-----------------------|-------------|------------------|-------------|-----------------------|-------------|
| | Nonminority | | Minority ² | | Nonminority | | Minority ² | | Nonminority | | Minority ² | |
| | Percent Denial | Sample Rate | Percent Denial | Sample Rate | Percent Denial | Sample Rate | Percent Denial | Sample Rate | Percent Denial | Sample Rate | Percent Denial | Sample Rate |
| <i>Type of Institution</i> | | | | | | | | | | | | |
| Commercial Banks | 23.1% | 16.8% | 18.9% | 31.7% | 30.0% | 17.5% | 22.4% | 30.5% | 70.1% | 22.2% | 74.3% | 37.9% |
| Thrift Institutions | 33.5 | 11.9 | 35.1 | 21.8 | 45.3 | 16.2 | 56.0 | 25.3 | 20.0 | 23.6 | 16.6 | 43.4 |
| Credit Unions | 1.1 | 10.0 | 0.7 | 21.8 | 2.8 | 10.0 | 1.9 | 19.2 | 7.7 | 8.5 | 6.9 | 16.1 |
| Bank Subsidiaries | 19.8 | 14.7 | 18.7 | 26.0 | 9.2 | 18.7 | 5.9 | 29.6 | 1.1 | 22.0 | 0.9 | 31.3 |
| Thrift Subsidiaries | 7.6 | 12.8 | 8.2 | 23.5 | 4.6 | 21.2 | 5.5 | 27.9 | 0.4 | 25.1 | 0.5 | 31.3 |
| Other Mortgage Banks | 14.9 | 11.2 | 18.3 | 20.5 | 8.1 | 19.0 | 8.3 | 26.2 | 0.7 | 25.9 | 0.8 | 31.2 |
| <i>Size of Institution</i> | | | | | | | | | | | | |
| < 100 Applications | 11.1 | 15.6 | 8.0 | 26.2 | 12.2 | 16.5 | 7.6 | 26.8 | 13.1 | 15.2 | 10.0 | 28.2 |
| 100-500 Applications | 37.6 | 13.8 | 29.4 | 25.6 | 32.9 | 15.8 | 18.7 | 26.9 | 30.6 | 17.0 | 23.4 | 31.0 |
| > 500 Applications | 51.3 | 12.8 | 62.6 | 23.9 | 34.8 | 18.0 | 73.6 | 27.3 | 56.2 | 25.1 | 66.7 | 40.4 |
| <i>Market (MSA) Share of Institution</i> | | | | | | | | | | | | |
| Less than 1 Percent | 21.1 | 14.4 | 19.0 | 24.3 | 25.8 | 17.9 | 21.3 | 27.3 | 20.7 | 18.5 | 19.3 | 31.9 |
| 1-5 Percent | 43.5 | 12.9 | 43.0 | 24.4 | 39.4 | 16.6 | 40.5 | 26.2 | 33.3 | 21.7 | 33.6 | 37.7 |
| More than 5 Percent | 35.4 | 13.7 | 37.9 | 25.2 | 34.8 | 17.2 | 38.2 | 28.1 | 46.0 | 22.7 | 47.2 | 37.7 |
| <i>Size of MSA</i> | | | | | | | | | | | | |
| < 25,000 Applications | 51.5 | 14.1 | 39.5 | 26.4 | 42.0 | 15.7 | 22.3 | 27.9 | 50.9 | 17.7 | 39.1 | 33.3 |
| > 25,000 Applications | 48.5 | 12.8 | 60.5 | 23.0 | 58.0 | 18.1 | 77.7 | 27.8 | 49.1 | 25.1 | 60.9 | 39.6 |
| <i>FHA/VA (First Mortgage Applications)</i> | | | | | | | | | | | | |
| Less than 15 Percent | 58.4 | 15.3 | 53.6 | 26.0 | 84.2 | 17.4 | 88.4 | 27.1 | 85.2 | 21.3 | 85.7 | 36.6 |
| 15-50 Percent | 20.4 | 11.0 | 17.6 | 23.3 | 10.9 | 14.6 | 6.5 | 26.6 | 11.8 | 24.2 | 9.9 | 38.9 |
| More than 50 Percent | 21.2 | 11.0 | 28.8 | 22.8 | 4.8 | 17.3 | 5.1 | 28.8 | 3.0 | 17.6 | 4.4 | 29.3 |
| <i>First Mortgages Sold³</i> | | | | | | | | | | | | |
| Less than 33 Percent | 35.5 | 15.1 | 30.9 | 27.0 | 51.9 | 17.1 | 45.3 | 28.3 | 68.6 | 21.3 | 71.3 | 37.1 |
| 33-67 Percent | 16.6 | 13.6 | 19.4 | 24.5 | 19.0 | 17.8 | 22.8 | 28.0 | 18.1 | 20.7 | 17.2 | 34.7 |
| More than 67 Percent | 47.9 | 12.3 | 49.8 | 23.1 | 29.1 | 16.8 | 32.0 | 24.7 | 13.3 | 23.3 | 11.5 | 37.3 |
| <i>Return on Assets (Earnings)⁴</i> | | | | | | | | | | | | |
| Loss | 23.6 | 13.3 | 26.6 | 24.3 | 24.1 | 17.6 | 26.2 | 26.9 | 15.2 | 24.6 | 14.8 | 41.1 |
| 0-.5 Percent | 37.6 | 12.5 | 40.3 | 23.5 | 38.0 | 16.7 | 40.0 | 26.6 | 24.8 | 25.2 | 26.0 | 41.8 |
| More than .5 Percent | 38.8 | 16.3 | 33.2 | 29.6 | 37.9 | 17.0 | 33.7 | 28.4 | 60.1 | 19.3 | 59.2 | 33.7 |
| <i>Capitalization (Capital to Assets)⁴</i> | | | | | | | | | | | | |
| Less than 6 percent | 58.0 | 15.2 | 67.6 | 26.5 | 56.2 | 18.5 | 70.2 | 28.3 | 52.9 | 24.5 | 59.0 | 39.2 |
| More than 6 Percent | 42.0 | 12.6 | 32.4 | 25.2 | 43.8 | 14.9 | 29.8 | 25.6 | 47.1 | 18.1 | 41.0 | 33.9 |
| <i>Total</i> | 100.0 | 13.2 | 100.0 | 25.3 | 100.0 | 16.8 | 100.0 | 26.6 | 100.0 | 20.6 | 100.0 | 39.6 |

¹ Lenders operating in multiple MSAs are treated as separate institutions.

² Native Americans, blacks, and Hispanics.

³ Based on loans both originated and sold during 1990.

⁴ Earnings and capitalization data are not available for any independent mortgage banks and some other institutions.

Table 3: Regression Sample Variables--Descriptive Statistics

| | <u>All Institutions</u> | | <u>Credit Unions</u> | | <u>Thrift Institutions</u> | | <u>Commercial Banks</u> | |
|---|-------------------------|----------------|----------------------|----------------|----------------------------|----------------|-------------------------|----------------|
| | Mean | Standard Error | Mean | Standard Error | Mean | Standard Error | Mean | Standard Error |
| Nonminority Denial Residual | .004 | .170 | -0.083 | .136 | .014 | .153 | .014 | .172 |
| <i>Institution Type</i> | | | | | | | | |
| Commercial Bank (Dummy) | .344 | .475 | -- | -- | -- | -- | -- | -- |
| Thrift Institution (Dummy) | .212 | .408 | -- | -- | -- | -- | -- | -- |
| Credit Union (Dummy) | .082 | .275 | -- | -- | -- | -- | -- | -- |
| Commercial Bank Subsidiary (Dummy) | .152 | .359 | -- | -- | -- | -- | -- | -- |
| Thrift Subsidiary (Dummy) | .064 | .244 | -- | -- | -- | -- | -- | -- |
| Independent Mortgage Bank (Dummy) | .145 | .352 | -- | -- | -- | -- | -- | -- |
| <i>Size Measures</i> | | | | | | | | |
| Market Share of MSA (Fraction) | .021 | .039 | .008 | .020 | .025 | .043 | .024 | .044 |
| 101 to 500 Applications (Dummy) | .333 | .475 | .175 | .381 | .410 | .492 | .338 | .473 |
| More than 500 Applications (Dummy) | .098 | .297 | .013 | .115 | .143 | .350 | .092 | .289 |
| Market Share of Minorities in MSA | .023 | .049 | .013 | .139 | .025 | .052 | .027 | .052 |
| More than 100 Minority Appl. (Dummy) | .060 | .237 | .011 | .014 | .078 | .268 | .057 | .231 |
| <i>Government Programs</i> | | | | | | | | |
| FHA Share of 1st Mortgage Applications | .131 | .247 | .011 | .068 | .112 | .216 | .094 | .195 |
| VA Share of 1st Mortgage Applications | .033 | .093 | .025 | .110 | .029 | .088 | .026 | .079 |
| FNMA Share of 1st Mortgages Originated | .115 | .215 | .046 | .169 | .108 | .201 | .093 | .193 |
| FHLMC Share of 1st Mortgages Originated | .066 | .159 | .014 | .080 | .072 | .154 | .059 | .157 |
| GNMA Share of 1st Mortgages Originated | .062 | .171 | .014 | .076 | .039 | .127 | .053 | .155 |
| Other Sale Share of 1st Mortgages Orig. | .180 | .310 | .090 | .254 | .161 | .282 | .167 | .301 |
| <i>Loan Types</i> | | | | | | | | |
| Home Purchase Share of Applications | .567 | .319 | .239 | .252 | .613 | .262 | .525 | .310 |
| Refinance Share of Applications | .196 | .210 | .182 | .242 | .260 | .207 | .179 | .191 |
| Home Improvement Share of Applications | .237 | .310 | .579 | .350 | .127 | .220 | .296 | .308 |
| <i>Financial Ratios</i> | | | | | | | | |
| Non Real Estate Loans / Assets | -- | -- | .415 | .125 | .066 | .074 | .304 | .139 |
| Real Estate Loans / Assets | -- | -- | .241 | .125 | .580 | .194 | .318 | .166 |
| Deposits / Assets | -- | -- | .900 | .046 | .814 | .120 | .804 | .149 |
| Capital / Assets | -- | -- | .029 | .030 | .011 | .270 | .076 | .057 |
| Earnings / Assets | -- | -- | .009 | .013 | -0.004 | .016 | .004 | .015 |
| <i>Loan Performance Measures</i> | | | | | | | | |
| Total Loans Charged Off / Total Loans | -- | -- | -- | -- | .009 | .045 | .010 | .017 |
| Nonperforming Mortgages / Total Mortgages | -- | -- | -- | -- | .018 | .038 | -- | -- |
| Mortgages Charged Off / Total Mortgages | -- | -- | -- | -- | .001 | .007 | -- | -- |
| Mortgages Repossessed / Total Mortgages | -- | -- | -- | -- | .020 | .066 | -- | -- |
| <i>Commercial Bank Types</i> | | | | | | | | |
| In a Bank Holding Company (Dummy) | -- | -- | -- | -- | -- | -- | .806 | .395 |
| Minority Bank (Dummy) | -- | -- | -- | -- | -- | -- | .008 | .087 |
| <i>Memo Item:</i> | | | | | | | | |
| Number of Observations | 14,787 | | 1,196 | | 3,910 | | 7,663 | |

Table 4: Lender Characteristics and Residual Differences in Minority Denial Rates by Type of Institution
(Dependent Variable Is the Unexplained Lender Residual from the Minority Denial Rate Equation)

| | <u>All Institutions</u> | | <u>Credit Unions</u> | | <u>Thrift Institutions</u> | | <u>Commercial Banks</u> | |
|---|-------------------------|----------------|----------------------|----------------|----------------------------|----------------|-------------------------|----------------|
| | Parameter Estimate | Standard Error | Parameter Estimate | Standard Error | Parameter Estimate | Standard Error | Parameter Estimate | Standard Error |
| Intercept | .01544* | .00698 | .04195 | .17514 | .01155 | .03239 | -0.00442 | .03620 |
| Nonminority Denial Residual | .81666*** | .01264 | .71165*** | .05557 | .76091*** | .02587 | .81795*** | .01850 |
| <i>Institution Type (Base Group Commercial Banks)</i> | | | | | | | | |
| Thrift Institution (Dummy) | -0.00631 | .00626 | -- | -- | -- | -- | -- | -- |
| Credit Union (Dummy) | -0.07071*** | .00827 | -- | -- | -- | -- | -- | -- |
| Commercial Bank Subsidiary (Dummy) | .01188 | .00844 | -- | -- | -- | -- | .01951 | .01130 |
| Thrift Subsidiary (Dummy) | .00611 | .01021 | -- | -- | .00594 | .01170 | -- | -- |
| Independent Mortgage Bank (Dummy) | -0.02184** | .00844 | -- | -- | -- | -- | -- | -- |
| <i>Size Measures</i> | | | | | | | | |
| Market Share of MSA (Fraction) | .15295 | .10088 | 1.28952* | .53039 | .06273 | .15530 | .12304 | .14560 |
| 101 to 500 Applications (Dummy) | .00274 | .00493 | -0.01745 | .02222 | -0.00055 | .00877 | -0.00028 | .00715 |
| More than 500 Applications (Dummy) | -0.00243 | .00966 | -0.04365 | .08643 | .01053 | .01525 | -0.01327 | .01425 |
| Market Share of Minorities in MSA | -0.07869 | .07759 | -0.13257 | .24296 | .01144 | .12113 | -0.10953 | .11767 |
| More than 100 Minority Appl. (Dummy) | .00667 | .01107 | .00047 | .09107 | -0.02388 | .01761 | .00278 | .01638 |
| <i>Government Programs</i> | | | | | | | | |
| FHA Share of 1st Mortgage Applications | .03882** | .01189 | .04744 | .10964 | .02254 | .02490 | .07415*** | .02178 |
| VA Share of 1st Mortgage Applications | .01268 | .02518 | -0.01486 | .07948 | .05265 | .04867 | .00957 | .04507 |
| FNMA Share of 1st Mortgages Orig. | -0.00584 | .01104 | .01901 | .04641 | -0.00103 | .02088 | -0.01407 | .01831 |
| FHLMC Share of 1st Mortgages Orig. | -0.00575 | .01429 | .24241* | .09654 | -0.04757 | .02564 | -0.00586 | .02335 |
| GNMA Share of 1st Mortgages Orig. | -0.11351*** | .01682 | -0.16846 | .11511 | -0.07214 | .04119 | -0.15669*** | .02981 |
| Other Sale Share of 1st Mortgages Orig. | -0.01174 | .00805 | -0.02428 | .02962 | -0.01260 | .01640 | -0.00926 | .01166 |
| <i>Loan Types</i> | | | | | | | | |
| Refinance Share of Applications | .01942 | .01132 | .07503 | .04308 | .01675 | .02150 | .04466* | .01816 |
| Home Improvement Share of Applications | .00596 | .00957 | -0.00760 | .03041 | .01541 | .01960 | .02368 | .01383 |
| <i>Financial Ratios</i> | | | | | | | | |
| Non Real Estate Loans / Assets | -- | -- | -0.02462 | .07654 | -0.10845* | .05447 | -0.01350* | .02926 |
| Real Estate Loans / Assets | -- | -- | -0.05691 | .07687 | -0.04018 | .02460 | .00299 | .02478 |
| Deposits / Assets | -- | -- | -0.09148 | .18417 | .04294 | .03449 | .00145 | .03079 |
| Capital / Assets | -- | -- | -0.35967 | .28516 | -0.00183 | .04341 | -0.18231* | .07717 |
| Earnings / Assets | -- | -- | -0.22286 | .65537 | -0.03311 | .35556 | .89638** | .32927 |
| <i>Loan Performance Measures</i> | | | | | | | | |
| Total Loans Charged Off / Total Loans | -- | -- | -- | -- | .11375 | .37354 | .29433 | .35377 |
| Nonperforming Mortgages / Total Mortgages | -- | -- | -- | -- | .32885** | .11784 | -- | -- |
| Mortgages Charged Off / Total Mortgages | -- | -- | -- | -- | -1.96726 | 2.22421 | -- | -- |
| Mortgages Repossessed / Total Mortgages | -- | -- | -- | -- | .03417 | .08053 | -- | -- |
| <i>Commercial Bank Types</i> | | | | | | | | |
| In a Bank Holding Company (Dummy) | -- | -- | -- | -- | -- | -- | .02586** | .00840 |
| Minority Bank (Dummy) | -- | -- | -- | -- | -- | -- | -0.11704*** | .03454 |
| <i>Memo Items:</i> | | | | | | | | |
| Number of Observations | 14,787 | | 1,196 | | 3,910 | | 7,663 | |
| R squared | .252 | | .157 | | .208 | | .237 | |
| Dependent Variable Mean | .013 | | -.121 | | .028 | | .033 | |
| Dependent Variable Standard Deviation | .290 | | .273 | | .263 | | .299 | |

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

Table 5: Lender Characteristics and Residual Differences in Minority Denial Rates by Type of Loan
(Dependent Variable Is the Unexplained Lender Residual from the Minority Denial Rate Equation)

| | <u>Home Purchase</u> | | <u>Refinance</u> | | <u>Home Improvement</u> | | <u>Large Institutions</u> | |
|---|----------------------|----------------|--------------------|----------------|-------------------------|----------------|---------------------------|----------------|
| | Parameter Estimate | Standard Error | Parameter Estimate | Standard Error | Parameter Estimate | Standard Error | Parameter Estimate | Standard Error |
| Intercept | .06019*** | .00786 | .03219** | .01001 | -0.00591 | .01036 | .01699* | .00799 |
| Nonminority Denial Residual | .74959*** | .01457 | .72808*** | .01893 | .77497*** | .01842 | 1.07175*** | .01867 |
| <i>Institution Type (Base Group Commercial Banks)</i> | | | | | | | | |
| Thrift Institution (Dummy) | -0.01039 | .00721 | -0.00287 | .00926 | .01931 | .01013 | -0.00878 | .00571 |
| Credit Union (Dummy) | -0.06347*** | .01233 | -0.03311* | .01530 | -0.08043*** | .01133 | -0.05395*** | .01108 |
| Commercial Bank Subsidiary (Dummy) | .02560** | .00988 | .03387* | .01434 | -0.01205 | .02246 | -0.01763* | .00830 |
| Thrift Subsidiary (Dummy) | .02656* | .01182 | .00025 | .01693 | -0.10729*** | .02734 | -0.02265* | .01006 |
| Independent Mortgage Bank (Dummy) | -0.01292 | .01007 | -0.00600 | .01405 | .00569 | .02066 | -0.03075*** | .00868 |
| <i>Size Measures</i> | | | | | | | | |
| Market Share of MSA (Fraction) | .02189 | .11232 | .27244 | .14820 | .25291 | .15564 | .19856** | .06799 |
| 101 to 500 Applications (Dummy) | .00587 | .00576 | .00108 | .00844 | .00770 | .00844 | - | - |
| More than 500 Applications (Dummy) | .00016 | .01067 | -0.01322 | .01363 | .00110 | .01554 | -0.00306 | .00576 |
| Market Share of Minorities in MSA | .01037 | .08652 | -0.17230 | .11516 | -0.20910 | .11763 | -0.13288* | .05304 |
| More than 100 Minority Appl. (Dummy) | -0.00635 | .01201 | .00629 | .01428 | -0.00217 | .01658 | -0.01168 | .00695 |
| <i>Government Programs</i> | | | | | | | | |
| FHA Share of 1st Mortgage Applications | .04123** | .01362 | -0.01235 | .02383 | .04519 | .03061 | .02036 | .01247 |
| VA Share of 1st Mortgage Applications | .03578 | .02990 | -0.07132 | .05578 | -0.02239 | .06151 | .03769 | .03120 |
| FNMA Share of 1st Mortgages Originated | -0.02704* | .01318 | .00840 | .01889 | .03266 | .02427 | -0.00682 | .01171 |
| FHLMC Share of 1st Mortgages Orig. | -0.02174 | .01654 | -0.02548 | .02260 | -0.01797 | .03396 | .00534 | .01431 |
| GNMA Share of 1st Mortgages Orig. | -0.13719*** | .01960 | -0.05067 | .03371 | -0.07580 | .04874 | -0.02142 | .01771 |
| Other Sale Share of 1st Mortgages Orig. | -0.02062* | .00956 | -0.01334 | .01467 | .00267 | .01549 | .00520 | .00819 |
| <i>Loan Types</i> | | | | | | | | |
| Home Purchase Share of Applications | -0.05213*** | .01212 | - | - | - | - | - | - |
| Refinance Share of Applications | - | - | -0.02059 | .01763 | - | - | .02570 | .01416 |
| Home Improvement Share of Applications | - | - | - | - | .02055 | .01386 | .00554 | .01105 |
| <i>Memo Items:</i> | | | | | | | | |
| Number of Observations | 11,798 | | 7,185 | | 6,450 | | 6,393 | |
| R squared | .212 | | .182 | | .245 | | .367 | |
| Dependent Variable Mean | .030 | | .025 | | -.014 | | .014 | |
| Dependent Variable Standard Deviation | .303 | | .307 | | .333 | | .196 | |

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

Table 6: Minority Denial Rate Correlations, All Institutions

| | Relative Denial Rate ¹ | | | | Minority Denial Rate | | | |
|---|-----------------------------------|-------------|-----------|--------------|----------------------|-------------|-----------|--------------|
| | Total | Home Purch. | Refinance | Home Improv. | Total | Home Purch. | Refinance | Home Improv. |
| <i>Relative Denial Rate¹</i> | | | | | | | | |
| Total | 1.000 | | | | | | | |
| Home Purchase | .801*** | 1.000 | | | | | | |
| Refinance | .588*** | .046*** | 1.000 | | | | | |
| Home Improvement | .710*** | .064*** | .048** | 1.000 | | | | |
| <i>Minority Denial Rate</i> | | | | | | | | |
| Total | .812*** | .656*** | .488*** | .589*** | 1.000 | | | |
| Home Purchase | .688*** | .818*** | .060*** | .082*** | .861*** | 1.000 | | |
| Refinance | .536*** | .076*** | .825*** | .048** | .691*** | .230*** | 1.000 | |
| Home Improvement | .644*** | .069*** | .057** | .799*** | .798*** | .187*** | .153*** | 1.000 |

¹ Minority denial rate residual minus nonminority denial rate residual.

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

Table 7: Lender Characteristics and Residual Differences in Minority Application Rates by Type of Institution
(Dependent Variable Is the Unexplained Lender Residual from the Minority Application Rate Equation)

| | <u>All Institutions</u> | | <u>Credit Unions</u> | | <u>Thrift Institutions</u> | | <u>Commercial Banks</u> | |
|---|-------------------------|----------------|----------------------|----------------|----------------------------|----------------|-------------------------|----------------|
| | Parameter Estimate | Standard Error | Parameter Estimate | Standard Error | Parameter Estimate | Standard Error | Parameter Estimate | Standard Error |
| Intercept | .05830*** | .00377 | .18339 | .13622 | .07085*** | .01526 | .07217*** | .01769 |
| <i>Institution Type (Base Group Commercial Banks)</i> | | | | | | | | |
| Thrift Institution (Dummy) | -0.01341*** | .00338 | -- | -- | -- | -- | -- | -- |
| Credit Union (Dummy) | .03232*** | .00444 | -- | -- | -- | -- | -- | -- |
| Commercial Bank Subsidiary (Dummy) | .02772*** | .00449 | -- | -- | -- | -- | .01944*** | .00546 |
| Thrift Subsidiary (Dummy) | .04170*** | .00547 | -- | -- | .05631*** | .00544 | -- | -- |
| Independent Mortgage Bank (Dummy) | .02436*** | .00454 | -- | -- | -- | -- | -- | -- |
| <i>Size Measures</i> | | | | | | | | |
| Market Share of MSA (Fraction) | -0.06913* | .03291 | -0.64894 | .33831 | .05046 | .04761 | -0.09613* | .03939 |
| 101 to 500 Applications (Dummy) | -0.05077*** | .00265 | -0.06017*** | .01724 | -0.04249*** | .00412 | -0.04834*** | .00349 |
| More than 500 Applications (Dummy) | -0.04408*** | .00432 | -0.03500 | .05331 | -0.04023*** | .00604 | -0.04372*** | .00590 |
| <i>Government Programs</i> | | | | | | | | |
| FHA Share of 1st Mortgage Applications | .01565* | .00641 | -0.08024 | .08552 | -0.01245 | .01177 | .03795*** | .01064 |
| VA Share of 1st Mortgage Applications | .01030 | .01361 | -0.08762 | .06197 | -0.00066 | .02297 | .06048** | .02207 |
| FNMA Share of 1st Mortgages Originated | -0.05080*** | .00595 | .00853 | .03615 | -0.05034*** | .00987 | -0.03007*** | .00888 |
| FHLMC Share of 1st Mortgages Orig. | -0.03688*** | .00771 | -0.15634* | .07534 | -0.02587* | .01208 | -0.03579** | .01139 |
| GNMA Share of 1st Mortgages Orig. | -0.05352*** | .00906 | -0.09488 | .08934 | -0.08024*** | .01942 | -0.06322*** | .01458 |
| Other Sale Share of 1st Mortgages Orig. | -0.03950*** | .00435 | -0.04004 | .02311 | -0.02986*** | .00775 | -0.03824*** | .00571 |
| <i>Loan Types</i> | | | | | | | | |
| Refinance Share of Applications | .01216* | .00612 | -0.06237 | .03362 | -0.00049 | .01016 | .02787** | .00889 |
| Home Improvement Share of Applications | -0.00195 | .00516 | -0.08119*** | .02353 | .00768 | .00922 | .00926 | .00673 |
| <i>Financial Ratios</i> | | | | | | | | |
| Non Real Estate Loans / Assets | -- | -- | -0.04203 | .05976 | .09123*** | .02573 | .04989*** | .01434 |
| Real Estate Loans / Assets | -- | -- | -0.03484 | .05995 | .03050** | .01161 | .02236 | .01210 |
| Deposits / Assets | -- | -- | .00324 | .14309 | -0.07019*** | .01628 | -0.04098** | .01494 |
| Capital / Assets | -- | -- | -0.02583 | .22173 | -0.06393** | .02049 | -0.09009* | .03757 |
| Earnings / Assets | -- | -- | .15598 | .51170 | .01696 | .16814 | .37647* | .16113 |
| <i>Loan Performance Measures</i> | | | | | | | | |
| Total Loans Charged Off / Total Loans | -- | -- | -- | -- | .00559 | .17631 | .40821* | .17286 |
| Nonperforming Mortgages / Total Mortgages | -- | -- | -- | -- | .20550*** | .05570 | -- | -- |
| Mortgages Charged Off / Total Mortgages | -- | -- | -- | -- | -0.64308 | 1.05034 | -- | -- |
| Mortgages Repossessed / Total Mortgages | -- | -- | -- | -- | .10470** | .03802 | -- | -- |
| <i>Commercial Bank Types</i> | | | | | | | | |
| In a Bank Holding Company (Dummy) | -- | -- | -- | -- | -- | -- | -0.01684*** | .00411 |
| Minority Bank (Dummy) | -- | -- | -- | -- | -- | -- | .18242*** | .01691 |
| <i>Memo Items:</i> | | | | | | | | |
| Number of Observations | 14,787 | | 1,196 | | 3,910 | | 7,663 | |
| R squared | .061 | | .051 | | .104 | | .072 | |
| Dependent Variable Mean | .031 | | .076 | | .016 | | .029 | |
| Dependent Variable Standard Deviation | .140 | | .202 | | .238 | | .133 | |

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

Table 8: Lender Characteristics and Residual Differences in Minority Application Rates by Type of Loan
(Dependent Variable Is the Unexplained Lender Residual from the Minority Application Rate Equation)

| | <u>Home Purchase</u> | | <u>Refinance</u> | | <u>Home Improvement</u> | | <u>Large Institutions</u> | |
|---|----------------------|----------------|--------------------|----------------|-------------------------|----------------|---------------------------|----------------|
| | Parameter Estimate | Standard Error | Parameter Estimate | Standard Error | Parameter Estimate | Standard Error | Parameter Estimate | Standard Error |
| Intercept | .10840*** | .00424 | .17530*** | .00569 | .11978*** | .00611 | -0.01205*** | .00244 |
| <i>Institution Type (Base Group Commercial Banks)</i> | | | | | | | | |
| Thrift Institution (Dummy) | -0.01249** | .00394 | -0.02474*** | .00526 | -0.00649 | .00597 | -0.00271 | .00175 |
| Credit Union (Dummy) | .07113*** | .00672 | .02482** | .00868 | .02182** | .00665 | .00696* | .00336 |
| Commercial Bank Subsidiary (Dummy) | .01846*** | .00531 | .04115*** | .00812 | .07925*** | .01327 | .00650** | .00251 |
| Thrift Subsidiary (Dummy) | .03549*** | .00639 | .01777 | .00962 | .07725*** | .01614 | .00247 | .00306 |
| Independent Mortgage Bank (Dummy) | .02368*** | .00547 | .03025*** | .00799 | .08618*** | .01219 | .00887*** | .00264 |
| <i>Size Measures</i> | | | | | | | | |
| Market Share of MSA (Fraction) | -0.10434** | .03656 | -0.13084** | .04959 | -0.13704** | .05314 | .04440*** | .01240 |
| 101 to 500 Applications (Dummy) | -0.07060*** | .00313 | -0.11741*** | .00479 | -0.07635*** | .00521 | — | — |
| More than 500 Applications (Dummy) | -0.06620*** | .00485 | -0.12974*** | .00657 | -0.08080*** | .00768 | .00041 | .00148 |
| <i>Government Programs</i> | | | | | | | | |
| FHA Share of 1st Mortgage Applications | .01570* | .00742 | .03161* | .01354 | .02373 | .01811 | .02075*** | .00378 |
| VA Share of 1st Mortgage Applications | .00979 | .01631 | .05814 | .03176 | .01945 | .03641 | .00538 | .00952 |
| FNMA Share of 1st Mortgages Originated | -0.05788*** | .00715 | -0.03861*** | .01074 | -0.03670* | .01436 | -0.01508*** | .00356 |
| FHLMC Share of 1st Mortgages Orig. | -0.02312* | .00901 | -0.07264*** | .01286 | -0.04160* | .02009 | .00671 | .00437 |
| GNMA Share of 1st Mortgages Orig. | -0.03880*** | .01068 | -0.08306*** | .01915 | -0.07570** | .02881 | -0.01220* | .00541 |
| Other Sale Share of 1st Mortgages Orig. | -0.03919*** | .00522 | -0.04941*** | .00834 | -0.00627 | .00916 | -0.00640* | .00250 |
| <i>Loan Types</i> | | | | | | | | |
| Home Purchase Share of Applications | -0.03623*** | .00658 | — | — | — | — | — | — |
| Refinance Share of Applications | — | — | -0.07587*** | .01003 | — | — | .01542*** | .00433 |
| Home Improvement Share of Applications | — | — | — | — | -0.06041*** | .00817 | .01561*** | .00335 |
| <i>Memo Items:</i> | | | | | | | | |
| Number of Observations | 11,798 | | 7,185 | | 6,450 | | 6,393 | |
| R squared | .094 | | .139 | | .076 | | .020 | |
| Dependent Variable Mean | .040 | | .064 | | .055 | | -.002 | |
| Dependent Variable Standard Deviation | .154 | | .182 | | .178 | | .048 | |

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

Table 9: Minority Application and Denial Rate Residual Correlations, All Institutions

| | Minority Application Rate | | | |
|---|---------------------------|-------------|-----------|--------------|
| | Total | Home Purch. | Refinance | Home Improv. |
| <i>Minority Application Rate</i> | | | | |
| Total | 1.000 | | | |
| Home Purchase | .789*** | 1.000 | | |
| Refinance | .584*** | .156*** | 1.000 | |
| Home Improvement | .659*** | .148*** | .188*** | 1.000 |
| <i>Relative Denial Rate¹</i> | | | | |
| Total | -0.007 | -0.009 | .005 | -0.030** |
| Home Purchase | -0.014 | -0.006 | -0.023* | -0.029* |
| Refinance | -0.015 | -0.033** | .018 | -0.044** |
| Home Improvement | -0.026* | -0.049*** | -0.052*** | -0.001 |
| <i>Minority Denial Rate</i> | | | | |
| Total | .035*** | .028** | .028** | .003 |
| Home Purchase | .023* | .027** | .001 | -0.004 |
| Refinance | .023 | -0.011 | .041*** | -0.005 |
| Home Improvement | -0.001 | -0.027* | -0.022 | .025* |

¹ Minority denial rate residual minus nonminority denial rate residual.

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

Appendix Table 1: 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 |
| Income Spline at \$100,000 | -0.00045* | .00019 |

Appendix Table 1: (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.

Appendix Table 2: 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 |

Appendix Table 2: (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.

Appendix Table 3: 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 |

Appendix Table 3: (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.

Appendix Table 4: Linear Probability Model of Minority (1) or Nonminority (0) Application, Home Purchase

| | Parameter Estimate | Standard Error |
|--|--------------------|----------------|
| Owner-occupied (Dummy) | .01034*** | .00112 |
| FHA Loan (Dummy) | .12305*** | .01201 |
| VA Loan (Dummy) | .12368*** | .01203 |
| <i>Income (\$1,000's)</i> | | |
| Income | -0.00171*** | .00028 |
| Income Spline at \$20,000 | .00082* | .00032 |
| Income Spline at \$40,000 | .00040** | .00013 |
| Income Spline at \$60,000 | .00008 | .00012 |
| Income Spline at \$80,000 | -0.00023 | .00015 |
| Income Spline at \$100,000 | .00048*** | .00012 |
| Income Spline at \$150,000 | .00018* | .00008 |
| Income Spline at \$200,000 | -0.00002 | .00005 |
| <i>Loan Amount (\$1,000's)</i> | | |
| Loan Amount | -0.00159*** | .00017 |
| Loan Amount Spline at \$20,000 | .00180*** | .00023 |
| Loan Amount Spline at \$40,000 | -0.00017 | .00015 |
| Loan Amount Spline at \$60,000 | -0.00006 | .00014 |
| Loan Amount Spline at \$80,000 | .00001 | .00014 |
| Loan Amount Spline at \$100,000 | .00052*** | .00012 |
| Loan Amount Spline at \$125,000 | -0.00053*** | .00007 |
| Loan Amount Spline at \$200,000 | .00004 | .00002 |
| <i>Loan-to-Income Ratio (Dummies, Less than 1.5 Is Base Group)</i> | | |
| Ratio of 1.5 to 2.0 | -0.00301*** | .00089 |
| Ratio of 2.0 to 2.25 | -0.00244* | .00119 |
| Ratio of 2.25 to 2.5 | .00093 | .00138 |
| Ratio of 2.5 to 2.75 | .00068 | .00158 |
| Ratio of 2.75 to 3.0 | .00455* | .00192 |
| Ratio over 3.0 | .00365 | .00175 |
| <i>Applicant Gender (Dummies, Female Applicant, No Co-applicant Is Base Group)</i> | | |
| Male Applicant, Female Co-applicant | -0.02765*** | .00644 |
| Female Applicant, Male Co-applicant | -0.01765** | .00652 |
| Male Applicant and Co-applicant | -0.01237 | .00664 |
| Female Applicant and Co-applicant | .00225 | .00675 |
| Male Applicant, No Co-applicant | -0.01565*** | .00092 |
| <i>Income, Interacted With No Co-applicant</i> | | |
| Income | -0.00157*** | .00036 |
| Income Spline at \$20,000 | .00184*** | .00042 |
| Income Spline at \$40,000 | -0.00028 | .00020 |
| Income Spline at \$60,000 | .00036 | .00025 |
| Income Spline at \$80,000 | .00012 | .00031 |
| Income Spline at \$100,000 | -0.00047** | .00016 |
| <i>Marital Status, Interacted With VA or FHA Loan</i> | | |
| No Co-applicant (VA Loan) | .02287*** | .00262 |
| No Co-applicant (FHA Loan) | .00166 | .00138 |

Appendix Table 4: (continued)

| | Parameter Estimate | Standard Error |
|---|--------------------|----------------|
| <i>Income, Interacted With VA or FHA Loan</i> | | |
| Income | -0.00141** | .00045 |
| Income Spline at \$20,000 | .00096* | .00049 |
| Income Spline at \$40,000 | .00024 | .00020 |
| Income Spline at \$60,000 | -0.00001 | .00028 |
| Income Spline at \$80,000 | -0.00007 | .00044 |
| Income Spline at \$100,000 | .00035 | .00029 |
| <i>Loan Amount, Interacted With VA or FHA Loan</i> | | |
| Loan Amount | -0.00171*** | .00045 |
| Loan Amount Spline at \$20,000 | .00151** | .00059 |
| Loan Amount Spline at \$40,000 | -0.00025 | .00029 |
| Loan Amount Spline at \$60,000 | .00030 | .00023 |
| Loan Amount Spline at \$80,000 | .00004 | .00023 |
| Loan Amount Spline at \$100,000 | .00048* | .00023 |
| <i>Loan-to-Income Ratio, Interacted With VA or FHA Loan</i> | | |
| Ratio of 1.5 to 2.0 | -0.00542** | .00188 |
| Ratio of 2.0 to 2.25 | -0.00601* | .00252 |
| Ratio of 2.25 to 2.5 | -0.01143*** | .00293 |
| Ratio of 2.5 to 2.75 | -0.01058** | .00335 |
| Ratio of 2.75 to 3.0 | -0.00848* | .00401 |
| Ratio over 3.0 | -0.00967* | .00415 |
| <i>Memo Items:</i> | | |
| Number of Observations | 1,984,688 | |
| Mean Minority Share of Regression Sample | .133 | |
| Number of Tract/Institution Dummies | 607,631 | |
| R squared (Including Tract/Institution Dummies) | .577 | |
| R squared (Variation Around Tract/Institution Means) | .005 | |

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

Appendix Table 5: Linear Probability Model of Minority (1) or Nonminority (0) Application, Refinance

| | Parameter Estimate | Standard Error |
|--|--------------------|----------------|
| Owner-occupied (Dummy) | .02004*** | .00171 |
| FHA Loan (Dummy) | .03422*** | .00958 |
| VA Loan (Dummy) | .04686*** | .01099 |
| <i>Income (\$1,000's)</i> | | |
| Income | .00048 | .00040 |
| Income Spline at \$20,000 | -0.00076 | .00048 |
| Income Spline at \$40,000 | -0.00049• | .00022 |
| Income Spline at \$60,000 | -0.00024 | .00021 |
| Income Spline at \$80,000 | .00067** | .00024 |
| Income Spline at \$100,000 | .00007*** | .00019 |
| Income Spline at \$150,000 | .00044• | .00012 |
| Income Spline at \$200,000 | -0.00018 | .00007 |
| <i>Loan Amount (\$1,000's)</i> | | |
| Loan Amount | -0.00110*** | .00023 |
| Loan Amount Spline at \$20,000 | .00115*** | .00032 |
| Loan Amount Spline at \$40,000 | -0.00024 | .00023 |
| Loan Amount Spline at \$60,000 | .00061** | .00023 |
| Loan Amount Spline at \$80,000 | -0.00026 | .00024 |
| Loan Amount Spline at \$100,000 | .00012 | .00021 |
| Loan Amount Spline at \$125,000 | -0.00052*** | .00012 |
| Loan Amount Spline at \$200,000 | .00022*** | .00003 |
| <i>Loan-to-Income Ratio (Dummies, Less than 1.5 Is Base Group)</i> | | |
| Ratio of 1.5 to 2.0 | .00153 | .00153 |
| Ratio of 2.0 to 2.25 | .00373 | .00203 |
| Ratio of 2.25 to 2.5 | .00718** | .00230 |
| Ratio of 2.5 to 2.75 | .01070*** | .00248 |
| Ratio of 2.75 to 3.0 | .01383*** | .00287 |
| Ratio over 3.0 | .01628*** | .00249 |
| <i>Applicant Gender (Dummies, Female Applicant, No Co-applicant Is Base Group)</i> | | |
| Male Applicant, Female Co-applicant | -0.02934** | .01066 |
| Female Applicant, Male Co-applicant | -0.03328** | .01082 |
| Male Applicant and Co-applicant | -0.03473** | .01121 |
| Female Applicant and Co-applicant | -0.02352• | .01156 |
| Male Applicant, No Co-applicant | -0.00830*** | .00192 |
| <i>Income, Interacted With No Co-applicant</i> | | |
| Income | -0.00145• | .00061 |
| Income Spline at \$20,000 | .00083*** | .00076 |
| Income Spline at \$40,000 | .00062 | .00042 |
| Income Spline at \$60,000 | .00010 | .00047 |
| Income Spline at \$80,000 | .00038 | .00052 |
| Income Spline at \$100,000 | -0.00046 | .00027 |
| <i>Interacted With VA or FHA Loan</i> | | |
| No Co-applicant | .01509• | .00637 |
| Income | .00007 | .00007 |
| Loan Amount | -0.00027• | .00011 |
| <i>Memo Items:</i> | | |
| Number of Observations | 716,595 | |
| Mean Minority Share of Regression Sample | .134 | |
| Number of Tract/Institution Dummies | 326,535 | |
| R squared (Including Tract/Institution Dummies) | .666 | |
| R squared (Variation Around Tract/Institution Means) | .006 | |

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

Appendix Table 6: Linear Probability Model of Minority (1) or Nonminority (0) Application, Home Improvement

| | Parameter Estimate | Standard Error |
|--|--------------------|----------------|
| Owner-occupied (Dummy) | -0.00970*** | .00252 |
| FHA Loan (Dummy) | .01125 | .00608 |
| VA Loan (Dummy) | -0.01939 | .01667 |
| <i>Income (\$1,000's)</i> | | |
| Income | -0.00100*** | .00027 |
| Income Spline at \$20,000 | .00019 | .00033 |
| Income Spline at \$40,000 | .00020 | .00017 |
| Income Spline at \$60,000 | .00010 | .00020 |
| Income Spline at \$80,000 | .00046 | .00027 |
| Income Spline at \$100,000 | -0.00023 | .00023 |
| Income Spline at \$150,000 | .00053** | .00019 |
| Income Spline at \$200,000 | -0.00024* | .00011 |
| <i>Loan Amount (\$1,000's)</i> | | |
| Loan Amount | -0.00125*** | .00009 |
| Loan Amount Spline at \$20,000 | .00141*** | .00016 |
| Loan Amount Spline at \$40,000 | -0.00061* | .00025 |
| Loan Amount Spline at \$60,000 | .00065 | .00038 |
| Loan Amount Spline at \$80,000 | -0.00075 | .00047 |
| Loan Amount Spline at \$100,000 | .00141** | .00045 |
| Loan Amount Spline at \$125,000 | -0.00097** | .00035 |
| Loan Amount Spline at \$200,000 | .00012 | .00011 |
| <i>Loan-to-Income Ratio (Dummies, Less than 1.5 Is Base Group)</i> | | |
| Ratio of 1.5 to 2.0 | -0.00223 | .00288 |
| Ratio of 2.0 to 2.25 | -0.00451 | .00470 |
| Ratio of 2.25 to 2.5 | -0.00355 | .00653 |
| Ratio of 2.5 to 2.75 | -0.01890** | .00634 |
| Ratio of 2.75 to 3.0 | -0.00141 | .00893 |
| Ratio over 3.0 | -0.01259** | .00440 |
| <i>Applicant Gender (Dummies, Female Applicant, No Co-applicant Is Base Group)</i> | | |
| Male Applicant, Female Co-applicant | -0.03378*** | .00578 |
| Female Applicant, Male Co-applicant | -0.02947*** | .00588 |
| Male Applicant and Co-applicant | -0.03066*** | .00721 |
| Female Applicant and Co-applicant | -0.01309 | .07109 |
| Male Applicant, No Co-applicant | -0.00431** | .00139 |
| <i>Income, Interacted With No Co-applicant</i> | | |
| Income | -0.00163*** | .00034 |
| Income Spline at \$20,000 | .00140* | .00044 |
| Income Spline at \$40,000 | -0.00004 | .00032 |
| Income Spline at \$60,000 | .00092* | .00046 |
| Income Spline at \$80,000 | -0.00117* | .00060 |
| Income Spline at \$100,000 | .00055 | .00033 |
| <i>Interacted With VA or FHA Loan</i> | | |
| No Co-applicant | -0.00193 | .00497 |
| Income | -0.00002 | .00009 |
| Loan Amount | .00034 | .00018 |
| <i>Memo Items:</i> | | |
| Number of Observations | 787,951 | |
| Mean Minority Share of Regression Sample | .168 | |
| Number of Tract/Institution Dummies | 267,158 | |
| R squared (Including Tract/Institution Dummies) | .657 | |
| R squared (Variation Around Tract/Institution Means) | .004 | |

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