



COMMUNITY  
DEVELOPMENT

Working Paper

Lending in Low- and Moderate-Income  
Neighborhoods in California:  
The Performance of CRA Lending  
During the Subprime Meltdown

*by*

*Elizabeth Laderman and Carolina Reid*

November 2008  
Working Paper 2008-05  
<http://frbsf.org/community>

FEDERAL RESERVE BANK OF SAN FRANCISCO

101 Market Street  
San Francisco, California 94105  
[www.frbsf.org/community](http://www.frbsf.org/community)

**Lending in Low- and Moderate-Income Neighborhoods in California:  
The Performance of CRA Lending During the Subprime Meltdown**

Elizabeth Laderman  
Federal Reserve Bank of San Francisco

Carolina Reid †  
Federal Reserve Bank of San Francisco

November 26, 2008

Working paper to be presented at the  
*Federal Reserve System Conference on  
Housing and Mortgage Markets*  
Washington, DC, December 4, 2008

The views expressed herein are those of the authors and do not necessarily reflect those of the Federal Reserve Bank of San Francisco or the Federal Reserve System.

†Corresponding Author. Community Development Department, 101 Market Street, San Francisco, CA 94105, USA. Telephone: (415) 974-2161. Facsimile: (415) 393-1920. Email: carolina.reid@sf.frb.org.

# **Lending in Low- and Moderate-Income Neighborhoods in California: The Performance of CRA Lending During the Subprime Meltdown**

Elizabeth Laderman, Economic Research, Federal Reserve Bank of San Francisco  
Carolina Reid, Community Development, Federal Reserve Bank of San Francisco

November 14, 2008

## **Introduction**

The current scale of mortgage delinquencies and foreclosures—particularly in the subprime market—has sparked a renewed debate over the Community Reinvestment Act (CRA) and the regulations governing home mortgage lending. On one side, detractors argue that the CRA helped to precipitate the current crisis by encouraging lending in low- and moderate-income neighborhoods (Walker 2008). Economist Thomas DiLorenzo, for instance, wrote that the current housing crisis is "the direct result of thirty years of government policy that has forced banks to make bad loans to un-creditworthy borrowers" (DiLorenzo 2007). Robert Litan of the Brookings Institution similarly suggested that the 1990s enhancement of CRA may have contributed to the current crisis. "If the CRA had not been so aggressively pushed," Litan said, "it is conceivable things would not be quite as bad. People have to be honest about that." (Weisman 2008)

On the other side, advocates of the CRA point to a number of reasons why the regulation shouldn't be blamed for the current subprime crisis. Ellen Seidman, formerly the Director of the Office of Thrift Supervision, points out that the surge in subprime lending occurred long after the enactment of the CRA, and that in 1999 regulators specifically issued guidance to banks imposing restraints on the riskiest forms of subprime lending (Seidman 2008). In addition, researchers at the Federal Reserve Board of Governors have reported that the majority of subprime loans were made by independent mortgage lending companies, which are not covered by the CRA and receive less regulatory scrutiny overall (Avery, Brevoort and Canner 2007). In particular, in addition to exclusion from CRA coverage, independent mortgage companies are not regularly evaluated for "safety and soundness" (a key component of the regulatory oversight

of banks) nor for their compliance with consumer protections such as the Truth in Lending Act and the Equal Credit Opportunity Act.<sup>1</sup> This created what the late Federal Reserve Governor Ned Gramlich aptly termed, a “giant hole in the supervisory safety net” (Gramlich 2007).

What has been missing in this debate has been an empirical examination of the performance of loans made by institutions regulated under the CRA, versus those made by independent mortgage banks. The ability to conduct this research has been limited by the lack of a dataset that links information on loan origination with information on loan performance. In this study, we use a unique dataset that joins lender and origination information from the Home Mortgage Disclosure Act (HMDA) reports with data on loan performance from Lender Processing Services, Inc. Applied Analytics (LPS).<sup>2</sup> We thus have access to information on borrower characteristics (including race, income, and credit score), loan characteristics (including its loan-to-value ratio, whether it was a fixed or adjustable rate mortgage, and the existence of a prepayment penalty), institutional characteristics (whether the lending institution was regulated under the CRA and the loan source), and loan performance (delinquency and foreclosure).

In this paper, we use these data to examine several inter-related questions:

- What is the neighborhood distribution of loans made by independent mortgage companies versus those made by institutions regulated under the CRA?
- After controlling for borrower credit risk, is there a difference in the foreclosure rates for loans made by independent mortgage companies versus those made by institutions regulated under the CRA?
- How do other factors – such as loan terms and loan source – influence the likelihood of foreclosure?
- How do these factors differ in low- and moderate-income neighborhoods compared with the factors in middle- and upper-income neighborhoods?

---

<sup>1</sup> The federal laws that govern home mortgage lending, including the Equal Credit Opportunity Act, the Home Mortgage Disclosure Act, and the Truth in Lending Act, apply to both depository institutions and non-bank independent mortgage companies. However, the enforcement of these laws and the regulations that implement them differ greatly between banks and non-banks. Banks are subject to ongoing supervision and examination by their primary federal supervisor. In contrast, the Federal Trade Commission is the primary enforcer of these laws for non-banks, and only conducts targeted investigations based on consumer complaints.

<sup>2</sup> Formerly known as McDash Analytics.

The paper is organized into four sections. In the first section, we provide background information on the CRA and review the existing literature on the relationship between the CRA and mortgage lending in low- and moderate-income communities. In the second section, we describe our data and methodology. The third section presents the results of our models. We conclude with the policy implications of this study and present suggestions for further research.

## **The Community Reinvestment Act**

In 1977, concerned about the denial of credit to lower income communities—both minority and white—Congress enacted the Community Reinvestment Act (CRA). The CRA encourages federally insured banks and thrifts to meet the credit needs of the communities that they serve, including low- and moderate-income areas, consistent with safe and sound banking practices. Regulators consider a bank’s CRA record in determining whether to approve that institution’s application for mergers with, or acquisitions of, other depository institutions. A key component of the CRA is the lending test (which accounts for 50 percent of a large bank’s CRA rating), which evaluates the bank’s home mortgage, small-business, small-farm, and community-development lending activity. In assigning the rating for mortgage lending, examiners consider the number and amount of loans to low- and moderate-income borrowers and areas, and whether or not they demonstrate “innovative or flexible lending practices.”<sup>3</sup>

The CRA has generated significant changes in how banks and thrifts view and serve low- and moderate-income communities and consumers. Researchers who have studied the impact of the CRA find, on balance, that the regulations have reduced information costs and fostered competition among banks serving low-income areas, thereby generating larger volumes of lending from diverse sources and adding liquidity to the market (Avery et al. 1996, 1999; Barr

---

<sup>3</sup> As part of their CRA exam, large banks are also evaluated on their investments and services. Under the investment test, which accounts for 25 percent of the bank’s CRA grade, the agency evaluates the amount of the bank’s investments, its innovation, and its responsiveness to community needs. Under the service test, which makes up the remaining 25 percent of the bank’s evaluation, the agency analyzes “the availability and effectiveness of a bank’s systems for delivering retail banking services and the extent and innovativeness of its community development services.” Different rules apply for “small” and “intermediate small” institutions. For more complete details on the CRA regulations, visit <http://www.ffiec.gov/cra/default.htm> for text of the regulations and Interagency Q&A.

2005; Belsky, Schill and Yezer 2001; Evanoff and Siegal 1996; Litan 2001). In a detailed review, William Apgar and Mark Duda of The Joint Center for Housing Studies at Harvard University concluded that on balance, the CRA has had a positive impact on low- and moderate-income communities. In particular, the study notes that “CRA-regulated lenders originate a higher proportion of loans to lower-income people and communities than they would if CRA did not exist” (Apgar and Duda 2003, p. 176).

Since the passage of the CRA, however, the landscape of financial institutions serving low- and moderate-income communities has changed considerably. Most notably, innovations in credit scoring, coupled with the expansion of the secondary market, have led to an explosion of subprime lending, especially in the last few years. According to one source, the subprime market accounted for fully 20 percent of all mortgage originations in 2005, with a value of over \$600 billion (Inside Mortgage Finance 2007). Many of these loans were not made by regulated financial institutions; indeed, more than half of subprime loans were made by independent mortgage companies, and another 30 percent were made by affiliates of banks or thrifts, which also are not subject to routine examination or supervision (Avery, Brevoort and Canner 2007).

Given the large role played by independent mortgage companies and brokers in originating subprime loans, there has been growing interest in extending the reach of the CRA to encompass these changes in the financial landscape. Yet to date, there has been little research that has empirically assessed individual loan performance at CRA-regulated institutions versus loan performance at independent mortgage companies, particularly within low- and moderate-income areas. Instead, most of the existing literature has focused on determining the share of subprime lending in low-income communities and among different racial groups (see, for example Avery, Canner and Cook 2005; Bocian, Ernst and Li 2008; Calem, Hershaff and Wachter 2004). These studies, however, can’t assess whether loans made by institutions regulated by the CRA have performed better than those made by independent mortgage companies. Answering this question has been difficult given the lack of a single dataset that captures details on loan origination as well as details on loan performance.

A few recent studies attempt to match data from different sources to shed light on pieces of this puzzle. Researchers at Case Western's Center on Urban Poverty and Community Development used a probabilistic matching technique to link mortgage records from HMDA with locally recorded mortgage documents and foreclosure filings (Coulton et al. 2008). They found that the risk of foreclosure for subprime loans is 8.16 times higher than for non-subprime loans. They also found that loans originated by financial institutions without a local branch had foreclosure rates of 19.08 percent compared to only 2.43 percent for loans originated by local banks.

Another recent study released by the Center for Community Capital at the University of North Carolina uses a propensity score matching technique to compare the performance of loans made through a LMI-targeted community lending program (the Community Advantage Program (CAP) developed by Self-Help, a community development financial institution) to a sample of subprime loans in the McDash database (Ding, Quercia, Ratcliffe and Li 2008). They found that for borrowers with similar income and risk profiles, the estimated default risk is much lower with a prime loan made through the community lending program than with a subprime mortgage. In addition, they find that broker-origination, adjustable rate mortgages and prepayment penalties all increase the likelihood of default.

Both of these studies provide important insights into the relationship between subprime lending and foreclosure risk, and conclude that lending to low- and moderate-income communities is viable *when those loans are made responsibly*. However, both studies are limited in certain important ways. Coulton and her colleagues do not examine the regulatory oversight of the banks that made the loans, and are only able to control for a limited number of borrower and loan characteristics. Ding and his colleagues are constrained by only having access to a relatively narrow subset of loans securitized by the CAP program. Because the sample of CAP mortgages may not be representative of a national sample of mortgage borrowers, and especially since being part of the CAP demonstration may influence the lender's behavior and the quality of the loans they sell to Self-Help, the study's findings may not be applicable to lending in low- and moderate-income areas more generally.

In this study, we attempt to build on these research contributions by a) examining the performance of a sample of all loans (prime and subprime, and not limited to a specific demonstration program) made in California during the height of the housing boom and b) controlling for a wider range of variables, examining not only borrower characteristics, but assessing the influence of loan and lender variables on the probability of foreclosure as well.

## **Methodology**

The quantitative analysis used in this paper relies on a unique dataset that joins loan-level data submitted by financial institutions under the Home Mortgage Disclosure Act (HMDA) of 1975<sup>4</sup> and a proprietary dataset on loan performance collected by LPS.<sup>5</sup> Using a geographic crosswalk file that provided corresponding zip codes to census tracts (weighted by the number of housing units), data were matched using a probabilistic matching method that accounted for the date of origination, the amount of the loan, the lien status, the type of loan, and the loan purpose. To check the robustness of the matching procedure, we compared the sample statistics from the matched sample with the same sample statistics from the unmatched sample, and found them to be similar.

For this paper, we limit our analysis to a sample of conventional, first-lien, owner-occupied loans originated in metropolitan areas in California between January of 2004 and December of 2006. This time period represents the height of the subprime lending boom in California. We also limit our analysis in this instance to home purchase loans, although other studies have noted that much

---

<sup>4</sup> Enacted by Congress in 1975, the Home Mortgage Disclosure Act (HMDA) requires banks, savings and loan associations, and other financial institutions to publicly report detailed data on their mortgage lending activity. A depository institution (bank, savings and loan, thrift, and credit union) must report HMDA data if it has a home office or branch in a metropolitan statistical area (MSA) and has assets above a threshold level that is adjusted upward every year by the rate of inflation. For the year 2006, the asset level for exemption was \$35 million. A non-depository institution must report HMDA data if it has more than \$10 million in assets and it originated 100 or more home purchase loans (including refinances of home purchase loans) during the previous calendar year. Beginning in 2004, lenders were required to report pricing information related to the annual percentage rate of “higher-priced” loans, defined as a first-lien loan with a spread equal to or greater than three percentage points over the yield on a U.S. Treasury security of comparable maturity.

<sup>5</sup> Lender Processing Services Inc. Applied Analytics (formerly known as McDash) is a proprietary database that provides loan information collected from approximately 15 mortgage servicers, including 9 of the top 10, and covers roughly 60 percent of the mortgage market. The database includes over 70 variables related to loan characteristics and performance.



of the demand for mortgages during this period was driven by refinance loans and this will certainly be an area for further study. This leaves us with 239,101 matched observations for our analysis. (Summary statistics of our variables are presented in Table 1, and the variables are described in more detail below.)

### *Borrower and Housing Market Characteristics*

For borrower characteristics, we include information from the HMDA data on borrower race and/or ethnicity. Most of the existing research on subprime lending has shown that race has an independent effect on the likelihood of obtaining a higher-priced loan (Avery, Canner and Cook 2005). HMDA reporting requirements allow borrowers to report both an ethnicity designation (either “Hispanic or Latino” or “Not Hispanic or Latino”) and up to five racial designations (including “white” and “African-American” or “Black”). We code and refer to borrowers who were identified as “Hispanic or Latino” and “white” as Latino, borrowers who were identified as “African-American or Black” as Black, and borrowers who were identified as “Asian” as Asian. We code borrowers and refer to them as “white” if they are “Not Hispanic or Latino” and only identified as “white” in the race field.

We use two other borrower level variables in the analyses that follow. From HMDA, we include the borrower income, scaled in \$1,000 increments. From the McDash data, we include the FICO<sup>6</sup> credit score of the borrower at origination. Because FICO scores are generally grouped into “risk categories” rather than treated as a continuous variable, we distinguish between “low” (FICO < 640), “middle” (640 >= FICO < 720) and “high” (FICO >= 720) credit scores.<sup>7</sup> We assume that lower credit scores would lead to a higher probability of delinquency, and, subsequently, foreclosure.

At the neighborhood level, we include the FFIEC income designation for each census tract, the same measure which is used in evaluating a bank’s CRA performance. Low-income census tracts are those that have a median family income less than 50 percent of the area median

---

<sup>6</sup> Although there are several credit scoring methods, most lenders use the FICO method from Fair Isaac Corporation.

<sup>7</sup> In running the models with FICO treated as a continuous variable, foreclosure risk increased monotonically with FICO score declines, and did not significantly affect the other variables in the model.

income; moderate-income census tracts are those that have a median family income at least 50 percent and less than 80 percent of the area median income; middle-income census tracts are those that have a median family income at least 80 percent and less than 120 percent of the area median income; and upper-income are those with a median family income above 120 percent of the area median income. In addition to tract income, we also include variables from the 2000 Census that attempt to capture the local housing stock, including the percent of owner occupied units and the median year houses in the census tract were built.<sup>8</sup> We also include the tract's capitalization rate, defined as a ratio of the tract's annualized median rent divided by the median house value. A larger value for this measure is consistent with lower expected price appreciation or more uncertain future house prices (Calem, Hershaff and Wachter 2004). We would expect this variable to be positively associated with the relative likelihood of foreclosure.

In addition to neighborhood level variables, we also include a variable on the performance of the local housing market. Economic research conducted at the Federal Reserve Bank of San Francisco and the Federal Reserve Bank of Boston has shown that house price dynamics are an important predictor of foreclosure (Doms, Furlong and Krainer 2007; Gerardi, Shapiro and Willen 2007). Because current house values may be endogenously related to foreclosure rates, we include an OFHEO variable that captures house price changes in the MSA/metropolitan division in the two years prior to the loan origination. We assume that loans originated during a time of significant house price appreciation will be more likely to be in foreclosure, since it is areas that saw prices rising rapidly relative to fundamentals that have seen the most dramatic realignment of prices.

### *Loan Characteristics*

In the models that follow, we also include various loan characteristics that may affect the probability of foreclosure. From HMDA, we include whether or not the loan was a "higher-priced" loan. Researchers have shown a strong correlation between higher-priced loans and

---

<sup>8</sup> In some models we tested, we also controlled for neighborhood level variables such as the race distribution and educational level of the census tract, but these proved not to be significant in many of the model specifications, and tended to be highly correlated with the FFIEC neighborhood income categories. In addition, we were concerned about including too many census variables from the 2000 Census which may not reflect the demographic changes that occurred in neighborhoods in California between 2000 and 2006, years of rapid housing construction and price appreciation.

delinquency and foreclosure (Pennington-Cross 2003; Gerardi, Shapiro and Willen 2007; Immergluck 2008). Since higher-priced loans are presumably originated to respond to the cost of lending to a higher risk borrower (such as those with impaired credit scores), it is not surprising that this relationship exists. However, the current crisis has also shed light on the fact that many loans originated during the height of the subprime lending boom included additional features that can also influence default risk, such as adjustable mortgage rates, the prevalence of prepayment penalties, as well as the level of documentation associated with the loan (Cutts and Van Order 2005; Immergluck 2008). For this reason, we include a wide range of variables in the McDash data on the terms of the loan, including the loan-to-value ratio, whether or not the loan has a fixed interest rate, whether or not it included a prepayment penalty at origination, and whether or not it was a fully documented loan. We also include data on the value of the monthly payment, scaled at \$500 increments. While standard guidelines for underwriting suggest that monthly costs should not exceed 30 percent of a household's income, recent field research suggests that many loans were underwritten at a much higher percent.

### *Lender Characteristics*

To determine whether or not a loan was originated by a CRA regulated institution, we attach data on lender characteristics from the HMDA Lender File, following the insights of Apgar, Bendimerad and Essene (2007) on how to use HMDA data to understand mortgage market channels and the role of the CRA. We focus on two variables – whether or not the lender is regulated under the CRA, and whether or not the loan was originated within the lender's CRA-defined assessment area, generally defined as a community where the Bank or Thrift maintains a branch location.<sup>9</sup>

As was described above, CRA regulations only apply to the lending activity of deposit-taking organizations and their subsidiaries (and, in some instances, their affiliates). Independent mortgage companies fall outside of not only the regulatory reach of the CRA, but also a broader set of federal regulations and guidance designed to protect the “safety and soundness” of the lender (Apgar, Bendimerad and Essene 2007). In contrast to CRA regulated institutions,

---

<sup>9</sup> We exclude loans originated by credit unions from this analysis; credit unions are not examined under the CRA and comprise a relatively small proportion of the home purchase mortgage market.

independent mortgage companies are subject to state licensing and monitoring requirements and do not undergo routine examination.

We further distinguish between loans made by a CRA regulated lender outside its assessment area and those made by a CRA regulated lender within its assessment area. Mortgages made by banks and thrifts in their assessment areas are subject to the most detailed CRA review, including on-site reviews and file checks. The assessment area distinction also correlates with differences in the way mortgages are marketed and sold (Apgar, Bendimerad and Essene 2007). For example, loans made to borrowers living inside the assessment area are likely to come through the institution's retail channel. In contrast, loans made to borrowers living outside of the organization's CRA-defined assessment area are more likely to be originated by loan correspondents or mortgage brokers. We assume that if a lending entity subject to CRA has a branch office in an MSA, then that MSA is part of the entity's assessment area. Loans made in MSAs where the lending entity does not have a branch office are assumed to be originated outside of the entity's assessment area.<sup>10</sup>

Building on recent research suggesting the importance of mortgage brokers during the subprime lending boom (Ernst, Bocian and Li 2008), we also include a loan source variable that captures the entity responsible for the loan origination, even if the loan eventually was financed by a CRA-regulated lender or independent mortgage company. We control for whether the loan was made by a retail institution, a correspondent bank, or a wholesale lender. Wholesale lenders are third-party originators – generally mortgage brokers – that market and process the mortgage application. One important methodological note is that our models that include the loan source variable are run on a smaller sample of loans. In these models we exclude loans where loan source is equal to “servicing right” due to endogeneity concerns.<sup>11</sup> Some financial institutions specialize in servicing “scratch and dent” mortgages, which, by their nature, would be more

---

<sup>10</sup> Our methodology is consistent with that of Apgar, Bendimerad, and Essene (2007), who assume that if a lending entity subject to CRA has a branch office in a particular county, then that county is part of the entity's assessment area.

<sup>11</sup> "Servicing right" as the loan source means that only the servicing rights were purchased, not the whole loan. The lender was likely not involved in the credit decision or determining the credit criteria. In some cases the loan itself may not be saleable or may be damaged ("scratch & dent"). Damaged loans are usually impaired in some way, such as missing collateral or an imperfect note/lien.

likely to foreclose (see Pennington-Cross and Ho 2006). Indeed, in early models we found loans obtained through a servicing right were significantly more likely to be in foreclosure than loans with any other loan source.

## **Findings**

In Table 2, we present simple descriptive statistics which show the distribution of loan originations made by CRA regulated institutions (CRA lenders) versus independent mortgage companies (IMCs), stratified by neighborhood income level. The table demonstrates the important role that IMCs have played in low- and moderate-income communities in California during the subprime boom. While CRA lenders originated more loans in low- and moderate-income tracts than did IMCs, IMCs originated a much greater share of higher-priced loans in these communities. Indeed, more than half of the loans originated by IMCs in low-income communities were higher-priced (52.4 percent), compared with 29 percent of loans made by CRA lenders; in moderate-income communities, 46.1 percent of loans originated by IMC lenders were higher-priced, compared with 27.3 percent for CRA lenders. In addition, 12 percent of the loans made by IMCs in low-income census tracts and 10.3 percent of loans in moderate-income census tracts are in foreclosure, compared with 7.2 percent of loans made by CRA lenders in low-income census tracts and 5.6 percent in moderate-income census tracts.

It is also worth noting the relatively small share of loans that were originated in low- and moderate-income communities; only 16 percent of loans made by CRA lenders were located in low- and moderate-income census tracts. IMCs made a slightly greater share of their total loans (20.5 percent) in low- and moderate-income communities. The relatively limited share of lending in low- and moderate-income communities may be due in part to the high cost of housing in California, yet it also suggests that on the whole, lending in low- and moderate-income communities remained a relatively small share of the lending market for regulated financial institutions, despite the incentive of the CRA.

These descriptive statistics, however, do not control for the wide range of borrower and loan characteristics that may influence the likelihood of foreclosure. For example, might the higher rates of foreclosure among IMC originated loans be due to different risk profiles of the

borrowers themselves? In the following tables, we present a series of binomial logistic regression models that predict the likelihood of a loan being in foreclosure, controlling for various borrower and loan characteristics. In all of the models, we cluster the standard errors by census tract because standard errors are likely not independent across time within tracts. We also examined the correlation among the independent variables in each of the models, and found that although many of the factors we include are inter-related, the models perform well and the coefficients and standard errors do not change erratically across different model specifications.

In Table 3, we present a very simple model where we predict the likelihood of foreclosure, controlling for borrower risk factors including income, race, and credit score. We present the findings as odds ratios to assist in interpreting the coefficients. We also control for neighborhood characteristics that may influence the underwriting decision, including the CAP rate, the age of the housing stock, and the percent of owner-occupied housing. Given the importance of house values in predicting foreclosures, we control for house price appreciation in each of the model iterations.

Several findings from even this simple model stand out. First, metropolitan house price changes do have a significant effect on the likelihood of foreclosure. Rapid house price appreciation in the 2 years preceding origination significantly increases the likelihood of foreclosure. This is consistent with previous research that has linked foreclosures and delinquencies to local housing market conditions, particularly in California where house prices rose quickly in relation to fundamentals and where subsequent corrections have been quite dramatic (Doms, Furlong and Krainer 2007). The tract's capitalization rate is significant only at the 10 percent level, but also increases the foreclosure rate as expected. A higher percent of owner occupied housing in a tract and more recent construction both also seem to increase the likelihood of foreclosure, but only slightly.

Second, and not surprisingly, FICO scores matter. A borrower with a FICO score of less than 640 is 12.6 times more likely to be in foreclosure than a borrower with a FICO score of more than 720; for borrowers with a FICO score between 640 and 720, the odds ratio is 4.7 times compared to borrowers with the highest credit scores. We also find that race has an independent

effect on foreclosure even after controlling for borrower income and credit score. In particular, African American borrowers were 3.3 times as likely as white borrowers to be in foreclosure, whereas Latino and Asian borrowers were 2.5 and 1.6 times respectively more likely to be in foreclosure as white borrowers.<sup>12</sup> The income of the neighborhood also seems to have some effect on the foreclosure rate. Loans located in low-income tracts were 2.7 times more likely to be in foreclosure than those in upper-income tracts, with the risk declining monotonically as the income of the neighborhood increases.

What is interesting, however, is that even after controlling for borrower characteristics, a CRA lender significantly *decreases* the likelihood of foreclosure. Loans made by lenders regulated under the CRA were close to half as likely (.59 odds ratio) to go into foreclosure than those made by IMCs.

The second column in the table shows the same model with the CRA lender status broken down by loans made within the CRA lenders' assessment area, and loans made outside of the CRA lenders' assessment area (with the omitted category being loans originated by IMCs). The effect here is striking. While coefficients on both variables are statistically significant and reduce the likelihood of foreclosure, loans made within a CRA lender's assessment area are much less likely to go into foreclosure than loans made by IMCs (odds ratio .39). For loans made by a CRA lender outside of its assessment area, the odds ratio is .87.

These results provide at least initial evidence that even when controlling for borrower characteristics, loans originated by CRA lenders were less likely to be in foreclosure than loans made by IMCs. Even so, this model paints an incomplete picture of the relationship among borrower characteristics, loan characteristics (particularly whether or not the borrower received a higher-priced loan), and loan performance.

---

<sup>12</sup> In some additional preliminary analysis, we interacted the race variables with income, and found some variation among the coefficients. For example, while African American borrowers at all income levels were more likely to be in foreclosure, for Asian borrowers, as income went up, the risk of foreclosure decreased compared to white borrowers. The story for Latino borrowers was more mixed, and warrants further research. However, these interaction terms did not meaningfully alter the other coefficients, and we do not include the interaction terms in this paper.

In Table 4, we add additional variables that test the relationship between various loan characteristics and the likelihood of foreclosure. Notably, the relative predictive strength of many of the borrower characteristics declines, although the general picture remains the same. Lower FICO scores continue to have a significant predictive effect on the likelihood of foreclosure (odds ratio 4.1). Yet the model shows that even with controls for borrower characteristics included, the terms of the loan matter. Consistent with previous research, we find that higher-priced loans are significantly more likely (odds ratio 3.2) to be in foreclosure than those not designated as higher-priced in the HMDA data. But we also find that other loan features – such as the presence of a prepayment penalty at origination, a fixed rate interest loan, a high loan-to-value ratio, a large monthly payment in relation to income, and the loan’s level of documentation—all have a significant effect on the likelihood of foreclosure, even after controlling for whether the loan was a higher-priced loan or not. A fixed interest rate significantly and strongly reduces the likelihood of foreclosure (odds ratio .35), as does the presence of full documentation (odds ratio .61). An increase of 10 percentage points in the loan-to-value ratio—for example, from 80 to 90 percent loan-to-value—increases the likelihood of foreclosure by a factor of 3.0.

After adding these controls for loan characteristics, however, CRA regulated institutions continue to decrease the likelihood of foreclosure, although the effect is dimmed somewhat (odds ratio .70). In the second column of the table, we find that the assessment area remains a critical determinant of the likelihood of foreclosure: loans made by CRA lenders in their assessment areas were half as likely to be in foreclosure as loans made by IMCs (odds ratio .53).

In Table 5, we add information about the source of the loan. As discussed earlier, we omit observations where the loan source is indicated as ‘servicing right’.<sup>13</sup> The model demonstrates the importance of the originating mortgage market channel in the performance of the loan. While the findings for other variables remained similar to those in models presented above, we find significant differences in the loan performance among loans originated at the retail branch, by a correspondent lender, or by a wholesale lender/mortgage broker. In particular, loans

---

<sup>13</sup> This decreases our sample size from 239,101 to 195,698.



originated by a wholesale lender were twice as likely to be in foreclosure as those originated by a retail branch. This is a significant finding, and it supports other research that has shown that there were significant differences between broker and lender pricing on home loans, primarily on mortgages originated for borrowers with weaker credit histories (Ernst, Bocian and Li 2008). Interestingly, the inclusion of loan source also weakens the effect of the CRA variables. While loans made by CRA lenders within their assessment area are still less likely to go into foreclosure than those made by IMCs (an odds ratio of .743), the coefficient for CRA loans made outside of the assessment area is no longer significant. This suggests that the origination channel is a critical factor in determining the likelihood of foreclosure, even for CRA regulated institutions.

#### *The Performance of CRA Lending in Low- and Moderate-Income Census Tracts*

While the models above control for the income category of the neighborhood, they do not explore the relative performance of loans from CRA regulated institutions within low- and moderate-income census tracts. In other words, on average, the loan performance of CRA lenders may be better than that of IMCs, but does this hold true within low- and moderate-income census tracts, the areas which are intended to benefit the most from the presence of the CRA? In Tables 6-9, we replicate our analysis above by looking specifically at what happens when we stratify the models by neighborhood income level. For each neighborhood classification (low, moderate, middle and upper), we present two models: the first including borrower and loan characteristics, and the second adding the loan source.

Some interesting differences emerge, both in comparison to the full model and among the models for the different neighborhood income categories.

Regarding the restriction of the sample to low-income neighborhoods, it is interesting to see that the effect of being a CRA lender loses much of its strength as well as its statistical significance. With no loan source control, the point estimate indicates that CRA loans made outside of the assessment area were only slightly less likely to be in foreclosure than loans made by IMCs (an odds ratio of .95). However, loans made by a CRA lender *within* its assessment area remain

quite a bit less likely (odds ratio of .73) to be in foreclosure than loans made by IMCs in the same neighborhoods, and the effect remains statistically significant. In moderate-income communities, loans made by CRA lenders, both outside and within their assessment areas, are significantly less likely to be in foreclosure. In moderate-income communities, loans made by CRA regulated institutions within their assessment areas were 1.7 times less likely (an odds ratio of .58) to be in foreclosure than those made by IMCs.

Yet, when we include the loan source variable, the statistical significance of the effect of CRA lending in low- and moderate-income neighborhoods disappears. It is possible that, in low- and moderate-income neighborhoods, the explanatory variables other than the CRA-related variables fully capture the practical application of the prudent lending requirements of the CRA and other regulations. If this were the case, then regulations, working through those factors, would be significant underlying determinants of loan performance without the coefficients on the CRA-related variables themselves showing up as statistically significant. That said, the estimation results do demonstrate the importance of the terms of the loan and the origination source in predicting foreclosure, in particular, whether or not the loan was originated by a wholesale lender. Indeed, in low-income neighborhoods, wholesale loans were 2.8 times as likely to be in foreclosure as are those originated by the retail arm of the financial institution; in moderate-income neighborhoods, wholesale loans were 2 times as likely to be in foreclosure. Given that these regressions control for a wide range of both borrower and loan characteristics, it suggests that more attention be paid to the origination channel in ensuring responsible lending moving forward.

In the following tables, we present the same analysis for middle- and upper-income census tracts. Here, the results are more in line with the full sample. Loans made by CRA lenders within their assessment area are significantly less likely to be in foreclosure than those made by IMCs, even after controlling for the loan source. Although at first glance this may be counterintuitive—why would the CRA have an effect in middle- and upper-income areas?—we believe that this finding reflects much broader differences in market practices between regulated depository institutions and IMCs. Specifically, while the CRA may have provided regulated financial institutions with some incentive to lend in low- and moderate-income communities, the CRA is really only a

small part of a much broader regulatory structure. This regulatory structure, as well as the very different business models of regulated financial institutions compared with IMCs, has significant implications for loan performance, only some aspects of which we have controlled for in our regressions.

Although not the focus of this paper, an interesting difference that emerges across neighborhood income classifications is the role of the loan-to-value ratio as well as the variable on previous house price appreciation. In middle- and upper-income neighborhoods, these seem to carry more weight than in low- and moderate-income neighborhoods, suggesting that in higher income areas, investment and economic decisions may be more important in predicting the likelihood that a borrower enters foreclosure. In contrast, in low- and moderate-income neighborhoods, fixed rate and monthly payment seem to have relatively more importance in predicting the likelihood of foreclosure, indicating that in these communities it may be more of an issue of short-term affordability. While these findings are very preliminary and deserve further exploration, they do suggest that there may be important differences among communities regarding the factors that influence the sustainability of a loan.

## **Conclusions and Policy Implications**

This paper presents the first empirical examination of the loan performance of institutions regulated under the CRA relative to that of IMCs using a large sample of loans originated in California during the subprime lending boom. Importantly, by matching data on mortgage originations from HMDA with data on loan performance from McDash, we are able to control for a wide range of factors that can influence the likelihood of foreclosure, including borrower and neighborhood characteristics, loan characteristics, lender characteristics, and the mortgage origination channel.

Before turning to our conclusions and the policy implications of our research, we would like to emphasize that these findings are preliminary, and additional research is needed to more fully understand the relationship between borrowers, lending institutions, loan characteristics and loan performance. We see several important gaps in the literature that still need to be addressed.

First, it is unclear whether or not our findings for California are applicable to other housing and mortgage markets. The size and diversity of California lend it weight as a valid case study for the performance of CRA lending more generally. However, the high cost of housing in California may influence the nature of the findings, and it would be valuable to replicate this analysis in other markets. Second, we focused our analysis on loans made in low- and moderate-income census tracts, given the CRA's original "spatial" emphasis on the link between a bank's retail deposit-gathering activities in a neighborhood and its obligation to meet local credit needs. A yet unanswered question is the performance of CRA lending for low- and moderate-income borrowers. In addition, this paper focuses solely on mortgage lending activities, and does not examine the impact that the CRA investment or service components may have had on the current crisis.<sup>14</sup> Third, the continued importance of race as a variable deserves further exploration. In all of the models, African Americans were significantly more likely to be in foreclosure than whites. While some of this is likely due to differences in assets and wealth (which we cannot control for), additional research that can tease out the underlying reasons for this disparity may have important implications for fair lending regulations. Fourth, we focus this analysis on lending for home purchases, yet an examination of refinance loans may yield different results. Finally, it may be valuable to specify this model as a two step process, where the choice of lender is modeled separately from loan outcomes, particularly if the decision to borrow from an IMC versus a CRA regulated institution is correlated with unobservable characteristics that affect the likelihood of foreclosure.

Despite these caveats, we believe that this research should help to quell if not fully lay to rest the arguments that the CRA caused the current subprime lending boom by requiring banks to lend irresponsibly in low- and moderate-income areas. First, the data show that overall, lending to low- and moderate-income communities comprised only a small share of total lending by CRA lenders, even during the height of subprime lending in California. Second, we find loans originated by lenders regulated under the CRA, in general, were significantly less likely to be in foreclosure than those originated by IMCs. This held true even after controlling for a wide

---

<sup>14</sup> For example, regulated financial institutions may have increased their exposure to mortgage backed securities to satisfy their requirements for the CRA investment test. However, analysis conducted by the Federal Reserve Board suggests that banks only purchased a very small percentage of higher-priced loans.

variety of borrower and loan characteristics, including credit score, income, and whether or not the loan was higher-priced. More importantly, we find that whether or not a loan was originated by a CRA lender *within its assessment area* is an even more important predictor of foreclosure. In general, loans made by CRA lenders within their assessment areas were half as likely to go into foreclosure as those made by IMCs (Table 4). While certainly not conclusive, this suggests that the CRA, and particularly its emphasis on loans made within a lender's assessment area, helped to ensure responsible lending, even during a period of overall declines in underwriting standards.<sup>15</sup>

The exception to this general finding is the significance of the CRA variables in the models that focused on loans made in low- and moderate-income neighborhoods. In these regressions, when loan source was not included as an explanatory variable, loans from CRA regulated institutions within their assessment areas performed significantly better than loans from IMCs. But, when we included loan source, the significance of the CRA variables disappeared. Even so, loans from CRA regulated institutions certainly performed *no worse* than loans from IMCs. Moreover, as mentioned earlier, the practical application of the prudent lending requirements of the CRA (as well as other regulations) may have been captured in the other explanatory variables in the model without the coefficients on the CRA-related variables themselves showing up as statistically significant. For example, 28 percent of loans made by CRA lenders in low-income areas within their assessment area were fixed-rate loans; in comparison, 18.2 percent of loans made by IMCs in low-income areas were fixed-rate. And only 12 percent of loans made by CRA lenders in low-income areas within their assessment areas were higher-priced, compared with 29 percent in low-income areas outside their assessment areas and with 52.4 percent of loans made by IMCs in low-income areas.

Yet the finding that the origination source of the loan – retail, correspondent, or wholesale originated—is an important predictor of foreclosure, particularly in low- and moderate-income neighborhoods, should not be ignored. This builds on evidence from other research that suggests that mortgage brokers are disproportionately associated with the origination of higher-priced

---

<sup>15</sup> See Demyanyk and van Hemert (2008) for an examination of the quality of loans between 2001 and 2006.

loans, particularly outside of depository institutions' CRA assessment areas (Avery, Brevoort and Canner 2006) and that mortgage brokers may be extracting materially higher payments from borrowers with lower credit scores and/or less knowledge of mortgage products (Ernst, Bocian and Li 2008).

The paper also emphasizes the importance of responsible underwriting in predicting the sustainability of a loan. Loan characteristics matter: a higher-priced loan, the presence of a prepayment penalty at origination, a high loan-to-value ratio, and a large monthly payment in relation to income all significantly increase the likelihood of foreclosure, while a fixed interest rate and full documentation both decrease the likelihood of foreclosure. For example, in low- and moderate-income communities, higher-priced loans were 2.3 and 2.1 times respectively more likely to be in foreclosure than those that were not higher-priced, even after controlling for other variables including loan source.

In that sense, our paper supports the need to reevaluate the regulatory landscape to ensure that low- and moderate-income communities have adequate access to “responsible” credit. Many of the loans analyzed in this paper were made outside of the direct purview of supervision under the CRA, either because the loan was made outside of a CRA lender’s assessment area, or because it was made by an IMC. Proposals to “modernize” the CRA, either by expanding the scope of the CRA assessment area and/or by extending regulatory oversight to IMCs and other nonbank lenders, certainly deserve further consideration (Apgar and Duda 2003). In addition, the paper’s findings also lend weight to efforts to rethink the regulations and incentives that influence the practice of mortgage brokers (Ernst, Bocian and Li 2008).

In conclusion, we believe that one of the more interesting findings of our research is the evidence that some aspect of “local” presence seems to matter in predicting the sustainability of a loan – once a lender is removed from the community (outside of their assessment area) or from the origination decision (wholesale loan), the likelihood of foreclosure increases significantly. For low- and moderate-income borrowers and communities, a return to localized lending may be even more important. Research on lending behavior has suggested that “social relationships and networks affect who gets capital and at what cost” (Uzzi 1999, p. 482; see also Holmes et al.

2007). Particularly in communities that have traditionally been denied credit, and where intergenerational wealth and knowledge transfers integral to the homeownership experience may be missing, social networks and local presence may be a vital component of responsible lending (See Moulton 2008 for an excellent overview of how these localized social networks may influence mortgage outcomes, for example, by filling information gaps for both lenders and borrowers). Indeed, the relatively strong performance of loans originated as part of statewide affordable lending programs (Moulton 2008), Self-Help's Community Action Program (Ding, Quercia, Ratcliffe and Li 2008), and loans originated as part of Individual Development Account programs (CFED 2008) all suggest that lending to low- and moderate-income communities can be sustainable. Going forward, increasing the scale of these types of targeted lending activities—all of which are encouraged under the CRA—is likely to do a better job of meeting the credit needs of all communities and promoting sustainable homeownership than flooding the market with poorly underwritten, higher-priced loans.

## References

- William Apgar and Mark Duda (2003). “The Twenty-Fifth Anniversary of the Community Reinvestment Act: past Accomplishments and Future Regulatory Challenges,” *FRBNY Economic Policy Review*, June: 169 – 191.
- William Apgar, Amal Bendimerad, and Ren Essene (2007). *Mortgage Market Channels and Fair Lending: An Analysis of HMDA Data* (Cambridge, MA: Harvard University, Joint Center for Housing Studies).
- Robert B. Avery, Raphael W. Bostic, Paul S. Calem and Glenn B. Canner (1996). “Credit Risk, Credit Scoring, and the Performance of Home Mortgages,” *Federal Reserve Bulletin* 82: 621– 648.
- Robert B. Avery, Raphael W. Bostic, Paul S. Calem and Glenn B. Canner (1999). “Trends in Home Purchase Lending: Consolidation and the Community Reinvestment Act.” *Federal Reserve Bulletin* 85: 81 - 102.
- Robert B. Avery, Glenn B. Canner, and Robert E. Cook (2005). “New Information Reported Under HMDA and Its Application in Fair Lending Enforcement,” *Federal Reserve Bulletin* (Summer 2005): 344-394.
- Robert B. Avery, Kenneth P. Brevoort, and Glenn B. Canner (2006). “Higher-Priced Home Lending and the 2005 HMDA Data,” *Federal Reserve Bulletin* (September 8): A123 – A166.
- Robert B. Avery, Kenneth P. Brevoort, and Glenn B. Canner (2007). “The 2006 HMDA Data,” *Federal Reserve Bulletin* 94: A73 – A109.
- Michael S. Barr (2005). “Credit Where it Counts: The Community Reinvestment Act and its Critics.” *New York University Law Review* 80(2): 513-652.
- Eric Belsky, Michael Schill, and Anthony Yezer (2001). *The Effect of the Community Reinvestment Act on Bank and Thrift Home Purchase Mortgage Lending* (Cambridge, MA: Harvard University Joint Center for Housing Studies).
- Debbie Gruenstein Bocian, Keith Ernst, and Wei Li (2008). “Race, ethnicity, and subprime home loan pricing,” *Journal of Economics and Business* 60: 110-124.
- Paul S. Calem, Jonathan E. Hershaff, and Susan M. Wachter (2004). “Neighborhood Patterns of Subprime Lending: Evidence from Disparate Cities,” *Housing Policy Debate* 15(3): 603-622.
- CFED (2008). “IDA Program Survey on Homeownership and Foreclosure,” accessed online at <http://www.cfed.org/focus.m?parentid=31&siteid=374&id=2663> on November 13, 2008.



- Claudia Coulton, Tsui Chan, Michael Schramm, and Kristen Mikelbank (2008). "Pathways to Foreclosure: A Longitudinal Study of Mortgage Loans, Cleveland and Cuyahoga County," Center on Urban Poverty and Community Development, Case Western University, Cleveland, Ohio.
- Amy Crews Cutts and Robert Van Order (2005). "On the Economics of Subprime Lending," *Journal of Real Estate Finance and Economics* 30(2): 167-197.
- Yuliya Demyanyk and Otto van Hemert (2008), "Understanding the Subprime Mortgage Crisis," Working Paper, Federal Reserve Bank of St. Louis, February 4, 2008.
- Thomas J. DiLorenzo, "The Government-Created Subprime Mortgage Meltdown," September 2007. Online posting accessed on October 28, 2008 at <http://www.lewrockwell.com/dilorenzo/dilorenzo125.html>.
- Lei Ding, Roberto G. Quercia, Janneke Ratcliffe, and Wei Li (2008). "Risky Borrowers or Risky Mortgages: Disaggregating Effects Using Propensity Score Models," Center for Community Capital, University of North Carolina, Chapel Hill, North Carolina.
- Mark Doms, Frederick Furlong, and John Krainer (2007). "Subprime Mortgage Delinquency Rates," Working Paper 2007-33, Federal Reserve Bank of San Francisco.
- Keith Ernst, D. Bocia and Wei Li (2008). *Steered Wrong: Brokers, Borrowers and Subprime Loans* (Durham, NC: Center for Responsible Lending).
- Douglas D. Evanoff and Lewis M. Siegal (1996). "CRA and Fair Lending Regulations: Resulting Trends in Mortgage Lending," *Economic Perspectives* 20(6): 19-46.
- Kristopher Gerardi, Adam Hale Shapiro, and Paul S. Willen (2007). "Subprime Outcomes: Risky Mortgages, Homeownership Experiences, and Foreclosures," Working Paper 07-15, Federal Reserve Bank of Boston.
- Edward M. Gramlich (2007). "Booms and Busts: The Case of Subprime Mortgages," paper presented in Jackson Hole, Wyoming, August 31, 2007. Accessed online on October 28, 2008 at [http://www.urban.org/UploadedPDF/411542\\_Gramlich\\_final.pdf](http://www.urban.org/UploadedPDF/411542_Gramlich_final.pdf).
- Jessica Holmes, Jonathan Isham, Ryan Petersen, and Paul Sommers (2007). "Does relationship lending still matter in the consumer banking sector? Evidence from the automobile loan market," *Social Science Quarterly* 88(2): 585-597.
- Dan Immergluck (2008). "From the Subprime to the Exotic: Excessive Mortgage Market Risk and Foreclosures," *Journal of the American Planning Association* 74(1): 59-76.
- Inside Mortgage Finance (2007). *Mortgage Market Statistical Annual* (Bethesda, Md.: Inside Mortgage Finance Publications).

- Robert E. Litan et al (2001). *The Community Reinvestment Act After Financial Modernization: A Final Report* (Washington, D.C.: U.S. Treasury Department).
- Stephanie Moulton (2008). “Marketing and Education Strategies of Originating Mortgage Lenders: Borrower Effects & Policy Implications,” paper presented at the Association for Public Policy Analysis and Management 30<sup>th</sup> Annual Research Conference, Los Angeles, CA, November 6, 2008,
- Anthony Pennington-Cross (2003). “Performance of Prime and Nonprime Mortgages,” *Journal of Real Estate Finance and Economics* 27(3): 279-301.
- Ellen Seidman, “It’s Still Not CRA,” September 2008. Online posting accessed on October 28, 2008 at <http://www.newamerica.net/blog/asset-building/2008/its-still-not-cra-7222>.
- Brian Uzzi (1999). “Embeddedness in the making of financial capital: How social relations and networks benefit firms seeking financing,” *American Sociological Review* 64(4): 481-505.
- David Walker. Interview with Larry Kudlow. *Lessons from Subprime*. CNBC, Apr. 4 2008 and Steve Moore. Interview with Larry Kudlow. *Kudlow & Company*. CNBC, Mar. 26, 2008.
- Jonathan Weisman (2008), “Economic Slump Underlines Concerns About McCain Advisers,” *The Washington Post*, Wednesday, April 2, 2008; A01.

Table 1: Sample Statistics

	mean	standard deviation
<b>continuous variables</b>		
borrower income (\$000)	153	173
loan-to-value ratio	.736	.140
monthly payment and interest amount (\$000)	2.72	1.78
house price appreciation rate in MSA over prior two years	.353	.093
percent owner occupied housing units in tract	66.3	21.3
median year house built in tract	1973	13.9
annualized median rent/median house value in tract (capitalization rate)	.053	.024
<b>categorical variables</b>		
loan in foreclosure	.043	
CRA lender	.753	
CRA lender in assessment area	.515	
low income census tract	.022	
moderate income census tract	.148	
middle income census tract	.386	
Latino borrower	.241	
African American borrower	.037	
Asian borrower	.184	
FICO < 640	.073	
640 <= FICO < 720	.349	
fixed-rate	.298	
pre-payment penalty	.164	
correspondent loan	.116	
wholesale loan	.304	
higher-priced loan	.175	
full documentation	.273	

Table 2: Distribution of Lending Activity: CRA Lenders vs. Independent Mortgage Companies

	CRA Lenders	Independent Mortgage Companies
<b>Total Loans</b>		
Low-Income Neighborhood	3,843	1,487
Moderate-Income Neighborhood	24,795	10,609
Middle-Income Neighborhood	67,766	24,606
Upper-Income Neighborhood	83,563	22,432
All Neighborhoods	179,967	59,134
<b>Total High-Priced Loans</b>		
Low-Income Neighborhood	1,116	779
Moderate-Income Neighborhood	6,765	4,892
Middle-Income Neighborhood	10,573	8,068
Upper-Income Neighborhood	5,307	4,338
All Neighborhoods	23,761	18,077
<b>Total Foreclosures</b>		
Low-Income Neighborhood	275	177
Moderate-Income Neighborhood	1,379	1,092
Middle-Income Neighborhood	2,517	1,945
Upper-Income Neighborhood	1,613	1,211
All Neighborhoods	5,784	4,425

Table 3: Dependent variable: foreclosure

---

Observations	239,101	
	Odds Ratio	Odds Ratio
low income	2.69*** (.222)	2.55*** (.205)
moderate income	1.79*** (.096)	1.70*** (.089)
middle income	1.45*** (.055)	1.41*** (.053)
Latino	2.49*** (.076)	2.41*** (.073)
African American	3.30*** (.140)	3.21*** (.137)
Asian	1.57*** (.060)	1.58*** (.060)
income	1.00*** ( $4.20 \times 10^{-5}$ )	1.00*** ( $4.08 \times 10^{-5}$ )
FICO low	12.6*** (.460)	11.9*** (.434)
FICO mid	4.74*** (.146)	4.54*** (.139)
percent owner-occupied	1.01*** (.001)	1.01*** (.001)
median year built	1.01*** (.001)	1.01*** (.001)
capitalization rate	2.62* (1.45)	2.44* (1.32)
house price appreciation	1.31*** (.019)	1.27*** (.019)
CRA	.586*** (.013)	
CRA in assessment area		.389*** (.011)
CRA outside assessment area		.866*** (.022)

Standard errors in parentheses.

\*(\*\*)(\*\*\*) Statistically significant at 10(5)(1) percent level.

---

Table 4: Dependent variable: foreclosure

Observations	236,536	
	Odds Ratio	Odds Ratio
low income	1.79*** (.149)	1.73*** (.142)
moderate income	1.32*** (.067)	1.28*** (.064)
middle income	1.21*** (.045)	1.18*** (.044)
Latino	1.36*** (.044)	1.36*** (.044)
African American	1.78*** (.084)	1.79*** (.084)
Asian	1.29*** (.052)	1.29*** (.052)
income	1.00 ( $7.17 \times 10^{-5}$ )	1.00** ( $7.26 \times 10^{-5}$ )
FICO low	4.09*** (.166)	4.07*** (.165)
FICO mid	2.68*** (.087)	2.65*** (.086)
percent owner-occupied	1.00*** ( $8.69 \times 10^{-4}$ )	1.00*** ( $8.68 \times 10^{-4}$ )
median year built	1.01*** (.001)	1.01*** (.001)
capitalization rate	.849 (.515)	.753 (.451)
house price appreciation	1.26*** (.019)	1.22*** (.019)
loan-to-value ratio	3.00*** (.080)	3.02*** (.081)
fixed rate	.347*** (.017)	.351*** (.017)
pre-payment penalty	1.30*** (.036)	1.31*** (.036)
monthly payment	1.06*** (.004)	1.05*** (.004)
higher-priced	3.23*** (.110)	3.05*** (.104)
full documentation	.613*** (.021)	.628*** (.022)
CRA	.703*** (.018)	
CRA in assessment area		.532*** (.017)
CRA outside assessment area		.874*** (.024)

Standard errors in parentheses.

\*(\*\*)(\*\*\*) Statistically significant at 10(5)(1) percent level.

Table 5: Dependent variable: foreclosure

---

Observations	195,698
	Odds Ratio
low income	2.11*** (.232)
moderate income	1.35*** (.096)
middle income	1.24*** (.063)
Latino	1.38*** (.066)
African American	1.77*** (.127)
Asian	1.24*** (.067)
income	1.00 ( $8.91 \times 10^{-5}$ )
FICO low	4.58*** (.266)
FICO mid	2.73*** (.124)
percent owner-occupied	1.00*** (.001)
median year built	1.01*** (.002)
capitalization rate	.860 (.680)
house price appreciation	1.20*** (.026)
loan-to-value ratio	2.53*** (.078)
fixed rate	.389*** (.025)
pre-payment penalty	1.55*** (.072)
monthly payment	1.05*** (.005)
higher-priced	2.47*** (.119)
full documentation	.629*** (.027)
CRA in assessment area	.743*** (.043)
CRA outside assessment area	.995 (.057)
correspondent loan	1.45*** (.092)
wholesale loan	2.03*** (.099)

Standard errors in parentheses.

\*(\*\*)(\*\*\*) Statistically significant at 10(5)(1) percent level.

---

Table 6: Dependent variable: foreclosure (low-income neighborhoods only)

Observations	5,271	3,981
	Odds Ratio	Odds Ratio
Latino	.946 (.121)	1.09 (.291)
African American	1.75** (.393)	1.96* (.728)
Asian	1.25 (.280)	1.43 (.396)
income	1.00 ( $4.43 \times 10^{-4}$ )	1.00 ( $6.97 \times 10^{-4}$ )
FICO low	4.10*** (.783)	4.00*** (1.13)
FICO mid	2.41*** (.434)	2.48*** (.632)
percent owner-occupied	1.01*** (.005)	1.01 (.008)
median year built	.999 (.006)	.998 (.008)
capitalization rate	.638 (.742)	.351 (.685)
house price appreciation	1.16* (.092)	1.17 (.125)
loan-to-value ratio	2.35*** (.220)	1.81*** (.262)
fixed rate	.294*** (.081)	.274*** (.104)
pre-payment penalty	1.28* (.180)	1.42 (.361)
monthly payment	1.10*** (.031)	1.15*** (.037)
higher-priced	3.12*** (.559)	2.31*** (.591)
full documentation	.708** (.114)	.844 (.150)
CRA in assessment area	.732** (.115)	.890 (.264)
CRA outside assessment area	.946 (.121)	.863 (.244)
correspondent loan		1.58 (.536)
wholesale loan		2.79*** (.702)

Standard errors in parentheses.

\*(\*\*)(\*\*\*) Statistically significant at 10(5)(1) percent level.



Table 7: Dependent variable: foreclosure (moderate-income neighborhoods only)

Observations	34,933	26,248
	Odds Ratio	Odds Ratio
Latino	1.32*** (.089)	1.17 (.117)
African American	2.13*** (.202)	1.88*** (.269)
Asian	1.27*** (.115)	1.15 (.145)
income	1.00 ( $1.37 \times 10^{-4}$ )	1.00 ( $1.14 \times 10^{-4}$ )
FICO low	3.69*** (.310)	3.72*** (.475)
FICO mid	2.29*** (.162)	2.38*** (.242)
percent owner-occupied	1.00** (.002)	1.00** (.002)
median year built	1.00 (.002)	1.00 (.003)
capitalization rate	1.21 (1.16)	.581 (.806)
house price appreciation	1.10*** (.033)	1.10** (.048)
loan-to-value ratio	2.49*** (.106)	2.04*** (.125)
fixed rate	.296*** (.032)	.374*** (.053)
pre-payment penalty	1.14*** (.057)	1.55*** (.148)
monthly payment	1.09*** (.011)	1.10*** (.015)
higher-priced	2.64*** (.181)	2.07*** (.207)
full documentation	.729*** (.050)	.729*** (.062)
CRA in assessment area	.584*** (.040)	.960 (.119)
CRA outside assessment area	.842*** (.048)	1.17 (.143)
correspondent loan		1.62*** (.221)
wholesale loan		1.96*** (.212)

Standard errors in parentheses.

\*(\*\*)(\*\*\*) Statistically significant at 10(5)(1) percent level.

Table 8: Dependent variable: foreclosure (middle-income neighborhoods only)

Observations	91,400	73,603
	Odds Ratio	Odds Ratio
Latino	1.33*** (.063)	1.31*** (.091)
African American	1.53*** (.113)	1.52*** (.176)
Asian	1.17*** (.073)	1.09 (.093)
income	1.00*** ( $1.14 \times 10^{-4}$ )	1.00*** ( $1.42 \times 10^{-4}$ )
FICO low	4.22*** (.261)	5.13*** (.454)
FICO mid	2.68*** (.130)	2.82*** (.201)
percent owner-occupied	1.01*** (.001)	1.01*** (.002)
median year built	1.01*** (.002)	1.00 (.002)
capitalization rate	.690 (.636)	2.27 (2.92)
house price appreciation	1.27*** (.030)	1.23*** (.041)
loan-to-value ratio	3.10*** (.159)	2.67*** (.127)
fixed rate	.338*** (.025)	.346*** (.035)
pre-payment penalty	1.30*** (.055)	1.51*** (.111)
monthly payment	1.06*** (.008)	1.06*** (.010)
higher-priced	2.93*** (.142)	2.34*** (.172)
full documentation	.614*** (.034)	.589*** (.040)
CRA in assessment area	.559*** (.028)	.799*** (.072)
CRA outside assessment area	.920** (.038)	1.06 (.091)
correspondent loan		1.39*** (.129)
wholesale loan		1.97*** (.147)

Standard errors in parentheses.

\*(\*\*)(\*\*\*) Statistically significant at 10(5)(1) percent level.

Table 9: Dependent variable: foreclosure (upper-income neighborhoods only)

Observations	104,932	91,866
	Odds Ratio	Odds Ratio
Latino	1.47*** (.088)	1.65*** (.141)
African American	1.67*** (.148)	1.69*** (.218)
Asian	1.38*** (.096)	1.33*** (.117)
income	1.00 ( $1.09 \times 10^{-4}$ )	1.00 ( $1.68 \times 10^{-4}$ )
FICO low	3.99*** (.301)	4.64*** (.498)
FICO mid	2.83*** (.162)	2.83*** (.213)
percent owner-occupied	1.01*** (.002)	1.00* (.002)
median year built	1.01*** (.002)	1.01*** (.003)
capitalization rate	2.79 (4.72)	3.93 (8.28)
house price appreciation	1.27*** (.039)	1.26*** (.051)
loan-to-value ratio	3.52*** (.127)	2.89*** (.152)
fixed rate	.406*** (.032)	.450*** (.045)
pre-payment penalty	1.40*** (.074)	1.50*** (.119)
monthly payment	1.04*** (.006)	1.05*** (.007)
higher-priced	3.44*** (.225)	2.96*** (.248)
full documentation	.574*** (.036)	.592*** (.048)
CRA in assessment area	.485*** (.028)	.640*** (.067)
CRA outside assessment area	.844*** (.046)	.927 (.096)
correspondent loan		1.37*** (.164)
wholesale loan		2.12*** (.180)

Standard errors in parentheses.

\*(\*\*)(\*\*\*) Statistically significant at 10(5)(1) percent level.