

CRA Lending During the Subprime Meltdown

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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.¹ 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 uncreditworthy borrowers."² Robert Litan of the Brookings Institution similarly suggested that the 1990s enhancement of the 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."³

On the other side, advocates of the CRA point to a number of reasons why the regulation should not 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.⁴ 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.⁵ In addition to being excluded from CRA obligations, 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.⁶ This has created what the late Federal Reserve Board Governor Ned Gramlich aptly termed, a "giant hole in the supervisory safety net."⁷

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

* This article is based on a longer working paper that is part of a Federal Reserve Bank of San Francisco's Working Paper Series, available at <http://www.frbsf.org/publications/community/wpapers/2008/wp08-05.pdf>.

- 1 Walker, David. Interview with Larry Kudlow. *Lessons from Subprime*. CNBC, April 4, 2008, and Steve Moore. Interview with Larry Kudlow. *Kudlow & Company*. CNBC, March 26, 2008.
- 2 DiLorenzo, Thomas J. "The Government-Created Subprime Mortgage Meltdown." September 2007, available at <http://www.lewrockwell.com/dilorenzo/dilorenzo125.html>.
- 3 Weisman, Jonathan (2008). "Economic Slump Underlines Concerns About McCain Advisers." *Washington Post*, April 2, 2008, A01.
- 4 Seidman, Ellen. "It's Still Not CRA," September 2008, available at <http://www.newamerica.net/blog/asset-building/2008/its-still-not-cra-7222>.
- 5 Avery, Robert B., Raphael W. Bostic, Paul S. Calem, and Glenn B. Canner (2007). "The 2006 HMDA Data." *Federal Reserve Bulletin* 94: A73–A109. See also: Kroszner, Randall S. (2008). "The Community Reinvestment Act and the Recent Mortgage Crisis." Speech given at the *Confronting Concentrated Poverty Policy Forum, Board of Governors of the Federal Reserve System, Washington, DC, December 3, 2008*.
- 6 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 nonbank independent mortgage companies. However, the enforcement of these laws and the regulations that implement them differ greatly between banks and nonbanks. 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 nonbanks and only conducts targeted investigations based on consumer complaints.
- 7 Gramlich, Edward M. (2007). "Booms and Busts: The Case of Subprime Mortgages." Paper presented in Jackson Hole, Wyoming, August 31, 2007, available at http://www.urban.org/UploadedPDF/411542_Gramlich_final.pdf.

information from the Home Mortgage Disclosure Act (HMDA) reports with data on loan performance from Lender Processing Services, Inc. Applied Analytics (LPS).⁸ 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 article, we use these data to examine several interrelated questions:

- What is the neighborhood income 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 the factors that influence foreclosure differ in low- and moderate-income neighborhoods compared with the factors in middle- and upper-income neighborhoods?

The article 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. The CRA encourages federally insured banks and thrifts to meet the credit needs of the communities 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."⁹

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.¹⁰ In a detailed review, William Apgar and Mark Duda of the Joint Center for Housing Studies at Harvard University

8 Formerly known as McDash Analytics.

9 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.

10 Avery, Robert B., 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: 621–48. See also: Avery, Robert B., 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; Michael S. Barr (2005). "Credit Where It Counts: The Community Reinvestment Act and Its Critics." *New York University Law Review* 80(2): 513–652; Belsky, Eric, Michael Schill, and Anthony Yezzer (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); Evanoff, Douglas D., and Lewis M. Siegal (1996). "CRA and Fair Lending Regulations: Resulting Trends in Mortgage Lending." *Economic Perspectives* 20(6): 19–46; and Litan, Robert E., et al. (2001). *The Community Reinvestment Act After Financial Modernization: A Final Report* (Washington, DC: U.S. Treasury Department).

concluded that 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 the CRA did not exist.”¹¹

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.¹² 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.¹³

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.¹⁴ These studies, however, cannot 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 the HMDA data with locally recorded mortgage documents and foreclosure filings.¹⁵ They found that the risk of foreclosure for higher-priced loans, as reported in the HMDA data, was 8.16 times higher than for loans that were not higher priced. 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.¹⁶ They found that for borrowers with similar income and risk profiles, the estimated default risk was much lower for borrowers with a prime loan made through the community lending program than with a subprime loan. In addition, they found that broker-origination, adjustable-rate mortgages and prepayment penalties all increased 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

11 Apgar, William, and Mark Duda (2003). “The Twenty-Fifth Anniversary of the Community Reinvestment Act: Past Accomplishments and Future Regulatory Challenges.” *Federal Reserve Bank of New York Economic Policy Review* (June): 176.

12 *Inside Mortgage Finance* (2007). *Mortgage Market Statistical Annual* (Bethesda, MD: Inside Mortgage Finance Publications).

13 Avery, Brevoort, and Canner (2007). “The 2006 HMDA Data.” See also: Kroszner (2008). “The Community Reinvestment Act.”

14 See, for example: Avery, Robert B., 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): 344–94; Gruenstein Bocian, Debbie, Keith Ernst, and Wei Li (2008). “Race, Ethnicity, and Subprime Home Loan Pricing.” *Journal of Economics and Business* 60: 110–24; and Calem, Paul S., Jonathan E. Herschaff, and Susan M. Wachter (2004). “Neighborhood Patterns of Subprime Lending: Evidence from Disparate Cities.” *Housing Policy Debate* 15(3): 603–22.

15 Coulton, Claudia, 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.

16 Ding, Lei, 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.

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 having access only 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 we use relies on a unique dataset that joins loan-level data submitted by financial institutions under the Home Mortgage Disclosure Act (HMDA) of 1975¹⁷ and a proprietary data set on loan performance collected by Lender Processing Services, Inc. Applied Analytics (LPS). Using a geographic cross-walk 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 match-

ing 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. The LPS database provides loan information collected from approximately 15 mortgage servicers, including nine of the top ten, and covers roughly 60 percent of the mortgage market. Because the LPS includes both prime and subprime loans, the sample of loans tends to perform better than the sample in other databases such as Loan Performance First American's subprime database. However, we believe that for this paper it is important to consider both prime and subprime loans in evaluating the performance of loans made by institutions regulated under the CRA, since presumably the original intent of the CRA was to extend "responsible" credit to low- and moderate-income communities.

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 2004 and December 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 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.

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.¹⁸ 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

17 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 nondepository 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.

18 Avery, Canner, and Cook (2005). "New Information Reported Under HMDA."

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 the HMDA data, we include the borrower income, scaled in \$1,000 increments. From the LPS data, we include the FICO credit score of the borrower at origination.¹⁹ 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.²⁰ 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 that 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 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.²¹ 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.²² 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.²³ 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.²⁴ 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 delinquency and foreclosure.²⁵ Since higher-priced loans are presumably originated to respond to the cost of lending to a higher risk borrower (such as those with

19 Although there are several credit scoring methods, most lenders use the FICO method from Fair Isaac Corporation.

20 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.

21 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 2000 census variables that may not reflect the demographic changes that occurred in neighborhoods in California between 2000 and 2006, years of rapid housing construction and price appreciation.

22 Calem, Hershaff, and Wachter (2004). “Neighborhood Patterns of Subprime Lending.”

23 Doms, Mark, Frederick Furlong, and John Krainer (2007). “Subprime Mortgage Delinquency Rates.” Working Paper 2007-33, Federal Reserve Bank of San Francisco. See also: Gerardi, Kristopher, 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.

24 We use OFHEO instead of Case Shiller because Case Shiller is available only for Los Angeles and San Francisco and we wanted to capture changes in house-price appreciation across a greater number of communities, particularly those in California’s Central Valley.

25 Pennington-Cross, Anthony (2003). “Performance of Prime and Nonprime Mortgages.” *Journal of Real Estate Finance and Economics* 27(3): 279–301. See also: Gerardi, Shapiro, and Willen (2007). “Subprime Outcomes;” and Immergluck, Dan (2008). “From the Subprime to the Exotic: Excessive Mortgage Market Risk and Foreclosures.” *Journal of the American Planning Association* 74(1): 59–76.

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, prepayment penalties, and the level of documentation associated with the loan.²⁶ For this reason, we include a wide range of variables in the LPS 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)²⁷ 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.²⁸

As was described above, CRA regulations apply only to the lending activity of deposit-taking organizations and their subsidiaries (and, in some instances, their affiliates). Independent mortgage companies not only fall outside 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.²⁹ In contrast to CRA-regulated institutions, 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.³⁰ 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 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 the CRA has a branch office in a metropolitan statistical area (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 the entity's assessment area.³¹

Building on recent research suggesting the importance of mortgage brokers during the subprime lending boom,³² 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

26 Crews Cutts, Amy, and Robert Van Order (2005). "On the Economics of Subprime Lending." *Journal of Real Estate Finance and Economics* 30(2): 167–97. See also: Immergluck (2008). "From the Subprime to the Exotic."

27 Apgar, William, 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).

28 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.

29 Apgar, Bendimerad, and Essene (2007). *Mortgage Market Channels and Fair Lending*.

30 *Ibid.*

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

32 Ernst, Keith, D. Bocia, and Wei Li (2008). *Steered Wrong: Brokers, Borrowers, and Subprime Loans* (Durham, NC: Center for Responsible Lending).

exclude loans where loan source is equal to “servicing right” due to endogeneity concerns.³³ Some financial institutions specialize in servicing “scratch and dent” mortgages, which, by their nature, would be more likely to foreclose.³⁴ Indeed, in early models we found loans obtained through a servicing right were significantly more likely to be in foreclosure than loans originated by any other loan source.

Findings

In Table 1 (at the end of this article), we present simple descriptive statistics that 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 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 interrelated, the models perform well and the coefficients and standard errors do not change erratically across different model specifications. We present the findings as odds ratios to assist in interpreting the coefficients.

In Table 2, we present the full model, including all variables with the exception of loan source. Several findings stand out. First, metropolitan house-price changes do have a significant effect on the likelihood of foreclosure. Rapid house-price appreciation in the two years preceding origination significantly increases the likelihood of foreclosure (odds ratio 1.26). 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.³⁵ 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. The tract’s capitalization rate is not significant.

Second, and not surprisingly, FICO scores matter. A borrower with a FICO score of less than 640 is 4.1 times

33 “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 in determining the credit criteria. In some cases, the loan itself may not be salable or may be damaged (“scratch & dent”). Damaged loans are usually impaired in some way, such as missing collateral or an imperfect not/lien.

34 Pennington-Cross, Anthony and Giang Ho (2006). “Loan Servicer Heterogeneity and the Termination of Subprime Mortgages.” Working Paper 2006-024A, Federal Reserve Bank of St. Louis.

35 Doms, Furlong, and Krainer (2007). “Subprime Mortgage Delinquency Rates.”

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 2.68. 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 1.8 times as likely as white borrowers to be in foreclosure, whereas Latino and Asian borrowers were, respectively, 1.4 and 1.3 times more likely to be in foreclosure as white borrowers.³⁶ The income of the neighborhood also seems to have some effect on the foreclosure rate. Loans located in low-income tracts were 1.8 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.

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 0.35), as does the presence of full documentation (odds ratio 0.61). An increase of ten 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.

What is interesting, however, is that even after controlling for this wide range of borrower, neighborhood, and loan characteristics, loans made by lenders regulated under the CRA were significantly less likely to go into foreclosure than those made by IMCs (odds ratio 0.703). This provides compelling evidence that the performance of loans made by CRA-regulated institutions has been significantly stronger than those made by IMCs.

Even more striking is what we find when we present the same model with the CRA lender status broken down by loans made within the CRA lenders’ assessment area and loans made outside the CRA lenders’ assessment area (with the omitted category being loans originated by IMCs). Presented in the second column of the table, we find that loans made by CRA lenders in their assessment areas were half as likely to be in foreclosure as loans made by IMCs (odds ratio 0.53). For loans made by a CRA lender outside its assessment area, the odds ratio is 0.87. In other words, loans made by CRA lenders within their assessment areas, which receive the greatest regulatory scrutiny under the CRA, are significantly less likely to be in foreclosure than those made by independent mortgage companies that do not receive the same regulatory oversight.

In Table 3, we add information about the source of the loan. As discussed earlier, we omit observations where the loan source is indicated as “servicing right.”³⁷ 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 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.³⁸ 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 0.743), the coefficient for CRA loans made outside 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.

³⁶ 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 here.

³⁷ This decreases our sample size from 239,101 to 195,698.

³⁸ Ernst, Boccia, and Li (2008). *Steered Wrong*.

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 that are intended to benefit the most from the presence of the CRA? In Tables 4–7, 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 the assessment area were only slightly less likely to be in foreclosure than loans made by IMCs (an odds ratio of 0.95). However, loans made by a CRA lender within its assessment area remain quite a bit less likely (odds ratio of 0.73) 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 0.58) 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 these 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 two 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 our focus here, 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 article 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 the HMDA with data on loan performance from LPS, 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 understand more fully 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, we focus solely on mortgage lending activities and do not examine the impact that the CRA investment or service components may have had on the

current crisis.³⁹ 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 variety of borrower and loan characteristics, including credit score, income, and whether or not the loan was higher priced. More important, 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 2). 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.⁴⁰

The exception to this general finding is the significance of the CRA variables in the models that focused

39 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 purchased only a very small percentage of higher-priced loans (Kroszner 2008), 1.

40 For an analysis of the quality of loans between 2001 and 2006 see Demyanyk Yuliya, and Otto van Hemert (2008). "Understanding the Subprime Mortgage Crisis." Working Paper, Federal Reserve Bank of St. Louis, February 4, 2008.

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 loans, particularly outside depository institutions' CRA assessment areas⁴¹ and that mortgage brokers may be extracting materially higher payments from borrowers with lower credit scores and/or less knowledge of mortgage products.⁴²

The study 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 the direct purview of supervision under the CRA, either because the loan was made outside 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.⁴³ In addition, the study's findings also lend weight to efforts to rethink the regulations and incentives that influence the practice of mortgage brokers.⁴⁴

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 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.”⁴⁵ Particularly in communities that have traditionally been denied credit, and where intergenera-

41 Kenneth P. Brevoort, and Glenn B. Canner (2006). “Higher-Priced Home Lending and the 2005 HMDA Data.” *Federal Reserve Bulletin* (September 8): A123–A166.

42 Ernst, Boccia, and Li (2008). *Steered Wrong*.

43 Apgar and Duda (2003). “The Twenty-Fifth Anniversary of the Community Reinvestment Act.”

44 Ernst, Boccia, and Li (2008). *Steered Wrong*.

45 Uzzi, Brian (1999). “Embeddedness in the Making of Financial Capital: How Social Relations and Networks Benefit Firms Seeking Financing.” *American Sociological Review* 64(4): 481–505. See also: Holmes, Jessica, 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): 585–97.

tional wealth and knowledge transfers integral to the home-ownership 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).⁴⁶ Indeed, the relatively strong performance of loans originated as part of statewide affordable lending programs,⁴⁷ Self-Help's Community Action Program,⁴⁸ and loans originated as part of Individual Development Account programs⁴⁹ 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. ■

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See Tables 1 – 7 on the following pages

46 Moulton, Stephanie (2008). "Marketing and Education Strategies of Originating Mortgage Lenders: Borrower Effects and Policy Implications." Paper presented at the Association for Public Policy Analysis and Management 30th Annual Research Conference, Los Angeles, November 6, 2008.

47 *Ibid.*

48 Ding, Quercia, Ratcliffe, and Li (2008). "Risky Borrowers or Risky Mortgages."

49 CFED (2008). "IDA Program Survey on Homeownership and Foreclosure," available at <http://www.cfed.org/focus.m?parentid=31&siteid=374&id=2663>.

Table 1: Distribution of Lending Activity: CRA Lenders vs. Independent Mortgage Companies

	CRA Lenders	Independent Mortgage Companies
Total Loans		
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
Total High-Priced Loans		
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
Total Foreclosures		
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 2: Model Predicting the Likelihood of Loan Foreclosure

	CRA		CRA with Assessment Area	
	Odds Ratio	Standard Error	Odds Ratio	Standard Error
NEIGHBORHOOD VARIABLES				
Neighborhood Income Level (omitted: Upper-Income)				
Low-Income	1.79 ***	0.149	1.73 ***	0.142
Moderate-Income	1.32 ***	0.067	1.28 ***	0.064
Middle-Income	1.21 ***	0.045	1.18 ***	0.044
Percent Owner-Occupied	1.00 ***	8.69x10 ⁻⁴	1.00 ***	8.68x10 ⁻⁴
Median Year Housing Built	1.01 ***	0.001	1.01 ***	0.001
Capitalization Rate	0.85	0.515	0.75	0.451
House Price Appreciation (2 years prior to origination)	1.26 ***	0.019	1.22 ***	0.019
BORROWER VARIABLES				
Borrower Race (omitted: Non-Hispanic White)				
African American	1.78 ***	0.084	1.79 ***	0.084
Latino	1.36 ***	0.044	1.36 ***	0.044
Asian	1.29 ***	0.052	1.29 ***	0.052
Borrower Income	1.00 **	7.17x10 ⁻⁵	1.00 **	7.26x10 ⁻⁵
Borrower FICO Score (omitted: High - Above 720)				
Low FICO - Below 640	4.09 ***	0.166	4.07 ***	0.165
Mid-level FICO - 640-720	2.68 ***	0.087	2.65 ***	0.086
LOAN VARIABLES				
Higher-Priced Loan (yes=1)	3.23 ***	0.004	3.05 ***	0.104
Fixed Interest Rate (yes=1)	0.35 ***	0.017	0.35 ***	0.017
Prepayment Penalty (yes=1)	1.30 ***	0.036	1.31 ***	0.036
Full Documentation (yes=1)	0.61 ***	0.021	0.63 ***	0.022
Monthly Payment	1.06 ***	0.110	1.05 ***	0.004
Loan-to-Value Ratio	3.00 ***	0.080	3.02 ***	0.081
LENDER VARIABLES				
CRA (omitted: Independent Mortgage Company)	0.70 ***	0.018		
CRA in Assessment Area			0.53 ***	0.017
CRA outside Assessment Area			0.87 ***	0.024
Observations	236,536			

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

Table 3: Model Predicting the Likelihood of Loan Foreclosure, includes Loan Source

	CRA with Assessment Area	
	Odds Ratio	Standard Error
NEIGHBORHOOD VARIABLES		
Neighborhood Income Level (omitted: Upper-Income)		
Low-Income	2.11 ***	0.232
Moderate-Income	1.35 ***	0.096
Middle-Income	1.24 ***	0.063
Percent Owner-Occupied	1.00 ***	0.001
Median Year Housing Built	1.01 ***	0.002
Capitalization Rate	0.85	0.680
House Price Appreciation (2 years prior to origination)	1.20 ***	0.026
BORROWER VARIABLES		
Borrower Race (omitted: Non-Hispanic White)		
African American	1.77 ***	0.127
Latino	1.38 ***	0.066
Asian	1.24 ***	0.067
Borrower Income	1.00 **	8.91x10 ⁻⁵
Borrower FICO Score (omitted: High - Above 720)		
Low FICO - Below 640	4.58 ***	0.266
Mid-level FICO - 640-720	2.73 ***	0.124
LOAN VARIABLES		
Higher-Priced Loan (yes=1)	2.47 ***	0.119
Fixed Interest Rate (yes=1)	0.39 ***	0.025
Prepayment Penalty (yes=1)	1.55 ***	0.072
Full Documentation (yes=1)	0.63 ***	0.027
Monthly Payment	1.05 ***	0.005
Loan-to-Value Ratio	2.53 ***	0.078
LENDER VARIABLES		
CRA (omitted: Independent Mortgage Company)	0.70 ***	0.018
CRA in Assessment Area	0.743***	0.043
CRA outside Assessment Area	0.995	0.057
Loan Source (omitted: retail branch)		
Correspondent Loan	1.45 ***	0.092
Wholesale Loan	2.03 ***	0.099
Observations	195,698	

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

Table 4: Model Predicting the Likelihood of Loan Foreclosure in Low-Income Neighborhoods

	CRA Assessment Area		CRA with Assessment Area and Loan Source	
	Odds Ratio	Standard Error	Odds Ratio	Standard Error
NEIGHBORHOOD VARIABLES				
Percent Owner-Occupied	1.01 ***	0.005	1.01	0.008
Median Year Housing Built	1.00	0.006	1.00	0.008
Capitalization Rate	0.64	0.742	0.35	0.685
House Price Appreciation (2 years prior to origination)	1.16 *	0.092	1.17	0.125
BORROWER VARIABLES				
Borrower Race (omitted: Non-Hispanic White)				
African American	1.75 **	0.393	1.96 *	0.728
Latino	0.95	0.121	1.09	0.291
Asian	1.25	0.280	1.43	0.396
Borrower Income	1.00	4.43x10 ⁻⁴	1.00	6.97x10 ⁻⁴
Borrower FICO Score (omitted: High - Above 720)				
Low FICO - Below 640	4.10 ***	0.783	4.00 ***	1.130
Mid-level FICO - 640-720	2.41 ***	0.434	2.48 ***	0.632
LOAN VARIABLES				
Higher-Priced Loan (yes=1)	3.12 ***	0.559	2.31 ***	0.591
Fixed Interest Rate (yes=1)	0.29 ***	0.081	0.27 ***	0.104
Prepayment Penalty (yes=1)	1.28 *	0.180	1.42	0.361
Full Documentation (yes=1)	0.71 **	0.114	0.84	0.150
Monthly Payment	1.10 ***	0.031	1.15 ***	0.037
Loan-to-Value Ratio	2.35 ***	0.220	1.81 ***	0.262
LENDER VARIABLES				
CRA (omitted: Independent Mortgage Company)				
CRA in Assessment Area	0.73 **	0.115	0.89	0.264
CRA outside Assessment Area	0.95	0.121	0.86	0.244
Loan Source (omitted: retail branch)				
Correspondent Loan			1.58	0.536
Wholesale Loan			2.79 ***	0.702
Observations	5,271		3,981	

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

Table 5: Model Predicting the Likelihood of Loan Foreclosure in Moderate-Income Neighborhoods

	CRA Assessment Area		CRA with Assessment Area and Loan Source	
	Odds Ratio	Standard Error	Odds Ratio	Standard Error
NEIGHBORHOOD VARIABLES				
Percent Owner-Occupied	1.00 **	0.002	1.00 **	0.002
Median Year Housing Built	1.00	0.002	1.00	0.003
Capitalization Rate	1.21	1.160	0.58	0.806
House Price Appreciation (2 years prior to origination)	1.10 ***	0.033	1.10 **	0.048
BORROWER VARIABLES				
Borrower Race (omitted: Non-Hispanic White)				
African American	2.13 ***	0.202	1.88 ***	0.269
Latino	1.32 ***	0.089	1.17	0.117
Asian	1.27 ***	0.115	1.15	0.145
Borrower Income	1.00	1.37x10 ⁻⁴	1.00	1.14x10 ⁻⁴
Borrower FICO Score (omitted: High - Above 720)				
Low FICO - Below 640	3.69 ***	0.310	3.72 ***	0.475
Mid-level FICO - 640-720	2.29 ***	0.162	2.38 ***	0.242
LOAN VARIABLES				
Higher-Priced Loan (yes=1)	2.64 ***	0.181	2.07 ***	0.207
Fixed Interest Rate (yes=1)	0.30 ***	0.032	0.37 ***	0.053
Prepayment Penalty (yes=1)	1.14 ***	0.057	1.55 ***	0.148
Full Documentation (yes=1)	0.73 ***	0.505	0.73 ***	0.062
Monthly Payment	1.09 ***	0.011	1.10 ***	0.015
Loan-to-Value Ratio	2.49 ***	0.106	2.04 ***	0.125
LENDER VARIABLES				
CRA (omitted: Independent Mortgage Company)				
CRA in Assessment Area	0.58 ***	0.04	0.96	0.119
CRA outside Assessment Area	0.84 ***	0.048	1.17	0.143
Loan Source (omitted: retail branch)				
Correspondent Loan			1.62 ***	0.221
Wholesale Loan			1.96 ***	0.212
Observations	34,933		26,248	

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

Table 6: Model Predicting the Likelihood of Loan Foreclosure in Middle-Income Neighborhoods

	CRA Assessment Area		CRA with Assessment Area and Loan Source	
	Odds Ratio	Standard Error	Odds Ratio	Standard Error
NEIGHBORHOOD VARIABLES				
Percent Owner-Occupied	1.01 ***	0.001	1.01 ***	0.002
Median Year Housing Built	1.01 ***	0.002	1.00	0.002
Capitalization Rate	0.69	0.636	2.27	2.920
House Price Appreciation (2 years prior to origination)	1.27 ***	0.030	1.23 ***	0.041
BORROWER VARIABLES				
Borrower Race (omitted: Non-Hispanic White)				
African American	1.53 ***	0.113	1.52 ***	0.176
Latino	1.33 ***	0.063	1.31 ***	0.091
Asian	1.17 ***	0.073	1.09	0.093
Borrower Income	1.00 ***	1.14x10 ⁻⁴	1.00 ***	1.42x10 ⁻⁴
Borrower FICO Score (omitted: High - Above 720)				
Low FICO - Below 640	4.22 ***	0.261	5.13 ***	0.454
Mid-level FICO - 640-720	2.68 ***	0.130	2.82 ***	0.201
LOAN VARIABLES				
Higher-Priced Loan (yes=1)	2.93 ***	0.142	2.34 ***	0.172
Fixed Interest Rate (yes=1)	0.34 ***	0.025	0.35 ***	0.035
Prepayment Penalty (yes=1)	1.30 ***	0.055	1.51 ***	0.111
Full Documentation (yes=1)	0.61 ***	0.034	0.59 ***	0.040
Monthly Payment	1.06 ***	0.008	1.06 ***	0.010
Loan-to-Value Ratio	3.10 ***	0.159	2.67 ***	0.127
LENDER VARIABLES				
CRA (omitted: Independent Mortgage Company)				
CRA in Assessment Area	0.56 ***	0.028	0.80 ***	0.072
CRA outside Assessment Area	0.92 ***	0.038	1.06	0.091
Loan Source (omitted: retail branch)				
Correspondent Loan			1.39 ***	0.129
Wholesale Loan			1.97 ***	0.147
Observations	91,400		73,603	

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

Table 7: Model Predicting the Likelihood of Loan Foreclosure in Upper-Income Neighborhoods

	CRA Assessment Area		CRA with Assessment Area and Loan Source	
	Odds Ratio	Standard Error	Odds Ratio	Standard Error
NEIGHBORHOOD VARIABLES				
Percent Owner-Occupied	1.01 ***	0.002	1.00 ***	0.002
Median Year Housing Built	1.01 ***	0.002	1.01 ***	0.003
Capitalization Rate	2.79	4.720	3.93	8.280
House Price Appreciation (2 years prior to origination)	1.27 ***	0.039	1.26 ***	0.051
BORROWER VARIABLES				
Borrower Race (omitted: Non-Hispanic White)				
African American	1.67 ***	0.148	1.69 ***	0.218
Latino	1.47 ***	0.088	1.65 ***	0.141
Asian	1.38 ***	0.096	1.33 ***	0.117
Borrower Income	1.00 ***	1.09x10 ⁻⁴	1.00 ***	1.68x10 ⁻⁴
Borrower FICO Score (omitted: High - Above 720)				
Low FICO - Below 640	3.99 ***	0.301	4.64 ***	0.498
Mid-level FICO - 640-720	2.83 ***	0.162	2.83 ***	0.213
LOAN VARIABLES				
Higher-Priced Loan (yes=1)	3.44 ***	0.225	2.96 ***	0.248
Fixed Interest Rate (yes=1)	0.41 ***	0.032	0.45 ***	0.045
Prepayment Penalty (yes=1)	1.40 ***	0.074	1.50 ***	0.119
Full Documentation (yes=1)	0.57 ***	0.036	0.59 ***	0.048
Monthly Payment	1.04 ***	0.006	1.05 ***	0.007
Loan-to-Value Ratio	3.52 ***	0.127	2.89 ***	0.152
LENDER VARIABLES				
CRA (omitted: Independent Mortgage Company)				
CRA in Assessment Area	0.49 ***	0.028	0.64 ***	0.067
CRA outside Assessment Area	0.84 ***	0.046	0.93	0.096
Loan Source (omitted: retail branch)				
Correspondent Loan			1.37 ***	0.164
Wholesale Loan			2.12 ***	0.180
Observations	104,932		91,866	

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