

The Untold Costs of Subprime Lending: Examining the Links among Higher-Priced Lending, Foreclosures and Race in California

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Abstract

This paper explores the relationship between race, subprime lending, and foreclosure in California in an effort to understand what happened during the subprime lending boom. The paper finds that communities of color have been disproportionately affected by the foreclosure crisis, and that these disparities stem from a series of complicated and interrelated factors, including borrower credit profiles, the 'boom and bust' housing market, and rising unemployment. However, the paper also shows that Blacks and Hispanics in California had access to very different mortgage markets, and that mortgage market channels played an important role in the likelihood of receiving a higher-priced loan. Once we control for the probability of obtaining a higher-priced loan, the differences in foreclosure rates among minorities and whites shrink considerably. This paper provides compelling evidence for the need to revisit consumer protection regulations and fair lending laws to ensure that minority borrowers aren't unfairly being steered into different mortgage market channels.

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

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Cesario Gonzalez said he was encouraged to go for his first home last year by a mortgage broker handing out business cards in front of Pancho Villa Farmers Market on El Cajon Boulevard. Gonzalez said through a translator that he still is uncertain what kind of loans he signed up for on the \$565,000 duplex he purchased in May 2007. With monthly mortgage payments of \$4,200 and monthly income of \$3,200, the purchase appeared dubious. But Gonzalez planned to live on one side with his wife and three children, rent out the other side for \$1,200 and take on another job. The plan didn't work. Construction work ground to a halt as the housing market went south, and Gonzalez's income went with it. He scraped by with odd jobs, emptied his savings account, borrowed from his brother and opened a credit card account to borrow on it for his mortgage payment. Gonzalez tried to refinance the two loans on the duplex, one with a 9 percent interest rate and one with a 12 percent rate. But the loan officer told him he couldn't refinance because the value of his duplex had dropped from \$565,000 to \$340,000.¹

This anecdote, excerpted from an article in the *San Diego Union Tribune*, is only one of thousands chronicling how Latino and African American borrowers have been adversely affected by the subprime crisis. Housing counselors and legal aid providers—those at the front lines of the crisis—have similarly observed that there have been disproportionate levels of foreclosure among Latino, African American, and Asian families. At foreclosure prevention events, they arrive with papers that point to a combination of poorly underwritten or predatory loans, little understanding of their mortgage terms, and evidence of job loss or unexpected financial hardships. Indeed, Gonzalez's story points to the complexity of pinpointing the primary determinant of default: was it the broker soliciting customers in front of a market frequented by Latino families? Was it the financial institution that underwrote the loan without assessing Gonzalez's ability to repay? Would it have ended differently if Gonzalez spoke English, had more financial knowledge, or a more realistic view of his position in the labor market? Or was it the precipitous drop in house prices in California that left him nearly 40 percent underwater? From a public policy perspective, understanding why minorities seem to have been disproportionately affected by the foreclosure crisis is incredibly important, especially when one considers how foreclosures may serve to exacerbate disparities in wealth between minority and white households.

In this paper, we empirically assess whether or not there has been a disparate impact of foreclosure on communities of color in California. To date, this question has received little attention in the academic literature. In large part, this is due to the lack of a dataset that includes information both on the loan performance (e.g., delinquency and/or foreclosure) with information on the race of the homeowner. While data collected under the Home Mortgage Disclosure Act (HMDA) provide extremely valuable information on race and mortgage originations, HMDA data do not track loan performance over time. In

¹ Penni Crabtree (2008). "State's Hispanics, Blacks Hit Especially Hard in Housing Crisis," *The San Diego Union-Tribune*, June 29, 2008, p. B5. Corrected online on July 2, 2008.

addition, the HMDA data are limited in that they don't include borrower risk factors that might influence a lender's decision to offer a higher-priced loan, such as a lower FICO score or a lower downpayment.

To address this data gap, we created a unique dataset that matches HMDA data with proprietary loan performance information from large loan-servicing organizations. This dataset allows us to test whether or not Black, Hispanic², and Asian borrowers are more likely to be in foreclosure, controlling for differences in borrower and loan characteristics. It also allows us to provide some preliminary insights into the factors that influence the likelihood of foreclosure for minority homeowners, including whether or not they received a higher-priced loan. As far as we know, this paper focuses empirical attention for the first time on the consequences of subprime lending on individuals and communities of color, and directs concerns over fair lending not only to the question of disparate treatment, but also to whether prevailing lending standards during the subprime lending boom led to disparate impacts for minority borrowers.

In many ways, our paper continues in a tradition of academic research that has tried to assess whether or not there are racial differences in mortgage lending transactions. But we also hope that this paper helps to shift the debate over discrimination away from one that views the lending decision as solely an economic transaction, governed by market forces and profit motives (Ladd 1998). Instead, we begin with the premise that obtaining a mortgage is a social process, and that racial differences in mortgage terms and foreclosures are better understood as resulting from the cumulative effect of market forces, social norms, local context, and the decisions of multiple, individual economic actors (Arrow 1998; Stuart 2003). In particular, we believe that past and continued social and spatial segregation along racial lines in the United States led to multiple points of inequality in the mortgage market during the subprime boom. As Loury (1998, p. 121) has argued, "Given social segregation along race lines, the effects of past discrimination can persist over time by adversely affecting the skills acquired by the offspring of those discriminated against. Moreover, discrimination in one market can leave its victim less well prepared to compete in another market."³ Certainly, both the mortgage broker and the lender played a role in determining the loan terms that Gonzalez received, including charging him interest rates that were significantly higher than the prevailing contract rate for a mortgage. But his decision to buy the home was also shaped by watching his neighbors buy homes,⁴ and his job as a construction worker made him particularly vulnerable to the overall downturn in the housing market. And as for many

² Although we prefer to use the terms African American and Latino, the HMDA data only identify race and ethnicity using the terms Black and Hispanic, so we use this nomenclature in discussing our methods and results. The term White in this paper refers to non-Hispanic white consumers. We also use the general term "minority" to refer to Blacks, Hispanics and Asians collectively.

³ A recent *New York Times* article similarly highlights the multiple ways in which historical discrimination can lead to different contemporary choices. In the article, Colvin Grannum, an African American who grew up in a black neighborhood in Brooklyn, explained that his father bought several properties in the 1950s and '60s, often without turning to banks. "I don't want to say it's in the cultural DNA, but a lot of us who are older than 30 have some memory of disappointment or humiliation related to banks," Mr. Grannum said. "The white guy in the suit with the same income gets a loan and you don't? So you turn to local brokers, even if they don't offer the best rates." (Powell and Roberts 2009)

⁴ The newspaper story on Cesario Gonzalez provides evidence for the social component of this decision. "He could see his neighbors being owners of houses. He trusted the Realtor and the loan officer. He wanted a home."

minorities who may be the first to buy a home, lack of intergenerational wealth (as well as the knowledge that comes from previous home-buying experiences) may have further influenced Gonzalez's product choices and the inability to avoid foreclosure (Withers and Reid 2005).

The analytical goal of this paper, then, is not to prove discrimination by any one lending institution, but rather to shift our thinking of how minority borrowers may face multiple vulnerabilities in the homeownership market, vulnerabilities that were exacerbated by the "institutional landscape" of mortgage lending during the subprime boom. Our hypothesis is that black and Hispanic borrowers received loans from a different set of lenders than white borrowers, and that differences in underwriting criteria, profit and incentive structures, and regulatory regimes led to different product outcomes for minority borrowers (White 2009a). We argue that the disparate foreclosure rate among minority borrowers was not based primarily on "disparate-treatment" by any one institution—which is generally the focus of fair lending examinations—although we don't rule out that this might have occurred. Rather, we argue that the structure of the mortgage industry and the rise of a "shadow" banking system (Gramlich 2007) placed minority households at particular risk of receiving a higher-priced loan, with significant negative repercussions for their families and the communities in which they live. In other words, while it may not explain all the differences in product choices and loan performance between white and minority borrowers, mortgage channel has a significant effect on mortgage product outcomes and subsequent defaults, and there is a need to rethink the regulatory structure to improve homeownership outcomes for minority borrowers.

The paper proceeds as follows. In the next section, we review the literature examining discrimination in mortgage markets, and situate our research within a growing number of studies that examine the causes and implications of the recent subprime crisis. In Section 3, we present our methodology, including a description of the data and our analytical strategy. In Section 4, we present the results of our research, starting with descriptive statistics that for the first time provide information on defaults in California broken down by race and ethnicity. We then present a series of empirical models that answer two inter-related questions: first, were minority borrowers in California more likely to receive subprime, adjustable rate mortgages (even after controlling for risk based characteristics) and second, do we find evidence of a disproportionate impact of foreclosures on communities of color? We conclude with the policy implications of this study and present suggestions for further research.

Literature Review

Until the middle of the 20th Century, racial discrimination in housing and mortgage markets was overt, and there was little need to conduct research into whether or not minority households had fair and impartial access to credit (Arrow 1998). Both the private sector and the federal government were complicit in these practices (Stuart 2003). For example, restrictive covenants were widely used in the first half of the century to bar various racial groups from living in certain neighborhoods; title to almost all new homes built during the construction boom of the 1920s contained covenants prohibiting black occupancy (Abrams, 1955). The Federal Housing Administration (FHA) and the Home Owner's Loan Corporation (HOLC) perpetuated racial discrimination by explicitly advising real estate appraisers to note "adverse influences," which included "inharmonious racial groups" (LaCour-Little 1999). In addition, in

1935, HOLC created "residential security maps" of major cities in the U.S. to indicate the perceived security of real-estate investments. The maps, which outlined minority neighborhoods in red, identified areas that were deemed "too risky" to receive financing. It wasn't until November 1965 that the commissioner of the Federal Housing Administration announced that the agency would no longer "redline" black and other minority neighborhoods (Stuart 2003).

Between 1968 and 1977, the United States enacted several laws to redress this history of open discrimination in housing and mortgage markets. These laws include the Fair Housing Act of 1968 and the Equal Credit Opportunity Act of 1974 (ECOA).⁵ In the words of the 1968 Fair Housing Act (Section 804), "it shall be unlawful . . . to discriminate against any person . . . because of race, color, religion, sex, or national origin." This act covers many types of discriminatory behavior, including refusal to sell or rent, differential terms or conditions, differential advertising, and the provision of inaccurate information. Fair lending violations are based on two standards: "disparate treatment" of customers on the basis of their membership in a protected class (e.g., applying different rules for loan approval) or "disparate impact", when practices that do not explicitly consider a person's group membership but instead have an adverse impact on a protected class without any "business necessity" (Ladd 1998).

Since the legal framework prohibiting discrimination was put into place, there has been an extensive debate in the academic literature about the presence or absence of discrimination in credit and other consumer markets, and it is a debate that is unlikely to be resolved any time soon.⁶ Papers that claim the existence of discrimination, as well as those that claim no such discrimination exists, have been subjected to tremendous scrutiny, with models routinely criticized for being poorly specified and omitting important "unobservable" characteristics. Yet, on balance, the literature to date overwhelmingly shows that mortgage market outcomes do differ among different racial and ethnic groups, even if the reasons for those differences are not yet fully understood (Ross and Yinger 2003).

Although there are some earlier important works, research on discrimination in mortgage markets took off following the 1989 amendment to the Home Mortgage Disclosure Act, which required lenders to provide information on the race and ethnicity of each loan applicant, as well as information on the geography of the loan and whether or not the loan was approved or denied (Ross and Yinger 2003). In the first descriptive analysis of the 1990 HMDA data, Canner and Smith (1991) found that the denial rate for blacks on conventional home purchase loans was almost two and a half times the rate for whites, and the Hispanic rate was 50 percent higher than the white rate. In 1992, researchers at the Federal Reserve Bank of Boston advanced this research by releasing a study that supplemented the HMDA data with additional variables to better isolate discriminatory behavior by lenders (Munnell et al. 1992). A revised version in 1996 concluded that even after controlling for financial, employment, and neighborhood characteristics, black and Hispanic applicants were significantly more likely to be turned down for a mortgage than were comparable whites (Munnell et al. 1996). Numerous authors have since either critiqued and/or refuted the Boston Fed's study (Liebowitz 1993; Horne 1994; Yezer et al. 1994),

⁵ In addition, the Community Reinvestment Act of 1977 imposed an affirmative obligation on lenders to help meet the credit needs of their entire communities, including lower income households and neighborhoods.

⁶ For an excellent series of essays on this topic, see *The Journal of Economic Perspectives*, Vol. 12, No. 2 (Spring, 1998).

or have concluded that it clearly demonstrates the existence of discrimination (Carr and Megbolugbe 1993). A rigorous review of the Boston Fed data conducted by Ross and Yinger (2003) concluded that while many of the critiques did raise important issues with the original study's methods, the minority-white disparities in denial rates could not be entirely explained away.

As the share of the subprime market began to grow in the mid-1990s, researchers increasingly focused attention away from "access to credit" toward racial differences in subprime lending and "the cost of credit". In its original incarnation, subprime lending was seen as an important way to expand access to homeownership for underserved borrowers by reducing barriers to credit such as lower credit scores, fewer assets, and less stable incomes (Pennington-Cross, 2002; Nichols, Pennington-Cross and Yezer, 2005; Courchane, Surette, and Zorn, 2004).⁷ The risks associated with lending to these "subprime" borrowers were offset by charging a higher interest rate for the loan. In the words of former Federal Reserve Chairman Alan Greenspan, "where once marginal applicants would have simply been denied credit, lenders are now able to quite efficiently judge the risk posed by individuals and price that risk appropriately."⁸ This shift towards risk based pricing was accompanied by the rise of subprime mortgage lenders that specialized in subprime products. Subprime lenders—which are not subject to the same federal regulations as are banks—accounted for a large portion of the growth in home purchase financing for low-income and minority borrowers during the mid-1990s (Canner, Passmore, and Laderman 1999). In addition, as house prices began to take a steep climb upwards at the start of this decade, subprime increasingly became a moniker for a much wider range of nontraditional or alternative mortgage products, including interest-only loans, option ARMs, and loans that coupled extended amortization with balloon-payment requirements. In 2004, these new mortgage products accounted for 12.5 percent of loan originations; by 2006, this segment had increased to 32.1 percent (Chambers et al. 2008).

The growth in the subprime lending market led to new concerns that minority borrowers were disproportionately targeted for subprime or higher-priced loans. In 2000, the U.S. Department of Housing and Urban Development and the U.S. Treasury Department held joint hearings and issued a report that found that minority borrowers were more likely to receive a loan from a subprime lender⁹ and pay a higher interest rate than white borrowers (U.S. HUD and Treasury 2000). In 2004, the HMDA data were expanded to incorporate pricing data, allowing researchers to better understand lending activity in the higher-priced segment of the mortgage market—although not strictly analogous to "subprime", many researchers use the terms higher-priced, high-cost, and subprime interchangeably.¹⁰ One limiting factor in the HMDA data is that many of the underwriting factors used by lenders, such as

⁷ Researchers have shown that the existence of a subprime market can reduce borrowing constraints and mitigate the effect of credit rationing in the prime market (Chinloy and Macdonald 2005; Cutts and Van Order, 2005).

⁸ Alan Greenspan (2005). "Consumer Finance," Remarks presented at the Federal Reserve System's Fourth Annual Community Affairs Research Conference, Washington, D.C., April 8, 2005. Available online at <http://www.federalreserve.gov/boarddocs/speeches/2005/20050408/default.htm>.

⁹ Before the 2004 release of the HMDA data, researchers identified subprime loans based on the lender's presence on HUD's list of subprime lenders

¹⁰ The Federal Reserve intended that the reporting thresholds for higher-priced loans would help to identify subprime mortgages.

loan-to-value (LTV) ratios and borrower credit score, are not included (Avery et al. 2006). Subsequent studies have varied in terms of their ability to control for other variables, but the majority find that the use of subprime loan products varies significantly by race, with Blacks and Hispanics more likely and Asians less likely to hold a subprime loan (Nichols, Pennington-Cross, and Yezer 2005; Avery et al. 2006). Bocian, Ernst and Li (2008), for example, found that Blacks and Hispanics, compared to similarly situated white borrowers, were more likely to receive higher priced loans and mortgages with subprime characteristics such as prepayment penalties and balloon payments. Courchane (2004) similarly found that even after controlling for the likelihood of receiving a subprime loan, Black borrowers received APRs that were 3 basis points above white non-Hispanic subprime borrowers, and 12 basis points above white non-Hispanic prime borrowers. While she shows that controllable factors do reduce the difference in pricing considerably, racial disparities in loan pricing do not go away entirely. Moreover, she also found that there was a positive correlation between higher APRs and getting a loan through a mortgage broker.

Previous research has also found that mortgage lending has an important spatial dimension, and that subprime lenders target areas that have historically been underserved by bank lenders (Calem, Gillen and Wachter 2002; Immergluck and Wiles, 1999; Hershaff, Wachter and Russo, 2005; Calem, Hershaff and Wachter 2004). Many of these studies are limited due to data constraints and do not control for key factors that likely influence mortgage choice and pricing. Yet, on balance, these studies have all found that higher-priced loans are more frequent in low-income neighborhoods than in upper income neighborhoods, and more frequent in predominately Black neighborhoods than white neighborhoods (Scheessele 2002; Ding et al. 2008). Squires, Hyra and Renner (2009) also find that racial segregation at the metropolitan level has an independent influence on the proportion of subprime loans, even after controlling for a wide range of neighborhood level characteristics.

Understanding why these racial and ethnic differences in mortgage markets persist is much more difficult. Some researchers have argued that neighborhoods with a legacy of urban decline are strategic targets within the subprime business model, as they offer concentrations of these borrowers along with low levels of competition from other lenders (Immergluck and Wiles 1999; Immergluck and Smith 2004). In areas of lower competition, borrowers have fewer options to bargain, and the terms of credit may therefore be less advantageous (Ashton 2008). In this interpretation, the failure of prime lenders to seek out creditworthy borrowers in lower income and minority communities (despite an affirmative obligation to serve all communities under the Community Reinvestment Act) has resulted in a “dual mortgage market” that steers minority borrowers to the subprime segment, even when they could have qualified for a prime loan. Other researchers have noted that information constraints may also play a role. In a detailed survey, Courchane and her colleagues found that subprime borrowers were less knowledgeable about the mortgage process and were less likely to search “a lot” for the best rates. “Borrowers who do not search for the best interest rates or who do not have the opportunity to make choices about their mortgage options disproportionately end up with subprime loans, as do borrowers whose search emphasized affordable monthly payments.” (Courchane et al. 2004, p. 373)

Others have argued that if, once you control for risk characteristics, there are no differences between whites and minorities, lenders would have no incentive to discriminate since it would reduce their

profits. In addition, competition in the mortgage market would drive any discriminating lenders out of business. In this literature, race-based differences in lending outcomes are most likely due to factors unobservable to researchers, especially given that race remains a proxy for a host of other socio-economic factors. Thus, any remaining differential in lending outcomes is due to unobservable factors that increase the risk of default and therefore justify the lender charging higher prices. Yet in a very compelling book that examines discrimination in retail transactions, Ayres (2001) argues that differences in pricing could be the result of profit-maximizing sellers. In other words, rather than using pricing as a way to minimize risk based on the likelihood of default, sellers use pricing to make a larger profit. He writes, “[Car] dealerships may discriminate not because they expect higher costs but because they expect to be able to extract higher revenues. This is a surprising possibility because as an empirical matter people of color have a substantially lower ability to pay for new cars. But profit maximizing sellers care far more about the variability in willingness to pay than in the mean willingness. The presence of a few minority members who are willing to pay a large markup make it rational for the dealership to offer higher prices to all members of the group—even if group members are on average poorer.” (Ayres 2001, p. 2) He also points out that consumers with limited information may be less likely to seek out other sellers with better pricing. It is hard not to intuitively see an analogy between what Ayres has found in car sales and the mortgage lending that occurred during the subprime boom in California.

Ayres work points to the possibility that even if any individual lender/retailer treats all of its buyers equally, access to different sets of lenders/retailers might lead to very different prices for minority borrowers. This work, in addition to recent studies that have pointed to the importance of the mortgage market channel and regulatory regime in determining loan performance (Laderman and Reid 2008; Coulton et al. 2008; Ergungor 2007; Ding et al. 2008; Moulton 2008), prompted us to explore in more detail how mortgage market channel may be affecting the higher rates of foreclosure among minority homeowners. The existing literature on racial differences in default rates is small and fraught with methodological concerns (see Ross and Yinger 2002). In addition, few datasets include information about both the borrower’s race and loan performance, further limiting this type of analysis. Data from loans insured by the Federal Housing Administration are among the few that capture both these variables,, and early studies on the performance of FHA loans found that black borrowers had higher default rates than white borrowers, even after other key characteristics of the borrower and the neighborhood were taken into account (Berkovec et al. 1998). More recently, 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 similarly found that in parts of Ohio, the risk of foreclosure for Blacks was much greater than for white borrowers, and that foreclosures were concentrated in minority communities. Yet they were unable to control for borrower risk factors, and to date there have been few studies that have tried to empirically examine the effects of the recent subprime lending boom on minority communities.

In this paper, we make a first attempt to fill that gap, by directly studying the racial patterns of mortgage market channels, higher-priced and subprime lending, and foreclosures. To explore these questions in

more detail, this paper presents both descriptive data and a series of regression models that attempt to assess whether or not communities of color in California have been disproportionately affected by the subprime crisis.

Because there is so little information available on the foreclosure rate for minority households, we begin by providing simple descriptive statistics and maps that show the distribution of higher-priced lending and foreclosures by race. Even though these statistics do not control for other factors that may influence the lending transaction or the decision to default, they are nevertheless important in terms of furthering our understanding of who has been affected by the foreclosure crisis in California.

Second, we assess differences in the choice of mortgage product based on a range of borrower and mortgage market characteristics, testing to see if there are differences in mortgage choices between Black, Hispanic, Asian, and white borrowers. We use a multinomial logit regression to predict the likelihood that a borrower received: a) a prime, fixed rate mortgage, b) a prime, adjustable rate mortgage, c) a subprime fixed rate mortgage, or d) a subprime adjustable rate mortgage. We define subprime in this paper as loans that are indicated as “higher-priced” in the HMDA data (which is possible since we only looked at originations starting in 2004). Although we tested other possible definitions, we felt that the HMDA higher-priced variable was stronger since we were also able to control for other loan characteristics such as ARM v. Fixed, FICO, and documentation level. Our assumption is that measurable features such as the margin rate, LTV, FICO, and loan characteristics are likely to be more standardized and not as sensitive to individualized lender definitions (for example, of what constitutes a “B” or “C” Grade loan). We recognize, however, that the higher-priced designation also has its limitations and that currently there is no way to simply identify subprime loans in the data (see Mayer and Pence 2008 for an analysis of the strengths and limitations of the different data sources).

Based on previous research (e.g. Courchane 2004) we expect that a borrower with a lower FICO credit score, a higher loan to value ratio, a lower income, and a higher loan amount will be more likely to choose a subprime mortgage product: since subprime lending by definition has more lenient underwriting criteria, wealth- and income-constrained borrowers, or those with a blemished credit history, will be more likely to seek out subprime products. Yet unlike other studies that have studied the incidence of higher-priced lending, we also pay attention to the mortgage market channels. We examine how mortgage choice was influenced by lending channel (mortgage broker versus retail), type of lending institution (federally regulated institution versus independent mortgage company), as well as the lenders’ decision to either securitize the loan or hold it in portfolio.

Third, we model the predictors of default to see if minorities are more likely to be in foreclosure after controlling for other observable characteristics such as FICO score, income, and housing market changes. Specifying this model is far from easy: it is likely that unobservable factors that affect whether or not a borrower receives a higher-priced loan also affects the likelihood of foreclosure. In addition, many variables that could influence foreclosure (e.g. wealth or financial knowledge) are closely correlated with race and ethnicity. We experimented with several different modeling approaches, including using instrumental variables, a bivariate probit model, a nested logit, and a propensity score matching technique. All of these approaches led to the same qualitative conclusions in terms of the

relationships between race and ethnicity, higher priced lending, and default, and for simplicity's sake in this paper we present only the results using an instrumental variable approach. Although we believe that our findings are solid and qualitatively accurate, given that this is the first study to do this exact analysis, the values of individual coefficients should not be given undue weight.

Data and Methods

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 and a proprietary dataset on loan performance collected by LPS Applied Analytics, Inc. (LPS) (Laderman and Reid 2008).¹¹ As of December 2008, the LPS dataset covered nearly 60 percent of active residential mortgages in the United States, representing about 29 million loans with a total outstanding balance of nearly \$6.5 trillion (Foote et al. 2009).¹² The LPS data include both prime and subprime loans, and include information on borrower risk characteristics (e.g. FICO score), loan characteristics (e.g. LTV, ARM v. FRM, prepayment penalty), as well as loan performance (e.g. delinquency and foreclosure).

The merged proprietary HMDA/LPS dataset allows us to analyze foreclosures by race, which is not possible using the LPS or HMDA data alone. Even so, we are duly cautious about suggesting that our matched set is representative of all loans in California. In particular, the data collected by LPS do not represent a random sample of the mortgage lending industry. To account for possible bias within the LPS matched data set, we constructed post-sampling weights to increase our confidence that our findings are more generally applicable to borrowers in California. To create these weights, 160 mutually exclusive cells of data common to both HMDA and LPS were created by interacting race, ethnicity, higher-priced loan, and lender type for both the full HMDA LAR data and the matched data, based on the year of origination. The distributions of the HMDA and LPS mortgages over each of the mutually exclusive buckets are then calculated and used to create post-sampling weights by dividing the percentage of the HMDA data in each cell by the percentage of the proprietary data in the equivalent cell.¹³ These weights are applied to the matched data set throughout the analysis below.

For this paper, we limit the 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 present separate analyses for purchase versus refinance loans. Loan performance outcomes are observed through October of 2008. Observations with missing data or obvious data-coding errors were excluded from the analysis.

¹¹ This data was originally compiled by McDash Analytics, and is often still referred to as "McDash data" to avoid confusion with LP (or Loan Performance) data.

¹² The LPS dataset has grown over time as new servicers have been added, with a substantial spread in coverage of the market in 2005. Whenever a new servicer is added to the dataset, that servicer's existing portfolio is incorporated into the dataset. In our sample, 38.8 percent of loans were originated in 2004, 35.3 percent in 2005, and 25.9 percent in 2006.

¹³ Thank you to Marsha Courchane for suggesting this step and for providing such a clear explanation of the methodology in her 2004 paper on racial differences on mortgage pricing.

In addition to the merged data, we also include variables from other datasets, including the U.S. Census, the HMDA Lender file compiled by the Federal Reserve Board, the Federal Housing Finance Agency, and the Bureau of Labor Statistics. Each of the variables used in the subsequent analyses is described in more detail below. Sample statistics for the weighted data are presented in Table 1.

Variables

Our interest in this paper is to understand racial differences in mortgage outcomes, and we focus on the outcomes for Black, Hispanic, Asian and white non-Hispanic borrowers. Following Courchane (2004), we construct these categories as being mutually exclusive. Black and Asian borrowers are restricted to those that have a non-Hispanic ethnicity. We exclude from Hispanic borrowers those with a non-white race. To control for the different credit profiles of these groups, we include several borrower level characteristics that should influence the underwriting process. These include income, FICO score at origination, loan-to-value (LTV) and monthly payment-to-income ratios, the level of documentation, and the loan amount. FICO and LTV variables are recoded into categorical variables based on both theoretical assumptions and semi-parametric explorations of their relationships to the dependent variables. One drawback of the LPS data is that it does not include a combined loan-to-value ratio or a flag for the existence of a second loan, which means that it is not possible to control for the true level of borrower debt or equity (Foote et al. 2009). This is a significant drawback to the data, since large numbers of borrowers in California took out a first loan at 80 percent LTV and a second loan for the remainder during the subprime boom.

We recoded the loan amount into a binary variable coded 1 if the loan amount was below California's conforming loan limit at the time of origination.¹⁴ We would expect that conforming loans would decrease the likelihood of receiving a higher-priced loan. Documentation is coded as 1 if the borrower provided full documentation, 0 if it was a limited documentation or no documentation loan.

In addition to standard underwriting variables, we include several variables intended to capture the institutional structure of the mortgage market in which the loan was originated. Using data from the Federal Reserve Board's HMDA Lender file, we link each loan to the regulatory structure of the lending institution. Building on a recent paper that examined differences in performance of loans originated by CRA regulated institutions versus those made by independent mortgage companies (Laderman and Reid 2008), we identify loans made by federally-regulated institutions within their Community Reinvestment Act 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). 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. 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).

¹⁴ For California, the conforming loan limit was \$333,700 in 2004, \$359,650 in 2005, and \$417,000 in 2006. The Housing and Economic Recovery Act of 2008 expanded the definition of a "conforming loan" to include "high-cost" areas on loans originated on or after January 1, 2009, with a limit of \$625,500 for a one unit dwelling.

Building on recent research suggesting the importance of mortgage brokers during the subprime lending boom (Ernst, Bocian and Li 2008; Jackson and Berry 2002), 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.

Other factors that measure local market dynamics include the Herfindahl- Hirschman Index (HHI), which measures the extent of lending market competition in the neighborhoods in which borrowers' properties are located. A lower HHI value is associated with greater lending competition. The tract-level denial rate on mortgage applications is also calculated from the HMDA data. A dummy variable is included to indicate that the purchase was in an underserved census tract as defined by HUD. In MSAs, a census tract is considered underserved if it has a median income at or below 120 percent of AMI and a minority population of 30 percent or greater, or if it has a median income at or below 90 percent of AMI. We also include a variable that measures the percent of the population that has earned a college degree or higher within the census tract. Borrowers may interact with and seek advice from their neighbors, and that formal education and mortgage market experience both are associated with greater financial knowledge and literacy. We expect that a tract with a population that on average has higher educational levels will lower the probability of taking out a higher-priced mortgage (Calem, Hershaff and Wachter 2004).

To account for the recent volatility of house prices in California, we constructed two house price change variables for each loan: one that captures the extent of house price change in the two years prior to origination, and one that captures the extent of house price change in the two years after origination. Economic analyses conducted at the Federal Reserve Bank of San Francisco and the Federal Reserve Bank of Boston have shown that house price dynamics are important predictors of foreclosure (Doms, Furlong and Krainer 2007; Gerardi, Shapiro and Willen 2007). House price changes are measured at the MSA/Metropolitan Division and are based on FHFA's (formerly OFHEO) house price index. Although the FHFA index does not capture house values at the high-end of the market, the alternative Case Shiller index has limited value for our analysis, since it only covers Los Angeles and San Francisco. Much of the foreclosure crisis in California has been concentrated in the Central Valley and Inland Empire, where house prices were generally lower than in the coastal cities, so we decided that the FHFA index would accurately represent house price changes in California over this time period.

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 (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 and the prevalence of prepayment penalties (Cutts and Van Order 2005; Immergluck 2008). For this reason, we include LPS data on the terms of the loan, including the interest rate terms and whether or not it included a prepayment penalty at origination.

Finally, our dependent variable in this analysis is whether or not a loan originated between January 2004 and December 2006 has gone into default. Loans are followed until October 2008 or until the loan leaves the sample (for example, if the servicing rights are transferred or if the loan is paid off). The status of the loan at its last observation is used to determine the loan performance. Loans that were 90+ days delinquent, in foreclosure, or in REO at this last observation are counted as being ‘in default’.

Descriptive Statistics

Table 2 presents simple descriptive statistics of the weighted sample, stratified by racial and ethnic categories. More than half of the loans made in California between 2004 and 2006 went to white borrowers; yet nearly a quarter of loans went to Hispanics. Only 5.5 percent of the loans were made to Black borrowers. A higher percentage of loans to Blacks were refinance loans (79.4 percent) compared with other borrowers. As has previously been documented elsewhere, Blacks and Hispanics were much more likely to receive a higher-priced loan. Given the high cost of housing in California, the mean income across all borrowers is quite high, ranging from \$85,962 for Hispanics to \$126,919 for Asians. Whites and Asians also have higher FICO scores, on average, than Black and Hispanic borrowers. Hispanics were the least likely to have a fully documented loan, and were also most likely to purchase a home in a tract that was designated as “underserved” by financial services. Whites were least likely to use a broker to originate their mortgage.

Figure 1 presents the results of a simple cross tabulation of the percent of borrowers who received a higher-priced loan, broken down by FICO score categories. While much more goes into an underwriting decision than just a borrower’s FICO score, it is nevertheless striking to see the differences in the incidence of higher-priced lending among minority borrowers with good credit scores. More than 1 in 5 Black and Hispanic borrowers with FICO scores above 720 received a higher-priced loan, compared to 1 in 20 white and Asian borrowers.

Figure 2 presents a map of the San Francisco Bay Area which illustrates another key finding: independent mortgage companies originated a disproportionate share of loans in lower-income and minority neighborhoods, even when those neighborhoods were in close proximity to major metropolitan areas and located in census tracts eligible for CRA credit. The average market share of IMCs in California over this time period was around 30 percent, represented in green on the map. Areas in blue were underrepresented by IMCs, and cover higher-income areas such as Palo Alto, San Francisco, Marin County, and Walnut Creek. In contrast, the red and dark orange areas represent those that saw a disproportionate share of lending by IMCs – lower-income and predominantly minority areas such as East Oakland, Richmond, as well as the fast-growing outer ring suburbs of Vallejo, Antioch, and Stockton.

While many other factors likely contributed as well, this trend of higher-priced lending coupled with minimal regulatory oversight has led to devastating impacts on communities of color in California. In October of 2008, 8.4 percent of Hispanic homeowners and 6.3 percent of Black homeowners in our sample were in default. (Figure 3) This compares to a default rate of 2.7 percent for whites and 3.8 percent for Asians. In addition, as shown in Figure 3, the highest default rates have been for home

purchase, not refinancing. The impacts are felt at the neighborhood level as well. Figure 4 present a second map of the San Francisco Bay Area that illustrates what percent of defaults were among minority homeowners (grouping Blacks, Hispanics, and Asians together) at the census tract level. What is striking about this map is the extent to which even in traditionally “white” neighborhoods and suburbs, a large number of the defaults are being experienced by minority households. Although not the focus of this paper, this finding suggests that there is a need for more research on the long-term impacts of the foreclosure crisis on Black and Hispanic households, particularly in terms of how it may limit access to better neighborhoods, their upward mobility, and wealth (Oliver and Shapiro 2008).

Empirical Results: Determinants of Product Choice for Minority Borrowers

To understand how to address the disproportionate impact of foreclosures on communities of color, however, we need to move toward a better understanding of what happened in these communities during the subprime lending boom. Given the strong link between subprime lending and foreclosures, our first step was to understand better why Black and Hispanic borrowers were more likely to get a subprime loan.

In Tables 3 and 4, we present the results of multinomial logit models which assess racial differences in mortgage product choices for home purchase and refinance loans, controlling for standard underwriting risk factors, mortgage lending channels, as well as neighborhood characteristics. The four loan types we examine are: prime FRM, prime ARM, subprime FRM, and subprime ARM. Each column predicts the likelihood of receiving that loan type compared to receiving a prime, fixed-rate mortgage. We include the marginal effect of each coefficient, calculated as the partial derivative of the event probability with respect to the predictor of interest.¹⁵ There are few substantive differences between the models for purchase versus refinance loans; the only variable that changes signs between the two models is conforming loan amount, which has a positive effect on the likelihood of getting a subprime ARM for home purchase and a negative effect for home refinance.

The tables present very few surprises, and the findings are largely consistent with other studies that have examined the determinants of subprime lending (e.g. Courchane 2004; Bocian, Ernst and Li 2008). A lower FICO score and a higher LTV both increase the likelihood of receiving a subprime or subprime ARM loan. While we might expect the LTV variable to behave monotonically across categories, the stronger marginal effect for loans between 70 and 80 LTV is likely due to the fact that many loans financed at 80 percent LTV also had a second lien that we cannot observe in the data. Buying a home in an area with rapid house price appreciation – especially increases in house prices of more than 42 percent in the two years prior to origination – also increased the likelihood of a borrower taking out a subprime or subprime ARM product, supporting the theory that much of the subprime lending in California was driven by the search for “affordability” products to narrow the gap between household incomes and house prices. The likelihood of receiving a subprime or subprime ARM is also influenced by

¹⁵ We calculated marginal effects using the SAS PROC QLIM command. Since the derivative is not strictly defined for discrete explanatory variables, we plan to calculate the marginal effects by directly computing the effect of changing a predictor from 0 to 1 ($p_{xi} - p_{xj}$ the difference in event probabilities at levels i and j of the predictor) in the final version of this paper.

the mortgage market channel. Wholesale (as opposed to retail) originations are significantly more likely to result in a subprime ARM, whereas loans originated by federally regulated financial institutions within their CRA assessment areas were significantly less likely to be a subprime ARM. Loans that were sold to Fannie and Freddie were less likely to be subprime ARMs, and those held in portfolio more likely to be subprime ARMs, than those sold into private mortgage backed securities.¹⁶

Yet the model reveals that even after controlling for all these other variables, there remain significant racial differences in mortgage product choice. The model does successfully account for a large share of the race/ethnicity differentials in the probability of taking out a subprime, adjustable rate mortgage. Without controls, the marginal effects of the Black and Hispanic variables are 33.9 and 35.7 percent respectively; with controls, these drop to 6.7 and 7.9 percent. Still, the difference is still substantial, roughly equivalent to the marginal effect of raising one's credit score by 100 points. And while our model can't control for all of the factors that might lead to a higher probability of receiving a subprime ARM (e.g. wealth and/or financial literacy differences by race and ethnicity), in principle, we have controlled for most of the measures that lenders use in underwriting (Blackburn and Vermilyea 2004). As Alan White (2009b) has cautioned, while we empirically might want to "explain away" all the differences by continually adding in more information, a true test of mortgage discrimination would focus only on those variables that are routinely used in the lending decision.

Table 5 presents the results when we stratify the model by race/ethnicity, focusing only on the likelihood of receiving a subprime ARM (this model includes both purchase and refinance loans – see Appendix A for non-stratified model for all loans). While there are few differences between these models and the one for the full sample, what is striking is the difference in the importance of the marginal effects of the mortgage market channel variables for black and Hispanics in comparison to whites. For Blacks in particular, the marginal effect of using a broker is significantly higher than that for whites. Even after controlling for all the other borrower and loan characteristics, Blacks who obtained their loan through a mortgage broker were 10 percent more likely to obtain a subprime ARM as opposed to a prime FRM; for whites, using a mortgage broker increased this by only 3.5 percent. In contrast, loans originated by a CRA regulated institution have a greater protective effect for blacks than for whites. Blacks who obtained a loan through a federally regulated institution within their CRA assessment area were 13.5 percent less likely to get a subprime ARM than Blacks who obtained their loan through an independent mortgage company or through an affiliate or subsidiary of a federally regulated institution. This clearly demonstrates that racial differences in loan choice outcomes are significantly affected by the mortgage market channel. For fair lending concerns, this suggests there may be a need to shift the focus of fair lending examinations that emphasize whether or not individual institutions make different decisions based on race and ethnicity, and instead look more broadly at system-wide mortgage lending channels and products.

¹⁶ Including these variables could lead to endogeneity concerns; however, we tried the models with and without these variables, without any change to the sign or significance of the other coefficients.

Empirical Results: Determinants of Default

In this following section, we use mortgage market channel variables as an instrument to model differences in the default rates among racial and ethnic groups. As discussed above, determining the predictors of default—in particular, to see if racial and ethnic differences in default rates remain after controlling for other observable characteristics—presents model specification challenges. Many variables that could influence foreclosure (e.g. wealth or financial knowledge) are closely correlated with race and ethnicity. Moreover, a borrower's loan terms can't be treated as exogenous variables: It is likely that the "risk" factors that affect whether or not a borrower receives a higher-priced loan or a prepayment penalty also affect the likelihood of foreclosure. A single-equation regression model would thus likely yield biased coefficients. Indeed, in our estimation of the bivariate probit model, we found that the correlation parameter (ρ) between the probability of receiving a higher cost loan and being in default was strong and significant.

To help address this concern, we estimate a bivariate logit model in which the choice of a subprime loan and default are both treated as dependent variables. The predicted probability of choosing a subprime loan in the first model is used as an explanatory variable in the second model of default. For our instrumental variables, we selected to use variables that assess the effect of mortgage market channels on the likelihood of taking out a subprime loan. While the previous section documented the strong relationship between the mortgage market channel and loan choice, especially for minorities, there is no reason to assume that the originating lender or channel should have any effect on the decision to default. Instead, the decision to default is likely to be driven by household economic circumstances, be it the unexpected loss of income, declining house values (leading to a borrower being under water), or unsustainable loan terms (Foote et al. 2009, Doms et al. 2007). The one exception to this could be if one type of lender or servicer was more likely than another to modify a loan for a borrower in distress (for example, a loan held in portfolio may be easier to modify than one sold to a private investor), but given the small number of modifications that occurred before October 2008 we do not believe this is an important factor in our analysis. In addition, the discrepancy in modification rates between delinquent loans held in portfolio versus those privately securitized has been found to not be as large as it is often made out to be in policy circles and in media reports (Foote et al. 2009). Moreover, the other variables that we use as instruments, such as wholesale origination, should have no influence on the decision to default, since a broker does not have a role in the loan modification process.

We also add some new variables to the second stage of the model that we think may be important in predicting default. We include a county level measure of unemployment, as well as the income level of the census tract in which the home is located. We add two variables to control for "riskier" loan terms, including whether or not the loan is an adjustable rate mortgage and whether it has a prepayment penalty. We also include a measure of lack of affordability: this represents the percent of income the homeowner is spending on their monthly principal and interest payments. For our measure of house price change, we shift to using the change in house prices in the 2 years after purchase (as opposed to in the 2 years before purchase).

The results of our analysis are presented in Tables 6 and 7, again presenting separate models for purchases versus refinance loans.

For purchase loans, the model demonstrates the importance of house price changes in the decision to default. High loan-to-value ratios, as well as house price declines of over 20 percent, both strongly increase the likelihood of default. All other variables being held constant, house price declines of 20 percent or more increased the likelihood of default by 14.9 and 16.7 percentage points, compared to areas that saw sustained house price appreciation after origination. A higher unemployment rate also increases the likelihood of default, although the marginal effect is quite small—the lack of a strong effect here could be in part due to the fact that unemployment is measured at the county level, and not at the household. Higher FICO scores and full documentation both decrease the likelihood of default. Interestingly, affordability as measured by the ratio of monthly principal and interest payment to income is not a significant predictor of default for purchase loans, though the effect is significant but small for refinance loans. This is similar to findings by researchers at the Federal Reserve Bank of Boston, who found that debt-to-income was a poor predictor of delinquency in comparison with other factors such as the loan-to-value ratio (Foote et al. 2009). In this case, we surmise that the lack of effect may also be due to the fact that affordability is measured at origination, not at the time of delinquency or default.

Loan features also appear to matter. The presence of an adjustable rate mortgage increases the likelihood of default by 4.4 percent, and a prepayment penalty increases the likelihood of default by 5.1 percent. More striking, however, is the marginal effect of receiving a higher-priced loan. Borrowers with higher-priced loans were 15.7 percent more likely to be in default, even after controlling for loan-to-value, FICO scores, and house price change.

In contrast, the marginal effects of race after controlling for all these factors is quite small: Blacks are only 0.8 percent more likely to be in default than whites; Hispanics only 2.2 percent; and Asians only 1.7 percent. In other words, we do not find large variations in loan performance by race and/or ethnicity after controlling for loan choice, borrower risk factors, and economic changes at the MSA level.

The stronger marginal effect of the Hispanic and Asian variables, in comparison to the Black variable, may be explained by differences related to immigration status, including the presence of language barriers, limited knowledge of the financial system in the US, and/or other cultural differences that may influence the likelihood of default. The greater effect for Asians is noteworthy, since the low incidence of subprime lending in this community has meant that there has been less of a focus on foreclosure prevention outreach among Asian populations. Even though Asians overall have a lower foreclosure rate than Blacks and Hispanics, after controlling for other factors such as income and borrower risk, there clearly remains a segment of the Asian population that is vulnerable to higher rates of default. This finding suggests the need to develop culturally and linguistically relevant foreclosure prevention resources for multiple market segments, and to conduct outreach through a much larger network of nonprofits and community-based organizations.

Another interesting finding is that although neighborhood income level is not significant in the default decision for the loan purchase model, it is significant in refinance model. In particular, low-income neighborhoods increase the likelihood of default. While it is difficult to provide empirical evidence for why this might be the case, it is consistent with anecdotal evidence that some mortgage lenders and brokers aggressively marketed refinance loans in lower-income and minority neighborhoods. The California Reinvestment Coalition, for example, interviewed subprime refinance borrowers in four California cities and found that a large share of respondents reported that the idea to refinance came from their lender or broker, through mail, telephone or door-to-door solicitations (California Reinvestment Coalition 2009). Understanding why and how lower-income and minority households refinanced their homes during this time period is a critical question for researchers, especially since it appears that refinancing during the subprime boom led to significant equity stripping, and the resulting concentration of foreclosures in lower-income communities threatens to undo decades of community development work.

Conclusion

As far as we know, this paper focuses empirical attention for the first time on the consequences of subprime lending on individuals and communities of color, and directs concerns over fair lending not only to the question of disparate treatment, but also to whether prevailing lending standards during the subprime lending boom led to disparate impacts for minority borrowers.

Several findings stand out. Importantly, this paper shows that the foreclosure crisis is disproportionately affecting communities of color. Over our study period, the default rate for Black and Hispanic homeowners was more than twice that of whites. Approximately two-thirds of all foreclosures in California have been among Black, Hispanic, and Asian borrowers, with significant implications for their future financial stability and the neighborhoods in which they live.

While we can't control for all the factors that have led to these different foreclosure rates, we do show that they stem from a series of complicated and interrelated factors, including different credit profiles, the 'boom and bust' cycle that characterized house prices in California between 2004 and 2008, and the rising unemployment rate. But we also show that Blacks and Hispanics in California had access to very different mortgage markets, and that mortgage market channels played an important role in the likelihood of receiving a riskier loan product. For instance, Blacks who obtained their loan through a mortgage broker were 10 percent more likely to receive a subprime ARM than those who went through the retail side of the bank, and 13.5 percent less likely to receive a prime ARM if they obtained their loan through a federally regulated institution within its CRA assessment area. The map in Figure 2 also shows that a disproportionate number of loans in lower-income and minority communities were made by independent mortgage companies that fell outside the purview of federal regulatory oversight. Geographic distance from federally regulated financial institutions doesn't seem to be a defining feature of this phenomenon: even in a relatively small area like Oakland, minorities were more likely to get a high-cost loan from an independent mortgage company. We think this provides strong evidence that the structure of the mortgage market during the subprime lending boom in California interacted with

the historical legacy of credit rationing and discrimination to the distinct disadvantage of Black and Hispanic borrowers (Engel and McCoy 2002; Wyly, Hammel and Atia 2004).

Once we control for the likelihood of getting a higher-priced loan, the differences in foreclosure rates among minorities and whites shrinks considerably. Indeed, in our bivariate logit model, we find that the race variables have only a small marginal effect on the likelihood of default. This has important policy implications, since while it is difficult for public policy to tackle deep and fundamental racial inequalities, it is much easier to develop policies and regulations that can affect the functioning of mortgage markets. Although we can't say for certain whether or not minorities actively sought out subprime loans—for example, due to differences in wealth or a distrust of banks—the negative consequences of the lack of regulatory oversight of the terms of subprime loans have been severe. Moreover, while some might argue that this paper lends evidence to the idea that lenders priced loans correctly, we believe that the continued and unexplained discrepancy in the incidence of higher priced lending among minority borrowers needs to be addressed. This is especially true since we have shown that minority borrowers were not randomly distributed across mortgage market channels and products. More research in this area is needed, particularly research that teases out disparate-impact discrimination in loan performance scoring and underwriting (Ross and Yinger 2003).

This paper also attests to the need for more research that analyzes the effects of the recent subprime crisis and subsequent foreclosures on lower-income and minority households. Our study is limited in that it is focused only on the California experience, and there is much more work to be done to understand the complex interactions between race, mortgage and housing markets, foreclosure, and the long term impacts on families and communities. How did borrowers decide on which loan product to accept, and how knowledgeable were they about their loan terms? Were refinance loans in lower-income and minority communities “sold not sought?” What are the implications of this for the long-term wealth among communities of color? And what are the downsides of regulations that might limit product choice in such a way that it becomes even more difficult to close the homeownership and wealth gaps between minority and white households in the U.S.?

None of these questions are easily answered. That said, we believe that this paper provides compelling evidence for the need to revisit consumer protection regulations and fair lending laws, and to consider not only discrimination at the individual bank level, but also to ensure that certain borrowers aren't unfairly served by different mortgage market channels and systems.

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TABLE 1: WEIGHTED SAMPLE MEANS AND FREQUENCIES

	Frequency	Percent		Frequency	Percent
<u>TOTAL LOANS</u>			<u>MORTGAGE MARKET CHANNELS</u>		
Purchase	1,278,993		<u>CRA Regulated Institution</u>	737,857	57.7
Refinance	356,860	27.9	Outside Assessment Area	70,409	5.5
	922,133	72.1	Inside Assessment Area	667,449	52.2
<u>RACE OF BORROWER</u>			Independent Mortgage Company	291,407	22.8
White	712,967	55.7	Affiliate or Subsidiary of Federally Regulated Institution	249,728	19.5
Black	70,549	5.5			
Hispanic	305,948	23.9	Wholesale	472,542	37.0
Asian	189,529	14.8	Retail	552,053	43.2
			Correspondent	254,399	19.9
<u>CENSUS TRACT CHARACTERISTICS</u>			Fannie/Freddie	595,962	46.6
Low-Income Census Tract	28,015	2.2	Private Securitized	501,743	39.2
Moderate-Income Census Tract	203,218	15.9	Portfolio	181,288	14.2
Middle-Income Census Tract	514,629	40.2			
Upper-Income Census tract	755,089	59.0			
Underserved by Financial Services	630,743	49.3	<u>CONTINUOUS VARIABLES</u>		
				Mean	Std. Deviation
<u>LOAN CHARACTERISTICS</u>			Income	113,257	105,909
Prepayment Penalty	289,435	23.0	Loan to Value Ratio	64.1	25.0
ARM	673,484	52.7	FICO Score at Origination	714.4	85.3
Full Documentation	755,089	59.0	County Unemployment Rate (Oct 08)	10.9	3.8
Conforming Loan Limit	942,212	73.7	Percent Change in House Prices (2 Years Before Origination)	41.3	18.9
<u>Higher-priced</u>	125,962	9.9	Percent Change in House Prices (2 Years After Origination)	19.1	33.9
Higher-priced Purchase	47,352	13.3	Census Tract Mortgage Denial Rate	15.3	5.3
Higher-Priced Refinance	78,611	8.5	Percent College	37.0	27.8
			Herfindahl-Hirshmann Index	1,518	344.8
Seriously Delinquent	56,202	4.4	Monthly Payment as a Percent of Income	25.9	19.8

TABLE 2: DESCRIPTIVE STATISTICS BY RACE (weighted)

	<u>White</u>	<u>Black</u>	<u>Hispanic</u>	<u>Asian</u>
Total Loans	55.7	5.5	23.9	14.8
Purchase	25.9	20.6	29.1	36.1
Refinance	74.1	79.4	70.9	63.9
Higher-Priced Loan	5.9	20.8	19.2	5.7
Income (Mean)	123,197	94,466	85,962	126,919
FICO at Origination				
FICO <620	4.3	13.4	9.4	2.7
620 <= FICO < 680	18.4	32.0	29.7	13.9
680 <= FICO < 720	22.6	23.6	25.3	22.0
720 <= FICO < 780	37.7	24.1	28.5	44.3
FICO >= 780	17.1	6.9	7.1	17.2
Loan to Value				
LTV <=65	46.3	36.7	36.5	38.7
65 < LTV <=70	11.6	12.2	11.5	11.1
70 < LTV <=80	39.3	44.4	46.1	47.5
80 < LTV <=90	2.1	5.4	4.4	2.1
LTV > 90	0.7	1.3	1.5	0.6
Full Documentation	60.7	61.2	55.7	57.5
Conforming Loan Limit	70.1	82.7	86.4	63.3
Underserved by Financial Services	35.3	69.7	76.2	51.1
Census Tract Mortgage Denial Rate (Mean)	14.2	17.6	17.3	14.8
Wholesale Origination Channel	55.0	56.9	58.3	61.6
CRA in Assessment Area	52.8	42.0	48.8	59.1
Percent College (Mean)	42.1	29.6	22.9	43.6

Figure 1: Percent of Borrowers Who Received a Higher-Priced Loan by FICO Score

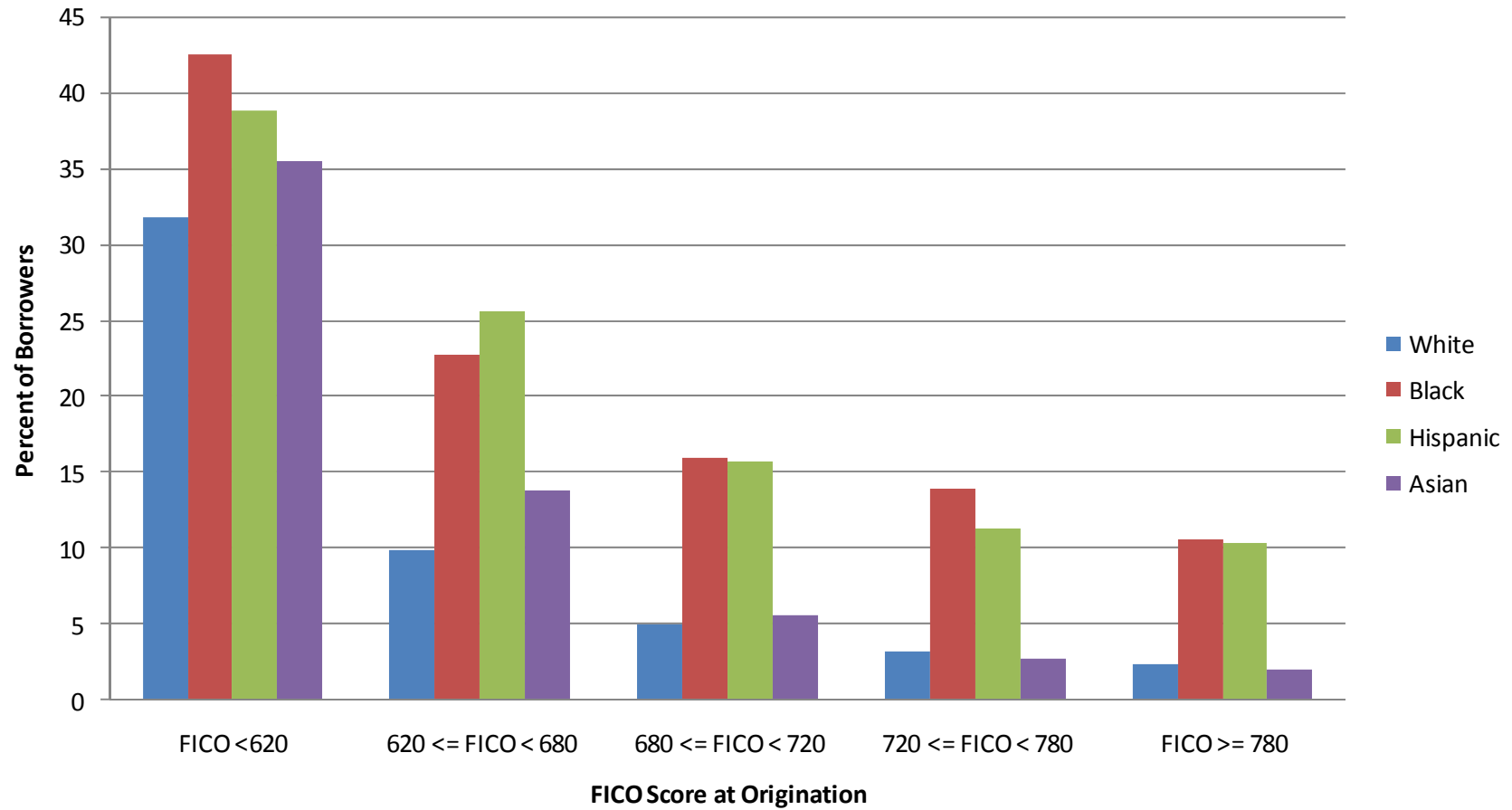
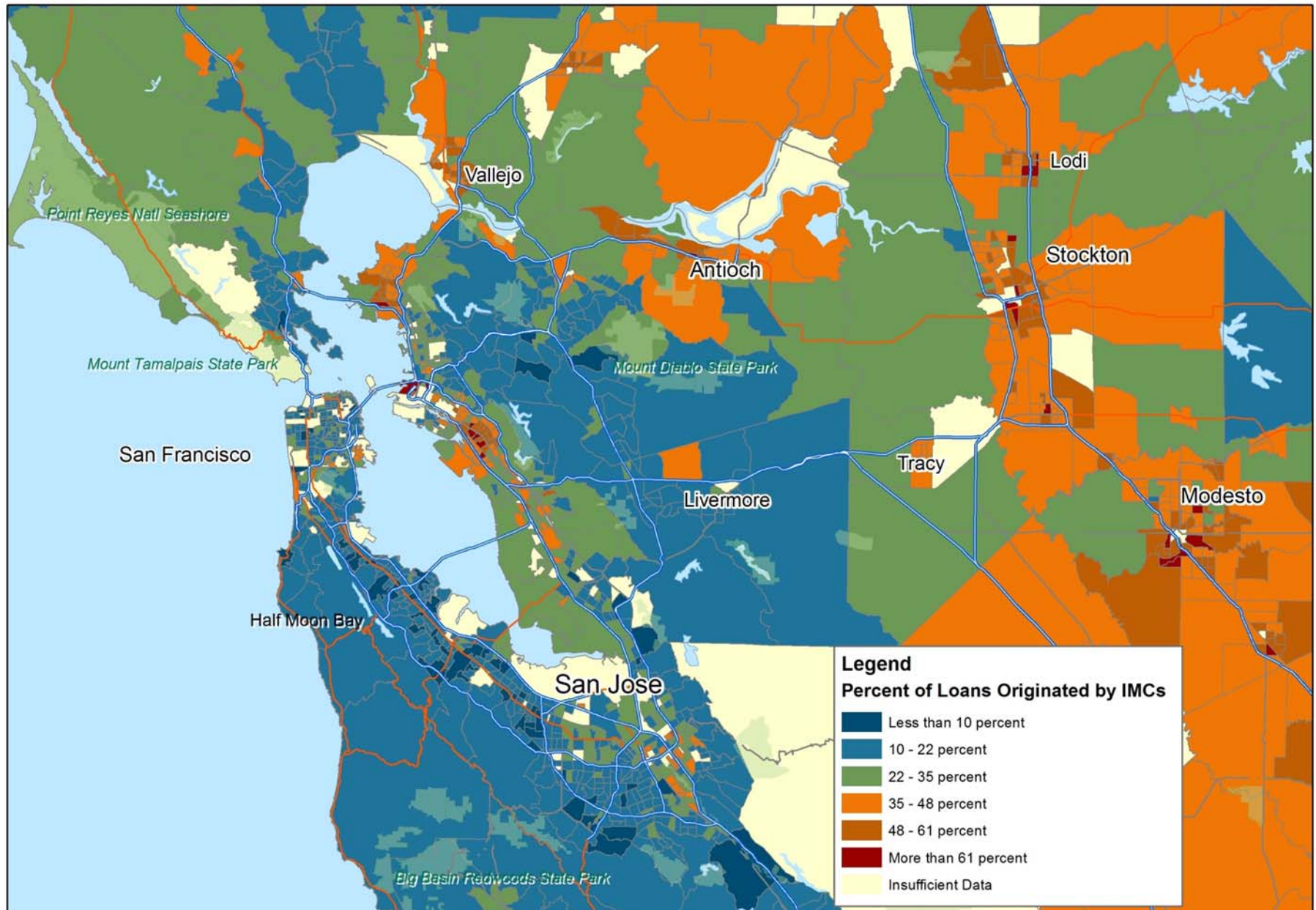


Figure 2: Geographic Distribution of Loans Made by Independent Mortgage Companies
 As a Share of Loans Originated between 2004 and 2006 in the San Francisco Bay Area



Source: HMDA/LPS Merged Dataset, data aggregated and presented at the census tract level. Insufficient data refers to tracts that have less than 50 loans in the merged dataset.

Figure 3: Percent of Loans in Default

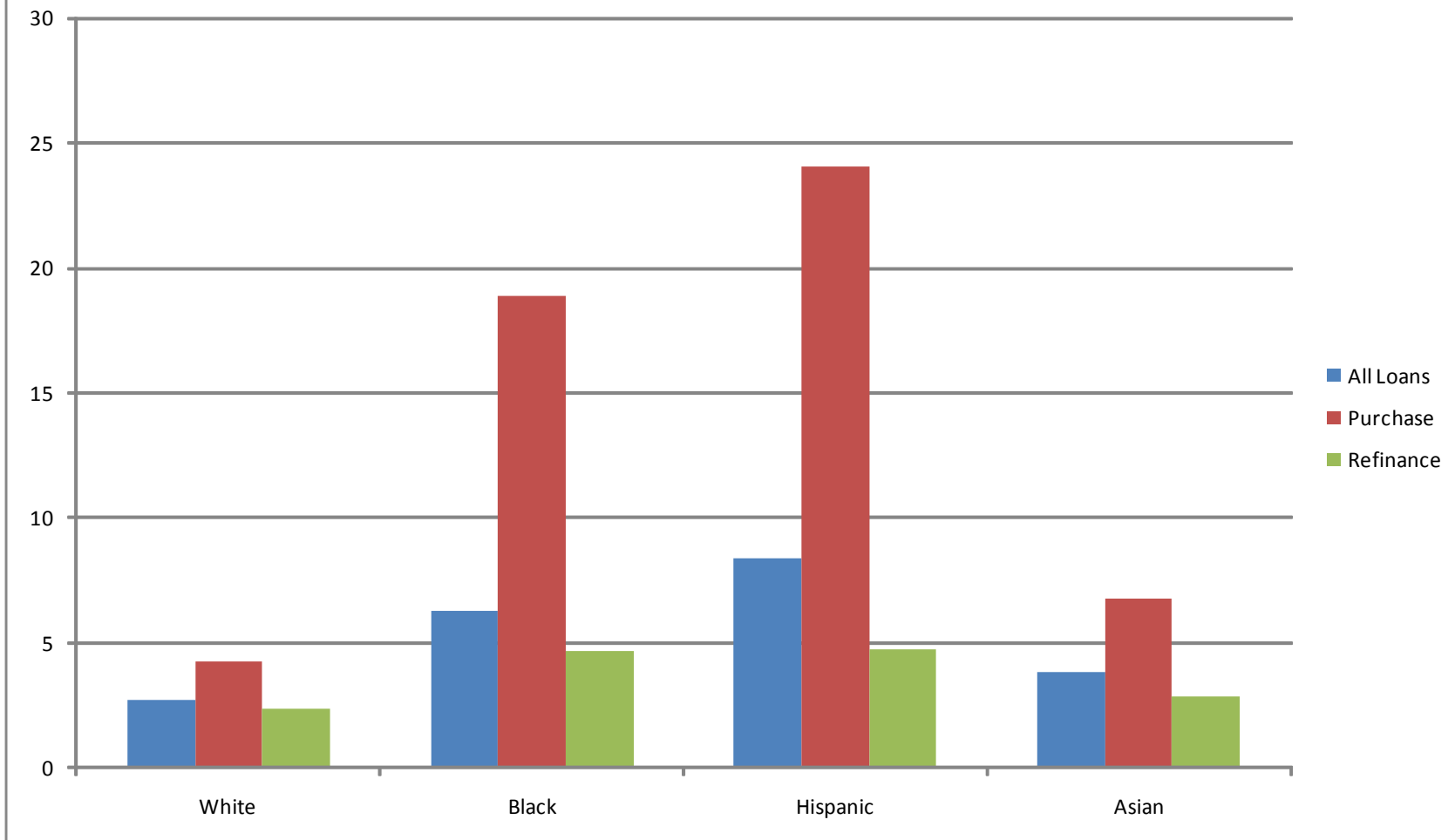
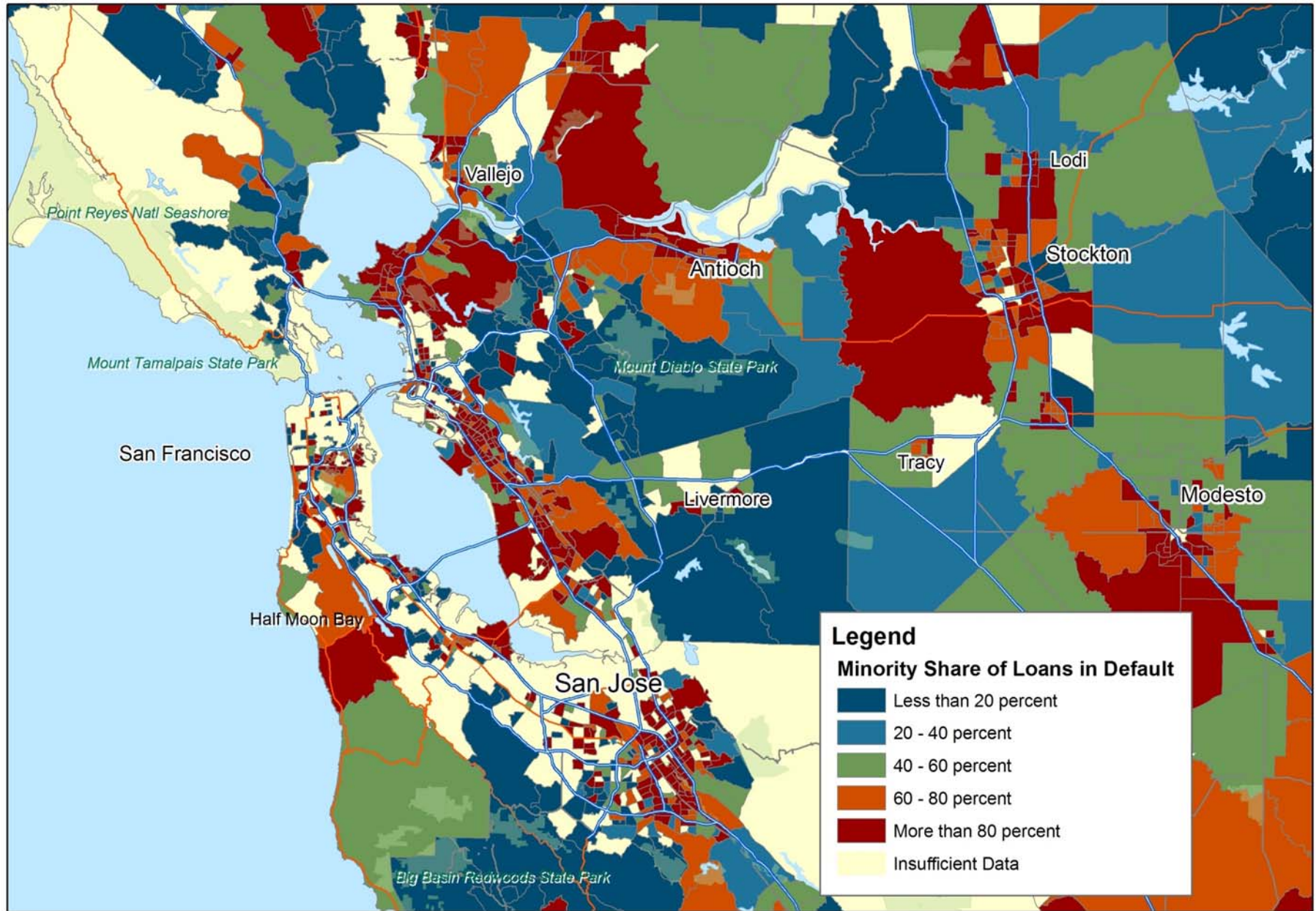


Figure 4: Percent of Loans in Default Held by Minority Homeowners
As a Share of Loans Originated between 2004 and 2006 in the San Francisco Bay Area



Source: HMDA/LPS Merged Dataset, data aggregated and presented at the census tract level. Insufficient data refers to tracts that have less than 25 loans in default merged dataset.

TABLE 3: MULTINOMIAL LOGIT MODEL OF PRODUCT CHOICE - PURCHASE ONLY

		Prime Adjustable Rate Mortgage			Subprime Fixed Rate Mortgage			Subprime Adjustable Rate Mortgage		
		Coefficient	Standard Error	Marginal Effect	Coefficient	Standard Error	Marginal Effect	Coefficient	Standard Error	Marginal Effect
Intercept		0.294	0.066 ***		-1.186	0.220 ***		-2.157	0.147 ***	
<u>Borrower and Loan Risk Characteristics</u>										
Race	Black	0.111	0.027 ***	1.7	0.920	0.060 ***	4.2	0.995	0.045 ***	6.7
	Hispanic	0.046	0.013 **	0.7	1.091	0.033 ***	4.9	1.175	0.026 ***	7.9
	Asian	-0.006	0.012	-0.1	-0.252	0.053 ***	-1.1	0.319	0.030 ***	2.1
Income		0.000	0.000 ***	0.0	0.003	0.000 ***	0.0	0.004	0.000 ***	0.0
FICO	620 <= FICO < 680	-0.537	0.031 ***	-8.1	-0.722	0.068 ***	-3.3	-1.153	0.044 ***	-7.8
	680 <= FICO < 720	-0.700	0.031 ***	-10.6	-0.650	0.067 ***	-2.9	-1.915	0.045 ***	-12.9
	720 <= FICO < 780	-0.899	0.031 ***	-13.6	-0.816	0.066 ***	-3.7	-2.509	0.045 ***	-16.9
	FICO >= 780	-1.238	0.032 ***	-18.7	-0.936	0.073 ***	-4.2	-2.876	0.055 ***	-19.4
Loan to Value	65 < LTV <=70	0.572	0.020 ***	8.6	0.207	0.060 **	0.9	0.893	0.064 ***	6.0
	70 < LTV <=80	1.295	0.012 ***	19.5	0.323	0.036 ***	1.5	2.134	0.043 ***	14.4
	80 < LTV <=90	0.684	0.025 ***	10.3	0.058	0.068	0.3	1.822	0.058 ***	12.3
	LTV > 90	-0.009	0.029	-0.1	0.184	0.068 *	0.8	0.721	0.068 ***	4.9
Full Documentation		-1.059	0.010 ***	-16.0	-0.392	0.029 ***	-1.8	-1.031	0.021 ***	-6.9
Conforming Loan Amount		0.075	0.015 ***	1.1	0.527	0.066 ***	2.4	0.261	0.030 ***	1.8
				0.0			0.0			0.0
				0.0			0.0			0.0
<u>Neighborhood Characteristics</u>										
House Price Change	20 >= HPC < 42	-0.157	0.018 ***	-2.4	0.273	0.096 *	1.2	0.606	0.055 ***	4.1
	42 >= HPC < 60	-0.232	0.019 ***	-3.5	0.569	0.095 ***	2.6	0.904	0.054 ***	6.1
	HPC >= 60	-0.550	0.031 ***	-8.3	0.984	0.103 ***	4.4	1.324	0.067 ***	8.9
Percent College Educated		0.009	0.000 ***	0.1	-0.015	0.001 ***	-0.1	-0.009	0.001 ***	-0.1
Herfindahl-Hirshmann Index		0.001	0.000 ***	0.0	-0.001	0.000 ***	0.0	0.000	0.000 ***	0.0
Census Tract Denial Rate		0.009	0.002 ***	0.1	0.016	0.005 *	0.1	0.042	0.004 ***	0.3
Underserved Census Tract		0.099	0.012 ***	1.5	0.160	0.038 ***	0.7	0.295	0.028 ***	2.0
				0.0			0.0			0.0
				0.0			0.0			0.0
<u>Mortgage Market Channel</u>										
Wholesale Origination Channel		0.223	0.010 ***	3.4	0.434	0.036 ***	2.0	1.307	0.027 ***	8.8
CRA in Assessment Area		0.556	0.010 ***	8.4	-1.848	0.050 ***	-8.3	-1.281	0.030 ***	-8.6
Securitization	Fannie/Freddie	-1.571	0.012 ***	-23.7	-0.030	0.037	-0.1	-2.981	0.029 ***	-20.1
	Held in Portfolio	0.506	0.015 ***	7.6	0.171	0.085	0.8	0.759	0.032 ***	5.1

TABLE 4: MULTINOMIAL LOGIT MODEL OF PRODUCT CHOICE - REFINANCE ONLY

		Prime Adjustable Rate Mortgage			Subprime Fixed Rate Mortgage			Subprime Adjustable Rate Mortgage		
		Coefficient	Standard Error	Marginal Effect	Coefficient	Standard Error	Marginal Effect	Coefficient	Standard Error	Marginal Effect
Intercept		-0.191	0.038 ***		-0.771	0.095 ***		-0.631	0.099 ***	
<u>Borrower and Loan Risk Characteristics</u>										
Race	Black	-0.031	0.013	-0.5	0.910	0.020 ***	5.0	0.920	0.025 ***	3.3
	Hispanic	-0.290	0.008 ***	-4.5	0.540	0.014 ***	2.9	0.643	0.018 ***	2.3
	Asian	-0.178	0.008 ***	-2.8	-0.301	0.029 ***	-1.6	0.368	0.025 ***	1.3
Income		-0.001	0.000 ***	0.0	-0.003	0.000 ***	0.0	0.001	0.000 ***	0.0
FICO	620 <= FICO < 680	-0.347	0.015 ***	-5.4	-0.196	0.023 ***	-1.1	-1.708	0.021 ***	-6.1
	680 <= FICO < 720	-0.415	0.015 ***	-6.5	-0.250	0.024 ***	-1.4	-2.228	0.023 ***	-7.9
	720 <= FICO < 780	-0.472	0.014 ***	-7.4	-0.252	0.024 ***	-1.4	-2.480	0.024 ***	-8.8
	FICO >= 780	-0.601	0.016 ***	-9.4	-0.140	0.029 ***	-0.8	-2.621	0.038 ***	-9.3
Loan to Value	65 < LTV <=70	0.583	0.009 ***	9.1	0.381	0.017 ***	2.1	0.596	0.024 ***	2.1
	70 < LTV <=80	1.038	0.007 ***	16.2	0.396	0.014 ***	2.1	1.178	0.018 ***	4.2
	80 < LTV <=90	1.216	0.021 ***	19.0	0.498	0.035 ***	2.7	1.953	0.030 ***	7.0
	LTV > 90	0.911	0.065 ***	14.2	0.988	0.135 ***	5.4	2.300	0.079 ***	8.2
Full Documentation		-1.322	0.006 ***	-20.6	0.020	0.013	0.1	-0.757	0.015 ***	-2.7
Conforming Loan Amount		-0.137	0.010 ***	-2.1	-0.162	0.035 ***	-0.9	-0.508	0.023 ***	-1.8
				0.0			0.0			0.0
				0.0			0.0			0.0
<u>Neighborhood Characteristics</u>										
House Price Change	20 >= HPC < 42	-0.071	0.010 ***	-1.1	0.418	0.043 ***	2.3	0.370	0.036 ***	1.3
	42 >= HPC < 60	-0.112	0.010 ***	-1.7	0.971	0.043 ***	5.3	0.662	0.036 ***	2.4
	HPC >= 60	-0.560	0.020 ***	-8.7	1.306	0.046 ***	7.1	0.755	0.047 ***	2.7
Percent College Educated		0.012	0.000 ***	0.2	-0.025	0.001 ***	-0.1	-0.012	0.001 ***	0.0
Herfindahl-Hirschmann Index		0.000	0.000 ***	0.0	-0.001	0.000 ***	0.0	0.000	0.000 ***	0.0
Census Tract Denial Rate		0.002	0.001	0.0	0.024	0.002 ***	0.1	0.035	0.003 ***	0.1
Underserved Census Tract		0.021	0.008 *	0.3	0.076	0.017 ***	0.4	0.135	0.021 ***	0.5
				0.0			0.0			0.0
				0.0			0.0			0.0
<u>Mortgage Market Channel</u>										
Wholesale Origination Channel		0.220	0.006 ***	3.4	0.209	0.013 ***	1.1	0.817	0.018 ***	2.9
CRA in Assessment Area		1.007	0.006 ***	15.7	-2.679	0.025 ***	-14.5	-1.878	0.024 ***	-6.7
Securitization	Fannie/Freddie	-1.548	0.007 ***	-24.1	-0.104	0.016 ***	-0.6	-2.257	0.018 ***	-8.0
	Held in Portfolio	0.735	0.010 ***	11.5	-0.156	0.050 *	-0.8	1.399	0.024 ***	5.0

Table 5: Likelihood of Obtaining a Subprime ARM over a Prime FRM, All Loans, Stratified by Race

		White Borrowers			Black Borrowers			Hispanic Borrowers			Asian Borrowers	
		Coefficient	Standard Error	Marginal Effect	Coefficient	Standard Error	Marginal Effect	Coefficient	Standard Error	Marginal Effect	Coefficient	Standard Error
Intercept		-1.23	0.124433 ***		-1.361568	0.2584 ***		-0.677891	0.144343 ***		-0.979	0.225054 ***
<u>Borrower and Loan Risk Characteristics</u>												
Income		0.002	0.000 ***	0.0	0.004	0.000 ***	0.0	0.008	0.000 ***	0.0	0.003	0.000 ***
FICO	620 <= FICO < 680	-1.820	0.028 ***	-6.2	-1.340	0.054 ***	-10.3	-1.134	0.030 ***	-7.3	-1.757	0.072 ***
	680 <= FICO < 720	-2.416	0.031 ***	-8.2	-1.689	0.062 ***	-12.9	-1.660	0.033 ***	-10.7	-2.502	0.073 ***
	720 <= FICO < 780	-2.703	0.031 ***	-9.2	-1.771	0.064 ***	-13.6	-1.906	0.034 ***	-12.3	-3.212	0.073 ***
	FICO >= 780	-2.890	0.043 ***	-9.8	-1.822	0.107 ***	-14.0	-1.869	0.057 ***	-12.1	-3.510	0.086 ***
Loan to Value	65 < LTV <=70	0.751	0.034 ***	2.6	0.893	0.070 ***	6.8	0.454	0.038 ***	2.9	0.399	0.071 ***
	70 < LTV <=80	1.468	0.024 ***	5.0	1.685	0.050 ***	12.9	1.699	0.025 ***	11.0	1.787	0.047 ***
	80 < LTV <=90	1.943	0.041 ***	6.6	2.002	0.080 ***	15.4	1.682	0.042 ***	10.9	2.338	0.083 ***
	LTV > 90	1.491	0.072 ***	5.1	1.336	0.133 ***	10.2	1.199	0.066 ***	7.7	1.571	0.138 ***
Full Documentation		-0.679	0.019 ***	-2.3	-0.885	0.039 ***	-6.8	-1.218	0.020 ***	-7.9	-0.842	0.033 ***
Conforming Loan Amount		-0.060	0.028	-0.2	-0.045	0.061	-0.3	-0.085	0.034 *	-0.6	-0.358	0.044 ***
<u>Neighborhood Characteristics</u>												
	20 >= HPC < 42	0.395	0.046 ***	1.3	0.284	0.099 *	2.2	0.313	0.060 ***	2.0	0.979	0.069 ***
House Price Change	42 >= HPC < 60	0.749	0.046 ***	2.5	0.585	0.097 ***	4.5	0.704	0.059 ***	4.5	1.118	0.070 ***
	HPC >= 60	0.925	0.058 ***	3.1	0.585	0.130 ***	4.5	0.997	0.068 ***	6.4	1.714	0.114 ***
Percent College Educated		-0.010	0.001 ***	0.0	-0.005	0.002 *	0.0	-0.013	0.001 ***	-0.1	-0.003	0.001
Herfindahl-Hirshmann Index		0.000	0.000	0.0	0.000	0.000 ***	0.0	0.000	0.000 ***	0.0	-0.001	0.000 ***
Census Tract Denial Rate		0.027	0.004 ***	0.1	0.057	0.007 ***	0.4	0.023	0.004 ***	0.2	0.089	0.006 ***
Underserved Census Tract		0.217	0.023 ***	0.7	0.402	0.057 ***	3.1	0.283	0.031 ***	1.8	0.081	0.044
<u>Mortgage Market Channel</u>												
Wholesale Origination Channel		1.026	0.024 ***	3.5	1.313	0.046 ***	10.1	0.993	0.026 ***	6.4	0.811	0.041 ***
CRA in Assessment Area		-2.151	0.036 ***	-7.3	-1.762	0.062 ***	-13.5	-2.048	0.032 ***	-13.2	-0.803	0.039 ***
Securitization	Fannie/Freddie	-2.473	0.024 ***	-8.4	-2.515	0.046 ***	-19.3	-2.680	0.024 ***	-17.3	-2.860	0.054 ***
	Held in Portfolio	1.570	0.032 ***	5.3	1.145	0.065 ***	8.8	1.280	0.034 ***	8.3	0.462	0.043 ***

TABLE 6: MODEL PREDICTING THE LIKELIHOOD OF DEFAULT - PURCHASE ONLY

<u>Pred(Likelihood of Higher Priced Loan)</u>					<u>Pred(Likelihood of Default)</u>				
		Coefficient	Standard Error	Marginal Effect			Coefficient	Standard Error	Marginal Effect
Intercept		-2.557	0.090 ***		Intercept		-7.739	0.087 ***	
<u>Borrower and Loan Risk Characteristics</u>					<u>Borrower and Loan Risk Characteristics</u>				
Race	Black	0.849	0.025 ***	6.4	Probability of Receiving Higher-Priced Loan		2.627	0.048 ***	15.7
	Hispanic	0.921	0.015 ***	7.0	Race	Black	0.130	0.033 ***	0.8
	Asian	0.218	0.020 ***	1.7		Hispanic	0.364	0.021 ***	2.2
Income		0.004	0.000 ***	0.0		Asian	0.281	0.022 ***	1.7
FICO	620 <= FICO < 680	-0.466	0.022 ***	-3.5	Income		-0.001	0.000 ***	0.0
	680 <= FICO < 720	-0.981	0.023 ***	-7.4	FICO	620 <= FICO < 680	0.191	0.028 ***	1.1
	720 <= FICO < 780	-1.309	0.024 ***	-9.9		680 <= FICO < 720	0.057	0.032	0.3
	FICO >= 780	-1.353	0.032 ***	-10.3		720 <= FICO < 780	-0.431	0.034 ***	-2.6
Loan to Value	65 < LTV <=70	0.146	0.040 **	1.1		FICO >= 780	-1.382	0.052 ***	-8.2
	70 < LTV <=80	0.487	0.026 ***	3.7	Loan to Value	65 < LTV <=70	1.071	0.078 ***	6.4
	80 < LTV <=90	0.756	0.035 ***	5.7		70 < LTV <=80	1.975	0.061 ***	11.8
	LTV > 90	0.400	0.044 ***	3.0		80 < LTV <=90	1.751	0.070 ***	10.4
Full Documentation		-0.458	0.013 ***	-3.5		LTV > 90	2.342	0.075 ***	14.0
Conforming Loan Amount		-0.039	0.018	-0.3	Full Documentation		-0.041	0.016 *	-0.2
				0.0	Ajustable Rate Mortgage		0.733	0.027 ***	4.4
				0.0	Prepayment Penalty		0.858	0.018 ***	5.1
<u>Neighborhood Characteristics</u>				0.0	Affordability		0.001	0.001	0.0
	20 >= HPC < 42	1.079	0.037 ***	8.2					0.0
House Price Change	42 >= HPC < 60	1.741	0.036 ***	13.2	<u>Neighborhood Characteristics</u>				0.0
	HPC >= 60	2.453	0.043 ***	18.6		HPC < - 20	2.806	0.025 ***	16.7
Percent College Educated		-0.017	0.001 ***	-0.1	House Price Change	- 20 >= HPC < 0	2.491	0.022 ***	14.9
Herfindahl-Hirshmann Index		-0.001	0.000 ***	0.0		0 >= HPC < 20	1.557	0.022 ***	9.3
Census Tract Denial Rate		0.027	0.002 ***	0.2	Unemployment		0.037	0.003 ***	0.2
Underserved Census Tract		0.179	0.017 ***	1.4		Low-Income	-0.075	0.040	-0.4
				0.0	Census Tract Income Level	Moderate-Income	0.036	0.022	0.2
				0.0		Middle-Income	0.025	0.018	0.2
<u>Mortgage Market Channel</u>				0.0					
Wholesale Origination Channel		0.908	0.018 ***	6.9					
CRA in Assessment Area		-2.065	0.020 ***	-15.7					
Securitization	Fannie/Freddie	-0.698	0.018 ***	-5.3					
	Held in Portfolio	-0.178	0.017 ***	-1.4					

TABLE 7: MODEL PREDICTING THE LIKELIHOOD OF DEFAULT - REFINANCE ONLY

<u>Pred(Likelihood of Higher Priced Loan)</u>					<u>Pred(Likelihood of Default)</u>						
		Coefficient	Standard Error	Marginal Effect			Coefficient	Standard Error	Marginal Effect		
Intercept		-0.171	0.063	**	Intercept		-6.948	0.054	***		
<u>Borrower and Loan Risk Characteristics</u>					<u>Borrower and Loan Risk Characteristics</u>						
Race	Black	0.841	0.015	***	4.51	Probability of Receiving Higher-Priced Loan	0.876	0.053	***	2.3	
	Hispanic	0.613	0.011	***	3.28	Race	Black	0.053	0.026	0.1	
	Asian	0.099	0.017	***	0.53		Hispanic	0.207	0.017	***	0.5
Income		0.000	0.000		0.00		Asian	0.208	0.022	***	0.5
FICO	620 <= FICO < 680	-1.044	0.013	***	-5.59	Income		0.002	0.000	***	0.0
	680 <= FICO < 720	-1.306	0.014	***	-7.00	FICO	620 <= FICO < 680	-0.016	0.025		0.0
	720 <= FICO < 780	-1.381	0.014	***	-7.40		680 <= FICO < 720	-0.518	0.029	***	-1.3
	FICO >= 780	-1.260	0.021	***	-6.75		720 <= FICO < 780	-1.114	0.030	***	-2.9
Loan to Value	65 < LTV <=70	0.258	0.013	***	1.38		FICO >= 780	-2.146	0.059	***	-5.5
	70 < LTV <=80	0.372	0.010	***	1.99	Loan to Value	65 < LTV <=70	1.012	0.027	***	2.6
	80 < LTV <=90	0.818	0.019	***	4.38		70 < LTV <=80	1.716	0.021	***	4.4
	LTV > 90	1.111	0.055	***	5.95		80 < LTV <=90	2.063	0.033	***	5.3
Full Documentation		-0.109	0.009	***	-0.59		LTV > 90	2.389	0.066	***	6.2
Conforming Loan Amount		-0.388	0.016	***	-2.08	Full Documentation		-0.157	0.014	***	-0.4
					0.00	Ajustable Rate Mortgage		0.583	0.019	***	1.5
					0.00	Prepayment Penalty		0.439	0.017	***	1.1
					0.00	Affordability		0.004	0.001	***	0.0
					0.00						0.0
<u>Neighborhood Characteristics</u>					<u>Neighborhood Characteristics</u>						
	20 >= HPC < 42	0.486	0.025	***	2.60		HPC < - 20	2.190	0.021	***	5.7
House Price Change	42 >= HPC < 60	0.891	0.025	***	4.77	House Price Change	- 20 >= HPC < 0	1.844	0.020	***	4.8
	HPC >= 60	1.317	0.029	***	7.06		0 >= HPC < 20	1.114	0.021	***	2.9
Percent College Educated		-0.024	0.000	***	-0.13	Unemployment		0.064	0.003	***	0.2
Herfindahl-Hirshmann Index		-0.001	0.000	***	0.00		Low-Income	0.288	0.040	***	0.7
Census Tract Denial Rate		0.031	0.002	***	0.17	Census Tract Income Level	Moderate-Income	0.099	0.021	***	0.3
Underserved Census Tract		0.104	0.012	***	0.56		Middle-Income	0.103	0.017	***	0.3
					0.00						
<u>Mortgage Market Channel</u>											
Wholesale Origination Channel		0.436	0.010	***	2.34						
CRA in Assessment Area		-2.757	0.016	***	-14.77						
Securitization	Fannie/Freddie	-0.417	0.011	***	-2.23						
	Held in Portfolio	0.005	0.015		0.03						

Appendix A: Product Choice Model for Full Sample (includes both purchase and refinance)

		Prime Adjustable Rate Mortgage			Subprime Fixed Rate Mortgage			Subprime Adjustable Rate Mortgage		
		Coefficient	Standard Error	Marginal Effect	Coefficient	Standard Error	Marginal Effect	Coefficient	Standard Error	Marginal Effect
Intercept		-0.160	0.033 ***		-0.922	0.087 ***		-1.495	0.080 ***	
<u>Borrower and Loan Risk Characteristics</u>										
Race	Black	-0.023	0.011	-0.4	0.934	0.019 ***	5.0	0.942	0.022 ***	4.4
	Hispanic	-0.184	0.007 ***	-2.9	0.623	0.013 ***	3.3	0.929	0.014 ***	4.3
	Asian	-0.099	0.007 ***	-1.5	-0.331	0.025 ***	-1.7	0.425	0.019 ***	2.0
Income		-0.001	0.000 ***	0.0	-0.002	0.000 ***	0.0	0.003	0.000 ***	0.0
FICO	620 <= FICO < 680	-0.381	0.013 ***	-5.9	-0.242	0.022 ***	-1.3	-1.501	0.019 ***	-6.9
	680 <= FICO < 720	-0.445	0.013 ***	-6.9	-0.289	0.023 ***	-1.5	-2.063	0.020 ***	-9.5
	720 <= FICO < 780	-0.516	0.013 ***	-8.1	-0.332	0.022 ***	-1.8	-2.409	0.020 ***	-11.1
	FICO >= 780	-0.683	0.014 ***	-10.7	-0.289	0.027 ***	-1.5	-2.605	0.029 ***	-12.0
Loan to Value	65 < LTV <=70	0.572	0.008 ***	8.9	0.360	0.016 ***	1.9	0.647	0.023 ***	3.0
	70 < LTV <=80	1.249	0.006 ***	19.5	0.351	0.013 ***	1.9	1.677	0.015 ***	7.7
	80 < LTV <=90	1.092	0.016 ***	17.0	0.355	0.030 ***	1.9	1.952	0.026 ***	9.0
	LTV > 90	0.501	0.025 ***	7.8	0.218	0.055 ***	1.1	1.347	0.043 ***	6.2
Full Documentation		-1.257	0.005 ***	-19.6	-0.038	0.011 **	-0.2	-0.944	0.012 ***	-4.3
Conforming Loan Amount		-0.038	0.008 ***	-0.6	-0.005	0.031	0.0	-0.134	0.018 ***	-0.6
<u>Neighborhood Characteristics</u>										
House Price Change	20 >= HPC < 42	-0.085	0.009 ***	-1.3	0.397	0.039 ***	2.1	0.487	0.030 ***	2.2
	42 >= HPC < 60	-0.141	0.009 ***	-2.2	0.910	0.039 ***	4.8	0.815	0.030 ***	3.7
	HPC >= 60	-0.547	0.017 ***	-8.5	1.256	0.042 ***	6.6	1.061	0.037 ***	4.9
Percent College Educated		0.011	0.000 ***	0.2	-0.024	0.001 ***	-0.1	-0.010	0.001 ***	0.0
Herfindahl-Hirshmann Index		0.000	0.000 ***	0.0	-0.001	0.000 ***	0.0	0.000	0.000 ***	0.0
Census Tract Denial Rate		0.003	0.001 **	0.1	0.023	0.002 ***	0.1	0.037	0.002 ***	0.2
Underserved Census Tract		0.037	0.006 ***	0.6	0.098	0.016 ***	0.5	0.210	0.016 ***	1.0
<u>Mortgage Market Channel</u>										
Wholesale Origination Channel		0.229	0.005 ***	3.6	0.228	0.012 ***	1.2	1.037	0.015 ***	4.8
CRA in Assessment Area		0.857	0.005 ***	13.4	-2.546	0.022 ***	-13.4	-1.710	0.018 ***	-7.9
Securitization	Fannie/Freddie	-1.602	0.006 ***	-25.0	-0.100	0.014 ***	-0.5	-2.611	0.015 ***	-12.0
	Held in Portfolio	0.631	0.008 ***	9.9	-0.065	0.043	-0.3	1.128	0.019 ***	5.2