SUBPRIME LENDING OVER TIME: THE ROLE OF RACE

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SUBPRIME LENDING OVER TIME: THE ROLE OF RACE

INTRODUCTION

Ideally, a prospective borrower seeking a mortgage loan would prefer to receive a prime loan. But such loans are generally available only to those with a high credit rating (i.e., those deemed highly creditworthy) and with sufficient funds to qualify for the loan. Those who have flawed credit (a history of late payments and/or a high debt-to-income ratio), not enough for a down payment, or no reserve funds usually obtain subprime loans. The terms of these loans are less favorable than those offered under prime loans. The difference between the two types of loans reflects the lender's risk assessment in making the loan. However, in the wake of efforts to increase access to mortgage capital for all potential borrowers, questions continue to be raised about the influence of race in determining whether a borrower receives a prime or subprime loan.

In light of the increased scrutiny of the subprime market nationally and the concerns raised by community leaders in the Federal Reserve's Third District (which includes the eastern portion of Pennsylvania, southern New Jersey, and Delaware) that low- and moderate-income and minority homeowners are targeted to receive high-cost loans,[1] this study will examine the extent to which subprime lending occurs in Pennsylvania, New Jersey, and Delaware and its change over time, as well as the role that race plays in obtaining subprime versus prime loans.

BACKGROUND

During the 1990s, there was a surge in lending in the mortgage industry. While loans by both subprime and prime lenders increased, loans by subprime lenders grew at a significantly faster pace. Between 1994 and 2003, prime lenders' originations grew by an annual rate of roughly 18 percent, but subprime lenders' loans increased by approximately 25 percent per year.[2] In 1994, the share of loans by subprime lenders was only 4.5 percent of all mortgage loans. The share of subprime loans rose to 14.5 percent in 1997 and then declined (Figure 1). In 2003, subprime loan originations comprised about 9 percent of total loan originations. This amounted to nearly a ten-fold growth in the total value of subprime loan originations, from $35 billion to $332 billion.[3] The share of subprime loans then reached its highest level in 2005, when it was 21 percent of all loans. By 2007, subprime loans had declined to roughly 8 percent of total loan originations.

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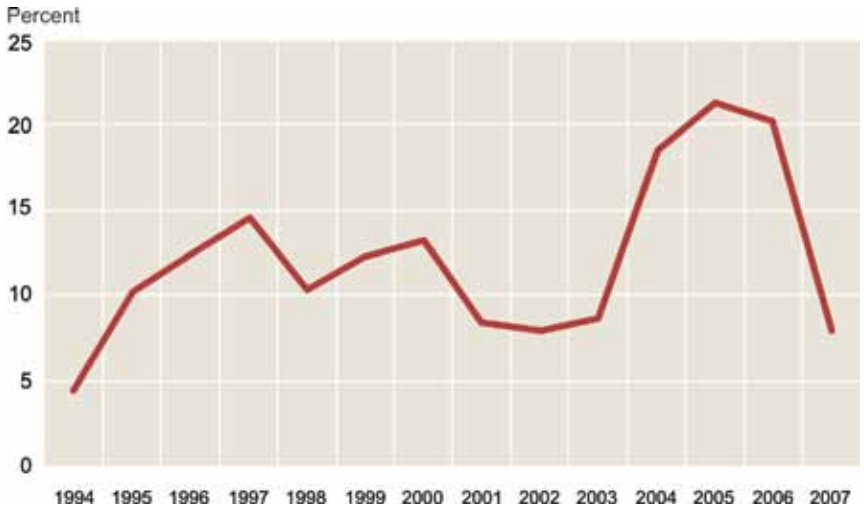
[1] These concerns were raised at outreach meetings conducted by the staff of the Reserve Bank's Community Affairs Department. During outreach meetings, the Reserve Bank's staff members meet with representatives of financial institutions, government agencies, nonprofit organizations, and consumer advocates to determine mutual areas of interest and activity as well as to discuss any finance-related issues that concern them. The targeting of certain segments of the population for subprime loans is thought to occur, in part, because unscrupulous mortgage brokers work closely with some subprime lenders. While not specifically mentioned during the outreach meetings, some correspondent banks, it is worth noting, have also made questionable high-cost loans.

[2] See the article by Governor Edward M. Gramlich.

[3] See Gramlich (2004).

The growth in mortgage loans was accompanied by the offering of mortgage products with features such as an adjustable rate, interest-only payments, loans requiring no down payment, and those requiring little or no documentation of income or debt burden that helped prospective homebuyers with poor or limited credit histories to qualify for a home loan.[4] The rise in prime and subprime loans helped fuel the increase in the national homeownership rate over the 1994 to 2003 period, from 64 percent to 68.3 percent. [5,6] In addition to new homebuyers, homeowners have also used subprime loans to refinance their mortgages. Moreover, lenders were emboldened to seek out potential borrowers for subprime loans to satisfy investors' demand for such loans to be securitized. While subprime lending has enabled some borrowers to move beyond their credit-blemished past into homes or provide current homeowners with extra funds through refinancing, there has been a downside. Unfortunately, subprime loans have been at the center of the discussion on foreclosures. High-cost lending has placed some borrowers who may not have been ready for homeownership or a refinance loan in an untenable financial position while stripping other homeowners of their equity[7] — their primary asset for wealth accumulation — when refinancing their loan. A special point of contention in this debate has been over minorities receiving a disproportionate share of subprime loans. Of concern is the extent to which the disparity in subprime lending is due to minority status.

FIGURE 1. Subprime Mortgage Originations as a Percent of Total Originations



Previous Studies

In complying with the Home Mortgage Disclosure Act (HMDA)[8] of 1975, most mortgage lending institutions began collecting loan-level data — which they report to the Federal Financial Institutions Examination Council — that could be used to enhance the enforcement of laws prohibiting discrimination in lending. Since then, these unique data have shown that lending disparities exist along racial and income lines. In 2005, for example, an examination of HMDA data by Avery et al. revealed that African-Americans were more likely

[4] As Chris Henderson so aptly points out, these nontraditional loans are legal and intended for savvy borrowers. Potential problems arise when these complex products are obtained by unsophisticated borrowers. See Henderson (2007).

[5] See Gramlich (2004).

[6] In 2007, the homeownership rate declined slightly to 68.1 percent. See http://en.wikipedia.org/wiki/Homeownership_in_the_United_States.

[7] For a discussion of legislation signed by Wisconsin Governor Jim Doyle to address this issue, see "Doyle to Sign Legislation Against Predatory Lenders."

[8] See http://www.ffiec.gov/hmda/default.htm.

to receive higher-priced loans than borrowers of other race categories. According to the data, the (unmodified or "gross") incidence of higher-priced lending for conventional home-purchase loans was 54.7 percent for African-Americans, 46.1 percent for Hispanic whites, 17.2 percent for non-Hispanic whites, and 16.6 percent for Asians.[9]

HMDA data have been used in a number of studies to investigate many aspects of lending, including the subprime/prime dynamic. But given that the data do not include all the credit and risk variables considered by lenders when making credit decisions, many studies have attempted to augment the HMDA data set with credit variables in order to better explain the lending disparity among racial or income groups. Failure to account for variances in creditworthiness or doing so at an aggregated level runs the risk of erroneously attributing any differential treatment in lending to race.

An earlier study by Immergluck and Wiles explored the relationship between neighborhood variables and the proportion of refinance loans originated by subprime lenders.[10] They used 1998 HMDA data, the U.S. Department of Housing and Urban Development (HUD) list of subprime lenders, and selected census data, but they did not include credit risk variables. The authors found that neighborhoods that were predominantly African-American experienced higher rates of subprime lending. Among the other variables that were found to influence subprime lending were educational attainment, median home value, and neighborhoods that were mixed-minority. [11,12]

Bocian, Ernst, and Li (2006) also used an augmented HMDA data set (including credit scores) to model a logistical regression on the likelihood of receiving a higher-rate loan in 2004. They concluded that race and ethnicity continue to be a factor in subprime loan pricing, with African-Americans and Hispanics more likely to receive higher-priced home-purchase and refinance subprime loans than similarly situated white borrowers — particularly for loans with prepayment penalties.[13] However, this study is limited in that it surveyed only subprime loans.

An analysis by Calem, Gillen, and Wachter used 1999 HMDA data, the HUD subprime list, 2000 census data, credit information on the tract level, and foreclosure data to estimate the frequency of subprime loans by neighborhood given the demographic composition of the neighborhood.[14] They conducted their investigation on the tract level by focusing on the percentage of tract loans that were subprime and the loan level by considering whether the loan received was subprime. They found that credit risk (i.e., the proportion of individuals with low credit scores or without credit records) was associated with the share of subprime loans in a census tract, but that African-Americans were still positively correlated with a neighborhood's subprime share in both Chicago and Philadelphia. Moreover, African-Americans were highly likely to obtain a subprime loan, regardless of where they lived.[15]

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[9] See Avery, Brevoort, and Canner (2006), p. A160.

[10] See Immergluck and Wiles (1999), p. 25.

[11] See Immergluck and Wiles (1999), p. 26.

[12] For a related line of inquiry that focuses on the role that neighborhood characteristics play in the loan-decision process via information externalities, see Lang and Nakamura (1993) and Blackburn and Vermilyea (2007).

[13] See Bocian, Ernst, and Li (2006), p. 3.

[14] See Calem, Gillen, and Wachter (2004), p. 396.

[15] See Calem, Gillen, and Wachter (2004), p. 401.

Although the findings by Calem, Gillen, and Wachter are quite enlightening, their controls for credit risk were based on tract level and not individual borrowers. However, the present study uses a *unique data set* (a merging of HMDA data and data from a national proprietary data set on loan performance with millions of loan-level records of originations) to examine subprime lending *over time* in Pennsylvania, New Jersey, and Delaware and the influence of race in the mortgage-lending process. This data set not only allows us to study subprime lending over time but also contains loan-level information on variables that allow for better controls over factors correlated with race so that better inferences can be drawn.

Moreover, while earlier studies have shown a racial disparity in lending with respect to prime and subprime loans, the present study improves upon previous efforts by using an estimating procedure that allows the differences in the probability of receiving a subprime loan over a prime loan to be separated into that portion arising from differences in identifiable characteristics and the remaining portion, which may be attributable in part to bias in mortgage lending. In the former portion, not only are the explanatory characteristics identified but their separate contributions are quantified. Thus, this study will fine-tune the influence of race in the allocation of mortgage capital between the prime and subprime markets.

METHODOLOGY AND DATA

The examination of subprime lending over time in Pennsylvania, New Jersey, and Delaware and the role played by race is carried out in three stages. First, we consider an overview of mortgage lending in the three states for 1999 through 2007. We pay attention to the breakdown of prime and subprime loans by race and income for conventional home purchase, refinance, and home improvement. Of special interest are the overall subprime rates for each year by race (African-American and white) and the subsequent gap between African-Americans and whites. We also take note of the change in the gap from 1999 to 2007.

To establish the existence of a racial disparity in subprime lending and further investigate the underlying influences of the racial disparity in the subprime lending gap, two types of regression analysis are employed.

Data

The analysis in the study is based on a data set constructed by merging data from several sources. The data set is composed of information extracted from the merging of HMDA data and data from a national proprietary data set on loan performance for 1999 through 2007. The data from the national proprietary data set contain loan-level information from most of the top 10 residential mortgage servicers in the industry.[16] Our data set also contains selected variables obtained from U.S. census data. Added to these data is a list of lenders compiled by the U.S. Department of Housing and Urban Development (HUD) to indicate whether loans were prime or subprime in 1999 through 2003. HUD employed a methodology that characterized a lender as prime or subprime by determining, through research in trade publications, websites, or telephone interviews, the type of loans originated by a lender. Many lenders readily identified themselves as subprime lenders, while others indicated the proportion of subprime loans they originated. If a lender predominantly originated prime loans (i.e., more than 50 percent), the lender was considered a prime lender. If, however, the lender predominantly originated subprime loans, the lender was classified as a subprime lender. For the purposes of our database, all loans originated by a HUD-designated subprime lender were considered subprime, while all loans originated by a lender not designated by HUD as subprime were considered prime.

[16] The data are 58 percent of the total market and a third of the subprime market.

The HUD list was discontinued in 2005. However, in 2004, HMDA began requiring lenders to disclose the pricing (interest rates and fees) for loans. This information is used to classify loans as "higher-priced" if the mortgage has an annual percentage rate (APR) 3 percentage points over the designated benchmark (Treasury securities).[17] The higher-priced loans are a proxy for subprime. In our analysis, we use the HMDA higher-priced designation for subprime loans in 2004 through 2007.[18]

The particular variables used in the analysis include socio-economic variables such as race (African-American, white), gender, and borrower's income.[19] We used several variables to capture neighborhood influences. These measures include the percent of owner-occupied units, tract income (low, moderate, middle, and upper), and whether the tract is a minority tract (over 50 percent minority). We also included information on the borrower's loan amount and type of loan (conventional home purchase, refinance, or home improvement). In addition, to depict credit and other risk factors, we used some variables that underwriters typically rely on. These variables consist of loan amount, debt-to-income ratio (DTI), credit score,[20] and documentation type (full documentation and not full documentation).[21] Following Calem, Gillen, and Wachter, we include the turnover rate of tract housing stock.[22] According to Calem et al., "Neighborhoods with little turnover will tend to have more uncertain housing values and, hence, represent greater credit risk."[23] We also used HMDA data to compute a denial rate for non-subprime conventional loans. Calem et al. suggest that this measure can be viewed as a proxy for the availability of such loans as well as a possible proxy for omitted risk variables. [24]

RESULTS

Analysis Results

First, we focus on the subprime lending patterns by race in Pennsylvania, New Jersey, and Delaware from 1999 to 2007. Next, we consider the disparities in subprime loans by race and then by income. Then we present the results of the logistic regression analysis of the racial disparities in subprime lending. Finally, we estimate the percent of the racial gap explained by differences in the observable characteristics between the races.

Spatial Location of Subprime Loans. The subprime loans of African-Americans and whites were geocoded to the census tract level in each of the three states for 1999 to 2007. Of interest is not only the spatial location of the loans but also the change in lending patterns over time. In order to highlight these two aspects, only the maps for 1999 and 2005 for each race in the three states will be shown. (The remaining maps are available from the authors upon request.)

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[17] See Avery, Canner, and Cook (2005), pp. 344–94.

[18] Even though the HUD list and the HMDA higher-priced designations for subprime lenders affect the estimates of loan originations, their use in the regressions estimated in this study where they overlap did not appreciably affect the results. For a similar result, see Mayer and Pence (2009).

[19] A list of the variables can be found in appendix Table A-1, p. 25.

[20] This is a FICO score.

[21] We were unable to use the loan-to-value ratio variable, since it does not include second liens on the property.

[22] This variable is equal to the number of home-purchase loans from HMDA divided by the number of owner-occupied housing units from the census.

[23] See Calem et al. (2004), p. 398.

[24] See Calem et al. (2004), p. 398.

In Pennsylvania, the main clusters of subprime loans for whites in 1999 are located in Philadelphia, Allentown/Easton/Bethlehem, Scranton/Wilkes-Barre, Reading, Harrisburg, York, Pittsburgh, and Erie (Figure 2). In 2005, subprime loans increased in some of these locations and spread to nearby areas (Figure 3). Figure 4 reveals a similar location of subprime-loan clusters for African-Americans in 1999. While subprime loans also increased for African-Americans in 2005, the increases are most notable in Mount Pocono, East Stroudsburg, Allentown/Easton/Bethlehem, and York (Figure 5).

PENNSYLVANIA Subprime Lending Patterns by Census Tract

FIGURE 2: Ratio of Subprime Loans to Whites, 1999

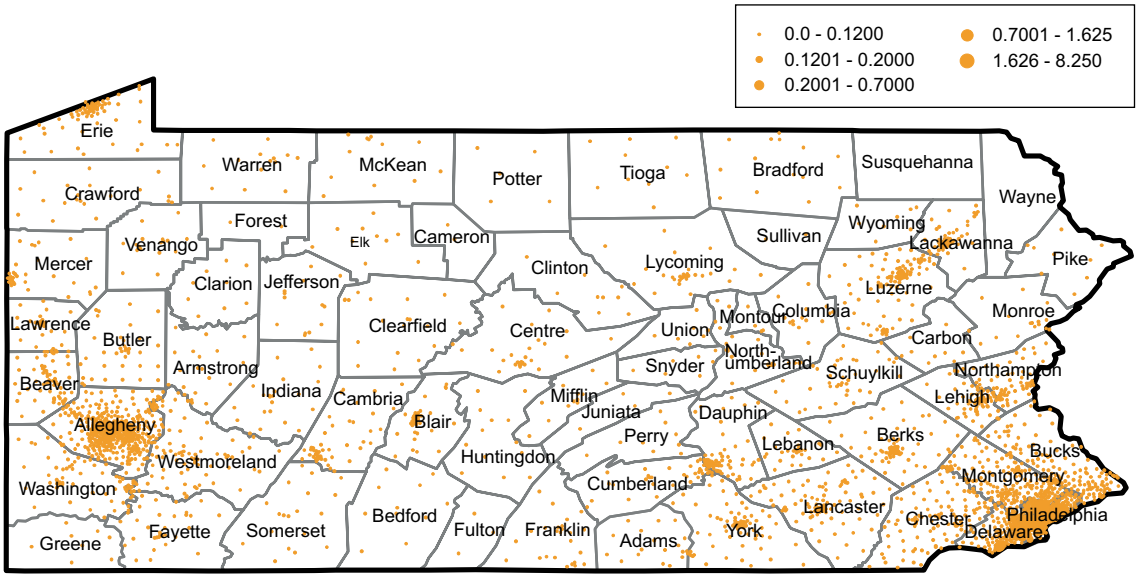
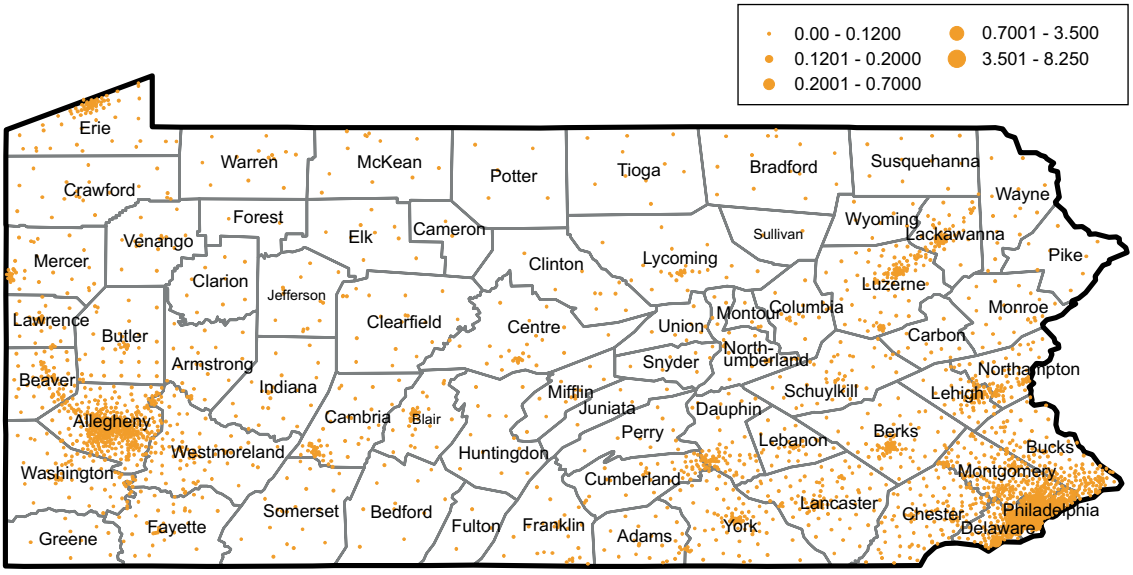


FIGURE 3: Ratio of Subprime Loans to Whites, 2005



Data Source: HMDA and a Large Mortgage Servicer Database. Prepared by the Federal Reserve Bank of Philadelphia, Community Affairs Department.

The spatial location of subprime loans for whites in New Jersey in 1999 tended to cluster in the northeastern part of the state in Paterson, Jersey City, Newark, and Elizabeth. Other clusters occurred in the areas of Asbury Park, Trenton, and Camden (Figure 6). Figure 7 shows that subprime loans for whites increased somewhat in the same general areas in 2005. The clusters of subprime loans for African-Americans in 1999 were located in the same areas as those for whites (Figure 8). However, Figure 9 reveals that in 2005, subprime loans for African-Americans increased in the same areas in which clusters occurred in 1999, but there were additional

PENNSYLVANIA Subprime Lending Patterns by Census Tract

FIGURE 4: Ratio of Subprime Loans to African-Americans, 1999

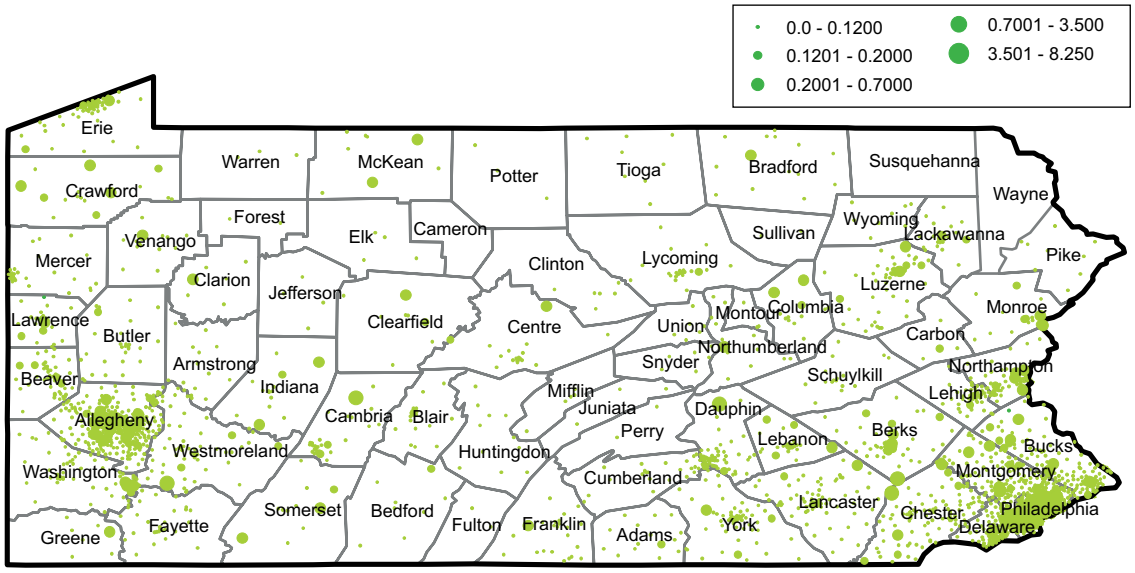
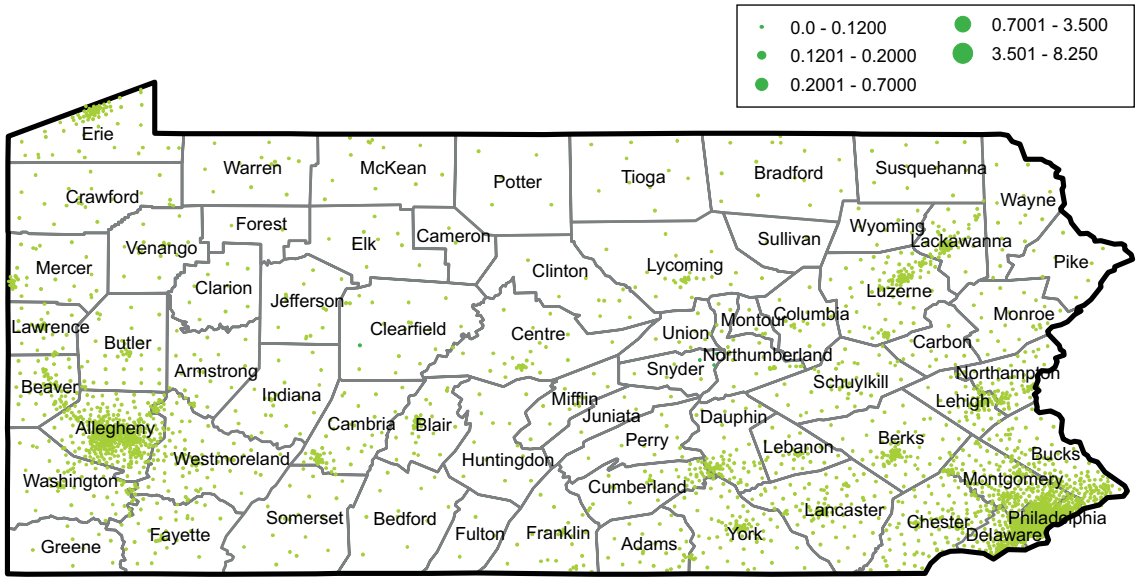


FIGURE 5: Ratio of Subprime Loans to African-Americans, 2005



Data Source: HMDA and a Large Mortgage Servicer Database. Prepared by the Federal Reserve Bank of Philadelphia, Community Affairs Department.

NEW JERSEY Subprime Lending Patterns by Census Tract

FIGURE 6:
Ratio of Subprime Loans to Whites, 1999

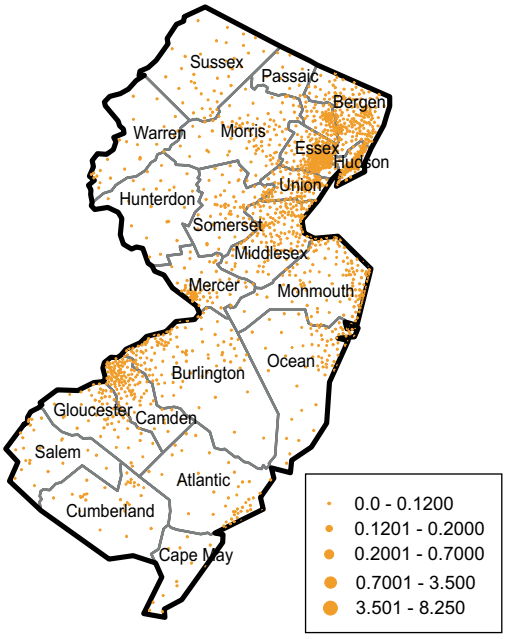


FIGURE 7:
Ratio of Subprime Loans to Whites, 2005

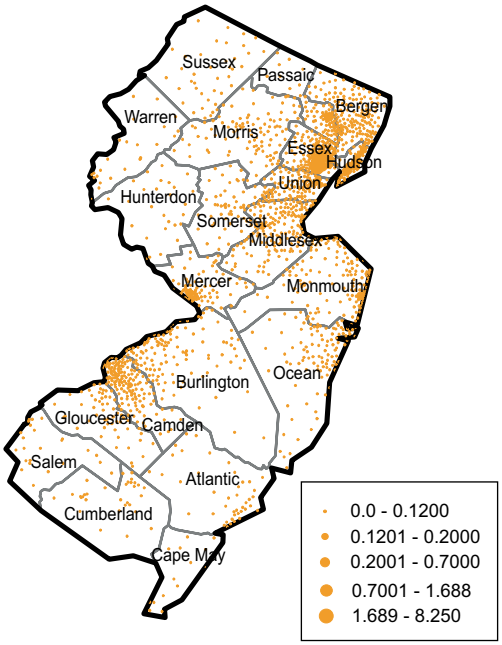


FIGURE 8:
Ratio of Subprime Loans to African-Americans, 1999

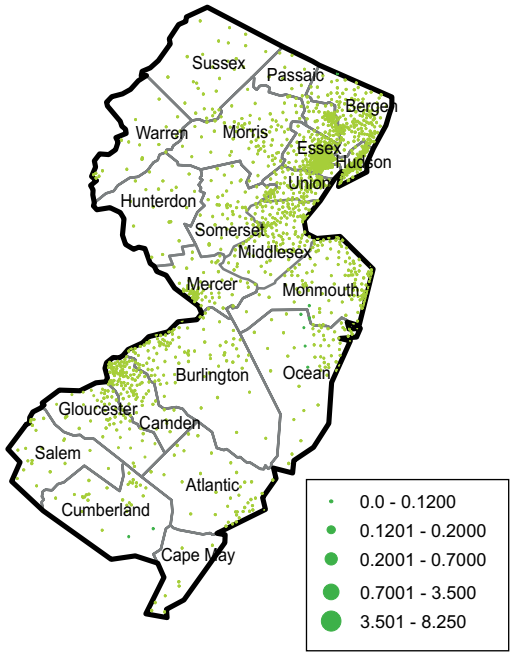
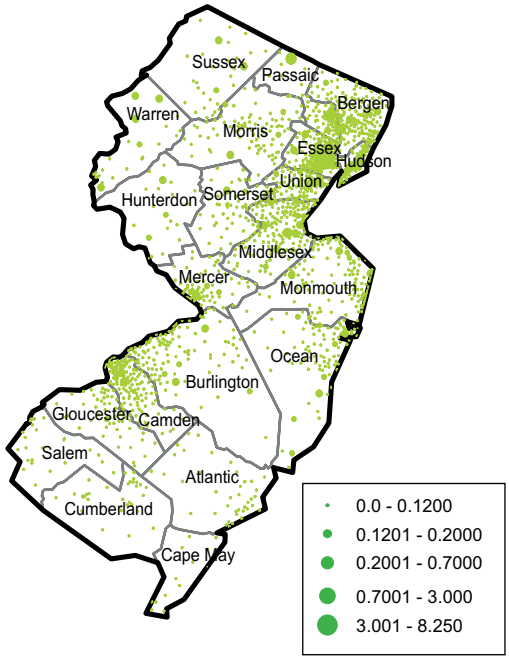


FIGURE 9:
Ratio of Subprime Loans to African-Americans, 2005



Data Source: HMDA and a Large Mortgage Servicer Database. Prepared by the Federal Reserve Bank of Philadelphia, Community Affairs Department.

clusters in such locations as Willingboro, Millville, and Atlantic City.

The location of subprime loans for whites in Delaware in 1999 occurred in the northern part of the state (Wilmington area), the center of the state (Dover area), and the southernmost part of the state (Figure 10). While subprime loans increased in all three states in 2005, the change in the location pattern was most dramatic in Delaware. As Figure 11 shows, subprime loans for whites occurred throughout the state. Figures 12 and 13 illustrate that the pattern of subprime loans for African-Americans in Delaware in 1999 and 2005 mirrors that of whites.

DELAWARE Subprime Lending Patterns by Census Tract

FIGURE 10:
Ratio of Subprime Loans to Whites, 1999

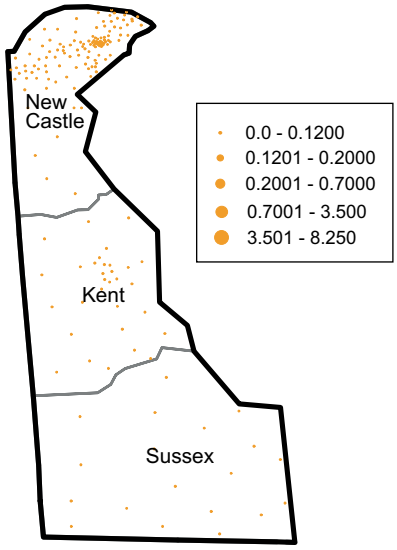


FIGURE 11:
Ratio of Subprime Loans to Whites, 2005

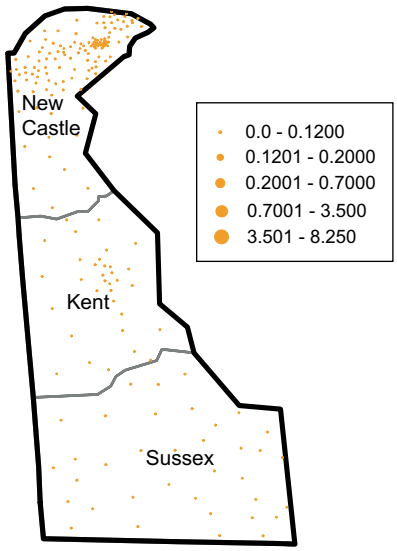


FIGURE 12:
Ratio of Subprime Loans to African-Americans, 1999

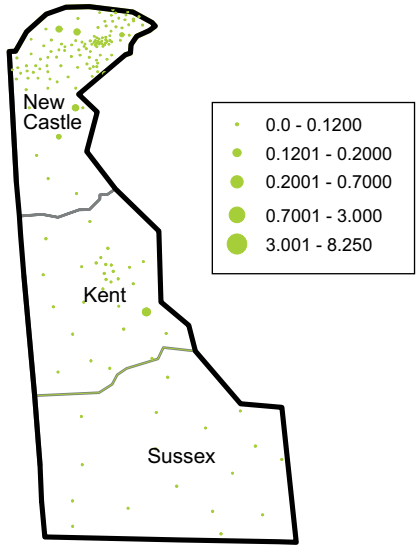
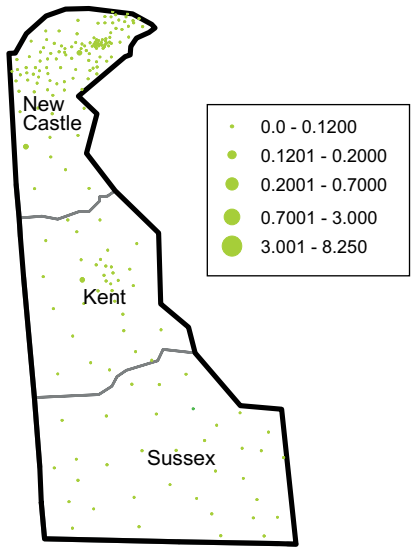


FIGURE 13:
Ratio of Subprime Loans to African-Americans, 2005



Data Source: HMDA and a Large Mortgage Servicer Database. Prepared by the Federal Reserve Bank of Philadelphia, Community Affairs Department.

Racial Disparities.[25] Table 1 shows a breakdown in the percent of subprime loans in 1999 through 2007 by state and race for conventional home-purchase, refinance, and all loans. Overall, African-Americans have

[25] The analysis in this study focuses only on African-Americans and whites.

TABLE 1.
Racial Disparities in Subprime Rates in Pennsylvania, New Jersey, and Delaware

PENNSYLVANIA

African-American

Type of Loan	1999	2000	2001	2002	2003	2004	2005	2006	2007
Conventional Home-Purchase Loans	5.7%	7.3%	8.1%	7.4%	6.4%	19.5%	35.9%	46.1%	34.5%
Refinance Loans	23.6%	47.4%	13.0%	12.5%	9.4%	15.2%	30.2%	48.8%	32.4%
All Loans	8.4%	11.1%	8.6%	9.6%	7.1%	15.1%	30.0%	42.4%	29.7%
Sample Size	1454	1536	1655	2302	3361	4361	4741	4973	4750

White

Type of Loan	1999	2000	2001	2002	2003	2004	2005	2006	2007
Conventional Home-Purchase Loans	1.5%	2.3%	2.7%	1.9%	2.6%	5.9%	10.7%	14.5%	10.9%
Refinance Loans	4.9%	12.8%	3.6%	3.6%	3.8%	5.9%	10.6%	21.1%	13.3%
All Loans	2.4%	4.0%	3.1%	2.8%	3.3%	5.6%	10.2%	15.9%	11.2%
Sample Size	27591	24089	49826	68527	96185	83778	79699	63895	65002

NEW JERSEY

African-American

Type of Loan	1999	2000	2001	2002	2003	2004	2005	2006	2007
Conventional Home-Purchase Loans	2.0%	2.6%	3.4%	3.2%	4.1%	13.3%	32.3%	39.4%	22.8%
Refinance Loans	7.1%	16.3%	4.9%	6.4%	7.0%	11.1%	23.9%	37.1%	21.7%
All Loans	2.9%	6.1%	3.7%	4.6%	5.8%	10.8%	25.8%	36.1%	20.9%
Sample Size	1546	1527	2322	3201	5281	6096	6795	6474	5572

White

Type of Loan	1999	2000	2001	2002	2003	2004	2005	2006	2007
Conventional Home-Purchase Loans	1.2%	1.7%	1.4%	1.0%	1.1%	3.0%	6.7%	11.5%	6.8%
Refinance Loans	2.6%	6.3%	2.5%	2.0%	2.5%	4.1%	8.0%	17.0%	10.0%
All Loans	1.6%	2.7%	2.2%	1.7%	2.1%	3.5%	7.2%	14.0%	8.3%
Sample Size	24406	19575	43933	62481	89862	71078	62795	45628	45871

DELAWARE

African-American

Type of Loan	1999	2000	2001	2002	2003	2004	2005	2006	2007
Conventional Home-Purchase Loans	3.4%	7.2%	7.9%	4.6%	6.0%	11.0%	29.5%	38.1%	23.9%
Refinance Loans	11.0%	37.3%	6.8%	7.6%	9.8%	10.9%	26.2%	36.7%	22.8%
All Loans	5.1%	8.1%	5.2%	4.8%	8.1%	9.2%	25.1%	33.7%	20.5%
Sample Size	235	265	362	492	428	1035	1239	1265	1027

White

Type of Loan	1999	2000	2001	2002	2003	2004	2005	2006	2007
Conventional Home-Purchase Loans	0.8%	1.6%	1.3%	1.1%	1.9%	3.3%	8.2%	10.7%	6.4%
Refinance Loans	2.5%	5.5%	2.0%	2.1%	3.3%	4.0%	9.0%	16.1%	8.5%
All Loans	1.3%	2.1%	1.7%	1.6%	2.8%	3.5%	8.3%	12.4%	7.0%
Sample Size	2776	2617	5758	7699	6430	9623	8826	6289	6134

Note: These are univariate statistics.

a higher percentage of subprime loans than whites in all three states in all years. Moreover, the percentage for African-Americans is nearly two times that of whites in all years in all states, and this pattern holds for each type of loan. (However, bear in mind that these are *simple univariate statistics* and that race might be a proxy for other variables correlated with risk and/or demand.)

The disparity in the percentage of subprime loans by race gives rise to a racial gap (Table 2). As Table 2 shows, there is a double-digit subprime gap among African-Americans and whites in the two types of loans and in all loans in 2005-2007 in all three states. Of the three states, Pennsylvania had the largest gap for all loans during the period, as well as all but one of the two different types of loans. However, the overriding point is that there is a racial gap in all years, in all loans, and in all states studied (albeit rather small for conventional home-purchase loans in 1999 and 2000 in New Jersey).

Income Differences. The differences in income by the race of borrowers holding subprime loans are also of interest. Table 3 presents the racial disparities in subprime mortgage holders by income for Pennsylvania, New Jersey, and Delaware for 1999-2007. African-Americans had a higher percentage of subprime loans than whites in each income category (low, moderate, middle, and upper) in all three states in all years, except for low income in 1999 in New Jersey and in 2002 in Delaware. Particularly noteworthy is the percentage of subprime mortgage

Table 2.
Percentage Point Disparities in Subprime Rates by Race in Pennsylvania, New Jersey, and Delaware

	PENNSYLVANIA								
Type of Loan	1999	2000	2001	2002	2003	2004	2005	2006	2007
Conventional Home-Purchase Loans	4.1%	5.0%	5.3%	5.5%	3.8%	13.6%	25.2%	31.6%	23.6%
Refinance Loans	18.7%	34.6%	9.4%	8.9%	5.7%	9.3%	19.6%	27.7%	19.1%
All Loans	6.0%	7.1%	5.5%	6.8%	3.9%	9.4%	19.8%	26.4%	18.4%
Sample Size	29045	25625	51481	70829	99546	88139	84440	68868	69752
	NEW JERSEY								
Type of Loan	1999	2000	2001	2002	2003	2004	2005	2006	2007
Conventional Home-Purchase Loans	0.8%	0.9%	2.0%	2.2%	3.0%	10.3%	25.7%	27.9%	16.0%
Refinance Loans	4.6%	9.9%	2.4%	4.4%	4.5%	7.0%	16.0%	20.1%	11.7%
All Loans	1.3%	3.4%	1.5%	2.9%	3.7%	7.3%	18.5%	22.1%	12.6%
Sample Size	25952	21102	46255	65682	95143	77174	69590	52102	51443
	DELAWARE								
Type of Loan	1999	2000	2001	2002	2003	2004	2005	2006	2007
Conventional Home-Purchase Loans	2.6%	5.6%	6.6%	3.4%	4.1%	7.7%	21.3%	27.4%	17.5%
Refinance Loans	8.5%	31.8%	4.8%	5.6%	6.5%	6.9%	17.3%	20.6%	14.3%
All Loans	3.8%	6.0%	3.5%	3.2%	5.3%	5.8%	16.8%	21.3%	13.5%
Sample Size	3011	2882	6120	8191	6858	10658	10065	7554	7161

Note: These percentages reflect the African-American subprime rates minus the white subprime rates.

Sample size indicates combined sample of African-Americans and whites.

These are univariate statistics.

TABLE 3.
Disparities in Subprime Mortgage Holders by Income in Pennsylvania, New Jersey, and Delaware

PENNSYLVANIA

African-American

Income Level	1999	2000	2001	2002	2003	2004	2005	2006	2007
Low	10.5%	17.4%	16.9%	8.8%	11.0%	18.4%	31.0%	43.4%	27.1%
Moderate	6.8%	11.7%	7.9%	10.7%	7.8%	17.1%	34.2%	42.1%	32.3%
Middle	8.9%	10.0%	9.3%	11.8%	8.7%	17.3%	31.5%	39.7%	28.5%
Upper	9.4%	11.4%	10.0%	9.6%	7.7%	16.7%	30.6%	43.4%	29.9%
Sample Size	1454	1536	1655	2302	3361	4361	4741	4973	4750

White

Income Level	1999	2000	2001	2002	2003	2004	2005	2006	2007
Low	4.4%	6.1%	4.1%	3.6%	4.3%	8.6%	12.4%	19.8%	15.2%
Moderate	3.2%	5.6%	4.2%	3.8%	4.4%	7.6%	13.0%	19.1%	13.4%
Middle	2.5%	4.4%	3.7%	3.5%	3.9%	6.3%	11.5%	16.5%	11.4%
Upper	2.3%	3.5%	3.1%	2.7%	2.9%	4.9%	9.0%	13.9%	9.8%
Sample Size	27591	24089	49826	68527	96185	83778	79699	63895	65002

NEW JERSEY

African-American

Income Level	1999	2000	2001	2002	2003	2004	2005	2006	2007
Low	1.4%	3.4%	3.2%	6.1%	10.7%	13.6%	23.8%	23.5%	23.8%
Moderate	3.4%	5.8%	3.8%	7.6%	8.3%	10.7%	24.5%	32.3%	18.2%
Middle	3.2%	5.9%	6.3%	5.8%	6.7%	12.0%	26.8%	31.3%	15.9%
Upper	3.1%	6.8%	3.7%	4.8%	6.3%	11.3%	28.6%	38.7%	27.1%
Sample Size	1546	1527	2322	3201	5281	6096	6795	6474	5572

White

Income Level	1999	2000	2001	2002	2003	2004	2005	2006	2007
Low	2.1%	2.8%	2.7%	2.5%	3.2%	3.3%	8.2%	11.8%	7.8%
Moderate	1.7%	3.5%	3.1%	2.3%	3.0%	3.8%	8.2%	12.6%	6.7%
Middle	1.7%	3.3%	2.7%	2.3%	2.7%	4.1%	8.2%	13.0%	7.3%
Upper	1.5%	2.4%	2.1%	1.6%	1.8%	3.0%	7.0%	14.2%	8.5%
Sample Size	24406	19575	43933	62481	89862	71078	62795	45628	45871

DELAWARE

African-American

Income Level	1999	2000	2001	2002	2003	2004	2005	2006	2007
Low	12.5%	21.4%	14.3%	0.0%	17.7%	13.9%	17.4%	25.0%	12.0%
Moderate	4.0%	5.6%	3.3%	5.2%	7.1%	12.0%	25.4%	29.3%	23.0%
Middle	7.5%	5.8%	4.7%	6.3%	11.8%	8.1%	30.2%	31.8%	17.0%
Upper	4.7%	9.7%	6.7%	5.3%	8.5%	9.6%	23.7%	36.0%	21.3%
Sample Size	235	265	362	492	428	1035	1239	1265	1027

White

Income Level	1999	2000	2001	2002	2003	2004	2005	2006	2007
Low	1.6%	6.7%	4.4%	4.5%	5.0%	3.1%	9.8%	10.1%	4.4%
Moderate	1.3%	4.0%	2.8%	2.5%	3.0%	4.2%	10.9%	15.2%	5.5%
Middle	2.2%	1.5%	2.8%	2.5%	3.3%	4.4%	10.6%	13.2%	7.4%
Upper	0.9%	1.9%	1.3%	1.5%	2.5%	3.1%	6.5%	10.7%	6.7%
Sample Size	2776	2617	5758	7699	6430	9623	8826	6289	6134

Note: These are univariate statistics.

holders in the upper-income category. African-Americans had nearly two times the percentage of subprime loans as whites in the upper-income level in each of the three states in all years. This is worth mentioning since there is some speculation that some borrowers in this income category could have qualified for a prime loan but were taken advantage of and saddled with a subprime loan instead.[26] Alternatively, it may very well be that these borrowers, despite their high incomes, were high credit risks who warranted a subprime loan.

Estimation Technique

The existence of racial disparities in the share of subprime loans does not necessarily imply any bias toward any segment of borrowers. Clearly, the characteristics of the groups play a role. For a better understanding, we examine the likelihood that a borrower receives a subprime or prime home-purchase mortgage loan. This is accomplished by estimating logistic regressions of the following form for the three states studied pooled for each year from 1999 through 2007:

$$(1) \qquad L_{gn} = \beta_g X_{gn} + \mu_{gn} \qquad (n = 1, \ldots, n_g),$$

where L_{gn} represents the binary choice of observation **n** in group **g** where L is either a prime or subprime loan (and L=1 if the borrower got a subprime home-purchase loan, and 0 otherwise); X_{gn} is a 1 x K_L vector of variables that reflect socio-economic, loan-related, and credit-related characteristics (see Table A-1 for a list of the variables); β_g is a K_L x 1 vector of parameters; and μ_{gn} is a stochastic component of observation **n** in group **g**, where mean = 0 and variance = $\sigma_{\mu g}^2$ or $\mu_{gn} \sim N(0, \sigma_{\mu g}^2)$.

Logistic regressions were estimated for all home-purchase mortgage loans in all three states for each year. While the results of the regressions for all years will be discussed, Table 4 shows the findings of the logit regression for 2005 for illustrative purposes.[27]

Most of the results for the regressions in all years are rather robust. As shown in Table 4, all of the vari-

[26] See National Community Reinvestment Coalition (2007), p. 18.

[27] The regressions for the remaining years of the data used here are available from the authors upon request.

TABLE 4.
Logistic Regressions for African-Americans and Whites in the Three States in 2005

Intercept	-1.8105*** (0.2293)
African-American	0.5903*** (0.0276)
Female	0.0919*** (0.0192)
Log Income	-0.1881*** (0.0209)
Loan Amount	-0.0010*** (0.0001)
FICO (559 or less)	3.7075*** (0.0402)
FICO (560 - 660)	1.9402*** (0.0216)
FICO (missing)	1.4089*** (0.0247)
Debt-to-Income (40 and over)	1.1001*** (0.0248)
Debt-to-Income (missing)	0.2500*** (0.0240)
Documentation (Full)	-0.2316*** (0.0244)
Documentation (Not Full)	-0.8386*** (0.0379)
Tract Income (Low)	0.6527*** (0.0595)
Tract Income (Moderate)	0.4544*** (0.0335)
Tract Income (Middle)	0.2577*** (0.0244)
Minority Tract	-0.0717*** (0.0354)
Percent Denial	2.6131*** (0.0940)
Percent Turnover	-1.2984*** (0.1198)
Nonowner Occupancy	0.7400*** (0.0300)

Sample size is 172,246. Wald chi-squared test is 20983.697 with 18 df (<0.0001).

Note: Standard errors are in parentheses.

*** significant to the 5% level

ables, with the possible exception of one, have the expected sign and are statistically significant. For instance, a borrower's income is inversely related to having a subprime versus a prime loan. Similarly, all three levels of tract income are positive, implying that income levels other than the highest ones are associated with a higher probability of taking out a subprime loan. Both loan amount and minority tract have an inverse association with the probability of having a subprime loan. While the former might be expected, a case could be made that the latter might have a positive sign. However, the influence of the minority tract variable might be explained by drawing on a rationale offered in the study by Calem et al.: The result might reflect the presence of community reinvestment-type loans by depository institutions crowding out subprime loans.[28] Both the full documentation and not full documentation variables are negatively associated with a subprime loan.[29] Nonowner occupancy is positively related with having a subprime loan.The turnover rate and denial rate variables exhibit the expected signs. In the former case, there is an inverse association with the probability of having a subprime loan, while there is a positive relationship in the latter case. Moreover, the variables reflecting a borrower's creditworthiness have the expected signs. Thus, borrowers with low credit scores (559 or lower and 560 to 660) and DTIs of 40 and over are more likely to hold a subprime loan. These results generally tend to hold to varying degrees in the remaining regressions. But perhaps the most compelling finding is the performance of the race variable. It is consistently positive and statistically significant in the regressions for all years (Table 5). This implies that African-Americans have a relatively high probability of having a subprime versus a prime loan.

While the results of the logistic regressions are instructive, there is a potential concern when using single-equation models to infer discrimination. As Yezer, Phillips, and Trost point out, a potential bias might arise in the estimated coefficients because some of the explanatory variables are endogenous. In the present context, DTI, loan amount, and borrower's income are likely to be considered endogenous. To account for this possible concern, we performed a robustness test and found that any resulting bias had virtually no effect on the conclusions.[30]

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[28] See Calem et al., p. 401.

[29] The negative sign on the full documentation variable is expected. But the negative sign on the not full documentation variable might be misleading. In our data, the vast majority of those with these types of mortgage documentation received prime loans. However, the excluded variable is unknown documentation type, a category in which many borrowers received a subprime loan and are likely to have supplied low or no documentation during the mortgage process.

TABLE 5.
Race Coefficients from the Logistic Regressions by Year

Year	African-American Coefficient	Standard Error	Sample Size
1999	0.4606***	0.0765	74255
2000	0.3861***	0.0614	66050
2001	0.3522***	0.0601	121600
2002	0.6507***	0.0538	160121
2003	0.4358***	0.0462	215520
2004	0.2189***	0.0356	189152
2005	0.5903***	0.0276	172246
2006	0.4643***	0.0255	138864
2007	0.2614***	0.0297	140426

*** significant at the 5% level

Decomposition. Since the racial disparity cannot be justified by differences in the groups' characteristics, we further investigate the racial gap by determining the fraction of the gap that can be explained by characteristics. We do so by using a variant of the Blinder-Oaxaca decomposition technique developed by Fairlie.[31] The approach allows for the decomposition when using a binary choice model to identify the factors that contribute to a borrower's being more likely to receive a subprime home-purchase loan. It permits the identification of the portion of the gap that can be explained by group differences in characteristics (or endowments) and the fraction attributable to the returns to the characteristics (or coefficients) of groups. The basic underlying estimating specification used in the decomposition is a modification of equation (1), where equation (1) is estimated separately for each race in each of the three study areas using the same explanatory variables.

The nonlinear decomposition is represented as follows:

$$(2) \quad \bar{L}^{W} - \bar{L}^{A-A} = \left[\sum_{i=1}^{N^W} \frac{F(X_i^{W} \hat{\beta}^{A-A})}{N^W} - \sum_{i=1}^{N^{A-A}} \frac{F(X_i^{A-A} \hat{\beta}^{A-A})}{N^{A-A}} \right] + \left[\sum_{i=1}^{N^W} \frac{F(X_i^{W} \hat{\beta}^{W})}{N^W} - \sum_{i=1}^{N^W} \frac{F(X_i^{W} \hat{\beta}^{A-A})}{N^W} \right]$$

where X^j is a row vector of average values of the independent variables, $\hat{\beta}^j$ is a vector of coefficient estimates for race *j*, and L^j is the average probability of having a subprime loan for race *j*.

The decomposition can be performed in two ways. In this formulation, the African-American coefficient estimates, $\hat{\beta}^{A-A}$, serve as weights in the first term of (2), while the white distributions of the independent variables, X^W, serve as weights in the second term. Alternatively, the decomposition can be carried out with the white coefficient estimates as weights in the first term and the African-American distributions of the independent variables as weights in the second term. Both approaches are equally valid but have different implications. In the first method, the decomposition assumes that African-Americans possess the average characteristics of whites and receive the returns to these characteristics that were estimated from the African-American sample — which is referred to in this study as the African-American specification. The second approach assumes that African-Americans have their average characteristics and receive the returns to the characteristics estimated from the white sample — which is referred to here as the white specification. Moreover, these two approaches have different inferences from a policy perspective. In the former method, the implication is that, in time, African-Americans will have the same characteristics as whites. In the latter approach, some action might be necessary to ensure that African-Americans receive the same returns to characteristics as whites. However, in both cases, the racial gap is decomposed into a portion explained by the differences in group characteristics and a portion attributable to differences in coefficients (or behavioral responses to characteristics).

The marginal contribution of variables to the group difference in the gap is somewhat involved when using logistic estimation. According to Fairlie, if we assume that the two groups are of equal size ($N_W = N_{A\text{-}A}$) and there is a one-to-one matching of African-American and white observations, then using the estimated coefficients from a logistic regression, the independent contribution of X_1 to the racial gap in subprime rates can be expressed as:[32]

$$(3) \quad \frac{1}{N} \sum_{i=1}^{N^W} \left[F(\hat{\alpha}_0 + X_{1i}^{W} \hat{\beta}_1^{W} + X_{2i}^{W} \hat{\beta}_2^{W}) - F(\hat{\alpha}_0 + X_{1i}^{A-A} \hat{\beta}_1^{W} + X_{2i}^{W} \hat{\beta}_2^{W}) \right]$$

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[30] We followed the procedure used by Courchane (2007), whereby we dropped DTI, loan amount, and borrower's income and added borrower's income as a percentage of area medium income. The results were quite similar to those reported here.

[31] See Blinder (1973), pp. 436-55; Oaxaca (1973), pp. 693-709; and Fairlie (2005), pp. 305-16 .

[32] See Fairlie (2005), p. 308.

However, in most cases the two groups have different sample sizes, as is the case here. Fairlie's decomposition approach compensates for this by drawing a "random subsample of whites equal in size to the full black sample (NB). Each observation in the white subsample and full black sample is then separately ranked by the predicted probabilities and matched by their respective rankings. This procedure matches whites who have characteristics placing them at the bottom (top) of their distribution with blacks who have characteristics placing them at the bottom (top) of their distribution."[33] Given that the resulting decomposition estimates rely on the randomly chosen subsample of whites, possible issues might arise regarding the sampling. To avoid this concern, Fairlie recommends drawing "a large number of random subsamples of whites, match each of these random subsamples of whites to the black sample, and calculate separate decomposition estimates. The mean value of estimates from the separate decompositions is calculated and used to approximate the results for the entire white sample."[34] In the decompositions in this study, we used 200 random subsamples of whites.

The nonlinear decomposition of the African-American–white gap in subprime mortgages was carried out for the pooled states in each year from 1999 to 2007, using both the African-American and white weights. Table 6 is representative of the decompositions and shows the portion of the racial gap in the probability of having a subprime loan that is explained by group differences in characteristics for 2005, using both the African-American and white specifications as defined above. (The decompositions for the other years are in the appendix Tables B-1 and B-2.) The decomposition for 2005 indicates that the characteristics included in the estimation are all statistically significant and

[33] See Fairlie (2005), p. 309.

[34] See Fairlie (2005).

TABLE 6.
Decomposition Results of Racial Disparities in Subprime Rates in 2005

	2005	
Sample used for coefficients	(1) African-American	(2) White
White subprime rate	0.0929	0.0929
African-American subprime rate	0.2927	0.2927
White/African-American gap	-0.1998	-0.1998
Contributions from racial differences in:		
Female	-0.0010	-0.0017
	0.0011	0.0003
	0.48%	0.87%
Log Income	-0.0022	-0.0031
	0.0015	0.0004
	1.11%	1.53%
Loan Amount	0.0002	-0.0035
	0.0014	0.0003
	-0.09%	1.76%
FICO	-0.0744	-0.0770
	0.0021	0.0008
	37.24%	38.52%
Debt-to-Income Ratio	0.0007	0.0001
	0.0005	0.0001
	-0.33%	-0.04%
Tract Income	-0.0125	-0.0138
	0.0029	0.0013
	6.25%	6.93%
Minority Tract	0.0017	-0.0026
	0.0040	0.0024
	-0.84%	1.28%
Percent Denial	-0.0397	-0.0436
	0.0042	0.0016
	19.86%	21.84%
Percent Turnover	0.0017	0.0042
	0.0006	0.0004
	-0.86%	-2.12%
Documentation	0.0069	0.0042
	0.0008	0.0003
	-3.48%	-2.11%
Owner Occupancy	0.0019	0.0024
	0.0003	0.0001
	-0.96%	-1.20%
Percent Total (Explained)	58.38%	67.25%
Sample Size	14,364	14,364

Note: All equations were estimated using the white specifications.

account for 58.4 percent of the gap using the African-American specification and 67.3 percent for the white specification. A closer look at the contributions made by specific characteristics reveals that borrowers' credit scores and the percent denial variable are the major factors in explaining the racial gap in subprime rates in the two specifications. The influence of credit scores is 37.2 percent in the African-American specification and 38.5 percent in the white specification, while the percent denial accounts for 19.9 and 21.8 percent of the total gap in the respective specifications.

It is interesting to note the contrast in the decomposition results of 2005 with those of 2003, a period in which subprime lending increased dramatically. The decomposition for 2003 shows that the group differences in characteristics explain 51.7 percent and 52.3 percent of the racial gap in subprime rates, under the African-American and white specifications, respectively (Table 7). These percentages are lower than those for 2005. The decrease in the explanatory power of the group differences in characteristics might be due in large part to the change that took place in the financial environment during 2003. Low interest rates, an increased willingness by investors on Wall Street to assume the risks associated with the securitization of mortgage loans, an excess capacity in the lending industry, and intense competition in the mortgage market all combined to create an explosion in loan originations nationally and in the three states we studied.[35] The increase in subprime loan originations was particularly striking in the refinance area. Nationally, loan refinances totaled approximately 2.5 trillion.[36] Refinance loans in Pennsylvania, New Jersey, and Delaware totaled 76.8, 95.7, and 7.2 billion, respectively.[37] However, the desire to accommodate the increased demand by investors for high-yielding mortgage-backed securities[38] led some lenders to loosen underwriting standards in order to generate more subprime loans for securitization pools.[39] This was accentuated with the offering of loans requiring minimal or no documenta-

[35] See Ip and Hilsenrath (2007); Bernanke (2007); Brubaker (2007); and Ashcraft and Schuermann (2008).

[36] See U.S. Department of Housing and Urban Development (2004).

[37] See U.S. Department of Housing and Urban Development (2004).

[38] "The subprime loan securitization rate [grew] from less than 30 percent in 1995 to over 58 percent in 2003." See Chomsisengphet and Pennington-Cross (2006), p. 37.

[39] See Hudson (2007).

TABLE 7.
Summary of Nonlinear Decomposition Results of Racial Disparities in Subprime Rates: Total Percent Explained by Year

Year	White subprime rate	African-American subprime rate	White/African-American gap	Total Percent Explained: African-American Specification	Total Percent Explained: White Specification	Sample Size
1999	0.0204	0.0556	-0.0352	65.5%	44.9%	6,511
2000	0.0340	0.0868	-0.0528	69.5%	45.4%	6,777
2001	0.0274	0.0655	-0.0382	64.1%	50.2%	7,677
2002	0.0232	0.0730	-0.0498	48.3%	33.9%	9,003
2003	0.0296	0.0761	-0.0465	51.7%	52.3%	11,617
2004	0.0481	0.1366	-0.0885	72.4%	86.1%	13,959
2005	0.0929	0.2927	-0.1998	58.4%	67.3%	14,364
2006	0.1467	0.3845	-0.2378	58.0%	76.6%	14,528
2007	0.0945	0.2411	-0.1465	65.8%	86.2%	13,623

tion of income.[40] In addition, some lenders made limited use of credit scores. These events no doubt lessened the influence of certain variables used here in explaining the racial gap in subprime rates.

This is further underscored by comparing the specifics of the decomposition results for 2003 and 2005 (see Table B2). Using the white specification, differences in group characteristics explained 52.3 percent of the racial gap in subprime rates in 2003, but 67.3 percent in 2005. Similarly, the contributions made by credit scores and the percentage of denial variables were 31 and 15.4 percent, respectively in 2003, but 38.5 and 21.8 percent, respectively in 2005. Alternatively, if the unexplained portion is viewed as a proxy for possible bias in lending — more will be said about this later — then a pure cross-sectional estimation of the influence of race in subprime lending in 2003 would be misleading. Such an approach would fail to reflect the distinct temporal explanatory aspect of the impact of race in subprime lending. Thus, an investigation of subprime lending over time using the decomposition technique provides a better context for assessing the effect of race as shown here.

Table 7 summarizes the decomposition of the African-American – white gap in subprime rates in 1999 through 2007 that are explained by group differences in characteristics. As Table 7 shows, group characteristics accounted for 33.9 percent to 86.2 percent of the gap across the states studied and two specifications. But that leaves 13.8 to 66.1 percent unexplained. Some researchers regard the unexplained fraction as a measure of the discrimination in the mortgage market. However, the "unexplained" portion is somewhat difficult to interpret, since it might capture both group differences in unmeasurable or unobserved endowments and possible bias in the lending process.

CONCLUDING REMARKS

This study helps to highlight the influence of race in the allocation of mortgage capital between the prime and subprime markets. It improves upon previous efforts by using a unique data set and the analysis of the racial gap in subprime mortgages is carried out over time—1999 through 2007. Moreover, we employ an estimating procedure that allows the racial differences in the probability of receiving a subprime loan compared to a prime loan to be separated into that portion arising from differences in identifiable characteristics and the remaining unexplained portion. The results, for the most part, are quite robust. Credit scores and the denial rate for non-subprime conventional loans tend to be key factors in accounting for the difference in the racial disparity in subprime rates. However, the influence of race remains contentious. The statistically significant effect of race in the logistic regressions and the results of the decomposition of the African-American – white gap in subprime rates suggest a possible role played by race in the receipt of subprime loans instead of prime loans. Although the unexplained portion of the decomposition remains open for interpretation, the possibility of bias in mortgage lending for the period examined here cannot be ruled out.[41]

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[40] See Ip and Hilsenrath (2007), p. A8.

[41] This is predicated on the notion, as stated above, that some analysts regard the unexplained portion as an approximation of the degree of bias, while others maintain that it might reflect unmeasurable or unobserved factors.

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TABLE A1.
Definition of Regression Analysis and Decomposition Variables

African-American	Dummy variable that equals one if the borrower is African-American
Female	Dummy variable that equals one if the borrower is female
Log Income	Natural log of the borrower's income
Loan Amount	Amount of the borrower's loan
FICO (559 or less)	Dummy variable that equals one if the borrower has a FICO score of 559 or less
FICO (560 - 660)	Dummy variable that equals one if the borrower has a FICO score between 560 and 660
FICO (missing)	Dummy variable that equals one if the borrower has a FICO score that is missing
Debt-to-Income (40 and over)	Dummy variable that equals one if the borrower has a debt-to-income ratio of 40 and over
Debt-to-Income (missing)	Dummy variable that equals one if the borrower has a debt-to-income ratio that is missing
Documentation (Full)	Dummy variable that equals one if the borrower has a full documentation loan
Documentation (Unknown)	Dummy variable that equals one if the borrower has a loan where the documentation type is unknown
Tract Income (Low)	Dummy variable that equals one if the tract is a low-income tract. HUD designates a tract as low income if the tract median family income as a proportion of the MA's median family income is less than 50 percent.
Tract Income (Moderate)	Dummy variable that equals one if the tract is a moderate-income tract. HUD designates a tract as moderate income if the tract median family income as a proportion of the MA's median family income is more than 50 percent but less than 80 percent.
Tract Income (Middle)	Dummy variable that equals one if the tract is a middle-income tract. HUD designates a tract as middle income if the tract median family income as a proportion of the MA's median family income is more than 80 percent but less than 120 percent.
Minority Tract	Dummy variable that equals one if the census tract is over 30 percent minority
Percent Denial	Denial rate for non-subprime conventional loans in a census tract
Percent Turnover	Number of home-purchase loans divided by total owner-occupied housing units in a census tract
Nonowner Occupancy	Dummy variable that equals one if the loan is non-owner occupied

TABLE B1.
Decomposition Results of Racial Disparities in Subprime Rates by Year and Race Specification: African-American Sample

	1999	2000	2001	2002	2003	2004	2005	2006	2007
White subprime rate	0.0204	0.0340	0.0274	0.0232	0.0296	0.0481	0.0929	0.1467	0.0945
African-American subprime rate	0.0556	0.0868	0.0655	0.0730	0.0761	0.1366	0.2927	0.3845	0.2411
White/African-American gap	-0.0352	-0.0528	-0.0382	-0.0498	-0.0465	-0.0885	-0.1998	-0.2378	-0.1465
Contributions from racial differences in:									
Female	-0.0010	0.0006	0.0002	0.0014	-0.0010	-0.0001	-0.0010	-0.0021	-0.0007
	0.0011	0.0011	0.0010	0.0009	0.0009	0.0007	0.0011	0.0012	0.0010
	2.73%	-1.11%	-0.49%	-2.76%	2.11%	0.16%	0.48%	0.88%	0.45%
Log Income	0.0021	-0.0002	0.0014	-0.0027	-0.0092	-0.0029	-0.0022	0.0039	0.0009
	0.0011	0.0016	0.0013	0.0016	0.0020	0.0010	0.0015	0.0013	0.0012
	-6.03%	0.37%	-3.72%	5.38%	19.71%	3.28%	1.11%	-1.66%	-0.60%
Loan Amount	-0.0112	-0.0064	-0.0099	-0.0061	0.0019	-0.0029	0.0002	-0.0011	-0.0027
	0.0017	0.0022	0.0018	0.0017	0.0018	0.0010	0.0014	0.0008	0.0009
	31.80%	12.14%	25.87%	12.26%	-4.03%	3.30%	-0.09%	0.48%	1.81%
FICO	-0.0025	-0.0086	-0.0061	-0.0095	-0.0095	-0.0440	-0.0744	-0.0873	-0.0581
	0.0013	0.0017	0.0014	0.0017	0.0014	0.0018	0.0021	0.0023	0.0022
	7.07%	16.30%	15.96%	19.05%	20.32%	49.72%	37.24%	36.69%	39.62%
Debt-to-Income Ratio	-0.0020	-0.0040	-0.0006	-0.0005	0.0006	0.0007	0.0007	0.0013	-0.0145
	0.0007	0.0009	0.0004	0.0004	0.0004	0.0002	0.0005	0.0004	0.0014
	5.56%	7.65%	1.62%	1.06%	-1.36%	-0.79%	-0.33%	-0.54%	9.90%
Tract Income	-0.0018	-0.0006	-0.0010	0.0000	0.0039	-0.0094	-0.0125	-0.0216	-0.0216
	0.0026	0.0032	0.0027	0.0026	0.0023	0.0022	0.0029	0.0034	0.0034
	5.08%	1.05%	2.65%	0.04%	-8.29%	10.64%	6.25%	9.07%	14.71%
Minority Tract	-0.0032	-0.0063	-0.0054	-0.0017	-0.0076	0.0027	0.0017	0.0008	0.0032
	0.0028	0.0032	0.0027	0.0026	0.0033	0.0037	0.0040	0.0043	0.0041
	9.03%	11.89%	14.27%	3.39%	16.30%	-3.04%	-0.84%	-0.32%	-2.16%
Percent Denial	-0.0024	-0.0069	-0.0031	-0.0034	-0.0060	-0.0149	-0.0397	-0.0430	-0.0291
	0.0016	0.0020	0.0017	0.0017	0.0016	0.0023	0.0042	0.0050	0.0042
	6.79%	13.00%	8.04%	6.91%	12.92%	16.84%	19.86%	18.06%	19.88%
Percent Turnover	-0.0049	-0.0076	-0.0010	-0.0035	-0.0013	0.0010	0.0017	0.0025	0.0024
	0.0022	0.0018	0.0011	0.0011	0.0006	0.0004	0.0006	0.0010	0.0006
	13.91%	14.34%	2.51%	6.98%	2.87%	-1.17%	-0.86%	-1.04%	-1.64%
Documentation	0.0037	0.0032	0.0011	0.0020	0.0038	0.0025	0.0069	0.0085	0.0197
	0.0010	0.0010	0.0004	0.0005	0.0009	0.0006	0.0008	0.0009	0.0020
	-10.43%	-5.99%	-2.81%	-3.98%	-8.27%	-2.83%	-3.48%	-3.59%	-13.47%
Owner Occupancy	0.0000	0.0001	-0.0001	0.0000	0.0003	0.0032	0.0019	0.0001	0.0040
	0.0005	0.0001	0.0001	0.0001	0.0002	0.0006	0.0003	0.0002	0.0003
	0.03%	-0.17%	0.22%	-0.02%	-0.58%	-3.67%	-0.96%	-0.04%	-2.74%
Percent Total (Explained)	65.54%	69.47%	64.12%	48.32%	51.69%	72.44%	58.38%	57.99%	65.77%
Sample Size	6,511	6,777	7,677	9,003	11,617	13,959	14,364	14,528	13,623

Note: All equations were estimated using the African-American specification.

Table B2.
Decomposition Results of Racial Disparities in Subprime Rates by Year and Race Specification: White Sample

	1999	2000	2001	2002	2003	2004	2005	2006	2007
White subprime rate	0.0204	0.0340	0.0274	0.0232	0.0296	0.0481	0.0929	0.1467	0.0945
African-American subprime rate	0.0556	0.0868	0.0655	0.0730	0.0761	0.1366	0.2927	0.3845	0.2411
White/African-American gap	-0.0352	-0.0528	-0.0382	-0.0498	-0.0465	-0.0885	-0.1998	-0.2378	-0.1465
Contributions from racial differences in:									
Female	-0.0002	0.0000	-0.0005	0.0000	-0.0004	-0.0008	-0.0017	-0.0025	-0.0002
	0.0003	0.0005	0.0003	0.0002	0.0002	0.0002	0.0003	0.0004	0.0003
	0.57%	0.07%	1.41%	0.02%	0.88%	0.90%	0.87%	1.04%	0.13%
Log Income	-0.0011	-0.0023	-0.0019	-0.0027	-0.0049	-0.0029	-0.0031	-0.0030	-0.0060
	0.0004	0.0006	0.0004	0.0004	0.0004	0.0003	0.0004	0.0005	0.0005
	3.00%	4.28%	4.94%	5.47%	10.48%	3.32%	1.53%	1.28%	4.09%
Loan Amount	-0.0024	-0.0034	-0.0021	-0.0008	0.0003	-0.0030	-0.0035	-0.0010	0.0019
	0.0004	0.0006	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
	6.69%	6.42%	5.49%	1.59%	-0.68%	3.40%	1.76%	0.42%	-1.30%
FICO	-0.0068	-0.0101	-0.0093	-0.0115	-0.0144	-0.0465	-0.0770	-0.1021	-0.0699
	0.0008	0.0008	0.0006	0.0006	0.0005	0.0006	0.0008	0.0009	0.0009
	19.22%	19.21%	24.30%	23.07%	31.04%	52.59%	38.52%	42.95%	47.73%
Debt-to-Income Ratio	-0.0013	-0.0025	0.0005	-0.0001	0.0009	0.0008	0.0001	-0.0009	-0.0084
	0.0004	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003
	3.78%	4.82%	-1.40%	0.12%	-1.98%	-0.86%	-0.04%	0.36%	5.75%
Tract Income	-0.0012	-0.0015	-0.0023	-0.0021	-0.0017	-0.0076	-0.0138	-0.0153	-0.0153
	0.0010	0.0014	0.0008	0.0009	0.0009	0.0010	0.0013	0.0015	0.0015
	3.48%	2.91%	5.97%	4.17%	3.59%	8.58%	6.93%	6.42%	10.47%
Minority Tract	0.0005	-0.0014	-0.0015	0.0026	0.0022	-0.0029	-0.0026	-0.0049	-0.0001
	0.0017	0.0023	0.0016	0.0014	0.0012	0.0016	0.0024	0.0028	0.0027
	-1.37%	2.64%	3.91%	-5.22%	-4.81%	3.24%	1.28%	2.06%	0.07%
Percent Denial	-0.0049	-0.0031	-0.0007	-0.0021	-0.0072	-0.0199	-0.0436	-0.0713	-0.0491
	0.0011	0.0013	0.0007	0.0006	0.0007	0.0011	0.0016	0.0022	0.0020
	13.89%	5.88%	1.91%	4.27%	15.44%	22.50%	21.84%	29.98%	33.51%
Percent Turnover	-0.0017	-0.0015	-0.0017	-0.0006	-0.0004	0.0029	0.0042	0.0086	0.0053
	0.0004	0.0004	0.0003	0.0001	0.0001	0.0003	0.0004	0.0007	0.0004
	4.72%	2.89%	4.48%	1.16%	0.90%	-3.24%	-2.12%	-3.61%	-3.60%
Documentation	0.0030	0.0022	0.0002	0.0003	0.0008	0.0021	0.0042	0.0060	0.0076
	0.0007	0.0006	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0006
	-8.37%	-4.09%	-0.63%	-0.68%	-1.67%	-2.37%	-2.11%	-2.52%	-5.21%
Owner Occupancy	0.0002	-0.0002	0.0000	0.0001	0.0004	0.0017	0.0024	0.0043	0.0079
	0.0002	0.0001	0.0001	0.0000	0.0001	0.0002	0.0001	0.0002	0.0003
	-0.67%	0.36%	-0.13%	-0.11%	-0.92%	-1.93%	-1.20%	-1.82%	-5.40%
Percent Total (Explained)	44.93%	45.39%	50.24%	33.86%	52.27%	86.12%	67.25%	76.57%	86.24%
Sample Size	6,511	6,777	7,677	9,003	11,617	13,959	14,364	14,528	13,623

Note: All equations were estimated using the white specification.