Segregation and the Subprime Lending Crisis*

by

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Abstract

The recent rise in subprime lending and record-level foreclosure rates has generally been explained in terms of ill-informed borrowers, irresponsible lenders, greedy investors, lax regulators, fraudulent appraisers, and other institutional actors in the financial and insurance services industries. Few have asked whether broader contextual factors influence the growth of high-cost loans. Some research has examined selected individual- and neighborhood-level predictors of subprime lending. In particular, prior research has shown that minorities or residents of predominately minority neighborhoods are more likely to receive a subprime loan. However, little research has examined the possible effects of racial segregation and the concentration of people of color. Using multivariate OLS regression models, with data from the 2006 HMDA report, the 2006 American Community Survey, and the 2000 Census, and credit score information, we find evidence that even after controlling for percent minority, low credit scores, poverty, and median home value, racial segregation is clearly linked with the proportion of subprime loans originated at the metropolitan level. We also find that black segregation has a stronger effect than Hispanic segregation. This research suggests that the context of racial segregation is an important determinant of subprime lending. We also find that general education levels seem to be an important protective factor against high proportions of subprime loans. Consequently, policy initiatives should address these broader dimensions of segregation and uneven development, in addition to consumer behavior, banking practices, and regulation of financial services industries.

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Introduction

The growth in subprime lending, coupled with rising defaults and record-level foreclosure rates, has gripped the nation since 2008. Blame is being directed at ill-informed consumers, lax underwriting by loan originators, failure of regulatory agencies, predatory lending practices, greedy investors, misguided appraisers and credit rating agencies, job loss in economically distressed regions, and a range of other institutional and individual factors (Baily, Elmendorf, and Litan 2008; Gramlich 2007).¹ Virtually ignored in this debate is the role of structural and contextual forces, most notably various trajectories of inequality, uneven metropolitan development, and racial segregation.² While there is widespread recognition that lower income households and communities, racial minorities, women and other vulnerable populations are hardest hit, the context of racial segregation as a driver of subprime lending, and as an explanation for the variance in such lending across cities and communities, has not received serious consideration. Yet there are theoretically plausible reasons why the segregation of minorities may establish a context in which these lending practices would flourish (Squires 2008a).

It is plausible that in highly segregated cities, minority populations are more susceptible, for at least three reasons, to high-cost financial products. One explanation is that in segregated cities, minority communities are more isolated, and may be less experienced with purchasing financial products. Consequently, subprime lenders might more effectively target those areas in

¹ There is an important difference between legitimate subprime lending and predatory lending. But the line between them is not always clear. Most predatory lending occurs in the subprime market. Fannie Mae and Freddie Mac have estimated that between one-third and one-half of those receiving subprime loans would qualify for prime loans (Engel and McCoy 2002). Despite the distinction between subprime and predatory lending, it is likely the case that initiatives to reduce one will reduce the other.

² While segregation has decreased since the 1960s, it still persists in most cities, and at hypersegregated levels in many (Fischer, Stockmayer, Stiles and Hout 2004; Logan, Stults, and Farley 2004; Timberlake and Iceland 2007; Wilkes and Iceland 2004).
their marketing strategy and exploit differences in financial education. There is some evidence that some financial institutions have targeted low-income and minority neighborhoods for subprime products (Avery, Brevoort, and Canner 2006; Bocian, Ernst, and Li 2008; Squires 2008a). Second, mainstream, prime lenders might avoid segregated, low-income areas and there may be less competition among lenders, leaving borrowers, regardless of their financial education level, little choice other than high-cost products. Finally, lenders may place a higher risk-based premium for those living in low-income, segregated areas. In more segregated cities, there may be more at-risk areas (or at least the perception of greater risk) and people in these communities, and this might affect the city’s overall proportion of high-cost loans. These mechanisms may explain why segregation might contribute to variation in subprime lending across cities.

Understanding the predictors of subprime loans is important because these types of loans are more likely to foreclose (Avery, Brevoort, and Canner 2007; Coulton, Chan, Schramm, and Mikelbank 2008; Immergluck and Smith 2004), and cause financial harm to multiple parties including homeowners, lenders, investment banks, insurance companies, cities, and states (Immergluck and Smith 2005; Joint Economic Committee 2007; Pennington-Cross 2004; U.S. Conference of Mayors 2007). Additionally, there is some evidence that these loans are being originated in ways that disproportionately affect minority homeowners and neighborhoods. In 2006, 53.7 percent of African American, 46.6 percent of Hispanic, and 17.7 percent of white mortgage recipients received a high-priced loan. In census tracts where the population was at least 80 percent minority, 46.6 percent obtained high-priced loans, compared to 21.7 percent in communities where racial and ethnic minorities accounted for less than 10 percent of the population (Avery, Brevoort, and Canner 2007). The intent of this research is to uncover
whether racial segregation is an underlying dynamic associated with the allocation of subprime loans.

The primary question we explore is whether metropolitan regions that exhibit greater segregation have proportionately more subprime loans, controlling for a range of socio-economic factors traditionally understood to account for the prevalence of high-cost loans. The dependent variable, drawn from the 2006 Home Mortgage Disclosure Act (HMDA) data, is the share of high-cost home purchase and refinance loans for each metropolitan area. The measure of residential segregation is the black and Hispanic dissimilarity indices. Control variables include percent with low credit scores, percent minority, poverty and unemployment rates, median home value, and education level.

Using multivariate OLS regression models, we find that racial segregation is a significant predictor of the share of subprime loans, even after controlling for the percent of minorities, credit score, median home value, poverty, and education. We find that black segregation has a stronger effect than Hispanic segregation. Moreover, we find that aggregate-level education seems to be an important protective factor. These results suggest that the context of segregation explains, in part, metropolitan-level variation in the proportion of subprime lending. Based on our findings, we discuss policy recommendations to decrease a metropolitan region’s susceptibility to subprime lending.

Mortgage Lending in Minority Neighborhoods

In first half of the 20th Century, lenders used neighborhood racial composition as a key determinant for loan underwriting. Loan applications from minority neighborhoods were often denied based on the premise that these areas were in decline. Lenders denied home loan

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3 In this paper the terms high-cost, subprime, and high-priced loans are used interchangeably.
applications from predominately black communities because it was assumed that home values in these areas would decline below an acceptable risk level. If home values decreased, properties would no longer meet the necessary loan collateral requirements. This practice of loan denial based on the racial composition of the neighborhood was known as redlining. Early indicators include the Federal Housing Administration’s denial of loan guarantees in black neighborhoods in the 1930s which was not officially made illegal until the passage of the Fair Housing Act of 1968 (Jackson 1985; Massey and Denton 1993). Redlining contributed to the unequal distribution of credit and equity by race in America.

To assist in the enforcement of the 1968 housing law, the Home Mortgage Disclosure Act (HMDA) of 1975, as subsequently amended, mandates that most mortgage lenders submit their individual loan level application data to the federal government. Today HMDA reports include substantial information on loan applications including race, gender, and income of the applicant, the dollar amount, type of loan applied for (with pricing data included for selected high-priced loans), disposition of the application (i.e., whether it was approved or denied), and the census tract in which the home is located. These data are available to the general public for analysis. The loan data allow for an assessment of bank lending patterns, making it easier to detect potentially discriminatory lending patterns.

In 1977 the Community Reinvestment Act (CRA) was enacted. This law mandates that federally chartered depository institutions be responsive, consistent with safe and sound lending practices, to the credit needs of their entire service areas, including low- and moderate-income communities. Lenders with inadequate CRA records can be denied authority by the federal government to open additional branches, merge with other financial institutions, or make other
changes to their business operations. HMDA and CRA were designed, in part, to alleviate inequities in credit allocation among racial groups.\textsuperscript{4}

In 1980 the lending environment drastically changed. The Depository Institutions Deregulation and Monetary Control Act altered the mortgage pricing guidelines for national lenders. By facilitating the charging of varying rates and fees, this act laid the groundwork for risk-based pricing in mortgage lending (Smith 2007).\textsuperscript{5} Prior to this act, borrowers whose loan applications were accepted typically received similar interest rates, but with risk-based pricing those with more default risk factors, such as lower credit scores, downpayments below 20 percent, and higher loan-to-value and debt-to-income ratios, receive higher rates (Chomsisengphet and Pennington-Cross 2006; Fellows 2006; Getter 2006). These new pricing, products, and underwriting procedures opened homeownership opportunities to a new set of borrowers. However, it also created the potential for a new type of lending discrimination, “reverse redlining,” where high-cost loan products are disproportionately concentrated in low-income, minority communities.

In the 1990s and 2000s, with new home loan underwriting procedures, certain minority communities that were once redlined became susceptible to reverse redlining, as high-priced lending products flooded into these areas. These high-priced lending products became a major problem in the mid and late 2000s when default and foreclosure rates started to skyrocket. Some homeowners who took out subprime loans were unable, for a variety of reasons, to sustain their mortgage payments. As a result subprime-concentrated minority neighborhoods in metropolitan

\footnotesize{\textsuperscript{4} The Equal Credit Opportunity Act of 1974 also encouraged a more equitable distribution of credit in the U.S. (Holloway 1998).}

\footnotesize{\textsuperscript{5} Following the 1980 Act, the passage of the Alternative Mortgage Transaction Parity Act in 1982, which allowed lenders to use variable interest rates and balloon payments, and the Tax Reform Act of 1986, which allowed interest rate mortgage deductions, facilitated, to some extent, the emergence of the subprime market. Some also argue that the Financial Institutions Reform, Recovery, and Enforcement Act of 1989 contributed to the evolution of the subprime market (Weicher 2007).}
areas like Cleveland and Baltimore became dotted with foreclosed properties. Some cities have sued lenders to recoup the costs incurred as a result of foreclosures, such as administrative expenses to process foreclosures, increased police services in response to rising crime, and cuts in property tax revenues (Leinwand 2008).

The foreclosure crisis was not isolated to minority communities but infected the entire housing market as property values started to decline throughout the country when foreclosure rates shot up. Studies indicate that even properties with current mortgages near foreclosures are losing value (Immergluck and Smith 2005; Schloemer, Li, Ernst, and Keest 2006). The combination of an increased number of foreclosed properties and declining property values has wrecked havoc for state and city budgets (Joint Economic Committee 2007; U.S. Conference of Mayors 2007). The foreclosure crisis also affected Wall Street and investors across the world. Subprime loans were bundled into mortgage-backed securities (MBSs) and these secondary market investments severely declined in value when the mortgages backing these securities started to default. Some estimates put losses associated with the subprime mortgage meltdown at one trillion dollars (Morris 2008). The U.S. mortgage crisis affected national and international economies and it all began, in part, with high-cost loan originations in America’s minority communities.

In 2000 a series of studies commissioned by the U.S. Department of Housing and Urban Development (HUD) indicated that communities of color, compared to other low-income neighborhoods, received a disproportionately larger share of high-cost loans (Bunce, Gruenstein, Herbert, and Scheessele 2001). In Atlanta, New York, Boston, and Baltimore, even after controlling for the community’s income level, African-American areas had a higher proportion of subprime loans. The evidence from these cities suggests lenders were inappropriately
targeting minority neighborhoods or subprime lenders were serving areas that prime lenders neglected.

The HUD reports highlight the troubling subprime loan patterns by race; however, there were several limitations with these studies. First, they did not control for credit score. Minority areas could have received more subprime loans because borrowers in these communities had impaired or blemished credit records. Second, these studies used a crude proxy for subprime loans; a loan was labeled subprime if the originator’s website said they were a subprime lender. The actual loan rates and terms were not available or assessed in the HUD-sponsored research. Lastly, the conclusions of the HUD reports were based on four cities that might not represent the subprime lending patterns in the rest of the country.

To address some of the limitations of the HUD reports, Calem, Hershaff, and Wachter (2004) expanded the number of cities to seven (Atlanta, Baltimore, Chicago, Dallas, Los Angeles, New York, and Philadelphia) and accounted for several individual and neighborhood credit risks factors. They found that even after controlling for neighborhood credit score, the neighborhood share of minorities was still positively associated with subprime lending. They also discovered that elevated neighborhood education levels were associated with a lower probability of subprime lending. While some scholars believe this study strongly suggests the presence of reverse redlining, others argue that the research did not account for important loan characteristics, such as loan-to-value and debt-to-income ratios, that might explain the racial disparities in high-cost lending.

A subsequent study by Avery, Brevoort, and Canner (2006) incorporated additional loan characteristics. The distinct advantage of Avery, Brevoort, and Canner’s study is that they had a more accurate indicator of subprime loans. In 2004 the HMDA (Regulation C) was altered requiring banks to indicate pricing information on selected high-cost loans. For such loans banks
had to report the spread between the loan’s annual percentage rate (APR) and the rates on Treasury securities with comparable maturities when the APR was 300 basis points above a comparable Treasury note for first lien loans and 500 basis points for second lien loans. Avery and colleagues found, using 2005 HMDA data, that even after controlling for a variety of individual and loan characteristics, black and Hispanic borrowers were more likely than whites to receive high-cost loans. A year later, Avery, Brevoort, and Canner (2007) replicated this study with 2006 HMDA data and found similar results.

Bocian, Ernst, and Li (2008) integrated multiple datasets on individual, loan, and property characteristics to establish the significance of race in the allocation of high-cost loans. Analyzing a comprehensive set of loan risk factors including loan-to-value, credit score, borrower income, and property location, the authors find that African Americans and Hispanics, compared to similarly situated whites borrowers, were more likely to receive high-priced loans and mortgages with subprime characteristics, such as prepayment penalties and balloon payments. The culmination of high-cost lending studies beginning in 2000 convincingly supports the notion that minority borrowers and communities are disproportionately receiving subprime loans.

In addition to these studies, others attempt to investigate whether mortgage pricing differentials between whites and minorities are justified relative to standard risk-based pricing underwriting factors. A study by Courchane (2007) demonstrates that up to 90 percent of the

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6 In the subprime literature there is a debate as to what is a subprime loan but most studies after 2005 use a high-cost loan as a proxy for a subprime loan. In July of 2008, the Board of Governors of the Federal Reserve System changed the definition of high-cost loans to those where the interest rate was 1.5 percent points or more above the average prime offer rate reported by Freddie Mac or a comparable Federal Reserve survey for a first lien; or 3.5 percent for second liens.

7 There were some important studies on racial lending differences that preceded 2000, most notably the “Boston Fed Study” (see Munnell, Tootell, Browne, and McEneaney 1996).
APR gap for African Americans and 85 percent of gap for Hispanics is explained by observable differences in underwriting, costing, and market factors. Further, Edelberg (2009) discovers that after controlling for the financial cost of issuing debt, the likelihood of price differential between whites and minorities greatly decreases after 1995, when risk-based pricing became more prevalent. These studies suggest that lending institutions might not be allocating higher debt prices in a discriminatory way. However, it is important to note that in these studies racial price disparities are not fully eliminated. Nor do these studies account for racial disparities in wealth, income, or education that may account for differences in standard risk analysis measures.

From the late 1990s through mid-2006, high-cost lending was on the rise throughout the country (Avery, Brevoort, and Canner 2007; Gramlich 2007); however, there was great variation in the proportion of subprime loans across metropolitan areas (see Figure 1). While previous studies identified individual and neighborhood characteristics associated with subprime lending, almost none explored whether broader contextual factors were related to the prevalence of subprime loans. One exception is Been, Ellen, and Madar’s (forthcoming) study, which found that the likelihood of receiving a high-cost loan for minority borrowers increased as metropolitan segregation worsened. One limitation of this study is that it did not include credit score, an important loan type predictor. Our investigation builds on this research, and other studies, by testing whether racial segregation predicts the metropolitan proportion of high-cost loans, while attempting to control for credit.

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8 In 1994 subprime mortgage originations were less than 4 percent of total originations and by 2005 they had grown to 20 percent (Gramlich 2007). For an excellent map that depicts the metropolitan variation in the proportion of subprime lending and foreclosures see Hannah Fairfield. “In the Shadow of Foreclosures,” New York Times, April 6, 2008. [http://www.nytimes.com/2008/04/06/business/06metricstext.html?r=1&oref=slogin] [accessed July 14, 2008]
Data and Methodology

To explore our primary questions, we assembled a dataset from a variety of sources including HMDA, the American Community Survey (ACS), Census data, and Equifax. The HMDA, ACS, and Equifax data were all collected in 2006. The Census data were from 2000. The dependent variable is the percentage of originated mortgage loans that were high-cost (or subprime) according to 2006 HMDA reports. This number was derived for each metro Core Base Statistical Area (CBSA) (metro CBSAs defined subsequently). We summed the number of prime and subprime home-purchase and refinance first lien mortgage loans for owner-occupants

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9 Loans are defined as high-cost when the APR is 300 basis points above a comparable Treasury note.
and divided the number of subprime loans by the total number of loans to determine the share of subprime loans originated.

The primary independent variable is the intensity of racial segregation as determined by the black and Hispanic dissimilarity indices (Cashin 2004; Timberlake and Iceland 2007). The dissimilarity index indicates how unevenly two mutually exclusive groups, in this case blacks and whites and Hispanics and whites, are distributed within a geographic area. It can be thought of as the extent to which one group or the other would have to move to achieve racial representation in each of the area’s census tracts proportionate to the composition of the two groups in the broader region. For instance, if African Americans made up 20 percent of the population within a metro CBSA, the black dissimilarity index tells us the percent of African Americans or whites that would have to move to achieve the 20 percent level in all of the metro CBSA’s census tracts. Thus, a 65 score on the black dissimilarity index means that 65 percent of African Americans or whites would have to move to achieve an even distribution of blacks and whites throughout the region. The higher the dissimilarity index, the more the region is segregated. Black and Hispanic dissimilarity indices were derived from the 2000 Census. The 2000 Census is the only available dataset that can be used to accurately construct these indices.

The control variables are attributes that previous research had identified as significantly related to the probability of subprime lending. These measures, at the metropolitan level, include the percent minority, percent below the poverty level, percent unemployed (16 years or older), percent of consumers with low credit scores (<639), median home value, and percent with college degrees. All of the variables are displayed in Table 1.
### Table 1. Variable Label, Description, and Source

<table>
<thead>
<tr>
<th>Variable Label</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCT_HC</td>
<td>Percent of High-Cost Loans</td>
<td>HMDA (2006)</td>
</tr>
<tr>
<td>UNEMP_RATE</td>
<td>Unemployment Rate</td>
<td>ACS (2006)</td>
</tr>
<tr>
<td>POV_RATE</td>
<td>Percent in Poverty</td>
<td>ACS (2006)</td>
</tr>
<tr>
<td>PCT_MINOR</td>
<td>Percent Minority</td>
<td>ACS (2006)</td>
</tr>
<tr>
<td>MED_VALUE</td>
<td>Median Value for Owner-Occupied Housing Units</td>
<td>ACS (2006)</td>
</tr>
<tr>
<td>D_BLACK</td>
<td>Dissimilarity Index for Black or African Americans</td>
<td>Census (2000 - Summary File 1)</td>
</tr>
<tr>
<td>D_HISP</td>
<td>Dissimilarity Index for Hispanics</td>
<td>Census (2000 - Summary File 1)</td>
</tr>
<tr>
<td>PCT_SCORE</td>
<td>Percent of Consumers with Low Credit Scores (&lt; 639)</td>
<td>Equifax (2006)</td>
</tr>
<tr>
<td>PCTBAPLUS</td>
<td>Percent with B.A. or higher</td>
<td>ACS (2006)</td>
</tr>
</tbody>
</table>

The unit of analysis is the metro Core Based Statistical Area (CBSA), which proxies the metropolitan region. The CBSA is a collective term for both metro and micro areas. A metro area contains a core urban area of 50,000 people or more, and a micro area contains an urban core between 10,000 and 50,000 people. Each metro or micro area consists of one or more counties and includes the counties containing the core urban area, as well as any adjacent counties that have a high degree of social and economic integration (as measured by commuting to work) with the urban core. We only assessed the metro CBSA data and not the micro areas because we are concerned with segregation and lending patterns in larger population areas. Additionally, we selected metro CBSAs over Metropolitan Statistical Areas (MSAs) since metro CBSAs cover extensively a city’s outlying suburban areas, while MSAs often do not. Lastly, it is a much easier to roll up HMDA, ACS, and credit score data to the metro CBSA level because CBSAs are based on county boundaries, while MSAs are not. In 2006 there were 367 metro CBSAs in the United States. Some of the metro CBSAs lacked a complete set of data; therefore 13 metro CBSAs (or 3.5 percent of the total) were excluded from our analyses.

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10 Metropolitan and micropolitan statistical areas are geographic entities defined by the U.S. Office of Management and Budget for use by Federal statistical agencies in collecting, tabulating, and publishing Federal statistics (see [http://www.census.gov/population/www/estimates/metroarea.html](http://www.census.gov/population/www/estimates/metroarea.html)). [accessed June 11, 2008]
Table 2 presents descriptive summary statistics of the variables. There is great metropolitan variation for our key variables. The minimum share of subprime loans is just under 10 percent and the maximum is 55 percent, with a mean of 27 percent. The black dissimilarity index ranges from a low of 16.2 to a high of 84.1 and the Hispanic index ranges from 7.2 to 69.1. There is also tremendous variation in poverty and unemployment rates, credit scores, home values, racial composition, and education levels across the country’s metropolitan regions.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCT_HC</td>
<td>367</td>
<td>27.4</td>
<td>7.30</td>
<td>9.68</td>
<td>55.61</td>
</tr>
<tr>
<td>UNEMP_RATE</td>
<td>367</td>
<td>2.4</td>
<td>0.84</td>
<td>0.65</td>
<td>7.16</td>
</tr>
<tr>
<td>POV_RATE</td>
<td>367</td>
<td>14.9</td>
<td>6.76</td>
<td>4.57</td>
<td>56.97</td>
</tr>
<tr>
<td>MED_VALUE (in $10,000)</td>
<td>367</td>
<td>17.8</td>
<td>11.73</td>
<td>5.40</td>
<td>74.05</td>
</tr>
<tr>
<td>D_BLACK</td>
<td>367</td>
<td>47.8</td>
<td>13.19</td>
<td>16.20</td>
<td>84.1</td>
</tr>
<tr>
<td>D_HISP</td>
<td>367</td>
<td>32.4</td>
<td>11.23</td>
<td>7.20</td>
<td>69.1</td>
</tr>
<tr>
<td>PCT_MINOR</td>
<td>355</td>
<td>26.5</td>
<td>17.25</td>
<td>3.00</td>
<td>99</td>
</tr>
<tr>
<td>PCT_SCORE</td>
<td>359</td>
<td>27.8</td>
<td>5.82</td>
<td>16.00</td>
<td>49</td>
</tr>
<tr>
<td>PCTBAPLUS</td>
<td>367</td>
<td>22.0</td>
<td>6.70</td>
<td>9.21</td>
<td>48.81</td>
</tr>
</tbody>
</table>

The key relationship is illustrated in Table 3 which lists the ten most segregated metropolitan areas and the ten least segregated (according to the black dissimilarity index), along with the share of loans in those communities that are high priced. For example, in Detroit-Warren-Livonia, MI, the most segregated area, 34 percent of loans were high priced compared to just 24 percent in Coeur d'Alene, ID, the least segregated area.

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11 The dissimilarity index ranges from 0 to 1. The closer the index is to one the higher the level of segregation. The index score was multiplied by 100 to scale the index with the other variables.
Table 3. Top 10 Most and Least Segregated Metro Areas and Percent of High-Cost Loans

<table>
<thead>
<tr>
<th>10 Most Segregated Metropolitan Regions</th>
<th>Black Segregation Index</th>
<th>Pct. of High-Cost Loans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detroit-Warren-Livonia, MI</td>
<td>84</td>
<td>34</td>
</tr>
<tr>
<td>Milwaukee-Waukesha-West Allis, WI</td>
<td>81</td>
<td>29</td>
</tr>
<tr>
<td>Chicago-Naperville-Joliet, IL-IN-WI</td>
<td>78</td>
<td>31</td>
</tr>
<tr>
<td>Cleveland-Elyria-Mentor, OH</td>
<td>77</td>
<td>28</td>
</tr>
<tr>
<td>Flint, MI</td>
<td>76</td>
<td>37</td>
</tr>
<tr>
<td>Muskegon-Norton Shores, MI</td>
<td>76</td>
<td>38</td>
</tr>
<tr>
<td>Buffalo-Niagara Falls, NY</td>
<td>76</td>
<td>25</td>
</tr>
<tr>
<td>Niles-Benton Harbor, MI</td>
<td>73</td>
<td>30</td>
</tr>
<tr>
<td>St. Louis, MO-IL</td>
<td>73</td>
<td>31</td>
</tr>
<tr>
<td>Cincinnati-Middletown, OH-KY-IN</td>
<td>73</td>
<td>25</td>
</tr>
</tbody>
</table>

| 10 Least Segregated Metropolitan Regions |
|------------------------------------------|-------------------------|
| Coeur d'Alene, ID                        | 16                      |
| Hinesville-Fort Stewart, GA              | 18                      |
| Santa Fe, NM                             | 21                      |
| Prescott, AZ                            | 21                      |
| Bellingham, WA                           | 22                      |
| Boulder, CO                              | 23                      |
| Jacksonville, NC                         | 24                      |
| Blacksburg-Christiansburg-Radford, VA    | 24                      |
| Santa Cruz-Watsonville, CA              | 24                      |
| Missoula, MT                             | 24                      |

| Average                                | 77                      |

Table 4 displays the correlation matrix among the variables. The percent of high-cost loans is highly associated with the poverty rate, the percent of minority, median home value (negative association), the segregation of African Americans, the percent with a low credit score, and the percent with a B.A. or higher (negative association).

Table 4. Correlation Matrix

<table>
<thead>
<tr>
<th>pct_hc</th>
<th>unemp_rate</th>
<th>pov_rate</th>
<th>pct_minor</th>
<th>med_value</th>
<th>d_black</th>
<th>d_hisp</th>
<th>pct_score</th>
<th>pctbaplus</th>
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</thead>
<tbody>
<tr>
<td>pct_hc</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>unemp_rate</td>
<td>.027</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>pov_rate</td>
<td>.443</td>
<td>.124</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>pct_minor</td>
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<td>.157</td>
<td>.411</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>med_value</td>
<td>-.377</td>
<td>-.119</td>
<td>-.350</td>
<td>-.290</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d_black</td>
<td>.296</td>
<td>.139</td>
<td>-.074</td>
<td>-.060</td>
<td>-.153</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d_hisp</td>
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<td>.082</td>
<td>-.136</td>
<td>.265</td>
<td>.247</td>
<td>.260</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>pct_score</td>
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<td>.114</td>
<td>.521</td>
<td>.592</td>
<td>-.302</td>
<td>.003</td>
<td>.076</td>
<td>1</td>
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<tr>
<td>pctbaplus</td>
<td>-.651</td>
<td>.127</td>
<td>-.373</td>
<td>-.095</td>
<td>.416</td>
<td>-.033</td>
<td>.129</td>
<td>-.415</td>
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</tbody>
</table>
We used multivariate OLS regression models to investigate the relationship between the proportion of loans that are high-cost and the independent variables. The basic model is represented by the following equation.

Racial Segregation Model

\[ Y(\text{proportion of subprime loans}) = aX_1(\text{dissimilarity index}) + bX_2(\text{unemployment rate}) + cX_3(\text{percent in poverty}) + dX_4(\text{percent minority}) + eX_5(\text{percent with low credit scores}) + fX_6(\text{median home price}) + gX_7(\text{education}) + e \]

Mortgage lending patterns may vary based on the specific regional context of an area. It may be the case that racial segregation has different magnitudes of effect on subprime lending based on the local features of the real estate market. For example, segregation might matter more or less based on whether the value of local real estate is declining, stable, or increasing. We investigate the effect of the local real estate market on the relationship between racial segregation and subprime lending by using a high-cost housing dummy variable.

High-cost housing metropolitan areas were determined by regressing the log of metropolitan median household income on the log of median home value (see Glaeser, Kolko, and Saiz 2001). Metropolitan areas with negative residuals can be considered low-cost housing areas while those with positive residuals are areas where household income is above the regression line. The residuals were separated into quintiles; those in the highest fifth category are considered high-cost housing areas. Figure 2 displays the geographic distribution of housing prices relative to income for metropolitan areas across the country. As you can see, the high-cost housing areas tend to be near the coasts. A high-cost housing dummy variable was constructed; metropolitan areas in the top fifth quintile were labeled 1 and all other areas were labeled 0.
We tested the subsequent model to see if the impact of segregation on high-cost lending was different in high-cost housing areas.

Racial Segregation Model with High-Cost Housing Variable

\[ Y(\text{proportion of subprime loans}) = aX_1(\text{dissimilarity index}) + bX_2(\text{unemployment rate}) + cX_3(\text{percent in poverty}) + dX_4(\text{percent minority}) + eX_5(\text{percent with low credit scores}) + fX_6(\text{median home price}) + gX_7(\text{education}) + hX_8(\text{high-cost housing}) + e \]

When assessing the results, keep these three points in mind. First, none of the models contains individual-level data since we are not trying to predict individual determinants of subprime lending. Second, since our dependent variable is proportional we ran traditional OLS
models and ones with a transformed version of our dependent variable.\textsuperscript{12} None of the relationships among the variables changed between the two models, so we present the results from the traditional OLS regressions. Third, we could not run models with both poverty and unemployment because of issues of multicollinearity. All models were run with poverty and then re-run replacing it with unemployment. Inserting one versus the other did not alter the relationships among the variables.

Results

The results suggest that racial segregation is an important predictor of the proportion of loans that are subprime. Holding poverty, percent minority, median home value, credit, and education constant, the level of segregation for blacks and Hispanics are statistically significant determinants of the proportion of all loans that are subprime (see Tables 5 and 6). Black segregation (0.14), in terms of effect size, is similar to percent minority (0.13) and is out ranked by credit score (0.23) and education (0.48). Median home value (-0.11) was also statistically significant and negatively associated with the percent of subprime loans. Poverty was statistically non-significant as was unemployment when it was inserted. According to the results, a 10 percent increase in black segregation, on average, is associated with a 1.4 percent increase in high-cost lending.

\textsuperscript{12} We altered our dependent variable using the following transformation $\ln(y/(1-y))$ to account for the bounded nature of the proportional data (see Papke and Wooldridge 1996). Using a log-odds ratio as a linear function is a recommended procedure when proportional dependant data fall between 0 and 1.
A model was also run replacing the black dissimilarity index with the Hispanic dissimilarity index. The results show that the segregation of Hispanics has a similar but smaller effect on the percent of high-cost loans compared to black segregation level. Table 6 indicates that the coefficient for the Hispanic dissimilarity index is 0.06. This means that a 10 percent increase in Hispanic segregation, on average, is associated with a 0.6 percent increase in high-cost lending.

We ran the segregation models with the high-cost housing dummy variable. The relationship between high-cost housing areas and the proportion of high-cost loans is statistically significant for black segregation, but not Hispanic segregation. The black segregation model suggests that compared to non high-cost housing areas, high-cost housing areas have, on average, 1.76 percent more high-cost loans. It appears that the metropolitan level relationship between segregation and subprime lending is not affected by the context of high- versus non high-cost housing areas since the black segregation coefficients for models run with and without the high-
cost housing area variable were very similar. The results of the black segregation model with the high-cost housing variable are shown in Table 7.

Table 7. Model III: Black Segregation and High-Cost Areas (HCA)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Standard Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent in Poverty</td>
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<td>0.07</td>
</tr>
<tr>
<td>Percent Minority</td>
<td>0.13**</td>
<td>0.02</td>
</tr>
<tr>
<td>Black Segregation</td>
<td>0.15**</td>
<td>0.02</td>
</tr>
<tr>
<td>Median Home Value</td>
<td>-0.15**</td>
<td>0.03</td>
</tr>
<tr>
<td>Percent with Low Credit Score</td>
<td>0.24**</td>
<td>0.06</td>
</tr>
<tr>
<td>Percent with B.A. or Higher</td>
<td>-0.47**</td>
<td>0.04</td>
</tr>
<tr>
<td>High-Cost Housing Areas (Dummy)</td>
<td>1.76*</td>
<td>0.78</td>
</tr>
</tbody>
</table>

N=354, R-Squared=0.6987, *p<.05, **p<.01

Discussion

John Relman, a prominent civil rights attorney, asserted that “reverse redlining arises in cities where there are racially segregated residential living patterns. This means that the people who are most vulnerable to abusive lending practices are geographically concentrated and therefore easily targeted by lenders” (Relman 2008: 637). Our results concur to some extent with Relman’s observation and suggest that racial segregation is a powerful predictor of the proportion of metropolitan area mortgage loans that are subprime. Results show that the intensity of black segregation is similar to the percent of minorities, percent with low credit scores, median home value, and percent with a B.A. or higher in determining a metropolitan’s share of subprime loans. In addition, Hispanic segregation also has an effect although less than black segregation. While past studies have found a strong association between the percent of minorities and prevalence of high-cost financial products (Avery, Brevoort, and Canner 2006; Bocian, Ernst, and Li 2008), it appears that the concentration of minorities is equally important. This suggests that there is something about segregated residential markets that leads to high rates of subprime lending, possibly giving credence to the notion that mortgage lenders find it easier to target minorities for high-priced financial products in more segregated cities.
Besides the segregation finding, we had some other surprising and provocative results. The association between median home value and the proportion of high-cost loans was negative, meaning that metropolitan areas with higher home values, on average, had lower proportions of subprime loans. This means that more affluent areas receive proportionately fewer high-cost loans. But, there is a twist. When housing prices are adjusted relative to income, and the high-cost housing variable is inserted into the model, high-cost housing areas are associated with more high-cost loans. The black segregation model with a high-cost housing variable suggests that in metropolitan areas where home prices are high, relative to income, there are higher proportions of subprime lending. This would, to a certain extent, coincide with observations seen in California, where property value escalation increased the likelihood of subprime loans and foreclosures (see Laderman and Reid 2009).

Prior research indicates that the poverty rate is associated with the prevalence of high-cost loans (Lanzerotti 2006). In addition, our correlation matrix indicates that the poverty rate and proportion of high-cost loans had a relatively high positive bivariate correlation ($r = 0.44$). However, our results suggest that the metropolitan poverty rate is a less important predictor of subprime lending once credit score, the intensity of segregation, the percent minority, median home value, and education are taken into account. At the metropolitan level, poverty seems to be accounted for by other factors such as credit score and race.

Metropolitan areas with higher education levels have a lower proportion of high-cost loans. While not an unexpected finding, the magnitude of the effect, compared to other studies (e.g., Calem, Hershaff, and Wachter 2004), was. Education seems to be the most powerful predictor compared to the percent of minorities, the concentration of minorities, median home value, and credit score. We will discuss the implications of this finding in the subsequent policy section.
While it is unequivocal that segregated areas have higher proportions of subprime lending, we know little about the specific mechanisms by which residential segregation may lead to higher rates of subprime lending. Several pathways may link the concentration of minorities to higher proportions of high-cost lending. First, neighborhood effects may play a part. High levels of segregation and poverty are associated with an increased chance of problematic behaviors and outcomes. For instance, highly segregated impoverished neighborhoods have elevated risks of teen pregnancy, crime, and school dropout rates beyond what individual characteristics would predict (Wilson 1987, 1996). It is plausible that there is an elevated community-level risk of loan default and property value depreciation, regardless of borrowers’ characteristics, such as FICO and loan-to-value and debt-to-income ratios, in segregated minority communities (see Lee, Rosentraub and Kobie 2008; Order and Zorn 2000). If this is the case, are lender underwriting procedures taking this into account in loan pricing?

Second, lenders might be targeting segregated neighborhoods for high-cost loans. It is quite possible that the concentration of minority populations makes it easier for subprime lenders to market and sell their financial products. This study provides evidence that strongly suggests the targeting hypothesis should be further explored.

Third, it is also possible that prime lenders are reluctant to enter segregated areas and thus little choice is given to minority borrowers. It is plausible that subprime lenders might not have specifically targeted minority communities but they may have been the only lending opportunity available to borrowers in segregated, minority communities. Finally, the effect of education begs the question of whether a lack of financial knowledge in isolated, minority communities might have also contributed to the higher proportions of subprime lending in more segregated regions. Further studies need to explore the mechanisms by which segregation influences patterns of high-cost lending.
Future Research

These findings suggest important directions for further research. The segregation index used in this study was derived from the 2000 Census data. This is problematic because our lending data are from 2006 and the segregation levels in the metropolitan regions between 2000 and 2006 might have changed. To address this concern, future research should, once the data are available, incorporate a segregation index that is paired more closely in time with loan origination data.

This investigation only explored one measure of segregation. Further studies should incorporate other segregation measures, such as the isolation index or the net difference measure that capture the extent to which one racial group is more concentrated in disadvantaged neighborhoods than another (see Timberlake and Iceland 2007). Models that include these measures might help specify the types of social distance between racial groups that leads to differences in lending patterns.

This study’s unique contribution is the finding that metropolitan-level racial segregation is associated with the proportion of loans that are subprime. While this study examined this relationship across metropolitan regions, investigating communities within a particular municipality might elucidate this finding. It would be informative to compare subprime lending patterns in neighborhoods with similar incomes, credit scores, housing structures, and number of minorities but distinct racial concentrations (e.g., those 90, 75, and 60 percent African American). Such research might help discern the level at which minority concentration influences high-cost lending patterns. It would also be informative to use hierarchical linear

\[\text{The neighborhood effects literature suggests that areas where 40 percent of the residents are living at or below the poverty line are the ones that have elevated rates of teen pregnancy, school dropout and crime (Wilson 1996). It would be interesting to better understand at what minority concentration level subprime mortgages become disproportionately present.}\]
models to account for individual, as well as neighborhood and metropolitan level characteristics (see Been, Ellen, and Madar forthcoming). This study only focuses on metropolitan level factors and did not account for community and individual characteristics.\textsuperscript{14}

It is important to note that these results show association and not causation. But they do suggest that segregation drives, to some extent, patterns of subprime lending. It is quite possible that the directionality of this relationship is reversed, as other have argued, where increased subprime lending leads to more intense racial segregation (see Bond and Williams 2007) or perhaps the relationship operates in both directions. While it is unlikely that subprime lending directly affects segregation levels, it is quite plausible that foreclosures, related to subprime lending, might have actually made low-income minority neighborhoods less desirable and more prone to increased levels of isolation and segregation. Further studies need to explore the causal direction and dynamics of the relationship between segregation and subprime lending.

Clearly, there is a need for more precise definitions of subprime and predatory loans that are consistently used over time. That a loan is three or five percentage points above a comparable Treasury note, does not necessarily indicate a subprime, high-cost, or predatory loan (Bocian, Ernst, and Li 2008). For instance, similarly situated borrowers might have different interest rates because one elects to not pay upfront points or decides to make a minimal downpayment. This could affect the results of our study since we know African Americans and Hispanics have, on average, less wealth than whites (Oliver and Shapiro 1995, 2007). If certain minority groups pay fewer upfront points and make lower downpayments they are going to have more higher-cost loans, so the effect may not necessarily be attributable to racial discrimination.

\textsuperscript{14} Because we did not account for individual-level factors in our analysis, it is important to note that our results do not generalize to individuals (i.e., the ecological fallacy). Our results apply to populations within metropolitan areas. Further, we do not have direct evidence that minorities in more segregated metropolitan areas are disproportionately receiving subprime loans but based on prior research, such as the studies referenced in the literature review section, this is likely the case.
but could be due to income/wealth differences among blacks, Hispanics, and whites. We attempted to control for this at the metropolitan level with our poverty measure. However, we did not control income or wealth at the individual level and this might account for some of the racial and segregation effects we are picking up in our regression models (Bocian, Ernst, and Li 2008).

Policy Recommendations

Although there are several reasons why subprime lending proliferated in the last ten years and various approaches that might ameliorate such lending, these findings suggest that reducing the level of residential segregation would decrease a metropolitan area’s vulnerability to subprime lending. While we did not explore the specific mechanisms by which segregation leads to higher rates of high-cost lending, it is evident that areas where certain minority groups are more concentrated are more susceptible to subprime lending. We propose policies to 1) decrease metropolitan level segregation, 2) educate borrowers, and 3) regulate the lending industry.

Housing policies of the past have been linked with the concentration of minorities, particularly African Americans, in extremely segregated and impoverished communities (Carr and Kutty 2008; Massey and Denton 1993; Massey and Kanaiaupuni 1993). Today, much of the distressed public housing that once segregated minorities in inner city neighborhoods is being razed (Goetz 2003; Hyra 2008). Residents of these demolished buildings are receiving housing vouchers, a rent subsidy, to obtain private market rental units. Evidence suggests that voucher holders are ending up in other highly segregated communities (Fischer 2003; Hartung and Henig 1997). To prevent the continuing concentration of poverty and racial disadvantage, the U.S. Department of Housing and Urban Development’s Housing Choice Voucher program must be
reformed to provide greater opportunities for recipients to find units in less segregated and impoverished neighborhoods.

The Low Income Housing Tax Credit (LIHTC) program and inclusionary zoning laws are two mechanisms for increasing the number of affordable rental units in non-poverty neighborhoods for voucher recipients. Traditionally, housing developments in low-income communities are given preferences for LIHTCs. This circumstance may indirectly increase or sustain prior levels of segregation by placing low-income residents and units in an already low-income community. To open up housing opportunities for low-income families, affordable housing developments in middle- and upper-income communities should be given priority for LIHTCs. Inclusionary zoning laws can also increase the stock of affordable housing in low-poverty areas. These local laws require new developments to set aside a certain percentage of units for affordable housing. The federal government could provide financial incentives for municipalities to adopt zoning laws that promote the construction and redevelopment of affordable units.

Housing market discrimination clearly contributes to segregation. To more effectively enforce fair housing laws already in place, the proposed Housing Fairness Act of 2009 (H.R. 476) should be passed and implemented. This bill would increase funding for the Fair Housing Initiatives Program to $52 million and would fund a $20 million nationwide paired testing program providing for 5,000 tests, approximately 50 in each of the nation’s 100 largest metropolitan areas. In paired-testing investigations, equally qualified white and non-white auditors posing as homebuyers or renters approach housing providers, such as real estate and rental agents, mortgage lenders, and insurance agents, and inquire about the availability of the same or similar housing units or housing related services like home insurance or mortgage loans. Any differences in treatment they receive likely reflect discrimination since these auditors or
 testers are assigned identical qualifications and interests. Such investigations have routinely revealed discrimination in at least one out of every five initial visits to real estate or rental agents. Discrimination in insurance and mortgage lending has also been documented using similar investigative techniques (Smith and Cloud 1997; Squires 2008b; Squires and Chadwick 2006; Turner and Skidmore 1999; Turner et al. 2002). If the real estate, mortgage and insurance industries knew these investigations were occurring more frequently, incidents of discrimination and levels of segregation might be reduced.

The results of this study and others (e.g., Calem, Hershaff, and Wachter 2004) show that education is highly associated with a decrease in subprime lending. Population levels of formal educational attainment are, of course, rough proxies for knowledge of the mortgage market. But programs that increase the financial competencies of borrowers could be one step to protect individuals from lenders peddling predatory subprime loans. An expansion of financial literacy programs focused specifically on negotiating the lending environment might reduce the number of individuals who take out high-cost loans.

This study focuses on the role of segregation and did not address the overall lending regulatory environment; however, several regulatory initiatives would limit the proliferation of subprime loans and associated defaults in all localities. Studies have shown that in a declining market, those who have an adequate equity stake in their home are less likely to default (Order and Zorn 2000). Some toxic subprime loans created debt burdens for householders greater than the value of the homes when closing costs were included in the financing. The Federal Housing Administration (FHA), which was once known as the lender of last resort, provides home loan insurance on mortgages that traditionally require at least a 3 percent downpayment. Research has shown that FHA loans have a much lower default rate than other conventional subprime

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15 As of January 1, 2009, the FHA’s minimum downpayment is 3.5 percent.
products (Stegman 2008). Ninety-seven percent should be the highest loan-to-value (LTV) possible and we should do away with the 100% plus finance products.

Additionally, prepayment penalties should be limited and teaser rates should be banned. Prepayment penalties make it more difficult for those that get behind in their payments to refinance or sell their homes. Even though these penalties provide banks with risk protection against early payment, it increases the likelihood that borrowers will default (Quercia, Stegman, and Davis 2007). Moreover, prepayment penalties should not be used in combination with other subprime loan characteristics, such as teaser rate loans (2/28s and 3/27s adjustable rate mortgages) and high loan-to-value ratios, which increase the likelihood of default even further (Pennington-Cross and Ho 2006). These simple product restrictions might reduce the extent of subprime loans, defaults, and foreclosures throughout the country. The National Mortgage Reform and Anti Predatory Lending Act (H.R. 1728) would reduce substantially the provision of inappropriate products in the mortgage market.

To ensure that these regulations and restrictions are followed, federal oversight is needed over the independent mortgage companies, the unregulated entities who originated the bulk of subprime mortgages (Avery, Brevoort, and Canner 2007), and the affiliated institutions that are involved in the trading of mortgage-backed securities. Currently, the CRA applies only to depository institutions but passage of the CRA Modernization Act of 2009 (H.R. 1749) would bring unregulated mortgage lenders under its purview. Having greater oversight over independent mortgage companies, might help decrease the number of high-cost loans.

Conclusion

Since 2008, lenders, regulators, elected officials, and residents generally have witnessed and been victimized by unprecedented turmoil in the U.S. housing, banking, and related
industries. That turmoil has spread worldwide. The decline in property values, coupled with record-level foreclosure rates, has crippled mortgage companies, commercial banks, and investment banks, and threatened the stability of the U.S. financial system. Despite massive government intervention in response to these crises, it remains unclear what progress, if any, has been made in restoring health to the nation’s credit markets. The continuing financial and broader economic disruption can be directly linked to the proliferation and securitization of subprime mortgages. While far more rigorous regulation of the credit and financial industry sector is necessary, the context of uneven metropolitan development, generally, and racial segregation, in particular, must also be addressed. To alleviate the current credit calamity and prevent future ones, measures must be put in place that tackle the specific lending regulatory challenges that have emerged along with the broader contexts that facilitate the proliferation of subprime and predatory lending.
References


