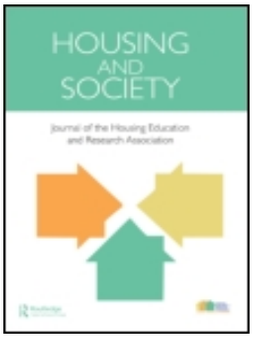

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SUBPRIME LENDING AND REVERSE REDLINING

Thessalenuere Hinnant-Bernard and Sue R. Crull

Abstract

This research related broadly to discrimination in mortgage lending and more specifically to subprime lending and reverse redlining. The article discussed subprime lending in the city of Des Moines, Iowa, using the Home Mortgage Disclosure Act data. The data identified areas of subprime lending and the probability of reverse redlining based on census tracts of the city. Demographic characteristics of the tracts that would indicate reverse redlining were studied in relation to the lending patterns. African-Americans, low-income applicants, and applicants receiving loans for home refinance had a greater probability of becoming victims of reverse redlining than others.

Introduction

The purpose of this study was to examine the phenomenon of *subprime lending* and to determine the likelihood of *reverse redlining* in relation to the demographic characteristics of census tracts and lending patterns within the tracts in the city of Des Moines, Iowa. Subprime lending is a very vital part of the economy. Subprime lenders provide loans to borrowers who do not meet standards which would make them "prime" borrowers. Citibank (2002) reported that fair subprime lenders compensate for the risk of lending to borrowers with credit issues by making appropriately priced loans. Although these borrowers are charged more than prime borrowers, the higher cost associated with higher interest rates do not make them victims of abusive practices that define predatory lending.

However, subprime loans are often given to borrowers with good credit. Citizens for Community Improvement (CCI) of Des Moines found that 63% of the subprime loans in Des Moines were made to people eligible for prime loans. This is unethical and considered to be a predatory practice (Community Reinvestment Association of North Carolina, 2002).

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The subprime market has grown dramatically. Much of this growth occurred between 1993 and 1998 (Housing Ohio, 2002). There was an explosion of loans combined with the nearly hyper-segmentation of mortgage lending markets by race and neighborhood, which created opportunities for abuse. This two-tier system has increased the opportunity for abuses within the market, especially targeting less sophisticated homeowners. According to the Woodstock Institute (1999), there are several reasons that explain the growth of subprime and abusive subprime lending:

- Increase in homeownership among the less experienced.
- Increase in medical and credit card debt.
- Use of information technology to target vulnerable homeowners.
- Minimal regulation of mortgage and finance companies.
- Weak community reinvestment activities and less attention to fair lending in refinance and home equity lending.

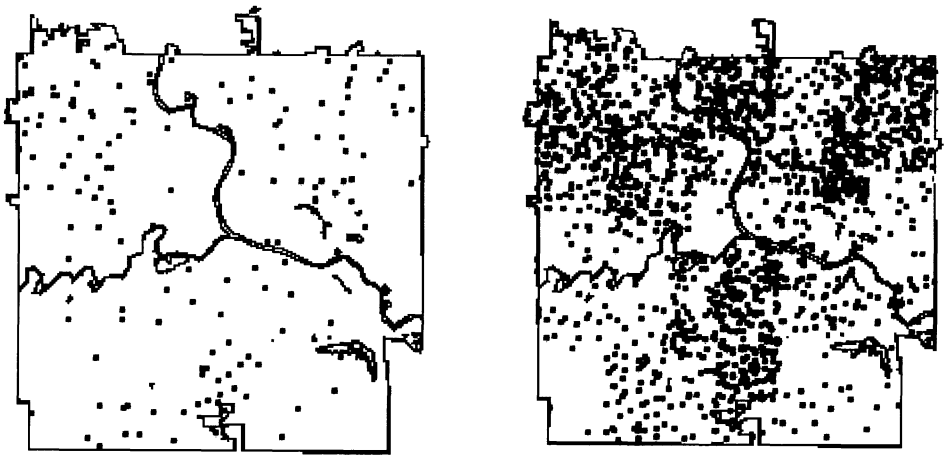
Targeted populations consist primarily of elderly, minority, women, and/or low- to moderate-income homeowners. These households are targeted because their access to conventional loans and other financial services is severely limited. It has been suggested that elderly populations are usually equity rich and cash poor (Quercia & Rohe, 1992). Also, their homes may be in need of expensive repairs (often roofing work) or they may have fallen behind on their property taxes, incurred substantial medical bills, or suffered a loss of income after the death of a spouse (Jesuit Social and International Ministries, 2000).

Nationally the practice of subprime lending has grown exponentially over the past several years. The Woodstock Institute (1999) reported that from 1993 to 1998 in the U.S., home purchase loans financed by subprime lenders grew 760% compared to prime lending which grew 38%. This same study also reported that refinance loans by subprime lenders grew 890% and loans by prime lenders grew by 2.5%. From 1993-1998, 80% of subprime lending was comprised of refinance and equity loans. In 1993 only 100,000 home purchase or refinance loans were brokered in the subprime market; by 1999 that number jumped to nearly 1 million loans (U.S. Department of Housing and Urban Development, 2000). In Des Moines during 1994, 198 subprime loans were originated and by 1999 that amount increased to 1,903 (National Training and Information Center, 2001) (Figure 1).

Review of Literature

Discrimination

According to Holmes and Horvitz (1997) racial discrimination in mortgage lending can take and has taken many different forms. Courchane, Nebhut, and Nickerson (2000) stated that some of these forms include uneven treatment by



198 Subprime Loan Originations Made in Des Moines in 1994

1,903 Subprime Loan Originations Made in Des Moines in 1999

Figure 1. Subprime Loan Originations Made in Des Moines in 1994 and 1999
1 subprime loan = •

brokers, pre-application screening, unfair application and credit standards in the loan approval process, differing levels of assistance provided during the application process, discriminatory pricing practices, and overt bigotry. Housing discrimination is known to influence many housing outcomes and life chances (Yinger, 1998). Yinger reported that discrimination constrains the opportunity to go to good schools, find jobs, and accumulate home equity, thus providing a rationale for the title of his article "Housing discrimination is still worth worrying about."

In 1989 large disparities in mortgage lending between minority and non-minority neighborhoods refocused attention on possible racial discrimination in the home loan market (Schill & Wachter, 1993). Racial disparity in homeownership can be attributed directly to discriminatory practices. Three cities in 1988 and in 1989 (Baltimore, Boston, and Chicago) revealed geographic racial and ethnic disparities congruent with home loan discrimination (Freeman, 2000). A study by Munnell, Browne, McEneaney, and Tootell (1992) found that African-Americans and Hispanics were 60% more likely than Whites of identical characteristics to be refused a mortgage loan after controlling for all variables that underwriters take into account in approving or denying loan applications.

The Federal Reserve Bank of Boston stated that for the same flaws, Whites seem to enjoy a presumption of credit worthiness that minority applicants do not and that lenders seem to be more willing to overlook credit imperfections for White applicants than for minority applicants (Walters, 1996). Ironically, a survey of 1,521 households by the National Mortgage Association reported that 87% of

Whites (compared to 33% of minorities) believed that minority purchasers had the same chance they had of getting a home that they could afford (Walters, 1996).

Disparate Treatment and Impact

There are two types of mortgage discrimination: disparate treatment and disparate impact. *Disparate treatment* occurs when a housing provider treats a member of a protected class different than other persons. This form of discrimination is easily detected because it typically involves intentional acts of discrimination. The following scenarios are examples of disparate treatment.

> A customer, of a protected class, enters a bank and inquires about mortgage options. The customer is told to fill out an application and return it. An identically qualified White applicant enters the same bank, inquires about mortgage options, and is given an immediate interview. (Interpretation of disparate treatment)

> A bank requires terms and conditions for unsecured home improvement loans from African-American customers that result in their paying more than similarly situated non-minorities. Additionally, most African-American customers receive "amortized loans" (at interest rates as high as 21.5%) while non-protected class customers obtain "single payment loans" (with interest rates ranging from 9.5%-10%). (S&FA Capital Services, Inc., 1998, p. 5)

> A Latino test applicant was told in response to an inquiry into the approximate amount of closing costs that "it would be stupid to respond in detail because I would only be guessing." The same lender indicated that he could only give a general estimate of monthly payment until the tester applied for the mortgage. The White test applicant was given specific information about both closing costs and monthly payment amounts. In addition, the White tester received a follow-up phone call from this lender while the Latino tester did not. (S&FA Capital Services, Inc., 1998, p. 5)

Courchane, Nebhut, and Nickerson (2000) addressed disparate treatment of loan applications by analyzing data collected in fair lending examinations between 1994 and mid-1999. The fair lending examination conducted most frequently with statistical methods was meant to determine whether there was a reasonable cause to believe disparate treatment resulted from the acceptance or rejection for home mortgage loans (Courchane et al., 2000). In this study, statistical analysis was used to determine if underwriting guidelines were applied consistently for all applicants. As stated by Courchane et al. (2000, p. 278), "The Department of Justice has recognized statistical modeling as a valid tool for discovery of disparate treatment in the credit-granting process." The authors found that three out of the eleven banks in their sample treated minorities differentially.

Disparate impact as a rule or regulation may be neutral on its face but nonetheless has a discriminatory impact on a protected class. Disparate impact is the disproportionate effect of higher denial rates (or pricing effects) that any underwriting system likely has and is a consequence of statistical group disparities in wealth, income, and other factors affecting the group distributions of a mortgage applicant's collateral, capacity, and credit (Straka, 2000). Disparate impact is not intentional and generally involves policies or laws that cause harm to members of a protected class. It can be subtle and even unconscious, but when a significant statistical effect is found to be unfavorable to those protected by law the result is discriminatory.

The potential misuse of credit scores is an example of disparate impact. It has not been shown that the scores or process is discriminatory but disparate impact is possible in how the scores are used. "Prevention of misuse in scoring requires strong industry communication, education, and system design" (Straka, 2000, p. 218). Straka also argued that giving too much latitude to subjective judgments could bring improper interpretations.

Holloway and Wyly (2001) contended that both disparate treatment and disparate impact are geographically contingent. The treatment of minority applicants depends on where the properties are located, and the impacts of lending institutions' actions are geographically variable in ways that affect applicants differently based on their racial and ethnic groups.

Redlining and Reverse Redlining

During the 1970s, lending institutions were commonly accused of *redlining*—intentionally withholding funds from areas on the basis of racial and ethnic makeup (Perle, Lynch, & Horner, 1993). Lending institutions refused to lend money in the area (presumably) by drawing a red pencil line around the area on a map (Morris & Winter, 1978). When redlining first surfaced it was not exclusively a racial issue. It was identified in mostly older, primarily White neighborhoods of Chicago, Baltimore, and other large cities (Holmes & Horvitz, 1997). "Yet the preponderance of African-American residents in many such areas usually means that the policy in effect becomes one of racial discrimination" (Forman, 1971, p. 68).

The two most widely publicized responses to redlining in mortgage lending were the Home Mortgage Disclosure Act (HMDA) and the Community Reinvestment Act (CRA). According to Schwartz (1998, p. 270), "The CRA and HMDA are both the result and the vehicle of community-based efforts to combat redlining and other discriminatory bank lending practices." Just as neighborhoods were once identified as African-American or White they are now being identified as subprime or prime.

> Increasingly, sub-prime lending is becoming the only option of all too many low-income and minority borrowers. This reality sadly documents

> the continued existence of the race line in America and the continued existence of the dual lending market in the United States. Whereas before, African Americans were openly denied access to credit, today the "race tax" is more sophisticated, more costly – and equally exploitative. Where once redlining undermined communities, today "reverse redlining" has become the norm and threatens to undermine our communities' economies, social services, and tax base. Sadly, an analogy to racial profiling is appropriate here. We have all become familiar with the term "Driving While Black." Sub-prime predatory lending has become the equivalent of "Borrowing While Black." (U.S. Senate Committee on Banking, Housing, and Urban Affairs, 2001, p. 11)

Reverse redlining is born out of redlining. Reverse redlining takes place most often in communities where predatory lenders face no competition. Reverse redlining victims are the same victims of redlining. The same neighborhoods, which were once denied financial opportunities, are targeted with overpriced products. They purposely take advantage of residents by pushing high cost loans, soliciting aggressively over the phone, through the mail, or face-to-face interaction. Many reverse redlining loans are so bad that the recipients would be better off not receiving a loan at all (U.S. Senate Committee on Banking, Housing, and Urban Affairs, 2001).

Reverse redlining was recognized legally as a form of predatory lending in *The Associates Home Equity* v. *Troupe*, A-3410-00, case decided on July 25, 2001 (Gallagher, 2001). The Troupes, a 75-year-old African–American woman and her son, showed that Home Equity Associates violated their civil rights. It was proven that the terms of their loan were not justified by their credit history and debt-to-income ratio.

Home Mortgage Disclosure Act

The Home Mortgage Disclosure Act (HMDA), enacted in 1975, required lenders to provide information about location (by census tract) of loan originations (Yinger, 1998). In 1989 revisions were made to HMDA requiring lenders to provide additional information for each individual application (Ladd, 1998). The new variables included loan guarantee (conventional, FHA, or VA), purpose of loan (purchase, improvement, or refinancing), loan amount, date of application, loan disposition (approved, approved but withdrawn, no lender action taken, or denied), race, census tract, gender, owner-occupied status, and applicant income.

HMDA does have some discrepancies that need to be addressed. Missing data in HMDA is a serious problem. Although race is required when reporting data, it is not always reported. Applications taken entirely by mail or telephone may lack this vital piece of information. The rising incidence of missing data on race in recent years and emerging technological trends in the mortgage industry, which

facilitate lending without face-to-face contact, make it reasonable to predict that this problem will become more serious in the near future (Huck, 2001). Fair housing was established to ensure that minorities were being treated fairly in housing. It is paradoxical when questions regarding race are not required for applicants applying through the mail or by phone. This makes it very difficult to use HMDA data to determine how much, if any, discrimination is occurring. This provides an environment for abusive mortgage lending to prosper.

In January 2002 the Federal Reserve Board announced changes in Regulation C, which implements HMDA (Center for Community Change, 2002). The two changes receiving the most attention were: (a) lenders must designate which of the loans they originate are high-cost loans and (b) lenders are now required to provide information regarding information about the pricing of some loans. Other changes included: indication of which applications are for manufactured homes, requirement of reporting denials under "covered" pre-approval programs for home purchase loans, and the new rule that allows an applicant to report more than one race. A very important amendment, effective January 1, 2003, required lenders to ask applicants their race or national origin and sex in applications taken by telephone, conforming the telephone application rule to the rule applicable to mail and Internet applications (Federal Financial Institutions Examination Council, 2002).

The conclusion of many studies using HMDA data indicate that redlining has been practiced in numerous places (Holmes & Horvitz, 1997). "HMDA has shown substantially higher denial rates for Black [African-American] and Hispanic applicants than for White applicants. Many have argued that these disparities in denial rates are proof of discrimination on the part of the lending institutions" (Munnell, Tootell, Browne, & McEneaney, 1996, p. 25).

Munnell et al. (1996) used HMDA data for Boston to determine whether race played an independent role in the mortgage lending decision. They found that minority applicants had less wealth, weaker credit histories, and higher loan-to-value ratios than White applicants did, and that these disadvantages accounted for a large portion of the differences in denial rates. White applicants, with similar property and personal characteristics as minorities, had a rejection rate of 20% compared to the minority rate of 28%.

Minority and Low-income Homeowners

The Association of Community Organizations for Reform Now (ACORN, 2000) released a study analyzing 1999 home mortgage lending data, which found that minority and lower-income borrowers were much more likely to receive a higher cost subprime mortgage loan when refinancing or buying a house. ACORN (2000) reported that two out of every three conventional refinance loans (61.3%) received by low-income African-Americans in 1999 were from subprime lenders and more than half (52.6%) of the conventional refinance loans received by

moderate-income African-Americans were from subprime lenders. Other findings indicated that the number of subprime loans made to African-American homebuyers rose by 631% from 1995 to 1999, and the number of prime conventional purchase loans received by African-American homebuyers in 1999 was lower than in 1995. White homebuyers experienced an increase in the percentage of subprime loans of 285%.

In 2001 ACORN analyzed data released by the Federal Financial Institutions Examination Council (FFIEC) about the lending activity of more than 7,800 institutions covered by HMDA, including figures for the nation as a whole as well as for 60 metropolitan statistical areas. In order to analyze the subprime market, ACORN used the list of subprime lenders developed by HUD (ACORN, 2001). This study included information on subprime refinance loans and subprime purchase loans. ACORN found that racial disparity remained significant when minority homeowners were compared with White homeowners of the same income as well as homeowners with higher incomes. Other pertinent information from the study indicated that subprime lenders also targeted lower income White homeowners and the growth of subprime lending had been much faster than that of prime lending, especially to African-American borrowers (ACORN, 2001).

Methods

Hypotheses

Based on the literature review the following hypotheses were examined to address the purpose of this research:

Hypothesis 1: Minority homeowners are more likely to be victims of reverse redlining than non-minority homeowners.

Hypothesis 2: Homeowners below the area median income are more likely to be victims of reverse redlining than homeowners above the area median income.

Hypothesis 3: Homeowners with refinance loans are more likely to be victims of reverse redlining than homeowners with home purchase loans.

Procedures

HMDA, as previously stated, was enacted by Congress in 1975 and is implemented by the Federal Reserve Board's Regulation C. According to the Federal Financial Institutions Examination Council (2002), this regulation provides public loan data that can be used in three ways: (a) in determining whether financial institutions are serving the housing needs of their communities, (b) for public officials to use in distributing public sector investments to attract private investment to areas where it is needed, and (c) in identifying possible discriminatory lending patterns. This particular study was concerned primarily with the last area of use. Loan application registers (LAR) for Des Moines, Iowa, were used in this research.

Variables from the HMDA file used in this endeavor were lenders, type of lending, loan type, loan amount, loan purpose, applicant's sex, applicant's race, and applicant's income. Proportions of minority population and median household income were added to the data file from the 2000 Census. A new variable was created identifying each lender as subprime (1) or not subprime (0). A list generated by the National Training and Information Center (NTIC) identified lenders for Des Moines. Citizens for Community Improvement of Des Moines (CCI) supplied the list. For a detailed description of variables and the values of each variable refer to Table 1.

Table 1. Definitions of Variables Used in Analysis

Variable Name	Variable Definition
Reverse redlining	1 = Reverse redlining; 0 = Not reverse redlining
Subprime lending	1 = Subprime lending; 0 = Not subprime lending
Tract	Census tract number
Applicant's sex	1 = Male; 0 = Female; 2 = Information not provided by applicant in mail or telephone application; 3 = Not applicable; (2 & 3 = Comparison group)
Applicant's race	1 = American Indian or Alaskan Native; 2 = Asian or Pacific Islander; 3 = African-American; 4 = Hispanic; 5 = White; 6 = Other; 7 = Information not provided by applicant in mail or telephone application; (6 & 7 = Comparison group)
Applicant's income*	1 = $1,000-31,000; 2 = $32,000-46,000; 3 = $47,000-64,000; 4 = $65,000-1,250,000
Loan type	1 = Conventional (any loan other than FHA, VA, FSA, or RHS loans); 2 = FHA-insured (Federal Housing Administration); 3 = VA-guaranteed (Veterans Administration); 4 = FSA/RHS (Farm Service Agency or Rural Housing Service)
Loan purpose	1 = Refinancing; 2 = Home improvement; 3 = Home purchase; 4 = Multifamily dwelling
Loan amount*	1 = $1,000-44,000; 2 = $45,000-69,000; 3 = $70,000-92,000; 4 = $93,000-8,775,000
High-minority tract	1 = Tracts identified as high minority (greater than 17.4%) 0 = Tracts identified as low minority (less than 17.4%)
Low-income tract	1 = Tracts identified as low income (less than $38,408) 0 = Tracts identified as high income (greater than $38,408)

* Continuous variable in regression; collapsed into quartiles for crosstabulations.

This study examined only the loan activity in the census tracts for the city of Des Moines in 2002. Partial tracts, or tracts that crossed corporate boundary lines, were eliminated from the data file because HMDA does not specify information for partial tracts. There are 47 complete tracts for the city of Des Moines. For the purpose of this research only loans originated were studied. The sample of 8,297 households receiving loans was reduced to 7,877 due to missing information for the applicant's income.

Two new variables were created to address census tract information: minority population percentage and median income. Based on the U.S. Census Bureau (2000), the minority population for the city of Des Moines was 17.4% and the median household income was $38,408. The new variables were constructed to determine census tracts above or below a designated minority population of 17.4% and the median income for the city. Each variable was coded "1" if above minority population percentage of 17.4% or below median income of $38,408 and coded "0" if below minority population percentage or above median income.

The two census tract variables and the subprime variable were combined to create the reverse redlining variable. If a household had a subprime loan and was located in a high-minority and low-income tract, it was considered a probable source of reverse redlining (Figure 2). Figure 2 shows the results of the new variables. An interesting dynamic is also displayed in that all tracts characterized as high minority were also characterized as low-income. Of the loan applicants, 2,522 were holders of subprime loans, 798 resided in high-minority tracts, and 3,641 were located in low-income tracts. When the three variables were combined for the reverse redlined variable, 258 were classified as potentially reverse redlined loan applicants.

Results

Descriptive analyses were performed with type of lending (not subprime or subprime) crosstabulated by the loan purpose, loan amount, household income, sex, race, and loan type. Crosstabulations are used primarily to show the relationship between two or more categorical variables. The results of these analyses are displayed in Table 2.

Higher percentages of subprime loans were used for home purchase and refinancing than for home improvement. Since the loan amount is a continuous variable, the amounts were collapsed into four categories. The lowest one-fourth loan amounts had the smallest percentage of subprime loans, 17.6%. The other three loan size categories all had about 34% to 35% subprime loans. Applicants within the highest income bracket had the lowest percentage of subprime loans (23.0%), while those in the lowest income category had the highest percentage of subprime loans (33.9%).

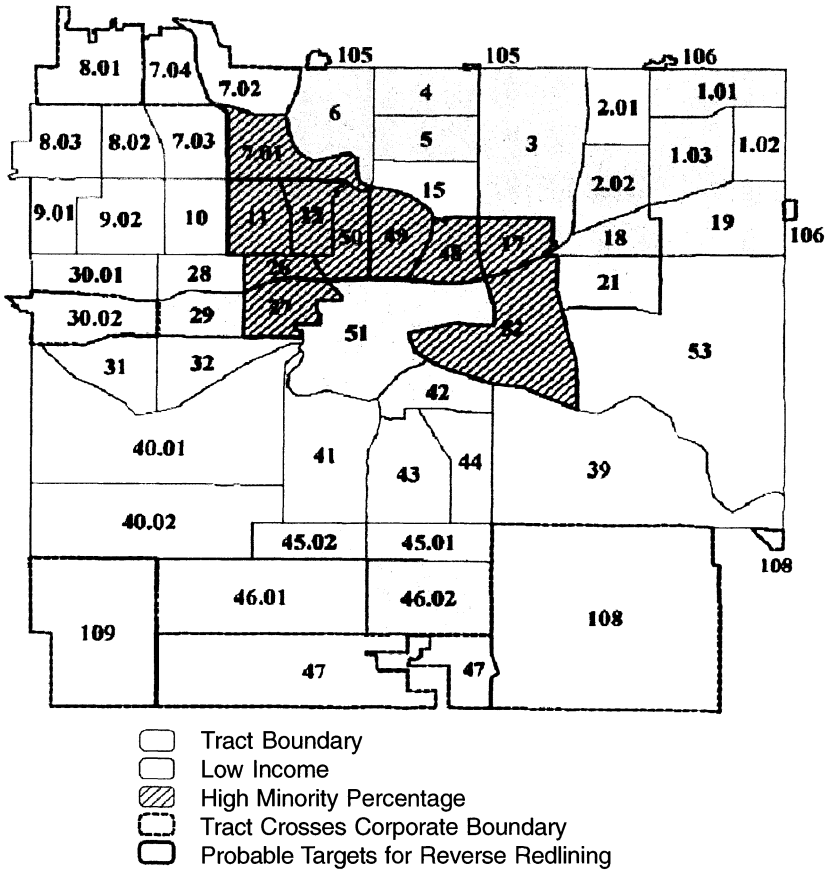


Figure 2. Census Tracts for the City of Des Moines

Gender did not yield a difference between subprime and not subprime lending, except for the category that included "no information." Race, on the other hand, was a very interesting variable when comparing type of lending. Although the percentage of subprime loans ranged between about 24% and 39%, African-Americans and American Indians had the highest subprime percentages (38.6% and 38.5%, respectively) and Asians had the lowest (24.4%). Finally, 27.6% of the applicants with conventional loans had subprime loans, while 50.6% with FHA loans and 45.4% with VA loans had subprime loans.

Binomial logit techniques were used to estimate the effects of the selected variables on the probability of being reverse redlined. Logistic regression is a form of regression in which the dependent variable is a dichotomy and the predictors are continuous variables, categorical variables, or both. Logistic regression estimates the probability of a certain event occurring. The models work by fitting the probability of response to the proportions of the responses observed. Logistic regression produces several tables. This study reports the Hosmer and Lemeshow

test, the omnibus tests of model coefficients, the model summary, the classification table, and the statistics of individual variables in the equation.

In the logistic regression, the dependent variable measures whether one has been reverse redlined or not. The results of the Omnibus tests revealed a chi-square value of 250.28 ($df = 14$, $p < .001$). Therefore, the overall model for reverse redlining was statistically significant. Based on the classification table the model correctly classified 69.6% of the applicants overall—72.2% of those who were reverse redlined and 69.6% of the borrowers who were not (Table 3). In addition,

Table 2. Crosstabulations of Variables

	Not subprime	Subprime
Purpose		
Refinancing	67.4%	32.6%
Home improvement	92.5%	7.5%
Home purchase	65.2%	34.8%
Loan amount		
$1,000-44,000	82.4%	17.6%
$45,000-69,000	64.5%	35.5%
$70,000-92,000	65.8%	34.2%
$93,000-8,775,000	65.9%	34.1%
Income		
$1,000-31,000	66.1%	33.9%
$32,000-46,000	67.8%	32.2%
$47,000-64,000	70.3%	29.7%
$65,000-1,250,000	77.0%	23.0%
Applicant's sex		
Male	69.9%	30.1%
Female	68.8%	31.2%
Information not provided by applicant in mail or telephone	70.4%	29.6%
Applicant's race		
American Indian or Alaskan Native	61.5%	38.5%
Asian or Pacific Islander	75.6%	24.4%
African-American	61.4%	38.6%
Hispanic	67.3%	32.7%
White	69.3%	30.7%
Other	73.8%	26.3%
Information not provided by applicant in mail or telephone	71.6%	28.4%
Loan type		
Conventional	72.4%	27.6%
FHA-insured	49.4%	50.6%
VA-guaranteed	54.6%	45.4%

Note: Row totals = 100%

Table 3. Logistic Regression (Classification of Loan as Reverse Redlined/ Not Reverse Redlined)

Omnibus Tests of Model Coefficients

		Chi-square	*df*	Sig.
Step 1	Model	250.28	14	<.001

Classification Table

	Not reverse redlined	Reverse redlined	Percentage correct
Not reverse redlined	5304	2321	69.6**
Reverse redlined	70	182	72.2
Overall percentage			69.6**

Variable in the Equation

	B	S.E.	Wald	*df*	Sig.
Applicant's sex			.906	2	.636
Male	-.308	.329	.879	1	.349
Female	-.255	.335	.577	1	.447
Loan amount	-.017	.003	41.059	1	<.001*
Applicant's race			115.513	6	<.001*
American Indian or Alaskan Native	-4.259	10.016	.181	1	.671
Asian or Pacific Islander	.130	.468	.077	1	.781
African-American	1.629	.344	22.401	1	<.001*
Hispanic	.314	.420	.557	1	.455
White	-.560	.304	3.396	1	.065
Other	-.541	.765	.501	1	.476
Type of loan			5.535	2	.063
Conventional	-1.079	.504	4.580	1	.032*
FHA-insured	-.761	.530	2.064	1	.151
Applicant's income	-.014	.003	16.167	1	<.001*
Purpose of the loan			45.163	2	<.001*
Refinancing	.452	.173	6.806	1	.009*
Home improvement	-1.685	.368	20.915	1	<.001*
Constant	-.374	.554	.456	1	.500

* Significant at $p < .05$

**Figures have been rounded, but are not identical

the Hosmer and Lemeshow test showed a goodness result that was greater than .05 (p = .343). The Hosmer and Lemeshow's (1989) Goodness of Fit test is different from the ordinary Goodness of Fit. Hosmer and Lemeshow's Goodness of Fit tests the null hypothesis that the data were generated by the model fitted by the researcher. If the Hosmer and Lemeshow's Goodness of Fit test statistic is .05 or less, we reject the null hympthesis that there is no difference between the observed and model-predicted values of the dependent variable. If the Hosmer and Lemeshow's Goodness of Fit test statistic is greather than .05, as we want, we fail to reject the null hypothesis that there is no difference. This implies that the model's estimates fit the data at a level that is acceptable (Sweet & Grace-Martin, 2003).

The model summary includes the –2 log likelihood (LL), the Cox and Snell R^2, and the Nagelkerke R^2. The –2LL measure is used to indicate how well the model fits the data. "Smaller –2LL values mean that a model fits the data better; a perfect model has a –2LL value of 0" (George & Mallery, 2001, p. 313). In this study the model summary yielded a –2LL value of 1980.48. The Cox and Snell R^2 and the Nagelkerke R^2 attempt to imitate the interpretation of the multiple R^2. The Nagelkerke's R^2 is a modification of the Cox and Snell R^2 and is normally larger. This model yielded a low Cox and Snell R^2 value of .031 and a low Nagelkerke R^2 value of .127.

There were six variable values that yielded significant results in the equation (Table 3). Loan amount indicated that as the loan amount increased, the probability of being reverse redlined decreased. African-Americans were more likely to be victims of reverse redlining when compared to those whose race was unknown. The probability of being reverse redlined using a conventional loan decreased when compared to the use of VA-guaranteed loans. Income indicated that applicants with high income had a high probability of not being reverse redlined. Refinancing loans resulted in an increased likelihood of being reverse redlined compared to home purchase loans. The probability of being reverse redlined decreased when using the loan for home improvement compared to home purchase.

All three hypotheses about subprime loans were supported. The results of the analysis supported the first and second hypotheses that income and race are factors in determining the likelihood of being reverse redlined. African-Americans and households with low-income compared to applicants of unknown race and those with high incomes were among the variables that yielded significant results. The third hypothesis was supported in that refinancing had a higher likelihood of being reverse redlined than home purchase.

Conclusions

The subprime market has grown dramatically. This explosion of loans combined with the nearly hyper-segmentation of mortgage lending markets has created opportunities for lending abuse. The opportunity for the use of subprime loans within the market, especially targeting less sophisticated homeowners, has increased. In this study the probability of being reverse redlined rested in race, loan amount, income, and purpose for the loan. The results of the analysis supported all three hypotheses. In particular, income and race were factors in determining the likelihood of being reverse redlined. Lower loan amounts were also more likely to be reverse redlined than higher loan amounts.

A major limitation in this study consists of missing data. The race of many applicants was not included in the HMDA file because they applied by mail or over the telephone. This makes it very difficult when making comparisons based on race. Beginning January 2003 recording the race of all applicants became required, whether the application is in person, by mail, or over the telephone. Another limitation is that the HMDA file did not include enough information to detect predatory lending. HMDA should be revised to include the type of loan (fixed, ARM, etc.), interest rate, the term, loan fees, applicants' ages, and the number of dependents. Inclusion of these factors would show the conditions of the loan and allow evaluation of the borrower's ability to repay. The final limitation in this study is the analysis of only one city. Hopefully, by establishing and presenting the methodology to investigate reverse redlining, future research will further test the concept.

This study provides an overall understanding of the patterns of subprime lenders in the city of Des Moines. The research method developed provides a creditable method for measuring the misuse of subprime lending—reverse redlining—that can be shared with policymakers and researchers who want to better understand lending practices. The systematic investigation illustrated in this research could help federal policymakers, local program administrators, and the general public decide how to invest in efforts aimed at addressing problems with subprime lending and their potential targeting of neighborhoods identified as low income and/or minority. In addition, HUD could assist local program administrators by producing a series of best practices reports to disseminate information about effective strategies for preventing or addressing problems with lending institutions. Educating the public about what goes on in their communities is a good defense to end discriminatory lending tactics.

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