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INTRODUCTION

The current foreclosure crisis has devastated many predominantly black or Hispanic communities, in part because blacks and Hispanics were disproportionately likely to finance their home purchases or refinance existing mortgages with subprime mortgages, which enter foreclosure at far higher rates than prime mortgages. Across the nation, blacks were almost three times more likely to receive a subprime first lien home purchase mortgage than whites, and Hispanics were 2.6 times more likely than whites to receive such loans. There are a variety of explanations for these stark racial disparities in subprime lending, ranging from underlying income and wealth inequalities between whites, blacks, and Hispanics to intentional discrimination in lending practices.

Efforts to determine which of these explanations are most apt and to craft appropriate policy responses to the racial disparities in the share of subprime mortgages should take into account the relationship between existing levels of residential segregation and the racial disparities in the types of mortgages homeowners received. Residential segregation may make discrimination more likely by providing easy geographic markers for the targeted racial groups, for example. Residential segregation may also exacerbate the exclusion of blacks and Hispanics from more competitive financial markets and from other consumers who are more sophisticated about mortgage products. Understanding the relationship between segregation and racial disparities in subprime lending may thus help elucidate the causes of those disparities. Similarly, understanding the relationship may help policy-makers develop better solutions to the racial disparities in the mortgage market. If levels of segregation are highly correlated with racial disparities in lending, policy-makers may need to devote more resources to ensuring that minority communities are not targeted by subprime lenders or deserted by prime lenders. If levels of black-white segregation are more highly correlated with racial disparities in lending patterns than levels of Hispanic-white segregation, policy-makers may need to fine-tune programs to take into account differences between highly segregated black and Hispanic communities.

This Article explores the relationship between residential segregation in about 200 metropolitan areas across the country and the propensity of borrowers within those areas to receive subprime loans. It also examines how borrowers of all races who live in highly segregated minority neighborhoods fare in the mortgage market, compared to those who live in more heterogeneous communities.

Part I reports the stark racial disparities in the percentage of subprime mortgages received by members of different racial groups. Part II explores

the various mechanisms that might explain those racial disparities, and assesses whether and how a higher level of segregation in a metropolitan area might magnify them. Part III reviews what we know—and do not know—from earlier studies about the relationships between subprime lending and neighborhood segregation. Part IV describes our study methodology and reports our findings.

I. RACIAL DISPARITIES IN SUBPRIME LENDING

Prior research on the mortgage market has found persistent racial disparities in the incidence of subprime and high-cost lending.[1] Across the United States, larger shares of black and Hispanic borrowers originated high-cost loans in 2006 relative to white borrowers[2] (see panel A of Table 1[3]).[4] That year, 53.3% of first lien home purchase loans issued to black borrowers were high-cost, and 46.2% of first lien home purchase loans issued to Hispanic borrowers were high-cost, compared to only 17.7% of loans issued to white borrowers.[5] The rates of high-cost refinance loans

1. *See, e.g.*, U.S. DEP'T OF HOUS. & URBAN DEV., UNEQUAL BURDEN: INCOME AND RACIAL DISPARITIES IN SUBPRIME LENDING IN AMERICA (2000), *available at* http://www.huduser.org/Publications/pdf/unequal_full.pdf; *see also* Robert B. Avery et al., *The 2007 HMDA Data*, 95 FED. RES. BULL. A107 (2008).

2. Our calculations use mortgage loan data reported by lenders under the Home Mortgage Disclosure Act ("HMDA") and made available by the Federal Financial Institutions Examination Council. Although 2007 HMDA data is now available, because of the turmoil in the real estate markets and mortgage lending industry beginning in 2007, several institutions that originated loans that year did not survive long enough to report their lending activity. Therefore for our national analysis, we use HMDA data for loans issued in 2006, which we believe represents the most recent complete set of single-year mortgage lending data.

3. In Table 1, the percentages presented in the columns represent the percentage of the population in that column that has the characteristics described by the row heading.

4. Throughout this Article, we use "high-cost" as a measure of subprime lending. We classify first lien loans as high-cost if they have an interest rate more than three percentage points higher than the federal treasury rate of similar maturity. For junior lien loans (included in our refinance loan observations), the threshold is five percentage points. This commonly used definition of subprime lending is more dependable than other measures, such as identifying loans made by subprime lenders (using the HUD Subprime Lender list), for two main reasons. First, the high-cost classification identifies subprime loans based on loan characteristics instead of lender characteristics. Second, the latest Subprime Lender list was released in 2005, making it a less accurate strategy for identifying subprime lenders in 2006 and 2007. *See* KRISTOPHER GERARDI ET AL., BROOKINGS PAPERS ON ECONOMIC ACTIVITY, MAKING SENSE OF THE SUBPRIME CRISIS (2008) (discussing the benefits and drawbacks to these measures); Avery et al., *supra* note 1; *see also* FURMAN CTR. FOR REAL ESTATE & URBAN POLICY, DECLINING CREDIT AND GROWING DISPARITIES: KEY FINDINGS FROM HMDA 2007 (2008).

5. In this Article, we analyze home purchase loans and refinance loans separately because their origination patterns are often tied to different macroeconomic contexts and borrower motivations. For home purchase loans, we look only at first lien loans to avoid the inherent double counting of borrowers that results from including junior lien home purchase

follow a similar pattern: over half of refinance loans issued to black borrowers in 2006 were high-cost, compared to over a third of refinance loans issued to Hispanic borrowers, and only a quarter of those issued to white borrowers.[6]

Although the rates of high-cost lending in the mid-2000s were lower in New York City than for the nation as a whole for all racial groups, in New York the racial disparities remained wide (see panel B of Table 1). Pooling New York City loan origination data from 2004–2007,[7] we find that less than 8% of the first lien home purchase loans issued to white borrowers were high-cost, compared to over 40% of the loans issued to black borrowers, and over 30% of the loans issued to Hispanic borrowers. The shares of high-cost refinance loans issued to blacks and Hispanics (37.3% and 30.1%, respectively) were approximately twice as large as the high-cost share issued to whites (17.5%).

II. CAUSES OF RACIAL DISPARITIES IN SUBPRIME LENDING AND THE ROLE OF SEGREGATION

There are several possible explanations for the wide disparity in subprime or high-cost lending rates between white borrowers, on the one hand, and black and Hispanic borrowers on the other. These include underlying economic inequality between borrowers of different races, cultural or geographic differences between the various racial groups that lead them to rely on different sources for mortgages, and racial discrimination in mortgage marketing and underwriting. This Part describes these explanations in more detail, and addresses how the extent of segregation in a metropolitan area might affect each of these possible underlying causes.

A. Underlying Economic Inequality

The mortgage underwriting process is primarily an evaluation of the risk that a mortgage loan applicant will default on a proposed loan and, if there is ultimately a foreclosure, that the collateral securing the loan will be in-

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loans (which by definition are issued to borrowers simultaneously receiving a first lien home purchase loan).

6. The disparities in high-cost lending between whites and blacks and whites and Hispanics highlighted at the national level persist across the nine census regions, although the magnitudes of the disparities differ.

7. 2004–2007 are the most recent years for which data are available for New York City and also are the years over the last decade in which the highest number of home purchase loans were originated in New York City. The highest share of the home purchase loans originated were subprime. AMY ARMSTRONG ET AL., FURMAN CTR. FOR REAL ESTATE & URBAN POLICY, STATE OF NEW YORK CITY'S HOUSING AND NEIGHBORHOODS 2007, at 7-9 (2008).

sufficient for the lender to recoup the resulting loss. While lenders differ in how they make these underwriting calculations,[8] the industry generally relies primarily on the following measures to make this risk evaluation: the applicant's credit history;[9] the ratio of the loan principal to the home value ("LTV") that would result from the proposed loan;[10] the ratio of the proposed mortgage payments (as well as required property tax payments, insurance payments, and, sometimes, other household debt payments) to the applicant's income (the debt-to-income ratio, "DTI"); the applicant's liquid assets (beyond the down payment); and the type of documentation the applicant provides to substantiate the applicant's reported income and asset base.[11]

A borrower with a lower credit score, higher LTV, higher DTI, lower asset base, lower amount of documentation, or a combination of these factors represents a greater presumed risk of default or foreclosure. In theory, lenders demand a higher rate of interest or higher origination fees to compensate for the additional risk posed by borrowers with these traits, or insist upon mortgage insurance or some other credit enhancement device to mitigate the additional risk. This trade-off is a key element of what is known as "risk-based mortgage pricing."[12] Although scholars contest the extent to

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8. Despite the large number of institutions that originate loans, the underwriting of much of the mortgage market is largely standardized as a result of the dominance of Fannie Mae and Freddie Mac in the secondary markets for prime loans. Fannie Mae and Freddie Mac make their proprietary automated underwriting systems available to originating lenders.

9. While an applicant's credit history is collapsed for many purposes into a single numeric score by Fair Isaac Corporation (FICO Score), Fannie Mae's automated underwriting system reviews the applicant's actual credit history for specific characteristics. *See* Lew Sichelman, *Fannie Mae Introduces Desktop Underwriter 5.0*, REALTY TIMES, July 19, 2000, *available at* http://realtytimes.com/rtpages/20000719_fmunderwriter.htm.

10. Since January 15, 2008, Fannie Mae has set lower LTV limits for loans to be issued in geographic areas that Fannie Mae considers to be "declining markets," in effect adding a geographic criterion to the underwriting process. MARIANNE E. SULLIVAN, FANNIE MAE, ANNOUNCEMENT 7-22 AMENDS THESE GUIDES: SELLING MAXIMUM FINANCING IN DECLINING MARKETS (2007), *available at* http://www.efanniemae.com/sf/guides/ssg/annltrs/pdf/2007/0722.pdf.

11. For a general description of underwriting criteria, see Anand K. Bhattacharya et al., *An Overview of Mortgages and the Mortgage Market*, *in* THE HANDBOOK OF MORTGAGE-BACKED SECURITIES 3, 17-20 (Frank J. Fabozzi ed., 6th ed. 2006) (1995).

12. Risk-based pricing also describes the manner in which a lender balances a borrower's strengths in some underwriting measures against the borrower's weaknesses in others. Lenders may also seek additional fees or higher interest rates to compensate for non-credit-based risks, including the risk of borrower prepayment and risks to the lender's reputation arising from making subprime loans. *See id*. at 24-26; *see also* J. Michael Collins et al., *Exploring the Welfare Effects of Risk-Based Pricing in the Mortgage Market*, *in* BUILDING ASSETS, BUILDING CREDIT: CREATING WEALTH IN LOW-INCOME COMMUNITIES

which economically efficient risk-based pricing explains the growth of subprime lending over the last several years,[13] there is a notable correlation between underwriting criteria and the interest rate an applicant receives, or whether or not the applicant receives a "subprime" loan (the precise definition of which varies across the studies).[14]

For multiple reasons, risk-based pricing is likely to cause disparate shares of whites, blacks, and Hispanics to receive subprime loans, given the persistent economic inequality between racial groups in the United States. First, income is a major component of DTI; in 2006 (the year the mortgages we analyze were originated), the median income for white households was 62% higher than that of black households, and 35% higher than that of Hispanic households.[15] Second, household wealth is an indicator (albeit an imprecise one) of both liquid assets and a borrower's ability to make a down payment, which is a primary determinant of LTV. Racial disparities in household wealth are even starker than those for income.[16] Finally, blacks and Hispanics are disproportionately more likely than whites to have lower credit scores or no credit score at all.[17] Underlying economic inequality is thus one important reason that racial groups have different likelihoods of receiving subprime loans.

138, 138-140 (Nicolas P. Retsinas & Eric S. Belsky eds., 2005) (providing thorough descriptions and discussions of risk-based mortgage pricing).

13. Alan White, for example, presents an alternative "opportunity-pricing" hypothesis in which subprime mortgage terms are not highly correlated with additional risk, but are instead the result of racial price discrimination and marketing, issues discussed later in this section. *See* Alan M. White, *Risk-Based Mortgage Pricing: Present and Future Research*, 15 HOUSING POL'Y DEBATE 503, 504-06 (2004); *see also* Howard Lax et al., *Subprime Lending: An Investigation of Economic Efficiency*, 15 HOUSING POL'Y DEBATE 533 (2004).

14. *See, e.g.*, Debbie Gruenstein Bocian et al., *Race, Ethnicity and Subprime Home Loan Pricing*, 60 J. ECON. & BUS. 110, 117-21 (2008); Marsha J. Courchane, *The Pricing of Home Mortgage Loans to Minority Borrowers: How Much of the APR Differential Can We Explain?*, 29 J. PLAN. EDUC. & RES. 399 (2007); Michael LaCour-Little, *The Home Purchase Mortgage Preferences of Low- and Moderate-Income Households*, 35 REAL EST. ECON. 265, 286-87 (2007).

15. The percentages reported are based on the median income for households with non-Hispanic white householders, black or African-American householders, and Hispanic or Latino householders (who could be of any race), as reported by the U.S. Census Bureau's 2006 American Community Survey.

16. In 2004, for example, the median wealth of white families was more than five times that of non-white and Hispanic families. *See* Brian K. Bucks et al., *Recent Changes in U.S. Family Finances: Evidence from the 2001 and 2004 Survey of Consumer Finances*, 92 FED. RES. BULL. A1, A8 (2006).

17. BD. OF GOVERNORS OF THE FED. RESERVE SYS., REPORT TO THE CONGRESS ON CREDIT SCORING AND ITS EFFECTS ON THE AVAILABILITY AND AFFORDABILITY OF CREDIT 150-55 (2007); TEX. DEP'T OF INS., REPORT TO THE 79TH LEGISLATURE, USE OF CREDIT INFORMATION BY INSURERS IN TEXAS 13-15 (2004).

B. Geographic Differences and Borrower Behavior

In addition to economic inequalities between racial and ethnic groups, several other differences between minority and white borrowers might also contribute to differential rates of subprime borrowing. First, mortgage channels—the institutional chains through which mortgages are funded—have a significant impact on the types of loans issued.[18] Thus, if racial groups use different mortgage channels, they are likely to end up with different rates of high-cost borrowing. White and minority borrowers have tended to access capital markets for home lending through different channels, with white borrowers more likely than black and Hispanic borrowers to take out loans from depository institutions, and black and Hispanic borrowers more likely than white borrowers to rely on largely unregulated mortgage banks.[19] An analysis of 2006 mortgage data highlighted the effect that a loan's source is likely to have on its subprime status by showing that controlling for the identity of the lender reduced most of the racial disparities in high-cost lending rates that year.[20]

Differences in racial groups' use of the various mortgage channels are no doubt at least partly a result of underlying economic inequality.[21] Some researchers hypothesize that these differences also might result from the relative scarcity of prime lenders in poor minority neighborhoods, which forces residents of those areas to rely on unregulated mortgage banks.[22] This hypothesis is supported by somewhat dated empirical evidence suggesting that bank branch locations in minority areas do in fact increase lending levels by that bank[23] and that minority neighborhoods are relatively underserved by bank branches.[24] However, all racial groups have come to rely less on mortgage lending by banks with proximate physical branches. In 2004, only 28.5% of mortgages issued to whites were issued by CRA-

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18. WILLIAM APGAR ET AL., JOINT CTR. FOR HOUS. STUDIES OF HARVARD UNIV., MORTGAGE CHANNELS AND FAIR LENDING: AN ANALYSIS OF HMDA DATA (2007), *available at* http://www.jchs.harvard.edu/publications/finance/mm07-2_mortgage_market_channels.pdf.

19. *Id.* at 27.

20. Robert B. Avery et al., *The 2006 HMDA Data*, 93 FED. RES. BULL. A73, A95 (2007).

21. Individual mortgage lenders have historically specialized in prime or subprime loans, and in 2006, there was still a significant concentration of high-cost lending among a relatively small number of lenders. *Id.* at A88.

22. *See* APGAR ET AL., *supra* note 18, at 30.

23. Angela E. Chang, *Role of Bank Branch Locations in Minority Lending* (Vassar Coll. Dep't of Econ., Working Paper No. 41, 1998).

24. *See* David N. Figlio & Joseph W. Genshlea, *Bank Consolidations and Minority Neighborhoods*, 45 J. URB. ECON. 474 (1999).

regulated[25] banks that had a branch in the borrower's metropolitan area,[26] which suggests that unequal proximity to lenders is unlikely to explain much of the racial disparities in loan outcomes.

Consumer advocates also have emphasized the increased role that brokers played in mortgage origination during the subprime lending boom, and the possible incentives brokers had to steer borrowers to high-priced products.[27] In theory, if using a broker to obtain a mortgage is linked to the probability of receiving a high-cost loan, racially disproportionate use of brokers (as a result of community relationships and social networks, for example) could contribute to racial disparities in high-cost lending. However, while brokers unquestionably played an outsized role in the subprime boom (brokers were involved in 71% of subprime loan originations, but only 50% of total loan originations in 2005[28]), the empirical evidence that broker usage resulted in high-cost loans is mixed.[29]

Finally, to the extent that racial groups have different levels of financial sophistication, or different access to information about the types of loans available, such differences may result in different rates of subprime borrowing. A number of studies matching borrower survey data to loan outcomes reveal that subprime borrowers are generally less financially sophisticated than prime borrowers, shop around for loans less than prime

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25. The Community Reinvestment Act ("CRA"), which covers most depository institutions, encourages covered lenders to extend loans to traditionally underserved communities in metropolitan areas in which the lender maintains physical branches. *See* APGAR ET AL., *supra* note 18.

26. *Id.* at 27.

27. *See, e.g.*, REN S. ESSENE & WILLIAM APGAR, JOINT CTR. FOR HOUS. STUDIES OF HARVARD UNIV., UNDERSTANDING MORTGAGE MARKET BEHAVIOR: CREATING GOOD MORTGAGE OPTIONS FOR ALL AMERICANS 7 (2007); KELLIE KIM-SUNG & SHARON HERMANSON, AARP RESEARCH REPORT, EXPERIENCES OF OLDER REFINANCE MORTGAGE LOAN BORROWERS: BROKER- AND LENDER-ORIGINATED LOANS (2003), *available at* http://www.aarp.org/research/credit-debt/mortgages/experiences_of_older_refinance_mortgage_loan_borro.html

28. MORTGAGE BANKERS ASS'N, MBA RESEARCH DATA NOTES, RESIDENTIAL MORTGAGE ORIGINATION CHANNELS 1 (2006).

29. *See* Amany El Anshasy et al., *The Pricing of Subprime Mortgages by Mortgage Brokers and Lenders* (Credit Research Ctr., Working Paper No. 70, 2006) (concluding that subprime borrowers who used brokers obtained cheaper loans than subprime borrowers who did not use brokers); Michael LaCour-Little, *The Pricing of Mortgages by Brokers: An Agency Problem?* (Cal. State Univ. at Fullerton, Working Paper, 2008) (finding that broker usage for prime loans did lead to higher borrower costs); *see also* Courchane, *supra* note 14, at 430 (finding that obtaining a loan through the wholesale channel (e.g., broker use) increased the probability of receiving a subprime loan and, in one of two years studied, a higher APR); LaCour-Little, *supra* note 14, at 287 (finding that the only observable impact of broker involvement was a correlation between minority borrowers and increased use of loans insured by the Federal Housing Administration).

borrowers, or have a less accurate estimate of their credit score than prime borrowers.[30] These findings suggest yet another mechanism that could contribute to racial disparities in high-cost lending: differences across racial groups in shopping behavior and financial accuity. Some data support this possibility. In survey results reported by the American Association of Retired Persons ("AARP"), for example, black respondents were significantly more likely than white respondents to list reviewing telephone and mail advertising and considering recommendations from a contractor as steps they take to find a home equity lender, and less likely than white respondents to list an inquiry at a bank, savings and loan institution, or credit union.[31] Hispanic respondents were more likely to list consulting their mortgage broker or current lender than white respondents, but listed an inquiry at a bank, savings and loan institution, or credit union as frequently as white respondents.[32] Other observers have posited that incorrect estimations by some high-credit blacks of their credit-worthiness has skewed the pool of black loan applicants towards the less credit-worthy, contributing to racially prejudiced misconceptions held by lenders about the creditworthiness of all blacks.[33]

C. Racial Discrimination, Steering, and Targeting

The final broad category of explanations for racial disparities in subprime borrowing is lender behavior that is motivated, or at least informed, by the loan applicant's race. The country's unfortunate legacy of excluding blacks, Hispanics, and other racial and ethnic minorities from housing and mortgage markets has prompted a rich literature examining lingering racial discrimination in these areas.[34] Two types of racial discrimination could contribute to the racial disparity in subprime outcomes: discriminatory underwriting and discriminatory targeting of potential loan applicants.

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30. *See, e.g.*, Marsha Courchane et al., *Consumer Credit Literacy: What Price Perception?*, 60 J. ECON. & BUS. 125 (2008); Marsha Courchane et al., *Subprime Borrowers: Mortgage Transitions and Outcomes*, 29 J. REAL EST. FIN. & ECON. 365, 381 (2004); Lax et al., *supra* note 13, at 569.

31. AARP, 2003 CONSUMER EXPERIENCE SURVEY: INSIGHT ON CONSUMER CREDIT BEHAVIOR, FRAUD AND FINANCIAL PLANNING fig.20 (2003).

32. *Id*.

33. *See* ESSENE & APGAR, *supra* note 27, at 23. *But see* Vanessa Gail Perry, *Is Ignorance Bliss? Consumer Accuracy in Judgments About Credit Ratings*, 42 J. CONSUMER AFF. 189, 201 (2008) (finding that those who overestimate their credit ratings are more likely to be black or Hispanic).

34. For a review of this literature, see Gary A. Dymski, *Discrimination in the Credit and Housing Markets: Findings and Challenges*, (Univ. of Cal., Riverside Dep't of Econ., Working Paper No. 02-18, 2002), *available at* http://www.economics.ucr.edu/papers/papers02/02-18.pdf.

Historically it has been difficult to use statistics to prove racial discrimination in underwriting because of a lack of publicly available data about borrowers' credit-worthiness. Using privately collected data, however, several researchers have attempted to isolate the significance of an applicant's race in underwriting decisions. Several studies since 1996[35] find that, even controlling for underwriting criteria (including applicant-level credit history), there is a racial gap in the probability of receiving a subprime loan or higher interest rate.[36] Most of the research, however, stops short of concluding that these results are evidence of actual racial discrimination.

An alternative method of investigating racial discrimination in lending outcomes is the auditing undertaken by the Federal Reserve, the Office of the Comptroller of the Currency, and the U.S. Department of Housing and Urban Development ("HUD"). Such in-depth reviews of actual loan files and underwriting processes have revealed some signs of biased behavior on the part of lenders.[37]

A second form of racial discrimination is targeting, or "reverse redlining," in which lenders or mortgage brokers, presuming a lack of financial sophistication, aggressively market loans to blacks or Hispanics, or to particular neighborhoods.[38] As a result of this targeting, and the high pressure or even deceptive sales tactics lenders or mortgage brokers may employ, some minority households who were not otherwise seeking mortgage loans will enter the subprime market, and some homeowners or potential homebuyers with strong underwriting profiles who could have qualified for prime loans will instead use subprime products. To date, little empirical research has demonstrated the distinct role of targeting in racial disparities of mortgage outcomes, but researchers have observed that geographic patterns of lending are consistent with this mechanism.[39]

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35. Alicia H. Munnell et al., *Mortgage Lending in Boston: Interpreting HMDA Data,* 86 AM. ECON. REV. 25 (1996). For a description of the ensuing debate, see Stephen L. Ross, *The Continuing Practice and Impact of Discrimination* (Univ. of Conn. Dep't of Econ.,Working Paper No. 19, 2005).

36. *See, e.g.*, Bocian et al., *supra* note 14; McKinley Blackburn et al., *A Comparison of Unexplained Racial Disparities in Bank-Level and Market-Level Models of Mortgage Lending*, 29 J. FIN. SERVICES RESOURCES 125 (2006); Courchane, *supra* note 14. *But see* La-Cour-Little *supra* note 14, at 287 (finding that race is not statistically significant in determining subprime outcomes).

37. For a review of audit studies, see Dymski, *supra* note 34, at 17.

38. For a review of legal issues surrounding racial targeting, see Benjamin Howell, *Exploiting Race and Space: Concentrated Subprime Lending as Housing Discrimination*, 94 CAL. L. REV. 101 (2006).

39. As part of an in-depth study of targeting in New Jersey, Newman and Wyly concluded that the geographic lending patterns they find are "what would be expected on the

D. The Role of Segregation

Metropolitan-level segregation could intensify some of the potential causes of racial inequalities in subprime lending described above.[40] Specifically, as outlined below, segregation may exacerbate underlying economic inequality, contribute to differences in financial sophistication, shopping behavior, and mortgage channel use, and provide increased opportunities for high-cost lenders and mortgage brokers to target potential borrowers.

Several observers have described the ways in which residential segregation can reinforce economic inequality between whites and minorities (particularly blacks). The spatial mismatch theory, for example, argues that segregation separates racial minorities from access to jobs.[41] Segregation can lead to the social isolation of racial minorities, preventing youth from learning from good role models, and limiting the ability of residents to benefit from networks that could help them find jobs or otherwise improve their lives.[42] Segregation can also lead to a concentration of poverty in certain neighborhoods.[43]

Several studies have examined the impact of segregation on economic performance and found that segregation exacerbates economic outcomes for blacks living in segregated communities.[44] Research on segregation and the concentration of poverty demonstrates that there may also be a multiplier effect when segregation interacts with poverty. High levels of segregation can create pockets of dense poverty within urban areas, magnifying the vulnerability of community members to the effects of an eco-

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basis of the economic rationality of targeting," but they were unable to establish causation with their data and analysis. *See* Kathe Newman & Elvin K. Wyly, *Geographies of Mortgage Market Segmentation: The Case of Essex County, New Jersey*, 19 HOUSING STUD. 53, 78 (2004).

40. "Metropolitan-level segregation" refers to the degree of racial or ethnic segregation measured at the level of the metropolitan statistical area.

41. As introduced by John Kain in 1968, "spatial mismatch" is the idea that segregation separates communities from access to jobs because these communities are often spatially separate from employment centers. John F. Kain, *Housing Segregation, Negro Unemployment, and Metropolitan Decentralization*, 82 Q. J. ECON. 175 (1968).

42. Katherine M. O'Regan & John M. Quigley, *Teenage Employment and the Spatial Isolation of Minority and Poverty Households*, 31 J. HUM. RESOURCES 692 (1996).

43. DOUGLAS S. MASSEY & NANCY DENTON, AMERICAN APARTHEID: SEGREGATION AND THE MAKING OF THE UNDERCLASS (1998).

44. *See, e.g.*, David M. Cutler & Edward L. Glaeser, *Are Ghettos Good or Bad?*, 112 Q. J. ECON. 827 (1997); O'Regan & Quigley, *supra* note 42. Similar to the theories described above, Cutler and Glaeser note that there are different pathways by which segregation can lead to negative outcomes for minorities, such as limiting contact with educated people and increasing commute times.

nomic shock.[45] Because economic inequality plays a significant role in creating racial disparities in high-cost lending, to the extent segregation intensifies underlying inequality, it also could magnify differential rates of high-cost loan origination.

Segregation also influences racial disparities in access to information and community networks in many ways.[46] By increasing the social isolation of racial minorities, high levels of segregation may limit their exposure to financial literacy information, including beneficial loan shopping strategies, and may lead black and Hispanic borrowers to rely on local mortgage brokers rather than lower cost but more distant bank branches or internet-based brokers. Given patterns of bank branch location, higher levels of racial segregation might also result in increased racial disparities in geographic proximity to traditional prime lending institutions. To the extent that differences in proximity to traditional prime banking channels contribute to disparities in the rate of subprime borrowing, segregation may exacerbate those disparities.

Finally, the geographic concentration of racial minorities resulting from higher levels of segregation could make residents of these communities more vulnerable to racial targeting by subprime lenders or to systematic, racially-motivated avoidance (i.e., "redlining") by prime lenders. To the extent prime lenders still market by neighborhood geography, high levels of high-cost lending resulting from targeting or from past redlining could "crowd out" better lending products that might otherwise be marketed there by willing prime lenders.[47]

III. PRIOR INVESTIGATIONS OF THE RELATIONSHIP BETWEEN SEGREGATION AND SUBPRIME LENDING

The proliferation of subprime lending over the last decade has led a handful of researchers to look at the relationship between subprime lending and segregation. A 2005 report by the National Community Reinvestment Coalition ("NCRC") looked across 177 metropolitan statistical areas

45. MASSEY & DENTON, *supra* note 43.

46. *See generally* INGRID GOULD ELLEN, IS SEGREGATION BAD FOR YOUR HEALTH? THE CASE OF LOW BIRTH WEIGHT, BROOKINGS-WHARTON PAPERS ON URBAN AFFAIRS (2000).

47. The National Community Reinvestment Coalition Report posits: "When subprime lending crowds out prime lending in traditionally underserved communities, price discrimination and other predatory and deceptive practices become more likely as residents face fewer product choices." NAT'L CMTY. REINVESTMENT COAL., FAIR LENDING DISPARITIES BY RACE, INCOME AND GENDER IN ALL METROPOLITAN AREAS IN AMERICA 3 (2005) [hereinafter NCRC REPORT].

("MSAs")[48] and found, among other things, that in 2003, black borrowers in MSAs with higher black-white segregation tended to have higher ratios of subprime to prime lending.[49] While there was no significant analogous interaction between Hispanic-white segregation and lending to Hispanics, the study found that Hispanic borrowers in MSAs with higher percentage of Hispanic residents tended to enjoy lower ratios of subprime to prime loans.[50] The study also found that for borrowers living in minority tracts (regardless of their individual race), higher MSA-level black-white segregation was associated with higher MSA-level ratios of subprime to prime lending.[51]

Professors Carolyn Bond and Richard Williams assessed whether increased access to lending for blacks fostered or hindered black-white integration in a study published in 2007.[52] Their analysis examined changes in lending and segregation patterns between 1990–2000 across MSAs and found that greater lending to blacks increased their homeownership and black-white integration in general.[53] The authors also found that traditional lending increased integration (although the effect was small), but other forms of loans (government insured or subprime) did not.[54]

Finally, a forthcoming paper looks at the relationship between subprime lending and segregation, theorizing that segregation may cause residents to be less financially sophisticated and therefore more vulnerable to targeting by subprime lenders, and that prime lenders may avoid low income and minority neighborhoods in highly segregated areas, leaving residents more likely to have to resort to subprime loans.[55] Using regression analysis, the authors find that MSA-level segregation has a significant impact on the

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48. The U.S. Office of Management and Budget defines a metropolitan statistical area as a:

> Core Based Statistical Area associated with at least one urbanized area that has a population of at least 50,000. The Metropolitan Statistical Area comprises the central county or counties containing the core, plus adjacent outlying counties having a high degree of social and economic integration with the central county as measured through commuting.

Standards for Defining Metropolitan and Micropolitan Statistical Areas, 65 Fed. Reg. 82,227, 82,238 (Dec. 27, 2000).

49. NCRC REPORT, *supra* note 47, at 13.

50. *Id.* at 15.

51. *Id.* at 16.

52. Carolyn Bond & Richard Williams, *Residential Segregation and the Transformation of Home Mortgage Lending*, 86 SOC. FORCES 671 (2007).

53. *Id.* at 691.

54. *Id.* at 692.

55. GREGORY D. SQUIRES ET AL., FED. RESERVE SYS. CMTY. AFFAIRS RESEARCH CONFERENCE, SEGREGATION AND THE SUBPRIME CRISIS (forthcoming 2009).

proportion of subprime loans issued in an MSA and that "concentration of minorities is just as important as the number of minorities in predicting subprime loans." Indeed, the study finds that "a 1% increase in segregation is associated with a .014% increase in the proportion of subprime lending."[56]

Those studies begin to illuminate the relationship between residential segregation and subprime lending, but they focus on the aggregate share of subprime lending in a community. This Article builds on these previous studies by focusing instead on individual borrowers, investigating the relationship between a metropolitan area's racial segregation and the probability that individual members of different racial groups will receive high-cost loans. Higher levels of residential segregation could be associated with a greater overall subprime share for the metropolitan area, yet affect the rate of subprime mortgages issued to blacks differently than the rate to Hispanics. Further, it is hard to predict, based upon the explanations discussed earlier, how levels of segregation are likely to affect the probability that whites receive subprime loans. This study therefore tries to disentangle the effects that segregation may have on subprime lending by assessing the relationship between MSA-level segregation indices and the probability that individual borrowers of different races will receive a high-cost loan, controlling for the borrowers' characteristics. We divide MSAs into different quartiles based on levels of black-white or Hispanic-non-Hispanic white segregation, to address the possibility that relationships between segregation and high-cost lending may be non-linear. We also assess the relationship between segregation and subprime first lien home purchase loans separately from the relationship between segregation and subprime refinancing loans, because the mechanisms by which segregation affects subprime lending may differ according to the type of loan at issue. Finally, we complement our national analysis of MSAs across the country with a more focused analysis of lending in neighborhoods within New York City. That analysis assesses whether borrowers of all races who live in neighborhoods with high concentrations of either blacks or Hispanics are more likely to receive subprime loans than borrowers living in more heterogeneous neighborhoods.

56. *Id.* at 17.

IV. EMPIRICAL ANALYSIS

A. Methodology

1. Metropolitan Area Segregation and Lending

As discussed above, nationwide, black and Hispanic borrowers are more likely than non-Hispanic white[57] borrowers to receive high-cost loans. Our key question is whether these disparities are larger in more segregated areas. We explore whether minority borrowers are more likely to receive a high-cost loan if they live in more racially segregated metropolitan areas and, using the case of New York City, whether minority borrowers are more likely to receive a high-cost loan if they live in neighborhoods with larger proportions of minority residents. In the first part of the analysis, we look across metropolitan areas to reveal whether residential segregation by race or ethnicity is related to the likelihood of minority borrowers within those large metropolitan areas receiving high-cost loans. Because this analysis only observes racial composition and segregation at the MSA-level, however, it might obscure more intricate relationships between the demographics of a neighborhood and the likelihood of its residents of each race or ethnicity to obtain a high-cost loan. Accordingly, the second part of the analysis focuses on New York City and looks across neighborhoods to determine whether the racial or ethnic composition by neighborhood (i.e., census tract) is associated with disparities in lending outcomes for individual borrowers of different races and ethnicities.

Our national analysis tests whether the difference in the likelihood that minority and white borrowers get high-cost loans is greater in more segregated metropolitan areas. Specifically, we estimate the following logistic regressions:

$$Log\,[P_i/(1-P_i)] = X'\beta + Z'\gamma + BSEG'\mu + BSEG*BLACK'\eta$$

$$Log\,[P_i/(1-P_i)] = X'\beta + Z'\gamma + HSEG'\mu + HSEG*HISP'\eta$$

P_i is the probability that borrower i receives a high-cost loan, X represents the matrix of individual-level variables, including a set of income variables, race, gender, whether there is a co-applicant on the loan, and the

57. Throughout this Article, our use of the term "white" refers to non-Hispanic whites.

loan amount.[58] *Z* represents the matrix of metropolitan area-level variables, including median income, population, proportion minority, and a set of dummy variables indicating which of nine census regions contains the metropolitan area. *BSEG* and *HSEG* represent a set of dummy variables representing the level of black-white segregation and Hispanic-non-Hispanic white segregation levels respectively in the metropolitan area (explained more fully below). *BLACK* and *HISP* are dummy variables taking on the value of one if the borrower is black or Hispanic, respectively. We are most interested in the coefficient μ, which measures the association between segregation and the likelihood of getting a high-cost loans for white borrowers, and the coefficient η, which measures the differential association between segregation and high-cost lending for blacks or Hispanics relative to whites. The first regression is estimated for black and white borrowers; the second regression is estimated for Hispanic and white borrowers. Standard errors are adjusted for clustering within a metropolitan area.

There are multiple approaches to measuring racial segregation. We choose to use the most standard measure of segregation, the dissimilarity index. The dissimilarity index captures the extent to which two groups (in this case, blacks and whites or Hispanics and whites) are distributed differently across neighborhoods within a metropolitan area. Although this index is imperfect,[59] it has been used extensively and can be conveniently interpreted as the share of minority residents that would have to move from one neighborhood—here proxied by a census tract—to another within a metropolitan area in order for minority and white residents to have the identical distributions. Thus, when there is no segregation, the index is zero, and with complete segregation, it equals one. We also estimated our regressions using the isolation index, a measure of exposure that captures the extent to which people live in census tracts with other people of their same race. The isolation index for blacks, for instance, is equivalent to the percentage of blacks living in the neighborhood of the typical black person in an MSA. The results were largely the same using both indices, therefore only the results with the dissimilarity index are shown.

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58. Because they are not available through HMDA or any other public source, our analysis does not include individual-level credit scores.

59. *See* David R. James & Karl E. Taeuber, *Measures of Segregation*, 15 SOC. METHODOLOGY 1 (1985); Sean F. Reardon & Glenn Firebaugh, *Measures of Multigroup Segregation*, 32 SOC. METHODOLOGY 33 (2002). The dissimilarity index is a measure of the evenness of the population—how evenly members of a racial group are distributed throughout the broader population—however, it does not describe the spatial proximity of members of a racial group to one another. Other measures such as the isolation index or the relative clustering index provide information about the spatial dimensions of segregation. The literature on segregation measures provides criteria for comparing and testing each index.

Whatever the measure used, we do not expect segregation to have a simple linear relationship with lending patterns. Thus, rather than simply including the value of the segregation index, we divide our metropolitan areas into quartiles of segregation levels and test whether borrowers are more likely to get high-cost loans when they live in a metropolitan area with low/moderate, moderate/high, or high levels of segregation as compared to a borrower living in a metropolitan area with low levels of segregation.

In addition to estimating separate regressions testing for an association between racial segregation and high-cost lending for black and Hispanic borrowers, we also undertake separate analyses for borrowers getting first lien home purchase loans and those getting refinance loans. As noted above, it is possible that the effects of racial composition and segregation differ for first lien home purchase borrowers and those getting refinance loans. We therefore estimate separate regressions for borrowers seeking different types of loans.

In both sets of analyses, we focus on the individual borrower and model his or her probability of getting a high-cost loan. By controlling for the individual characteristics of borrowers, we can test whether a household is more likely to get a high-cost loan than a household with identical, observable attributes if it resides in a more segregated metropolitan area.

In the national analysis of black segregation, we include all black and white borrowers in metropolitan areas in which at least 200 loans were made to blacks and at least 200 loans were made to whites in 2006. In the analysis of Hispanic segregation, we include all Hispanic and non-Hispanic white borrowers in metropolitan areas in which at least 200 loans were made both to Hispanics and to non-Hispanic whites in 2006. Table 2 shows key characteristics in 2000 of the 213 and 218 metropolitan areas from which our black-white and Hispanic-white sample were drawn, respectively.[60] It is worth noting that levels of black-white segregation are generally higher than levels of Hispanic-white segregation; the median level of black-white segregation in our sample is 0.55, measured by the dissimilarity index, while the median level of Hispanic-white segregation is just 0.41. In other words, within the MSAs in our sample, the median percentage of the black population who would have to move to another census tract in order to achieve an equal distribution of blacks across census tracts

60. In Table 2, the information in each column describes the characteristics of the metropolitan statistical areas in the particular quartile of segregation. For instance, the second row of the panel A presents the percentage of the population in all of the MSAs in each quartile that is black. The third row presents an average of the median incomes of the MSAs in each quartile. The column headings present the definitions of the four quartiles of segregation in terms of ranges of values of the dissimilarity index.

is 55%, while the median percentage of Hispanics who would need to move in the Hispanic-white sample is 41%. Table 2 shows that the characteristics of the metropolitan areas appear to differ with segregation. The more highly segregated metropolitan areas tend to be larger, to have higher incomes, and higher shares of minority residents. Thus, it is important for us to control for these characteristics in our regressions to estimate the independent association of segregation with lending patterns.

Table 3 shows summary statistics for our sample of borrowers in the black-white and Hispanic-white analyses.[61] The sample sizes are quite large.[62] In the analysis of black-white segregation, we have over 4.3 million white borrowers and over 730,000 black borrowers. These include borrowers receiving home purchase as well as refinance loans. In the analysis of Hispanic-white segregation, we have 3.9 million white borrowers and over a million Hispanic borrowers. Several key differences emerge. Black and Hispanic borrowers tend to have lower incomes and are more likely to get high-cost loans as compared to white borrowers. Specifically, approximately half of the black and Hispanic borrowers in our samples receive high-cost first lien home purchase loans, compared to approximately 16% of white borrowers. Black borrowers are also much more likely to be single female applicants (41.7%, compared to 22.8% of white borrowers), while Hispanic borrowers are more likely to be single male applicants (42.3%, compared to 29.7% of white borrowers).

2. Neighborhood Racial Composition and Lending: The Case of New York City

In our analysis of borrowers in New York City, we test whether borrowers are more likely to get high-cost loans in largely minority census tracts, and whether this difference across neighborhoods is particularly pro-

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61. In Table 3, the percentages in the columns are the percentage of the column population that has the characteristic of the according row. The figures for Median Loan Amount and Median Applicant Income are the median dollar amounts of the borrowers included in the column population.

62. The universe of loans in the raw HMDA data was narrowed for our analysis. First, the original 13,970,183 loans were cleaned to include only home purchase or refinance loans for conventional, one- to four-family, owner-occupied properties. Following this process, an MSA code was attached to each loan (by the FIPS county and census tract codes), resulting in the removal of observations missing geographic identifiers for either county or tract (74,593 observations); observations located in Puerto Rico (59,308 observations); observations in New England missing tract identifiers (430); and all observations located outside of metropolitan areas (1,358,844). Two sample data sets were then created, one including loans to blacks and whites, and one including loans to Hispanics and whites. As noted, loans were only included if they were located in a metropolitan area in which at least 200 loans were made to black or Hispanic borrowers in 2006.

nounced for minority borrowers. Specifically, we estimate the following regressions, similar to those above:

$$Log\,[P_i/(1-P_i)] = X'\beta + Z'\gamma + SHRBLACKQ'\mu + SHRBLACKQ*BLACK'\eta$$

$$Log\,[P_i/(1-P_i)] = X'\beta + Z'\gamma + SHRHISPQ'\mu + SHRHISPQ*HISP'\eta$$

P_i is the probability that borrower i receives a high-cost loan, X represents the matrix of individual-level variables, including race, income, gender, whether there is co-applicant on the loan, and the loan amount. Z represents the matrix of census tract, or neighborhood-level, variables, including poverty rate, percentage of residents who are foreign born, percentage of adult residents with at least some college education, tract population, and the share of housing units built prior to 1950. *SHRBLACKQ* and *SHRHISPQ* represent groups of dummy variables indicating whether the tract is in the second, third, or fourth highest quartile of neighborhoods, with respect to the share of blacks and Hispanics, respectively. The matrix of coefficients μ measures the association between neighborhood racial composition and likelihood of getting a high-cost loan for white borrowers, and the coefficient η measures the differential association for blacks or Hispanics relative to whites. The first regression is estimated for black and white borrowers. The second regression is estimated for Hispanic and white borrowers. Standard errors are adjusted for clustering within a census tract.

The New York City data set includes only home purchase or refinance loans for conventional, one- to four-family, owner-occupied properties in New York City during 2004–2007. We restrict loans to those made in census tracts with populations greater than 200 and greater than zero housing units. For the black-white sample, we additionally excluded loans in tracts that had fewer than ten loans to black borrowers or fewer than ten loans to white borrowers. For the Hispanic-non-Hispanic white sample, we excluded loans in tracts with fewer than ten loans to Hispanics or to non-Hispanic whites. The boundaries used in this analysis are 1999 census boundaries. All dollar amounts are adjusted to 2007 dollars.

Table 4 shows selected characteristics of the 733 census tracts defining our black-white sample and the 1093 tracts defining our Hispanic-non-Hispanic white sample. As shown, tracts with larger Hispanic proportions tend to have higher poverty rates (25.5% below the poverty line), less educated residents (35.6% with at least some college education), and a greater share of immigrants (43.7% foreign born). Interestingly, the poverty rate does not always increase with the share of blacks in a census tract, in part

because tracts with a moderate number of black residents also tend to have a larger share of Hispanic residents.

Table 5 shows individual borrower and loan characteristics for all the loans in our New York City samples. As in our analysis of MSA segregation, we used HMDA data for our analysis. Unlike our national analysis, however, we pooled loans originated in New York City over a four-year period, between 2004–2007, to create a larger sample of loans. While the sample size is of course smaller than for the national analysis, it is still quite large, with some 91,000 loans in the black-white sample and over 137,000 loans in the Hispanic-non-Hispanic white sample. As for individual level characteristics, borrowers in New York City in 2004–2007 were somewhat less likely to get high-cost loans than borrowers in the country as a whole were in 2006 (see Table 3). This difference may be due to the disparate time periods or to variations between lending patterns in New York City and those in the country as a whole.

B. Results of Regressions

1. Metropolitan Area Segregation and Lending

The first column of Table 6 shows the simple, unadjusted association between segregation at the MSA-level and the likelihood of getting a high-cost home purchase loan for whites and blacks. The second column shows the association between segregation and the likelihood of getting a high-cost loan, after controlling for metropolitan area characteristics other than segregation. The third column shows the association, after controlling for individual borrower attributes as well as other metropolitan area characteristics. The next three columns show these same regressions for refinance mortgages.

None of the coefficients on the segregation variables are statistically significant, suggesting that for white borrowers, there is no association between the segregation level of the metropolitan area in which they live and the likelihood that they will receive a high-cost home purchase loan.[63] The coefficients on the segregation variables that interact with the black race dummy variable are, however, almost all statistically significant and positive, and larger for the variables indicating higher levels of segregation, suggesting that black borrowers who live in more segregated metropolitan

63. The parameter estimates displayed in Tables 6 and 7 represent the logarithmic odds of the event (receipt of a high-cost loan) occurring to an individual who has particular characteristics. Given the complicated nature of interpreting these coefficients directly, predicted probabilities are presented in Tables 8 and 9.

areas are more likely to get high-cost loans. These relationships hold true even when individual borrower characteristics and other metropolitan area attributes are taken into account.

The pattern is generally similar for refinance loans, though the associations are somewhat weaker and only appear for the most segregated metropolitan areas. Specifically, the likelihood of white borrowers getting high-cost refinance loans is not associated with the level of segregation in their metropolitan areas, but black borrowers do appear to be more likely to get high-cost refinance loans in highly segregated metropolitan areas.

We see a generally similar story for Hispanic borrowers. The results from the Hispanic-non-Hispanic white regressions are presented in Table 7. Once again, the probability of white borrowers receiving a high-cost loan is not associated with the levels of Hispanic-white segregation and are slightly less likely to receive a high-cost loan in the most segregated metropolitan areas. Meanwhile, Hispanic borrowers, like black borrowers, are more likely to receive high-cost loans when they live in a metropolitan area in which their group is more residentially segregated.

In summary, it appears that white borrowers are unaffected by levels of either black-white or Hispanic-white segregation but that black and Hispanic borrowers in more segregated metropolitan areas are more likely to receive high-cost loans than those is less segregated areas. Significantly, the fact that segregation seems to matter for black and Hispanic borrowers and not for white borrowers, suggests that our segregation variables are not simply picking up some other characteristic of metropolitan area housing markets that is associated with high-cost lending.

Table 8 shows the predicted probability of a typical borrower of a given race getting a high-cost home purchase loan in metropolitan areas of different segregation levels. The table shows that segregation has a larger association with high-cost home purchase loans for blacks than for Hispanics. In a metropolitan area with low black-white segregation, the predicted probability of a black borrower getting a high-cost loan is 2.8 times higher than for a white borrower, while in a metropolitan area with high black-white segregation, the predicted probability of a black borrower getting a high-cost loan is 3.5 times higher than for a white borrower. Similarly, in a metropolitan area with low Hispanic-non-Hispanic white segregation, the predicted probability of a Hispanic borrower getting a high-cost loan is 2.8 times higher than for a white borrower, while in a metropolitan area with high Hispanic-non-Hispanic white segregation, the predicted probability of a Hispanic borrower getting a high-cost loan is 3.4 times higher than for a white borrower. Interestingly, in the case of refinance loans, segregation

appears to have a stronger association with the likelihood of getting a high-cost loan for Hispanic borrowers than for black borrowers.

2. Neighborhood Racial Composition and Lending: The Case of New York City

Our national analysis gives us strong reason to believe that racial segregation at the MSA level is related to lending outcomes for minority borrowers. This would suggest that within metropolitan areas, minority borrowers are more likely to receive high-cost loans when they live in neighborhoods with larger shares of minority residents, perhaps because of differential access to bank branches or information networks or more explicit racial targeting by high-cost lenders.[64] We therefore tested whether racial composition of census tracts within New York City is linked to the probability that a black or Hispanic borrower living there receives a high-cost loan, and whether this association is different than for white borrowers. In the interest of brevity, we do not show the full regression results for the New York City analysis. Instead, we simply show the predicted probability that a typical white borrower and a typical borrower of a given minority race or ethnicity will receive a high-cost loan in each quartile of census tracts arranged by their percentage of residents of that given race or ethnicity. These are predicted probabilities calculated from regression coefficients, holding all characteristics at their mean value for a borrower of the given race. We show results for home purchase loans only, but the results for refinance loans in our New York City analysis are highly similar.

The top panel of Table 9 shows that black and white borrowers are more likely to get a high-cost loan when they are buying a home in a census tract that has a high proportion of blacks. Blacks and whites, in other words, appear to be at a mortgage-cost disadvantage by buying homes in neighborhoods with more black residents. Specifically, in census tracts in the bottom quartile of black representation, our results suggest that a white borrower with mean characteristics for white borrowers in our sample has a 5% chance of receiving a high-cost home purchase loan, while a white borrower with identical observable characteristics faces a 17% chance of receiving a high-cost home purchase loan in the tracts in the top quartile of black representation. For the typical black borrower with mean characteristics of black borrowers in our sample, the likelihood of receiving a high-

64. Note that it is possible that all minority borrowers in a high-segregation metropolitan area are disadvantaged by high levels of segregation, regardless of the racial composition of their individual neighborhood, because they may have less freedom of residential choice than minority households living in less segregated metropolitan areas or that they experience more racial hostility.

cost home purchase loan is 25% in the census tracts with the lowest shares of black residents and 38% in the census tracts with the highest shares of blacks. It is possible, however, that there are systematic, unobserved differences between the borrowers living in neighborhoods with more black residents.[65]

A similar comparison of white and Hispanic borrowers in neighborhoods arranged in quartiles by their percentage of Hispanic residents reveals quite different results. As shown in the bottom panel of Table 9, the predicted probability that a typical white borrower gets a high-cost loan does not vary with the percentage of Hispanic residents in a tract. A typical Hispanic borrower is actually *less* likely to get a high-cost loan in tracts with higher proportions of Hispanic residents. There is little evidence here that high-cost lenders are disproportionately operating in heavily Hispanic neighborhoods.

The results for Hispanics in the Hispanic-white sample of census tracts, seemingly at odds with our findings from our MSA-level analysis, do not tell the whole story, however. Unlike most metropolitan areas around the country, New York City has relatively large proportions of both black and Hispanic residents, and neighborhoods which have low Hispanic populations often still have large non-white populations (see Table 4).[66] Thus, in New York City, it may be more relevant to test for the association between the likelihood of a borrower getting a high-cost loan and the share of non-whites in a census tract. Table 10 presents the results from this analysis. The bottom panel of Table 10 shows that as the share of the population that is non-white increases, the probability that a Hispanic borrower with average, observable characteristics for Hispanics receives a high-cost loan also increases.

CONCLUSION

In summary, we find strong evidence that residential segregation plays a role in shaping lending patterns. First, across metropolitan areas in the United States, we find that both black and Hispanic borrowers are more likely to receive high-cost home purchase and refinance loans in the metropolitan areas in which their racial group is more segregated. The likelihood that white borrowers will get a high-cost loan, however, is generally the same, regardless of the segregation level of the metropolitan area, suggest-

65. This is less of a concern in the metropolitan area analysis because it is far less likely that households will sort across metropolitan areas according to segregation levels.

66. As shown in Table 4, for instance, the percentage of blacks in low Hispanic tracts was 28.4%, while the percentage of blacks in high-Hispanic tracts was 15.7%.

ing that the level of segregation in an area is not simply picking up some other attribute of a metropolitan area that is associated with high-cost lending. Minority borrowers appear to be uniquely disadvantaged by segregation, and consequently, racial disparities in the percentage of borrowers who receive high-cost loans are significantly larger in more segregated metropolitan areas. Racial segregation surely does not explain the full extent of racial disparities in high-cost lending. Even in metropolitan areas with low levels of segregation, black and Hispanic borrowers are far more likely to receive high-cost loans than white borrowers. But segregation appears to magnify differences.

As for whether the racial composition of a neighborhood is directly linked to borrower outcomes, we find evidence that it is, at least in New York City. As the percentage of minorities in the neighborhood increases, whites, blacks, and Hispanics all have a higher probability of receiving high-cost loans. Interestingly, however, the evidence suggests that the *relative* difference between the probability that a white borrower will receive a high-cost loan and the probability that a black borrower will receive such a loan does not differ markedly between neighborhoods with smaller and larger proportions of minority residents.

While our results suggest that racial segregation may exacerbate racial disparities in high-cost lending, our data cannot reveal why these associations exist. Our findings for New York City, however, are consistent with mechanisms that depend on differences in access to credit markets by neighborhood, such as access to bank branches, differences in social networks across neighborhoods, and racially discriminatory geographic targeting by high-cost lenders, which would impact residents of all races in these neighborhoods. It appears that residents of neighborhoods with higher shares of black residents are particularly disadvantaged. More research is needed to understand why exactly minority borrowers are more likely to get high-cost loans in more segregated areas and to understand the different ways that concentrations of blacks and Hispanics in neighborhoods may affect lending patterns.

APPENDIX

Table 1: Characteristics of HMDA Borrowers

National (2006)	White	Black	Hispanic
% 1st Lien Home Purchase Loans that Are High-cost	17.7%	53.3%	46.2%
% Refinance Loans that Are High-cost	25.5%	51.7%	38.6%
Median Loan Amount	$143,000	$132,000	$170,000
Number of Loans	5,726,468	780,654	1,133,720

N.Y. City (2004-2007)	White	Black	Hispanic
% 1st Lien Home Purchase Loans that Are High-cost	7.8%	40.8%	30.1%
% Refinance Loans that Are High-cost	17.5%	37.3%	29.5%
Median Loan Amount	$292,000	$276,000	$288,000
Number of Loans	127,974	70,308	44,051

Table 2: MSA Characteristics by Quartiles of Segregation, for HMDA Samples (2000)

Black/White Sample	Q1: Low Seg. (0<D<=.45)	Q2: Low/Mod. Seg. (.45<D<=.55)	Q3: Mod./High Seg. (.55<D<=.64)	Q4: High Seg. (.64<D<=.85)
Total Population	29,452,222	33,622,783	46,450,480	94,264,194
% Black	8.86%	11.00%	13.64%	16.78%
Median Household Income	40,481	42,843	43,239	44,898
Number of MSAs	54	53	53	53

Hispanic/White Sample	Q1: Low Seg. (0<D<=.33)	Q2: Low/Mod. Seg. (.33<D<=.41)	Q3: Mod./High Seg. (.41<D<=.50)	Q4: High Seg. (.50<D<=.75)
Population	30,173,948	31,834,895	57,644,166	86,469,988
% Hispanic	5.79%	11.23%	15.43%	20.26%
Median Household Income	40,664	42,129	42,746	49,146
Number of MSAs	55	54	55	54

Table 3: Summary Statistics for HMDA Samples (2006)

	Black/White Sample		Hispanic/White Sample	
	White Borrowers	Black Borrowers	White Borrowers	Hispanic Borrowers
% of 1st Lien Homepurchase Loans that Are High-cost	16.5%	53.2%	16.2%	46.8%
% of Refinance Loans that Are High-cost	24.3%	51.4%	23.8%	38.4%
Median Loan Amount	175,000	159,000	186,000	216,000
Median Applicant Income	79,000	65,000	82,000	78,000
% in Income Category 1	19.6%	29.7%	17.8%	18.8%
% in Income Category 2	42.2%	44.0%	42.1%	43.8%
% in Income Category 3	18.6%	14.3%	19.3%	19.9%
% in Income Category 4	14.8%	7.3%	15.9%	10.4%
% Missing/Unreported Income	4.3%	4.3%	4.5%	6.6%
% Co-Applicant	47.3%	26.6%	47.3%	30.5%
% Single Male	29.7%	31.4%	29.7%	42.3%
% Single Female	22.8%	41.7%	22.9%	27.0%
% Gender Missing	0.2%	0.4%	0.2%	0.2%
N	4,325,144	733,451	3,904,704	1,061,725

Table 4: Neighborhood Characteristics by Quartiles of Minority Concentration, for HMDA Samples, New York City (2000)

Black/White Sample	Low % Black (0<%Black ≤0.19)	Low/Mod. % Black (0.19<%Black ≤0.56)	Mod./ High % Black (0.56<%Black ≤0.84)	High % Black (0.84<%Black)
% Non-Hispanic White	46.0%	13.2%	6.9%	1.3%
% Non-Hispanic Black	8.7%	36.6%	71.4%	88.9%
% Hispanic	26.6%	39.2%	15.9%	5.8%
Poverty Rate	14.0%	25.8%	23.6%	19.6%
% Foreign Born	36.2%	32.6%	33.9%	36.2%
% with at least Some College	53.4%	40.6%	42.1%	43.1%
% Old Units (built before 1950)	46.5%	50.3%	45.2%	52.4%
Number of Census Tracts	183	183	183	184

Hispanic/White Sample	Low % Hispanic (0<%Hispanic ≤0.08)	Low/Mod. % Hispanic (0.08<%Hispanic ≤0.17)	Mod./High % Hispanic (0.17<%Hispanic ≤0.33)	High % Hispanic (0.33< %Hispanic)
% Non-Hispanic White	57.2%	47.8%	32.9%	15.0%
% Non-Hispanic Black	28.4%	24.9%	23.1%	15.7%
% Hispanic	5.6%	12.0%	23.7%	54.9%
Poverty Rate	9.4%	13.5%	17.1%	25.5%
% Foreign Born	25.6%	33.7%	38.9%	43.7%
% with at least Some College	63.1%	54.5%	46.5%	35.6%
% Old Units (built before 1950)	42.4%	46.6%	50.0%	55.6%
Number of Census Tracts	273	273	273	274

Table 5: Summary Statistics for HMDA Samples (New York City) (2004-2007)

	Black/White Sample		Hispanic/White Sample	
	White Borrowers	Black Borrowers	White Borrowers	Hispanic Borrowers
% 1st Lien Home Purchase Loans that Are High-cost	11.1%	35.4%	7.0%	28.2%
% Refinance Loans that Are High-cost	23.9%	33.8%	16.8%	28.8%
Median Loan Amount	276,000	293,000	292,000	330,000
Median Applicant Income	95,000	86,000	104,000	97,000
% in Income Category 1	8.2%	9.6%	6.8%	7.4%
% in Income Category 2	42.7%	51.2%	37.2%	39.8%
% in Income Category 3	24.1%	24.4%	24.8%	30.7%
% in Income Category 4	19.2%	7.3%	25.1%	13.6%
% Missing/Unreported Income	5.0%	6.6%	5.5%	7.6%
% with Co-Applicant	33.8%	25.4%	39.3%	27.9%
% Single Male Applicant	37.2%	31.2%	34.3%	41.5%
% Single Female Applicant	28.7%	43.1%	26.1%	30.3%
% with Gender Missing	0.3%	0.3%	0.3%	0.3%
N	37,502	53,711	90,054	46,572

Table 6: Regression Results for Black/White Sample for Dissimilarity Index, Modeling Probability of receiving a High-cost 1st Lien Home Purchase or Refinance Loan (2006)

	1st Lien Home Purchase						Refinance					
	No controls		MSA controls[a]		MSA + Individual controls[b]		No controls		MSA controls[a]		MSA + Individual controls[b]	
Low/Mod. Seg. (Q1)	0.032		-0.084		-0.114		0.020		-0.005		-0.021	
Mod./High Seg. (Q2)	-0.055		0.031		0.025		0.037		-0.048		-0.055	
High Seg. (Q3)	0.061		0.038		0.029		0.072		-0.033		-0.036	
Low/Mod. Seg. Black	0.153	**	0.135		0.150	**	0.063		0.035		0.030	
Mod./High Seg. Black	0.080		0.301	***	0.302	***	-0.098		0.042		0.024	
High Seg. Black	0.382	***	0.468	***	0.420	***	0.142		0.212	***	0.173	**
Black	1.242	***	1.494	***	1.401	***	1.119	***	1.083	***	1.016	***
Other MSA Variables			X		X				X		X	
Other Indiv Variables					X						X	
N	2,154,042		2,154,042		2,154,042		2,904,553		2,904,553		2,904,553	

*** Indicates 99% confidence level, ** indicates 95% confidence. MSA control variables[a] include log of the population, share black, and log of median household income, and dummy variables for the 9 census regions. Individual variables[b] include applicant income, loan amount, co-applicant status, and gender. Q2: Dissimilarity index between 0.45 and 0.55; Q3: Dissimilarity index between 0.55 and 0.64; Q4: Dissimilarity index > 0.64.

Table 7: Regression Results for Hispanic/White Sample for Dissimilarity Index, Modeling Probability of Receiving a High-cost 1st Lien Home Purchase or Refinance Loan (2006)

	1st Lien Home Purchase						Refinance					
	No controls		MSA controls[a]		MSA + Individual controls[b]		No controls		MSA controls[a]		MSA + Individual controls[b]	
Low/Mod. Seg. (Q2)	-0.074		-0.091		-0.084		-0.077		-0.032		-0.029	
Mod./High Seg. (Q3)	0.035		0.074		0.074		-0.020		-0.028		-0.027	
High Seg. (Q4)	-0.167		-0.147		-0.134		-0.248	***	-0.161	**	-0.146	**
Low/Mod. Seg. Hispanic	0.144		0.135		0.119		0.200	**	0.147	***	0.135	***
Mod./High Seg. Hispanic	0.079		0.060		0.034		0.158	**	0.208	***	0.186	***
High Seg. Hispanic	0.227	***	0.260	***	0.226	***	0.273	***	0.308	***	0.274	***
Hispanic Other	1.376	***	1.311	***	1.197	***	0.503	***	0.548	***	0.499	***
MSA Variables			X		X				X		X	
Other Indiv Variables					X						X	
N	2,132,593		2,132,593		2,132,593		2,833,836		2,833,836		2,833,836	

*** Indicates 99% confidence level, ** indicates 95% confidence. MSA control variables[a] include log of the population, share black, and log of median household income, and dummy variables for the 9 census regions. Individual variables[b] include applicant income, loan amount, co-applicant status, and gender. Q2: Dissimilarity index between 0.33 and 0.41; Q3: Dissimilarity index between 0.41 and 0.5; Q4: Dissimilarity index > 0.5.

Table 8: Predicted Probability of Getting a High-cost Home Purchase Loan for Typical Borrower of Given Race, by Segregation Level of Metropolitan Area—National Sample. All borrower and metropolitan area characteristics were assumed to be at the mean for a borrower of that race, other than the segregation level of metropolitan area.

	Segregation Level of MSA (quartiles)			
	Q1: Low Seg.	Q2: Low/Mod. Seg.	Q3: Mod/High Seg.	Q4: High Seg.
White	0.16	0.14	0.16	0.16
Black	0.45	0.46	0.53	0.56
Black-White Difference	0.29***	0.32***	0.37***	0.40***
White	0.16	0.15	0.17	0.14
Hispanic	0.45	0.45	0.47	0.47
Hispanic-White Difference	0.29***	0.30***	0.30***	0.33***

*** Indicates significance at a 99% confidence level

Table 9: Predicted Probability of Getting a High-cost Home Purchase Loan for Typical Borrower of Given Race, by Minority Concentration in Census Tract—New York City Sample. All borrower and census tract characteristics were assumed to be at the mean for a borrower of that race, other than the share of blacks or Hispanics in the census tract.

	Black and Hispanic Concentration of Neighborhood (quartiles)			
	Q1: Low Black Conc.	Q2: Low/Mod Black Conc.	Q3: Mod/High Black Conc.	Q4: High Black Conc.
White	0.05	0.09	0.09	0.17
Black	0.25	0.31	0.31	0.38
Black-White Diff.	0.20***	0.22***	0.21***	0.21***
	Q1: Low Hispanic Conc.	Q2: Low/Mod Hispanic Conc.	Q3: Mod/High Hispanic Conc.	Q4: High Hispanic Conc.
White	0.05	0.04	0.05	0.04
Hispanic	0.32	0.23	0.25	0.22
Hispanic-White Diff.	0.27***	0.19***	0.20***	0.18***

*** Indicates significance at a 99% confidence level

Table 10: Predicted Probability of Getting a High-cost Home Purchase Loan for Typical Borrower of Given Race, by Non-White Concentration in Census Tract—New York City Sample. All borrower and census tract characteristics assumed to be at the mean for a borrower of that race, other than the share of blacks or Hispanics in the census tract.

Predicted Probabilities	Q1: Low Non-White Conc.	Q2: Low/Mod Non-White Conc.	Q3: Mod/High Non-White Conc.	Q4: High Non-White Conc.
White	0.05	0.11	0.11	0.18
Black	0.24	0.30	0.34	0.38
Black-White Difference	0.19***	0.19***	0.23***	0.20***
White	0.03	0.05	0.11	0.16
Hispanic	0.14	0.22	0.28	0.31
Hispanic-White Difference	0.11***	0.17***	0.18***	0.15***

*** Indicates significance at a 99% confidence level