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Racial Segregation and the American Foreclosure Crisis

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Abstract

Although the rise in subprime lending and the ensuing wave of foreclosures was partly a result of market forces that have been well-identified in the literature, in the United States it was also a highly racialized process. We argue that residential segregation created a unique niche of poor minority clients who were differentially marketed risky subprime loans that were in great demand for use in mortgage-backed securities that could be sold on secondary markets. We test this argument by regressing foreclosure actions in the top 100 U.S. metropolitan areas on measures of black, Hispanic, and Asian segregation while controlling for a variety of housing market conditions, including average creditworthiness, the extent of coverage under the Community Reinvestment Act, the degree of zoning regulation, and the overall rate of subprime lending. We find that black residential dissimilarity and spatial isolation are powerful predictors of foreclosures across U.S. metropolitan areas. In order to isolate subprime lending as the causal mechanism whereby segregation influences foreclosures, we estimate a two-stage least squares model that confirms the causal effect of black segregation on the number and rate of foreclosures across metropolitan areas. In the United States segregation was an important contributing cause of the foreclosure crisis, along with overbuilding, risky lending practices, lax regulation, and the bursting of the housing price bubble.

Four decades after the passage of the Fair Housing Act, residential segregation remains a key feature of America's urban landscape. Although levels of black segregation have moderated since the civil rights era, the declines have been concentrated in metropolitan areas with small black populations (Charles 2003). In areas with large African American communities—places such as New York, Chicago, Detroit, Atlanta, Houston, and Washington—the declines have been minimal or nonexistent (Iceland, Weinberg, and Steinmetz 2002). As a result, in 2000 a majority of black urban dwellers continued to live under conditions of hypersegregation (Massey 2004). At the same time, levels of Hispanic segregation have been rising, and during the 1990s Latinos in New York and Los Angeles joined African Americans among the ranks of the hypersegregated (Wilkes and Iceland 2004). Although much of the increase in Hispanic segregation stems from rapid population growth during a period of mass immigration, levels of anti-Latino prejudice and discrimination have also risen in recent years (Charles 2003; Ross and Turner 2005; Massey 2009). In addition, dark-skinned Latinos have long been known to experience higher levels of segregation than their light-skinned counterparts (Massey and Bitterman 1985; Denton and Massey 1989; Massey and Denton 1992).

During the 1990s, rates of subprime mortgage lending, home equity borrowing, and home ownership increased among minorities and in the context of high segregation many of the new borrowers were necessarily located in minority neighborhoods (Been, Ellen, and Madar 2009; Squires, Hyra, and Renner 2009). Williams et al (2005) estimate, for example, that subprime lending accounted for 43% of the increase in black home ownership during the 1990s and 33% of the growth in ownership within minority neighborhoods. As a result, when the housing bubble burst in 2007 and deflated in 2008 and 2009, the economic fallout was unevenly spread over the urban landscape (Immergluck 2008). Given that segregation concentrates the effects of any economic downturn spatially (Massey and Denton 1993), the rise in foreclosures hit black and Hispanic neighborhoods with particular force (Bromley et al 2008; Immergluck 2008; Schuetz, Been, and Ellen 2008; Hernández 2009).

Economic studies have generally concluded that leveraged refinancing, overbuilding, the collapse of home prices, and a poorly regulated mortgage market were primarily responsible for the remarkable rise in foreclosures across metropolitan areas (Doms et al 2007; Haughout et al 2008; Glaeser et al 2008; Gerardi et al 2009; Khandani, Lo, and Merton 2009). Here we argue that the foreclosure crisis also had significant racial dimensions. Although race has been considered as a factor in prior economic research, it was mainly to attribute intergroup disparities in defaults and foreclosures to the weaker economic position of minority group members. A careful reading of recent scholarship on segregation and mortgage lending reveals, however, that racial discrimination occurred at each step in the complex chain of events leading from loan origination to foreclosure (Stuart 2003; Williams, Nesiba, and McConnell 2005; Wily et al 2006; Bond and Williams 2007; Immergluck 2009). Specifically, ongoing residential segregation and a historical dearth of access to mortgage credit in American urban areas combined to create ideal conditions for predatory lending to poor minority group members in poor minority neighborhoods (Been et al 2009; Squires et al 2009), thus racializing the ensuing foreclosure crisis and focusing its negative consequences disproportionately on black borrowers and home owners (Oliver and Shapiro 2006; Wily 2006, 2009; Hernández 2009; Shapiro, Meschede, and Sullivan 2010).

SEGREGATION AND THE FORECLOSURE CRISIS

High levels of segregation create a natural market for subprime lending and cause riskier mortgages and thus foreclosures to accumulate disproportionately in minority neighborhoods within racially segregated metropolitan areas. Segregation by definition creates minority-dominant neighborhoods, which given the legacy of redlining and institutional discrimination, continue to be under-served by mainstream financial institutions (Ross and Yinger 2002; Renuart 2004). Moreover, those financial institutions that do exist in minority areas are likely to be predatory—pawn shops, payday lenders, and check cashing services that charge high fees and usurious rates of interest—so that minority group members are accustomed to exploitation and frequently unaware that better services are available elsewhere (Immergluck and Wiles 1999). Segregation also spatially concentrates the disadvantages associated with minority status, such as poverty and joblessness (Massey and Fischer 2000), so that when the economy stagnated families in minority neighborhoods were more likely than others to turn to home equity loans as a means of maintaining

consumption, thereby creating a ready demand for unscrupulous brokers to exploit (Sullivan, Warren, and Westbrook 2000).

Under conditions of high residential segregation, in other words, individual disadvantages associated with minority status are compounded in space and are amplified in markets that are necessarily organized geographically (Dymski and Veitch 1992; Immergluck 2008). By concentrating under-served, financially unsophisticated, needy minority group members who are used to exploitation in certain well-defined neighborhoods, segregation made it easy for brokers to target them for the marketing of subprime loans (Stuart 2003). Thus Avery, Brevoort, and Canner (2008) found that among mortgage lenders who went bankrupt in 2007, black borrowers who received loans in 2006 were three times more likely to receive a subprime than a prime loan (74% versus 26%) and Hispanics were twice as likely to receive a subprime than a prime loan (63% versus 37%). In contrast, whites were slightly *more likely* to get a prime than a subprime loan from the same lenders (46% versus 54%). Among those institutions that did not go bankrupt in 2007, blacks who borrowed in 2006 were just as likely to receive prime as subprime loans (51% versus 49%), underscoring the discriminatory nature of predatory lending practices in the United States.

Securitization and the Rewards to Risky Lending

Residential segregation has always created dense concentrations of potentially exploitable clients in need of capital, of course, but what changed in the 1990s was the attractiveness of such borrowers to mortgage lenders. Whereas before the 1980s lenders avoided inner city minority neighborhoods through a combination of fear, prejudice, and institutional discrimination (Squires 1994), the invention of securitized mortgages changed the calculus of mortgage lending and made minority households very desirable as clients. Indeed, the spread of mortgage-backed securities during the 1980s transformed home lending throughout the United States by splitting apart the origination, servicing, and selling of mortgages into discrete transactions that made it possible for banks to earn more money quickly by originating and selling loans than by lending money and collecting interest payments over time (Raynes and Rutledge 2003; Sowell 2009).

The advent of securitized mortgages transformed what had been a bank-based intermediary credit system into a securities-based market system (Dymski 2002) and in so doing the new financial instruments vastly expanded the pool of money available for lending. Under traditional systems of lending, the number of mortgages was limited by the amount of deposits that a bank had on hand to lend. Under the new system, the volume of mortgages was no longer limited by deposits, but by the number of potential borrowers and the willingness of investors to purchase mortgage-backed securities. The new arrangements thus created a demand on the part of banks to expand the pool of borrowers.

Securitized mortgages are not sold whole but pooled together and divided into different shares, or tranches, on the basis of risk (Raynes and Rutledge 2003). High interest mortgages pay more to investors, of course, but they also carry more risk and in order to manage the risk financial engineers combined different risk tranches into diversified bonds that could be sold on secondary markets. By mixing different tranches together, financiers were able create a salable security with almost any risk rating and interest rate they wished.

In theory, the risk of default by borrowers in high-risk tranches was offset by the surety of payments within low-risk tranches, thereby yielding a relatively safe investment that rating services beholden to the financiers were happy to affirm for a generous fee (Raynes and Rutledge 2003).

Because virtually any mortgage, however shaky, could be sold and repackaged as part of a collateralized debt obligation, risky borrowers who were formerly shunned by lenders suddenly became quite attractive. The resultant wave of predatory lending was spearheaded by independent mortgage brokers who did not bear the risk of their reckless lending practices. They simply generated mortgages and immediately sold them to banks and other financial institutions, which in turn capitalized the shaky subprime instruments as securities and sold them to third-party investors who ended up assuming the risk, typically in ways they neither appreciated nor understood (Engel and McCoy 2007; Peterson 2007). These lucrative subprime lending and securitization practices did not suddenly appear “at the fringes of finance,” but were fundamentally produced and legitimated by the financial industry using new, high-tech tools such as credit scoring, risk-based pricing, securitization, credit default swaps, and variable rate mortgages that appeared to be rational, scientific, and safe (Stuart 2003; Langley 2008, 2009).

How Segregation Shaped Unequal Lending

With the move to securitized lending, discrimination in real estate lending shifted from the outright denial of home loans to the systematic marketing of predatory loans to poor black and Hispanic households, which were easily found within segregated neighborhoods (Massey 2005a; Engel and McCoy 2008). Before the subprime boom, black borrowers were more likely to be denied loans overall, especially in white areas, whereas whites were denied loans in minority neighborhoods (Holloway 1998). Afterward, the underserved status of minority borrowers made them prime targets for subprime lenders who systematically targeted their communities for aggressive marketing campaigns (Dymski and Veitch 1992, Holloway 1998, Stuart 2003). Discriminatory real estate practices such as steering also prevented black and Latino homebuyers from accessing better housing and sounder loan products in affluent suburbs (Friedman and Squires 2005, Hanlon 2010) and channeled them instead into depressed inner ring suburbs that were undergoing sustained disinvestment (Hackworth 2007).

In a very real way, therefore, as Williams et al (2005) show, the old inequality in home lending made the new inequality possible by creating geographic concentrations of underserved, unsophisticated consumers that unscrupulous mortgage brokers could easily target and efficiently exploit (see also Lee 1999; Hernández 2009). One study of subprime borrowers in Los Angeles, Oakland, Sacramento, and San Diego found that African Americans were significantly more likely than whites (40% versus 24%) to report lender marketing efforts as the impetus for taking out a home equity loan (California Reinvestment Committee 2001). In the end, subprime lending not only saddled borrowers with onerous terms and unforeseen risks, but also reinforced existing patterns of racial segregation and deepened the black-white wealth gap (Friedman and Squires 2005; Williams et al 2005; Bond and Williams 2007).

In the new regime of racial inequality, African American and Latino homeowners bore a disproportionate share of costs stemming from the housing bubble. Compared to whites with similar credit profiles, down payment ratios, personal characteristics, and residential locations, African Americans were much more likely to receive subprime loans (Pennington-Cross et al 2000; Bocian et al 2006; Avery et al 2005, 2007). Moreover, after controlling for background factors, black and Hispanic homeowners were significantly more likely than whites to receive loans with unfavorable terms such as prepayment penalties (Farris and Richardson 2004; Squires 2004; Bocian et al 2006; Quercia et al 2007), higher cost ratios (Elliehausen et al 2008; LaCour-Little and Holmes 2008), and higher rate spreads (Bocian et al 2006). The racial gap in subprime lending holds across all income levels (Immergluck and Wiles 1999; Williams et al 2005; Bromley et al 2008) and, if anything, racial differentials in subprime lending appear to increase with income (Williams et al 2005, Institute on Race and Poverty 2009).

During the 1990s, in other words, the United States was increasingly characterized by a dual, racially segmented mortgage market, one that was structured both by the race of borrowers and the racial composition of neighborhoods (U.S. Department of Housing and Urban Development 2000; Stuart 2003; Apgar and Calder 2005). Controlling for neighborhood characteristics, the incidence of subprime lending was significantly greater for black and Hispanic borrowers (Calem et al 2004) as well as among people who had not gone to college (Manti et al 2004). As a result, from 1993 to 2000 the share of subprime mortgages going to households in minority neighborhoods rose from 2% to 18% (Williams et al 2005).

The rise of racially targeted subprime lending served to destabilize minority neighborhoods by increasing turnover (Gerardi and Willen 2008) and the destabilizing effects of subprime lending on homeownership did not remain confined to minority neighborhoods, but spilled over into adjacent white and mixed neighborhoods (Schuetz, Been and Ellen 2008). National evidence from a longitudinal study of homeowners from 1999 to 2005 shows that the racial gap in the homeownership exit rates widened in a way that cannot be explained by social, economic, and financial factors that historically have accounted for black-white differentials (Turner and Smith 2009). The coincidence of the peak in subprime lending with the inexplicable decline in the stability of black home ownership and exit rates together offer compelling evidence that segregation and the new face of unequal lending combined to further undermine black residential stability and erode any accumulated wealth (Shapiro et al 2010).

Race and the Housing Bust

From the lender's perspective, the new system worked well as long as real estate and lending markets remained liquid and housing prices continued to rise, and for a while minority ownership rates rose and everyone involved in securitized lending made good money—the broker who originated the loan, the lender who put up the money, the firm that packaged and underwrote the mortgage-backed security, the rating agency that affirmed its creditworthiness, and the company that insured the investments through novel instruments known as credit default swaps. In order to keep the system in operation and profits rolling

in, however, more borrowers constantly had to be found and housing prices need to continue rising. As the number of buyers increased and housing prices inflated, a speculative fever took hold (Shiller 2008; Andrews 2009). People began to finance home purchases on the assumption that home prices would rise indefinitely (Khandani et al 2009), buying properties with an interest-only loans, waiting for real estate prices to rise, and then “flipping” the properties to realize the capital gain. Research shows that minority-owned properties were more likely than others to be involved in loan flipping and equity stripping schemes (Immergluck and Wiles 1999).

As the market peaked after 2004, speculators, dubious lenders, negligent securities dealers, and compromised ratings firms increasingly focused on select few booming regional markets, such as Las Vegas, Phoenix, and South Florida, which appear to have played a large role in the final run-up in risky lending. At the height of the bubble, fraud may have been the rule rather than the exception. When Pendley et al (2007) analyzed a sample of delinquent subprime loans made in 2006, for example, they found widespread the “appearance of fraud or misrepresentation,” with two-thirds of stated owner occupied dwelling never actually being occupied, nearly half of all claims to first time ownerships not appearing valid, and average credit scores well above the national average. These findings suggest that the inflated housing bubble motivated sophisticated lenders, brokers, and buyers to engage in an unparalleled level of deceit.

As the market became fully saturated in 2006, housing prices ultimately stalled, foreclosures rose, and faith in mortgage backed securities evaporated, bringing down the entire system of collateralized debt obligations and taking much of the American economy with it (Shiller 2008; Khandani et al 2009). Ultimately, brokers, lenders, securitizers, and most of all, ratings agencies, failed to foresee the perils of “default correlation”, or the interrelated risks bound up in interconnected portfolios of troubled loans (Langley 2009). The utter collapse of subprime lending exposed the extremes of a pricing regime that assessed risks individually but not collectively, not accounting for the aggregate risk of ever-increasing subprime lending and securitization. Whereas less than 1% of mortgage loans were in foreclosure at the end of 2005, the rate more than quadrupled to more than 4.6% by the end of 2009. At the same time, the foreclosure rate on riskier subprime loans went from 3.3% in 2005 to 15.6% in 2009 (Mortgage Bankers Association 2006, 2010).

The resulting tidal wave of foreclosures was concentrated in areas that only a few years earlier had been primary targets for the marketing of subprime loans (Bond and Williams 2007, Edmiston 2009) and minority neighborhoods often bore the brunt of the foreclosures (Bromley et al 2008; Márquez 2008; Mallach 2009; Immergluck 2008; Edmiston 2009; Hernández 2009, Institute on Race and Poverty 2009). In the end, the housing boom and the immense profits it generated frequently came at the expense of poor minorities living in central cities and inner suburbs who were targeted by specialized mortgage brokers and affiliates of national banks and subjected to discriminatory lending practices (Peterson 2007; Engel and McCoy 2008; Been et al 2009; Squires et al 2009; Powell 2010).

That predatory lending and subsequent asset stripping were structured on the basis of race as well as class is suggested by two additional lines of research. First, contrary to conventional

wisdom, the housing crisis was not caused primarily by a decline in underwriting standards (Haughwout 2009; see also Khandani et al 2009). Bhardwaj and Sengupta (2009) show, for example, that average credit scores within the subprime loan sector actually increased in years prior to the housing bust and that most of the loans fell into the near-prime, low- or no-documentation “Alt-A” category rather than in more speculative B and C categories. Second, the crisis cannot be attributed to riskier lending engendered by the Community Reinvestment Act (CRA). Using a regression discontinuity design, Bhutta (2008) examined lending rates just below and above the CRA neighborhood income cutoff and found that whereas CRA oversight did increase lending in targeted areas, unregulated lending activity also increased substantially in the same places. Only 6% subprime loans were made to low income borrowers or those in neighborhoods subject to CRA oversight and that fewer than 2% of loans originated by unregulated independent mortgage brokers were CRA credit-eligible (Bhutta and Canner 2009).

Thus, although lending standards often left much to be desired, it appears that it was ongoing racial segregation, discriminatory lending, and an overheated housing market that combined to leave minority group members uniquely vulnerable to the housing bust. As Immergluck (2009) wryly notes, financial literacy and creditworthiness did not suddenly plummet on the eve of the crisis—home prices did. At the same time, although CRA regulations did stimulate lending to minority households in lower-income, the increase was not nearly enough to bring about the housing crisis (Park 2008, Bhutta and Canner 2009).

DATA SOURCES

From the above research, we conclude that residential segregation was significant in structuring how the rise of predatory lending and the consequent wave of foreclosures played out in the United States (Stuart 2003; Williams et al 2005; Wyly et al 2006, 2009; Bond and Williams 2007; Engel and McCoy 2008; Hernández 2009). We hypothesize, first, that segregation facilitated racially targeted subprime mortgage lending during the boom and, second, that it magnified the consequences of the housing crisis for blacks and Latinos by concentrating foreclosures in poor minority neighborhoods during the bust. To test these assertions, we draw on two principal sources of data. Our dependent variables are defined from data we obtained from RealtyTrac, the nation’s largest provider of foreclosure listings, from which we compute the number of properties with at least one foreclosure action in 2006, 2007, and 2008 in the nation’s 100 largest metropolitan statistical areas and divisions (MSAs), as defined in 2003. We then divided this figure by the number of housing units in 2006 to derive a foreclosure rate. For reasons unknown to us, the RealtyTrac database did not include tabulations for foreclosures in the Grand Rapids-Wyoming, MI MSA, and it substituted the Charleston-North Charleston, SC MSA instead. Over 77% of all foreclosure properties were located in this set of MSAs during the period under consideration. This sample is especially useful for making inferences about minorities in the U.S. because these 100 MSAs were home to over 75% of African Americans, nearly 80% of Hispanics, and 90% of Asians in 2000.

Our principal explanatory variables are measures of residential unevenness and spatial isolation for Hispanics, African Americans, and Asians computed across census tracts in the

top 100 metropolitan areas (see Iceland, Weinberg, and Steinmetz 2002). Unevenness was measured using the well-known index of dissimilarity and isolation was measured using the P^* within-group isolation index. The former gives the relative proportion of minority group members who would have to exchange tracts with majority group members to achieve an even residential distribution and the latter gives the proportion of own-group members in the tract inhabited by the average minority group member. Evenness and isolation are the two most important of the five dimensions of segregation identified by Massey and Denton (1988) and empirically account for most of the common variation (Massey, White, and Phua 1996).

Our analytic strategy is to regress the number and rate of foreclosures in MSAs on these two measures of segregation while holding constant the effect of metropolitan-level factors shown by prior research and theory to influence the odds of foreclosure. Our controls include standard census-based variables such as the 2008 MSA population and the racial and ethnic composition from 2000, as well as socioeconomic characteristics obtained from the 2005–2007 American Community Surveys, such as the percent of persons holding a college degree, median household income, percent of homeowners with a second mortgage, all defined as of 2006. We also include the median age of the MSA housing stock from the 2000 census of housing. From the Bureau of Labor Statistics we also obtained the 2006 unemployment rate and the 2000–2006 change in the rate of annual unemployment; and from Hirsch and MacPherson (2007) we obtained the share of the workforce that was unionized. In initial specifications of the model we also tested for the effects of the poverty rate, the share of female headed households, and per capita income, but these variables added nothing to the explanatory power of the models and were dropped from further consideration. The final models also include dummy variables to control for region and coastal location, and location along the Texas border with Mexico (the Rio Grande River).

In addition to these standard indicators, we included three specialized measures of conditions in metropolitan real estate markets that prior works have found to be important in explaining the foreclosure crisis. First, we constructed a measure of overbuilding by computing the ratio of 2000–2006 MSA housing starts to housing units in 2000, a procedure closely following that of Glaeser et al (2008). Second, we included the Wharton Residential Land Use Regulation Index as a measure of local land use planning regulation. This index was developed for different municipalities by Gyourko et al (2008) and following Rothwell and Massey (2009) we took the weighted average of the index for municipalities within each MSA that responded to Gyourko's survey. We then centered the distribution on the mean for the top 100 areas to yield a measure that controls for housing price premiums stemming from regulatory constraints on housing supply (Fischel 1990; Glaeser and Gyourko 2003, 2008; Glaeser et al 2008; Glaeser 2009). Finally, we also included a measure of the housing price boom in each MSA by using the Federal Housing Finance Agency's quarterly metropolitan area House Price Index (HPI), which is a weighted, repeat-sales index based on transactions involving single-family homes. We benchmarked the house price boom for each MSA by dividing annualized change in HPI from 2000 to 2006 by the annualized change in the two decades prior to 2000.

In addition to the foregoing indicators of economic conditions in metropolitan real estate markets, we also include MSA-level controls for the degree of subprime lending, the extent of CRA regulatory oversight, and average creditworthiness of borrowers. To assess the prevalence of subprime lending we computed the aggregate share of all loans originated in 2004, 2005, and 2006 that were subprime, drawing on data from the Federal Financial Institutions Examination Council (www.ffiec.gov/hmda). The FFIEC tabulates information that lending institutions must provide to the federal government under the Home Mortgage Disclosure Act (HMDA). These data cover more than 28 million loans originated during the peak years of the housing boom. Over 6.9 million, or nearly one in four, were subprime loans, meaning that the interest rate at origination exceeded that for a comparable U.S. Treasury security (e.g. a 30-year bond) by 3% or more. The latter is the cutoff for reporting the loan in the data files (rates of lower priced loans are intentionally left blank in fields) and is the definition of subprime lending used in other research (e.g. Bocian et al 2006, Been et al 2009, Squires et al 2009).¹

To measure the degree of regulatory oversight we also drew on 2004–2006 HMDA data and computed the weighted share (by dollar amount) of all 2004–2006 loans in each MSA that were originated by CRA-covered lending banking institutions (following Friedman and Squires 2005). In doing so, we use HMDA data on conventional loans (those not guaranteed by government) for the purchase of single-family properties (1–4 units) and took a 20% extract of the nearly 28 million mortgage loans originated in the top 100 metropolitan areas and computed the share of subprime loans going to borrowers. On average, less than two-thirds of total lending per MSA fell under the ambit of federal CRA regulation, but this share was noticeably lower, about half or less, in MSAs with elevated foreclosures such as Detroit, MI; Las Vegas, NV; and Bakersfield, CA, suggesting that greater CRA lending oversight acts to reduce foreclosures even as it makes more loans available to minority group members (Friedman and Squires 2005, Bond and Williams 2007).

Finally, to control for the creditworthiness of borrowers we compute the average consumer credit score at the MSA level using information obtained from the Experian National Score Index®, which ranges from 672 to 720 for the top 100 MSAs and constitutes the mean FICO (Fair Isaac Corporation) credit score for all consumers living in all counties of each MSA whose credit behavior is reported to Experian, one of the nation's three major credit reporting bureaus. We expect that higher overall MSA credit scores will be associated with lower foreclosure rates because of the higher aggregate creditworthiness of borrowers, and by extension, mortgage holders. We include this variable to proxy for differences in credit history and access that co-vary with racial composition and segregation in order to mitigate omitted variables bias.

Means and standard deviations of the foregoing variables are presented in Table 1. In terms of our leading explanatory variable, levels of segregation are highest for African Americans and lowest for Asians with Hispanics in-between. The index of dissimilarity, for example,

¹The 2004 HMDA data are the first year that such subprime loan pricing data were made available. Comparing extremes in our data, about 40% of all 2004–2006 loans were subprime in the Detroit-Livonia-Dearborn, MI Metro Division and the Miami-Miami Beach-Kendall, FL Metro Division, but less than 10% in the San Francisco-San Mateo-Redwood City, CA Metro Division.

averaged 0.59 for blacks with a range plus or minus two standard deviations that went from 0.34 to 0.83. By convention, dissimilarities below 0.3 are considered low, those from 0.3 to 0.6 are considered moderate, and those above 0.6 are regarded as high, with anything above 0.75 being considered extremely high. By these criteria, black segregation runs from moderate to extremely high. In contrast, the comparable range for Asians was from 0.25 to 0.52 with a mean of 0.39 and that for Hispanics was 0.24 to 0.67 with a mean of 0.46. Thus Asians ranged from low to moderate and Hispanics from low to high.

Similar patterns prevail with respect to the isolation index. Whereas the black isolation index averaged 0.45 and ranged from 0.07 to 0.84 from minus to plus two standard deviations, the Hispanic index averaged 0.32 and ranged from zero to 0.75 while the Asian mean stood at a very low 0.14 and ranged from zero to 0.40. If segregation creates a natural niche for subprime lending, then the more extreme maxima and greater variability of black segregation measures hold by far the greatest potential to predict foreclosures, followed by Hispanic segregation measures. The generally low averages and restricted variation of isolation and dissimilarity among Asians alone suggest a more limited potential to influence inter-metropolitan variation in foreclosures.

The effect of segregation in creating fertile terrain for subprime lending depends not only on segregation, however, but also on a group's socioeconomic status. This generalization holds because segregation not only concentrates minority group members spatially within particular neighborhoods; it also concentrates any characteristic associated with minority group status (Massey and Denton 1993; Massey and Fischer 1999). For underprivileged minorities segregation spatially thus concentrates poverty and its correlates to create areas of concentrated disadvantage that constitute prime targets for subprime lending. For privileged minorities, however, segregation has the opposite effect—concentrating advantage and its correlates to produce areas that are unlikely targets for subprime lending. As of 2008, the poverty rate for Asians stood at 12%, compared with 25% among African Americans and 23% among Hispanics (DeNavas-Walt, Proctor, and Smith 2009). Likewise, the median per capita income for Asians was \$30,000 compared with just \$18,000 for African Americans and \$16,000 for Hispanics. The Asian median income even exceeded that for non-Hispanic whites (\$28,500). To the extent that segregation has an effect on the economic geography of Asians, therefore, it would be to concentrate advantage and thus diminish the frequency of subprime lending and, hence, foreclosures.²

EFFECT OF SEGREGATION ON FORECLOSURES

Despite the persistence of residential segregation and its prevalence in areas with large minority populations, racial segregation is no longer as universal across American urban areas as it once was. As indicated by the wide variance just described, there is now considerable variation across metropolitan areas in the degree of black and Hispanic segregation (Iceland, Weinberg, and Steinmetz 2002; Charles 2003; Massey, Rothwell, and Domina 2009). In addition to a small minority proportion, other characteristics that predict

²Asian Americans are also clustered in MSAs with either very high (coastal California, New York, Hawaii) or remarkably affordable (Texas) home prices that forestalled somewhat the rise of subprime lending.

lower levels of residential segregation are a small urban population, a newer housing stock, the presence of a college or university, proximity to a military base, higher socioeconomic status, and location in the west or southwest (Farley and Frey 1994). Interurban differentials in Hispanic and black segregation thus carry the potential to contribute significantly to variation in foreclosure rates across U.S. metropolitan areas.

To assess the effect of segregation on foreclosures, we estimated a simple OLS multiple regression model defined by the equation:

$$F = \alpha + \beta_1 S + \beta_2 Z + \varepsilon \quad (1)$$

where F represents either the log of the total number of foreclosure filings or the log of foreclosures per housing unit, α is the intercept, S is a vector of segregation measures with associated coefficients β_1 , and Z is a vector of control variables with associated coefficients β_2 , and ε is the heteroscedastic error term. Table 2 presents estimates of equations that use dissimilarity and isolation indices to predict the log of total foreclosures by MSA and Table 3 shows estimates that predict the log of the foreclosure rate by MSA.

In both tables the models fit the data extremely well, with the predictor variables explaining on average 77% of the variance in the foreclosure rate and 90% of the variance in the absolute number of foreclosures. Moreover, coefficients for the segregation indices closely follow theoretical expectations. Whether measured in terms of residential dissimilarity or spatial isolation, the segregation of African Americans is a powerful and highly significant predictor of the number and rate of foreclosures across U.S. metropolitan areas. For instance, a 0.1 unit increase in black dissimilarity is associated with 37% more foreclosure actions and a 34% increase in the foreclosure rate. Inter-metropolitan variation in the segregation of Hispanics, does not consistently affect the rate and absolute number of foreclosures, however. As discussed in the next section, the effect of Hispanic segregation may be overwhelmed by the effect of black segregation. These statistical estimates are consistent with the findings of Been et al (2009) and Squires et al (2009).

In contrast, Asian Asian-white residential dissimilarity significantly *reduces* the number and rate of foreclosures across metropolitan areas, and spatial isolation also has a negative, though insignificant effect. Residential segregation acts to concentrate group characteristics in space, whatever they are. In the case of blacks, the prevailing characteristics are poverty and socioeconomic deprivation, but in the case of Asians they are affluence and socioeconomic privilege, given that Asian incomes exceed those of whites, on average. By concentration affluence, the segregation of Asians creates communities that are inherently resistant to the entreaties of subprime lenders—hence the negative relationship between Asian segregation and foreclosures.

The various control variables generally function as expected, thus lending face validity to the equation estimates. As predicted, foreclosures are positively predicted by greater housing start shares, higher rates of subprime lending, increasing unemployment, rising home prices, lower credit scores, more second mortgages, higher median incomes, greater levels of land use regulation, and location in the Midwest and West.³ If we assume that the housing start ratio measures overbuilding and rising relative home prices capture the housing bubble, then

our results are consistent with prior work on the economic causes of the U.S. foreclosure crisis (e.g. National Association of Realtors 2004; Glaser et al 2008; Haughwout et al 2008; Kochhar 2009; Immergluck 2009; Mayer et al 2009).

What our study adds to understanding of the foreclosure crisis is the important and independent role played by racial segregation in structuring the housing bust. Table 4 indicates the relative predictive power of segregation compared to other significant factors by reporting the standardized effect sizes evaluated at the sample mean of the foreclosure total and rate (in terms of number of foreclosures and percentage points, respectively). In the model using dissimilarity indexes, a standard deviation increase in the segregation of African Americans increases the number of foreclosures by 15,028 actions and the rate by 1.68 percentage points. This effect exceeds the effect of MSA home building and house price booms, and all other important explanatory variables. Changes in the proxy measures of economic conditions, land use restrictions, and overbuilding exert a considerably smaller impact on foreclosures, with absolute standard effect sizes just 40% to 56% of that for black segregation.

Again in the isolation model, one standard deviation in black segregation leads to a large change in foreclosures, 13,842, and the foreclosure rate, 1.58 percentage points. Standardized changes in the subprime lending share imply an increase of nearly 8,500 foreclosures and an even greater effect on foreclosure rates, at 1.1 percentage points. Relative changes in house prices and housing starts, average credit scores, and changes in unemployment rates imply an increase of 7,000 to 8,000 foreclosures and 0.8 to 0.9 percentage points in the foreclosure rate. While the effect size of Hispanic segregation in the dissimilarity model is not statistically distinguishable from zero, Hispanic isolation has a standardized effect of over 3,800 foreclosures and a 0.66 percentage point increase in the foreclosure rate.

FORECLOSURES AND THE SEGREGATION-SUBPRIME LINK

Taking into account the distribution of effect sizes estimated in Table 4, we conclude that the influence of black residential segregation clearly exceeds that of other factors that earlier studies have linked inter-metropolitan variation in foreclosures, and that racial segregation thus represents an important and hitherto unappreciated contributing cause of the current foreclosure crisis. This conclusion rests, of course, on a cross-sectional ecological regression and thus may be subject to certain methodological criticisms. Since we are not seeking to infer individual behavior from aggregate data, ecological bias itself is not an issue—our argument is structural and specified at the metropolitan and not the individual level.

As with any cross-sectional analysis, however, endogeneity or reverse causality is a potential problem. In this case, it does not seem likely that foreclosures could reasonably cause segregation. Patterns of racial segregation are the cumulative product of decades of actions in the public and private sphere, and high levels of black segregation were well institutionalized in U.S. urban areas by the mid-20th century (Massey and Denton 1993). In

³The share of lending made by CRA-covered banks is negative, as predicted, and is insignificant only in the presence of the subprime lending share since (the two variables are significantly negatively correlated, $r=-0.31$, $p<0.01$).

addition, we measure segregation as of 2000 and foreclosures as of 2006–2008 so in the present instance the independent variable is temporally prior to the dependent variable.

A more serious threat to causal inference is endogeneity. Perhaps there is a third, unmeasured variable that influences both segregation and foreclosures to bring about the observed association between them. Although we have endeavored to apply a rather exhaustive set of controls it is simply not possible to control for all potential confounding variables. One possible confounding variable is the degree of anti-black prejudice and discrimination, which could well vary across metropolitan areas and simultaneously increase both segregation and the extent of racially targeted subprime lending, and thus the number and rate of foreclosures. Indeed, Galster (1986) and Galster and Keeney (1988) show that discrimination in lending had a strong effect on racial segregation across 40 MSAs in the 1970s and 1980s.

The relationship between segregation and foreclosures can be purged of endogeneity using two stage least squares, of course, but only if a suitable instrument is available. Since we argue here that segregation facilitates subprime lending to African Americans, we should be able use inter-metropolitan variation in the *size* of racial differentials in subprime lending to isolate the causal effect of segregation. Specifically, if our argument is correct, then intergroup differentials in subprime lending offer a suitable instrument to predict segregation in a two-stage least squares model of foreclosures. Although simple logic predicts a strong relationship between the overall prevalence of subprime lending and foreclosures, there is no a priori reason to believe that the black-white or Hispanic-white gap in the extent of subprime lending will affect these outcomes; but according to our argument it should clearly be causally related to the degree of black segregation.

In a preliminary examination of the data we indeed found that inter-metropolitan variation in the size of the racial gap in subprime lending was strongly correlated with segregation but uncorrelated with either the rate or number of foreclosures, confirming its suitability as an instrument. According to Angrist and Krueger (2001:73), “a good instrument is correlated with the endogenous regressor for reasons the researcher can verify and explain, but uncorrelated with the outcome variable for reasons beyond its effect on the endogenous regressor.” We computed intergroup differentials in subprime lending by metropolitan area using the combined HMDA data from 2004, 2005, and 2006 described earlier in the data sources section. If lending discrimination is greater in more segregated MSAs, then racial-ethnic differentials in subprime lending permit us to identify the causal effect of residential segregation on MSA foreclosure rates, enabling us to specify the following two-stage model:

$$S = \eta + \delta RACEDIFF + W\lambda + \nu \quad (2)$$

$$F = \alpha + (\eta + RACEDIFF\delta + W\lambda + \nu)\beta_1 + Z\beta_2 + \varepsilon. \quad (3)$$

In this system, equation (2) expresses the first-stage relationship between segregation, S , and $RACEDIFF$, the black-white or Hispanic-white gap in the likelihood of obtaining a subprime loan in 2006. In this equation, δ is the coefficient associated with this variable, W is a vector of controls including percent black, percent Hispanic, and percent Asian, λ is a vector of

coefficients associated with these variables, and v is the error term. Equation (3) simply substitutes the value of segregation predicted from this first-stage equation into equation (1) to yield a second-stage equation that expresses foreclosures as a function of the segregation instrument plus the variables in Z ; β_1 and β_2 are then re-estimated in the second-stage equation, along with ε .

In order to generate a more refined measure of lending discrimination to use as our instrument, we estimated black-white and Hispanic-white differentials in the likelihood of receiving a subprime loan after adjusting for borrower and neighborhood characteristics reported in the HMDA data. That is, using an extract of 5,360,007 HMDA loan-level records with non-missing data we predicted *RACEDIFF* for each MSA using a probit model where the dependent variable was dichotomous indicator equal to one if the loan was flagged as subprime in the data by a non-missing interest rate greater than or equal to 3%. The probit model expressed the likelihood of receiving a subprime loan as a function of the type (home purchase, refinance, or improvement) and amount of the loan, borrower income, first or second lien status, occupancy (investor or owner), type of loan purchaser (government agency, private, bank, finance company, lender affiliate, or other independent entity), the median tract income and tract-to-MSA ratio, the ratio of total tract single family units to population, and the tract minority percentage.

We also merged the following extended control variables to the foregoing data computed from the HMDA data: the tract population density in persons per square mile, the median of age of the tract housing stock, and the MSA-level average credit score index described previously. The probit estimation clustered the errors at the MSA level. Avery et al (2005) have shown HMDA data file variables explain nearly half (48%) of the black-white gap in subprime lending whereas credit factors such as FICO scores, loan-to-value ratios, and interest rate type account only for an additional one-sixth (17%) of the observed gap. We recognize the limitations of ecological data at the tract and MSA-level and believe our proxies for credit factors in the probit equation adequately reduce potential bias in our estimates.

For each MSA, we averaged the group likelihood of receiving a subprime loan for 2004–2006 by summing the predicted probability by race and ethnicity across all loans and then dividing by the total number of loans to each borrower race/ethnic group (i.e., non-Hispanic white, non-Hispanic black, and Hispanic). We then calculated the black-minus-white and Hispanic-minus-white differences in regression-adjusted predicted subprime lending probabilities for each and every one of the 100 MSAs. The black-white differential had a mean of 11.8% (s.d. 4.3%) and ranged from 2.3% to 24.0%; the Hispanic-white differential was also always positive, with a mean of 8.1% (s.d. 3.8%) and a range of 1.4% to 1.7%. We merged these two differential variables to the main data file.

We used the regression-adjusted black-white and Hispanic-white differentials in subprime lending by MSA to predict the segregation instrument inserted into the second stage equation. In Table 5 we report OLS and 2SLS estimates of the effect of black and Hispanic segregation on the rate of foreclosures for the top 100 MSAs, excluding Honolulu, HI as we have in our main analysis. Again, the model includes the same covariates as in Table 1

except log of population, the level of unemployment, the Rio Grande border dummy, and the age of the housing stock.⁴

As can be seen, the estimated OLS coefficient in the first column for black segregation is highly significant and at 3.84 comparable to that in our initial model (see Table 2), suggesting that a 0.10-point rise in black segregation is associated with a 38% increase in the foreclosure rate. In contrast, the instrumental variable estimate of the coefficient is 4.64. This coefficient is estimated quite precisely and attains significance at the 0.001 level. Its higher point estimate implies that a 0.10-point increase in black segregation is associated with a 46% increase in the foreclosure rate. While this effect is not statistically different from the OLS effect due to overlapping confidence intervals, its higher value offers more evidence that segregation indeed has a causal effect on the MSA foreclosure rate by producing racial differentials in subprime lending.

The test statistics for endogeneity indicate that the racial differential instrument is indeed exogenous, a conclusion that is corroborated by the fact that it is uncorrelated with the residuals of the reduced form model in equation (3). The percent of the MSA population that is black has no impact whatsoever on our segregation estimates and a much smaller offsetting impact on the rate of foreclosures. This auxiliary finding underscores our contention that racial concentration in space, and not race alone, is a significant structural cause of the current foreclosure crisis.

Likewise, the coefficient for Hispanic segregation is initially insignificant with a coefficient of 0.81 when estimated using OLS but using indirect least squares the value rises to 1.12, which is nearly statistically significant ($p=0.15$ using a two-tailed test and $p=0.08$ under a one-tailed test). A 0.10-point increase in Hispanic dissimilarity is estimated to have a result in a 11% increase under IV estimation, indicating that unexplained Hispanic-white differences in subprime loan usage begin to augment our understanding of the effect of Latino segregation on metropolitan-level foreclosures.⁵ We note also that the OLS and IV models yield similar coefficient estimates for the effect of economic trends, housing market conditions, land use regulation, region, and other controls, suggesting that segregation contributes to explaining variation in the foreclosure rate above and beyond the standard indicators heretofore employed in analytic models.

CONCLUSION

The foregoing analyses provide strong empirical support for the hypothesis that residential segregation constitutes an important contributing cause of the current foreclosure crisis, that its effect is independent of other economic causes of the crisis, and that its explanatory

⁴Additionally, in the Hispanic segregation models, black segregation is omitted.

⁵To estimate the potential effects of Hispanic segregation, we have undertaken a separate analysis among the nation's largest state, California, where Hispanics are numerous and blacks are much fewer. In our analysis of California foreclosures at the city- and county-level that control for a much more extensive array of loan underwriting factors such as weighted loan-to-value ratios, average credit scores, and interest rates and matched city-level home price trends, we have estimated a significant, robust effect of Hispanic segregation. Thus, notwithstanding the incredible boom and bust in places like the Central Valley and Inland Empire, the residential segregation of Latinos matters a great deal to local differences in foreclosure trends. These results support our proposition about the primacy of segregation in structuring the foreclosure crisis, and do not bode well for housing market fortunes of the Hispanics, who became the largest minority group during the housing boom.

power exceeds that of other factors hitherto identified as key causes, such as overbuilding, excessive subprime lending, housing price inflation, and the failure of lenders adequately to evaluate the creditworthiness of borrowers. Simply put, the greater the degree of Hispanic and especially black segregation a metropolitan area exhibits, the higher the number and rate of foreclosures it experiences; and neither the number nor the rate of foreclosures is in any way related to expanded lending to minority home owners as a result of the Community Reinvestment Act.

The confluence of low interest rates, unparalleled levels of equity extraction via refinancing, and the bust of the housing bubble may have combined with overbuilding and lax regulation to make the foreclosure crisis possible (Glaeser 2009; Khandani et al 2009). However, we have added a crucial addition to our understanding of both the causes and the consequences of the foreclosure crisis by demonstrating the key role of residential segregation in shaping how the crisis played out. By concentrating foreclosures in metropolitan areas with large racial differentials in subprime lending, segregation structured the causes of the crisis, as well as the geographic and social *distribution* of its costs, on the basis of race. In the United States, segregation both racialized and intensified the consequences of the housing bubble relative to other countries. Hispanic and black home owners, not to mention entire Hispanic and black neighborhoods, ended up bearing the brunt of the foreclosure crisis and this outcome was not simply a result of neutral market forces, but was structured on the basis of race and ethnicity though the social fact of residential segregation.

Ultimately, this racialization of America's foreclosure crisis occurred because of a systematic failure to enforce basic civil rights laws in the United States. Discriminatory subprime lending is simply the latest in a long line of illegal practices that have been foisted on minorities in the United States (Satter 2009), and is all the more shocking because it was well-known and documented long before the housing bubble burst (e.g., U.S. Department of Housing and Urban Development 2000; Stuart 2003; Squires 2004; Williams et al 2005). In addition to tighter regulation of lending, rating, and securitization practices, therefore, greater civil rights enforcement has an important role to play in cleaning up American markets.

It is thus very much in the interest of the nation that federal authorities take stronger and more energetic steps to rid U.S. real estate and lending markets of discrimination, not simply to promote a more integrated and just society but to avoid future catastrophic financial losses. Racial discrimination is easily detected through a methodology known as the audit study, in which trained testers identifiable as black or white are sent into markets to seek out proffered goods and services. What happens to black and white testers over a number of trials is compiled and compared to discern systematic differences in treatment (Yinger 1986; Fix and Struyk 1993). Numerous audit studies have been done to document the persistence of anti-black discrimination not only in markets for real estate (Yinger 1995; Zhao, Ondrich, and Yinger 2006) and credit (Squires 1994; Ross and Yinger 2002), but also in markets for jobs (Turner, Fix, and Struyk 1991; Bertrand and Mullainathan 2004; Pager 2007), goods (Ayers and Siegelman 1995), and services (Ridley, Bayton, and Outtuz 1989; Feagin and Sikes 1994). Nonetheless, the discrimination continues.

A key goal in expanding civil rights enforcement should therefore be to create federal programs to monitor levels of discrimination in key U.S. markets and take remedial action on a routine basis. If a society uses markets to allocate production, distribute goods and services, generate wealth, and produce income, then it is incumbent upon government to ensure that all citizens have the right to compete freely in all markets (Massey 2005b). In a market society, lack of access to markets translates directly into a lack of equal access to material well-being and ultimately into socioeconomic inequality (Massey 2007).

Unfortunately, in order to secure passage of the Civil Rights Acts of 1964, 1968, 1974, and 1977 and avoid a southern filibuster, most of the enforcement mechanisms included in the original legislation were stripped away and the federal government was largely prohibited from playing an active role either in uncovering discrimination or instigating actions to sanction those who practice it. The existing body of civil rights law thus needs to be updated to establish within the U.S. Departments of Treasury, Labor, Commerce, and Housing and Urban Development permanent offices authorized to conduct regular audits in markets for jobs, goods, services, credit, and housing based on representative samples of market providers, both for purposes of enforcement and to measure progress in the elimination of discrimination from American markets.

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Table 1

Summary Statistics for Data Used in Analysis of Foreclosures in Top 100 MSAs.

Variables	Mean	Standard Deviation
Outcome Measures		
Foreclosures 2006–2008	33,633	38,710
Foreclosure Rate (per 100)	4.10	3.03
Index of Dissimilarity		
African Americans	0.587	0.121
Hispanics	0.455	0.108
Asians	0.385	0.068
P* Isolation Index		
African Americans	0.453	0.193
Hispanics	0.317	0.215
Asians	0.137	0.133
Control Variables		
Ratio of 2000–2006 Housing Starts to 2000 Units	0.12	0.07
Wharton Land Use Regulation Index	0.00	0.76
Relative Change in Housing Price Index after 2000	4.07	2.53
% Subprime Loans, HMDA (2004–2006)	24.23	5.82
% Loans Made by CRA-covered Lenders (2004–2006)	64.73	6.80
Experian MSA Credit Score Index	691.6	14.26
Population (2008)	1,891,540	1,787,775
% Persons 25+ with College Degree (2006)	29.47	6.78
% African American (2000)	13.59	9.62
% Hispanic (2000)	13.29	15.87
% Asian (2000)	4.83	7.29
Median Household Income (2006)	54,697	10,821
% Homeowners with Second Mortgage (2006)	7.35	2.15
% Workforce Unionized (2006)	12.08	6.59
Unemployment Rate (2006)	4.60	1.02
Change in Unemployment Rate 2000–2006	0.76	1.03
Median Age of Housing Stock, Years (2000)	31.31	9.37
Region		
Northeast	0.23	0.42
Midwest	0.18	0.39
South	0.37	0.49
West	0.22	0.42
Costal MSA	0.38	0.49
Borders Rio Grande	0.02	0.14
N	100	

Note: See text for data sources.

Table 2

OLS Estimates of Effect of Selected Measures of Residential Segregation on Log of Total Foreclosures

Variables	<u>Dissimilarity Index</u>		<u>Isolation Index</u>	
	B	SE	B	SE
Index of Segregation				
African Americans	3.72***	0.72	2.12***	0.62
Hispanics	-0.77	0.60	0.08	0.66
Asians	-2.08**	0.92	-2.16	1.64
Control Variables				
Housing Starts Ratio	2.98***	0.96	3.07***	1.08
Wharton Land Use Index	0.25***	0.08	0.27***	0.10
Change in Housing Price Index	0.08***	0.02	0.09***	0.03
CRA-covered Lending Share	-1.30	0.91	-0.81	1.06
Subprime Loan Share	3.02**	1.35	4.31***	1.58
MSA Credit Score Index	-0.02**	0.01	-0.02**	0.01
Log of Population	1.01***	0.09	1.01***	0.09
% with College Degree	-1.34	1.31	-1.00	1.46
Log Median Household Income	0.25	0.51	0.34	0.51
% with Second Mortgage	0.75	3.69	0.22	4.35
% Workforce Unionized	-0.03***	0.01	-0.02**	0.01
Unemployment Rate	-0.01	0.06	0.01	0.07
Change in Unemployment Rate	0.25***	0.05	0.21***	0.06
Age of Housing Stock	0.004	0.01	0.01	0.01
Region				
Midwest	0.43**	0.20	0.63***	0.20
South	0.04	0.26	0.08	0.30
West	0.46	0.38	0.68	0.44
Coastal MSA	-0.05	0.12	0.07	0.13
Borders Rio Grande	-1.03***	0.37	-1.05***	0.38
Constant	1.96	7.56	0.98	8.15
R ²	0.91		0.90***	
N	99		99	
Joint F-Test for Region	3.35**		7.97***	
Joint F-Test for Segregation	10.48***		6.28***	

Note: Robust standard errors. Model also includes % Black, % Hispanic, and % Asian.

*
 $p < .10$ **
 $p < .05$ ***
 $p < .01$

Table 3

OLS Estimates of Effect of Selected Measures of Residential Segregation on the Log of the Foreclosure Rate

Variables	<u>Dissimilarity Index</u>		<u>Isolation Index</u>	
	B	SE	B	SE
Index of Segregation				
African Americans	3.41***	0.72	1.99***	0.60
Hispanics	-0.69	0.58	0.07	0.64
Asians	-1.76*	0.91	-1.57	1.56
Control Variables				
Housing Starts Ratio	2.87***	0.95	2.97***	1.03
Wharton Land Use Index	0.24***	0.08	0.26***	0.09
Change in Housing Price Index	0.07***	0.02	0.07***	0.03
CRA-covered Lending Share	-1.32	0.90	-0.85	1.02
Subprime Loan Share	2.88**	1.34	4.56***	1.55
MSA Credit Score Index	-0.01*	0.01	-0.01**	0.01
Log of Population	0.01	0.09	0.01	0.09
% with College Degree	-1.74	1.29	-1.42	1.41
Log Median Household Income	0.75	0.49	0.86*	0.50
% with Second Mortgage	1.47	3.64	0.70	4.19
% Workforce Unionized	-0.03**	0.01	-0.02**	0.01
Unemployment Rate	0.02	0.06	0.03	0.07
Change in Unemployment Rate	0.22***	0.05	0.20***	0.06
Age of Housing Stock	0.003	0.01	0.01	0.01
Region				
Midwest	0.41**	0.19	0.58***	0.19
South	0.03	0.25	0.07	0.29
West	0.45	0.37	0.66	0.42
Coastal MSA	-0.08	0.12	0.02	0.13
Borders Rio Grande	-1.04**	0.39	-1.04**	0.39
Constant	1.12	7.44	0.10	8.01
R ²	0.78		0.76***	
N	99		99	
Joint F-Test for Region	3.17**		7.44***	
Joint F-Test for Segregation	8.71***		5.62***	

Note: Robust standard errors. Model also includes % Black, % Hispanic, and % Asian.

*
 $p < .10$ **
 $p < .05$ ***
 $p < .01$

Table 4

Effect of a One Standard Deviation Increase in Selected Variables on the Number and Rate of Foreclosures.

Effect of 1 SD Increase in:	Number of Foreclosure (Mean: 33,947)	Foreclosures Rate (Mean: 4.1%)
Dissimilarity Model		
Black Dissimilarity Index	15,028	1.68
Hispanic Dissimilarity Index	n.s.	n.s.
Asian Dissimilarity Index	-4,830	-0.50
Housing Starts Ratio	7,392	0.87
Wharton Land Use Index	6,208	0.71
Ratio of post- to pre-2000 HPI	7,094	0.76
Subprime Loan Share	5,944	0.87
MSA Credit Score Index	-7,301	-0.82
Change in Unemployment Rate	8,383	0.93
Isolation Model		
Black Isolation Index	13,842	1.58
Hispanic Isolation Index	n.s.	n.s.
Asian Isolation Index	n.s.	n.s.
Housing Starts Ratio	7,615	0.90
Wharton Land Use Index	6,767	0.78
Ratio of post- to pre-2000 HPI	7,939	0.84
Subprime Loan Share	8,477	1.09
MSA Credit Score Index	-7,817	-0.88
Change in Unemployment Rate	7,276	0.83
N=99		

Note: Effect on foreclosure rate shown in percentage points.

Table 5

Estimates of the Effect of Residential Segregation on 2006–2008 Foreclosure Rates via Black-white and Hispanic-White Adjusted Differentials in the Likelihood of Obtaining a Subprime Loan in 2004–2006.

	Black Segregation				Hispanic Segregation			
	OLS		IV		OLS		IV	
	B	SE	B	SE	B	SE	B	SE
Dissimilarity Index								
African Americans	3.84***	0.63	4.64***	0.89	0.81	0.66	1.12†	0.79
Hispanics								
Selected Control Variables								
Housing Starts Ratio	2.58***	0.77	2.73***	0.71	1.87**	0.94	1.90**	0.83
Ratio of pre- to post-2000 HPI	0.09***	0.02	0.08***	0.02	0.10***	0.03	0.10***	0.03
Wharton Land Use Index	0.22**	0.08	0.23***	0.08	0.18**	0.09	0.18**	0.08
Subprime Loan Share, 2004–06	2.57*	1.40	2.09††	1.29	4.89***	1.89	4.96***	1.65
MSA Credit Score Index	-0.015**	0.007	-0.015***	0.006	-0.014*	0.008	-0.014*	0.007
Change in Unemployment Rate	0.24***	0.04	0.25***	0.04	0.20***	0.06	0.20***	0.05
% Black, 2000	-1.65***	0.69	-1.85***	0.60	-0.80	0.91	-0.88	0.81
% Hispanic, 2000	-0.75	0.54	-0.64	0.49	-1.31	0.74	-1.44**	0.70
% College Degree, 2006	-1.96*	1.16	-2.27**	1.15	-0.48	1.70	-0.45	1.52
Region								
Midwest	0.39**	0.19	0.30*	0.15	0.81***	0.21	0.84***	0.20
South	-0.07	0.22	-0.01	0.19	0.01	0.29	0.06	0.28
West	0.50	0.33	0.53*	0.29	0.38	0.40	0.42	0.37
R^2	0.77		0.76		0.65		0.65	
F	27.40		10.65					
Wald χ^2			534.72				257.27	
[F , 2SLS 1 st stage]			[38.89]				[27.08]	

Tests of Endogeneity (Null: Instrument is Exogenous)

	<i>Black Segregation</i>				<i>Hispanic Segregation</i>			
	OLS		IV		OLS		IV	
	B	SE	B	SE	B	SE	B	SE
Robust χ^2 (p-value)			1.18 (0.27)				0.45 (0.50)	
Robust F (p-value)			0.99 (0.32)				0.35 (0.56)	
Covariance (Instrument, ε_{IV})			-0.00001				-0.00041	
N	99		99		99		99	

Ordinary Least Squares (OLS) and Indirect Least Squares or Instrumental Variables (IV) estimates with robust standard errors. Additional covariates included in model but not shown here are listed in Table 2 excluding log of 2008 population, 2006 unemployment rate, borders Rio Grande, age of housing stock. See text for detailed description of adjusted racial and ethnic differences in subprime lending instrument.

† $p=.15$
 †† $p=.11$
 * $p<.10$
 ** $p<.05$
 *** $p<.01$