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Neighborhood Foreclosures, Racial/Ethnic Transitions, and Residential Segregation

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Abstract

In this article, we use data on virtually all foreclosure events between 2005 and 2009 to calculate neighborhood foreclosure rates for nearly all block groups in the United States to assess the impact of housing foreclosures on neighborhood racial/ethnic change and on broader patterns of racial residential segregation. We find that the foreclosure crisis was patterned strongly along racial lines: black, Latino, and racially integrated neighborhoods had exceptionally high foreclosure rates. Multilevel models of racial/ethnic change reveal that foreclosure concentrations were linked to declining shares of whites and expanding shares of black and Latino residents. Results further suggest that these compositional shifts were driven by both white population loss and minority growth, especially from racially mixed settings with high foreclosure rates. To explore the impact of these racially selective migration streams on patterns of residential segregation, we simulate racial segregation assuming that foreclosure rates remained at their 2005 levels throughout the crisis period. Our simulations suggest that the foreclosure crisis increased racial segregation between blacks and whites by 1.1 dissimilarity points, and between Latinos and whites by 2.2 dissimilarity points.

Keywords

housing foreclosures; subprime lending; segregation; racial/ethnic inequality

Racial residential segregation has been a defining characteristic of U.S. cities for nearly a century and has played a prominent role in driving and maintaining racial/ethnic inequality. Since 1960, however, increasing numbers of stably integrated neighborhoods and substantial reductions in average levels of residential segregation, especially between blacks and whites, have led some people to conclude that segregation is no longer a significant social problem (Glaeser and Vigdor 2012). While the broad trend in segregation is encouraging, the pace of decline is considerably uneven across U.S. cities, with some areas experiencing large declines, others seeing little or no change, and some experiencing increasing segregation. Perhaps most important, segregation has been most persistent in areas with the largest minority populations, with black-white segregation remaining largely unchanged in cities

such as Detroit, Milwaukee, and New York (Iceland, Sharp, and Timberlake 2013; Logan and Stults 2011). As a consequence, the modal experience for blacks (and Hispanics) in U.S. cities is high residential segregation.

In the context of these halting and uneven moves toward integration, the foreclosure crisis of the late 2000s raises even greater reason for concern. Since 2008, roughly 1 in 12 households have begun the foreclosure process, and countless other families have been affected by foreclosures in their neighborhoods. Rates of foreclosure were particularly high among black and Latino households, and foreclosures were especially pronounced in minority neighborhoods. This racialized context to the foreclosure crisis, combined with underlying racial differences in residential mobility, provides strong theoretical reason to believe not only that segregation fueled foreclosures (Hyra et al. 2013; Rugh and Massey 2010; Squires, Hyra, and Renner 2009), but that the crisis may have significantly disrupted trajectories toward residential integration by altering race-specific patterns of migration and destabilizing integrated neighborhoods.

This study addresses three core research questions: (1) Did the concentration of foreclosures vary by the racial/ethnic composition of neighborhoods in U.S. metropolitan areas? (2) How did foreclosure concentrations influence race-specific migration patterns into and out of these neighborhoods? and (3) Did the effects of foreclosures on neighborhood racial change alter broader patterns of residential segregation in metropolitan areas? In addressing these questions, we use data on virtually all foreclosures in metropolitan neighborhoods in the periods leading up to and during the housing crisis to offer a first, comprehensive assessment of the impact of the foreclosure crisis on neighborhood racial change and broader patterns of racial segregation. We use a counterfactual framework to assess how the foreclosure crisis affected patterns of migration into and out of a wide range of neighborhood types and altered the trajectory of racial integration for Latino and black populations.

Background and Theory

The foreclosure crisis that hit the United States in 2007 was precipitated by a pernicious combination of unsustainable lending practices, irresponsible borrowing, and unrealistic expectations about the appreciation of real estate (Been et al. 2011; Engel and McCoy 2011). While the underlying forces are complex, federal policy played an important role in setting the stage for this crisis, most notably in the form of banking deregulation that facilitated the use of high-risk lending and underwriting strategies (Immergluck 2011), as well as federal efforts to preempt laws intended to protect consumers against predatory lenders (Ding et al. 2012). But more local policy dynamics also helped determine the depth of the crisis and its broader impacts. States vary dramatically in terms of the extent to which their laws protect consumers against predatory lenders (Goodman and Smith 2010) and the extent to which these laws are aggressively enforced (Bostic et al. 2008). As a result, the concentration of high-risk loans and levels of negative equity varied sharply across states in the years leading up to the crisis. The resulting state-level variation in the potential depth of the crisis was likely magnified by differences in laws governing the foreclosure process, with some states requiring judicial filings, encouraging mortgage counseling, or adopting

other strategies to slow the foreclosure process, whereas other states enacted policies that accelerated the pace at which foreclosures were processed (Collins, Lam, and Herbert 2011).

Variations in the policy backdrop and response to the foreclosure crisis likely interacted with highly variable patterns of fair housing enforcement and existing patterns of racial stratification to differentially affect residential segregation. In 1960, the average black-white dissimilarity across U.S. metropolitan areas stood at 79—indicating that nearly 8 out of every 10 black persons would have to move to another neighborhood to reach integration with whites—and the typical black person resided in a neighborhood that was 60 percent black. Segregation has fallen since that time, with black-white dissimilarity at 59 in 2010, and the average black person living in a neighborhood that was 45 percent black (Logan and Stults 2011). However, these shifts in segregation have been highly variable. Black-white segregation has dropped sharply in fast-growing metropolitan areas of the West and South but has remained stubbornly high in older cities of the Northeast and Midwest that have large black populations (Logan and Stults 2011). Similarly, levels of Hispanic-white segregation have dropped in many areas of the country but grew in areas where the foreign-born population increased in recent decades (Hall 2013; Lichter et al. 2010).

These trends and variations in segregation are likely due to a combination of interrelated factors, but sociologists typically highlight four general explanations. First, while racial gaps in socioeconomic attainment persist, there has been considerable convergence over the past several decades in education (Collins and Margo 2006), and modest reductions in occupational and wage inequality between groups (Carlson 1992; Smith and Welch 1989), that have bolstered middle-class minority populations (Landry and Marsh 2011) and increased access to less-segregated neighborhoods. Second, attitudes toward racial minorities have become more tolerant over time, with very few whites openly endorsing overt racial stereotypes (Schuman 1997), and a growing segment of the U.S. public stating that they value racial diversity (Pew Research 2008). Third, blatant forms of discrimination in housing access have been all but eliminated, although subtle discriminatory practices—including geographic steering, restricted access to information, and differential fees—persist (Turner et al. 2013). Fourth, broader population diversification and regional migration streams have transformed the racial composition of neighborhoods and altered the possibilities for neighborhood alternatives (Farrell and Lee 2011; Iceland 2004).

While these arguments emphasize different underlying social forces, each highlights the fact that segregation is perpetuated by racially differentiated migration patterns. Historical migration events, such as the Great Migration of southern blacks to northern cities, the ensuing out-migration of whites to suburban territories, and the return of blacks to the South have prominently shaped segregation patterns (Boustan 2010; Iceland et al. 2013; Tolnay 2003), and more local changes in segregation are brought about by shifts in race-specific patterns of mobility between neighborhoods (Quillian 2002; South and Crowder 1998).

Given the importance of migration patterns for understanding trends in segregation, the foreclosure crisis stands out as a potentially important force in reshaping patterns of neighborhood change and residential integration. Although typically viewed as a *housing* event, the foreclosure crisis represents arguably the most substantial *migration* event of the

past several decades. Somewhat crude estimates suggest that about 10 million homes were foreclosed on during the crisis period, with nearly all of these spurring a move. To put this in context, the Great Migration involved about 6 million migrants over half a century, and the Dust Bowl exodus from the Great Plains to the West involved about 2.5 million persons over a decade (Wilkerson 2010). While these and other major migration events often involved longer-distance moves and unique processes of migration selection, the scale of the foreclosure crisis as a migration process is substantial. As evidence, Stoll (2014) finds that 33.0 million moves occurred between 2009 and 2010, up from 30.5 in 2007 to 2008, reversing a long-run decline in geographic migration. This trend was driven by an increase in intra-county mobility, with 73 percent of all moves occurring within counties between 2009 and 2010, compared to roughly 60 percent in the years preceding the crisis. Bolstering the argument that foreclosures stimulated these shifts in migration, the spike in migration during the crisis period was most pronounced in states with the most foreclosures: between 2007 and 2010, rates of residential mobility increased by 54.2 percent in Michigan, 30.0 percent in California, 26.9 percent in Nevada, and 22.4 percent in Florida.

The foreclosure-induced migration surge has potentially important ramifications for residential segregation if foreclosures were concentrated in neighborhoods with particular racial compositions and if migration streams were racially differentiated. National migration statistics provide some clues that they were, with blacks making up a large share of all movers during the crisis (Stoll 2014) and local mobility rates increasing rapidly for Hispanics.¹ Yet, we do not know what the broader impact of these migration patterns has been on neighborhood racial compositions, how racially selective migration altered processes of neighborhood racial change, and ultimately how these events affected residential segregation.

While national data suggest that the housing crisis has altered migration streams in racially differentiated ways, the consequence for neighborhood racial compositions hinges on the mechanisms that link foreclosures to migration and on the types of neighborhoods affected most strongly by the foreclosure crisis. On a basic level, there are four types of migration responses to foreclosures: the direct effects on out- and in-migration, and the indirect effects on out- and in-migration.

Foreclosing on a home virtually always corresponds with the out-migration of a household, although the time between initial mortgage default and out-migration may be substantial. A Federal Reserve study (Molloy and Shan 2011) estimates that half of all households that begin the foreclosure process out-migrate within two years, but that number is confounded by the fact that fewer than half of foreclosure starts ultimately result in foreclosure. Among foreclosed movers, the vast majority (90 percent) relocate within their current metropolitan area (Molloy and Shan 2011).

The extent to which these direct foreclosure-induced out-migrations affect segregation thus depends partly on whether there are racial differences in the likelihood of foreclosure. Growing evidence suggests this is the case: Bayer, Ferreira, and Ross (2013) find that, on loans originating between 2004 and 2008, the probability of foreclosure was 4.2 points higher for blacks than whites, and 3.9 points higher for Latinos than whites. These racial

gaps are reduced with controls for mortgage terms, lender fixed effects, and local housing conditions, but they remain substantial in size (2.3 and 1.9 for blacks and Hispanics, respectively). Similarly, Bocian, Li, and Ernst (2010) find that between 2005 and 2008, blacks were 76 percent more likely, and Latinos 71 percent more likely, than whites to foreclose (see also Rugh 2015).

In addition to blacks and Latinos being more likely to experience foreclosure, there is also evidence that the risky loans that fueled the crisis were concentrated in minority neighborhoods, due to both the weaker socioeconomic position of residents and the explicit targeting of minority neighborhoods by sub-prime lenders (Engel and McCoy 2011). A report from the Department of Housing and Urban Development and the U.S. Treasury (2000) finds that subprime loans were five times more common in predominately black neighborhoods than in predominately white ones (see also Canner, Passmore, and Laderman 1999; Pennington-Cross, Yezer, and Nichols 2000), and during the 1990s, the annual percentage of all subprime loans signed by individuals in minority neighborhoods increased from 2 to 18 percent (Canner et al. 1999; see also Immergluck and Wiles 1999). Calem, Gillen, and Wachter (2004) find that controlling for individual-level demographic and socioeconomic characteristics, neighborhood-level minority shares were positively associated with subprime borrowing for whites as well as for racial/ethnic minorities, thereby increasing the vulnerability of minority-populated neighborhoods to the effects of the foreclosure crisis.

Foreclosed households must not only leave their homes but also find new ones to reside in, and the ultimate impact of the crisis on neighborhood change depends on racial differences in the residential destinations of families experiencing foreclosure. Because foreclosure typically also leads to a change in tenure, and because housing stress and the foreclosure process are correlated with, and jeopardize, financial security, foreclosed households are likely to settle in neighborhoods with more affordable and lower-quality housing than those they left. In their analysis of post-foreclosed households, Molloy and Shan (2011) find that the vast majority (85 percent) live in rental units two years after foreclosure and have high rates of transitioning from single-family to multi-family units. Because the availability of affordable housing differs substantially across neighborhoods, foreclosed households are likely to move to less desirable neighborhoods than the ones they exit. Molloy and Shan's (2011) analysis indicates that the post-foreclosed tend to move to more densely populated block groups with lower incomes and lower ownership levels (although the magnitudes of the differences are modest).

Changes in neighborhood conditions resulting from foreclosure may be especially pronounced for blacks and Latinos given underlying racial differences in residential mobility. Research has long documented that, controlling for a broad range of individual- and family-level characteristics, blacks are more likely than whites to move into poor, racially isolated neighborhoods (South and Crowder 1997, 1998; South, Crowder, and Chavez 2005), and given the consistent finding that blacks and Latinos need greater financial resources to access more desirable neighborhoods (South et al. 2005), it is plausible that post-foreclosure minority households would be especially prone to migrate to more racially isolated neighborhoods.

The largest migration effects of the housing crisis were likely among foreclosed households, but foreclosures also likely triggered the migration of other households by influencing the broader neighborhood. Considerable research documents the contagious nature of home foreclosure, with a single foreclosure increasing the risk of nearby foreclosure due to declining property values and potential easing of social constraints on default (Daneshvary and Clauretje 2012; Goodstein et al. 2011; Immergluck and Smith 2006; Lin, Rosenblatt, and Yao 2009; Towe and Lawley 2013; Wassmer 2011). Racial differences in the impact of these negative spillover effects may emerge if white households are better able to absorb the costs of mortgage stress or find new housing in neighborhoods of fairly comparable quality. By contrast, given lower levels of non-housing wealth and poorer social networks (Hall and Crowder 2011; Heflin and Pattillo 2006), blacks and Latinos in neighborhoods with high concentrations of foreclosures may end up stuck in place or having to move to neighborhoods of otherwise lower quality. Given the association between race and locational attainment, these neighborhoods likely have fewer whites and greater concentrations of minorities, unlike the neighborhoods into which whites leaving neighborhoods with high foreclosure rates might move.

Aside from their effects on local housing dynamics, foreclosures will also likely have profound impacts on neighborhood distress and instability, leading to a density of vacant, neglected, and abandoned properties, heightening the appearance of neighborhood deterioration, driving up crime, and increasing the likelihood of racial transition (Baumer, Wolff, and Arnio 2012; Baxter and Lauria 2000; Capone and Metz 2003; Teasdale, Clark, and Hinkle 2012; Wallace, Hedberg, and Katz 2012; Williams, Galster, and Verma 2014). Ellen, Lacoé, and Sharygin (2013) find, for example, that foreclosures in New York City were associated with a 1.4 percent increase in violent crimes and a .7 percent increase in public order crimes committed on the same block-face. Heightened concerns over neighborhood safety and increased signs of decay and abandonment may, in turn, undermine local engagement and social capital in the neighborhood. Consistent with this argument, Batson and Monnat (2015) find that neighborhood foreclosures are associated with significantly lower assessments of neighborhood quality. A concentration of foreclosures in a neighborhood may thus erode residential satisfaction and propel residents who are financially able to out-migrate.

These changes in neighborhood social conditions emerging from high foreclosure concentrations may significantly alter patterns of neighborhood integration by differentially affecting patterns of in- and out-migration for members of different racial groups. Whites living in racially mixed neighborhoods may be especially sensitive to changes in neighborhood conditions given that whites' perceptions of residential problems are often exaggerated in neighborhoods with large minority populations (Quillian and Pager 2001; Sampson and Raudenbush 2004), and whites tend to be less satisfied with their neighborhoods as minority populations expand (Swaroop and Krysan 2011). Accordingly, high neighborhood foreclosure concentrations, especially in combination with large minority populations, are likely to spawn out-migration among whites. Similarly, by signaling neighborhood decay, high foreclosure concentrations and large minority populations may reduce attractiveness to potential in-migrants, especially whites and members of some other

groups. At the same time, declining home values associated with densities of foreclosure may open access to formerly unattainable neighborhoods for minority groups.

While the aggregate data we use in this analysis do not allow us to distinguish between the direct and indirect effects of foreclosures on migration, or to completely disentangle the relative magnitude of in- and out-migration on neighborhood racial composition, these arguments provide theoretical justification for the link between foreclosure concentrations and racially selective migration. These aggregate data also make it difficult to fully separate the impact of the foreclosure crisis on racially selective migration from the impact of the late part of the housing boom (in the early 2000s) on migration. Available research suggests that credit expansion—especially in Sunbelt cities where foreclosures were subsequently high—was associated modestly with increased neighborhood integration. In the Rustbelt and other cities with more entrenched racial segregation, the housing boom tended to reproduce existing neighborhood patterns (see Bond and Williams 2007; Fischer 2013; Fischer and Lowe 2014). While remaining largely descriptive, our analytic approach partially addresses this issue by adjusting for underlying trends in racial change.

Data

We explore the relationship between foreclosures and neighborhood racial composition by linking data on neighborhood foreclosure concentrations with information on neighborhood racial/ethnic populations. Given our broader interest in metropolitan segregation, we restrict our entire analysis to dynamics within metropolitan areas, using 2010 Office of Management and Budget definitions for Core Based Statistical Areas (CBSAs). The foreclosure data we use come from RealtyTrac (2013) and include complete records on virtually all foreclosure (and pre-foreclosure) events in the United States that took place between 2005 and 2012. These data are compiled by RealtyTrac from county assessors' offices and provide complete coverage—by the end of the period—for 2,860 of 3,143 counties and include more than 20 million foreclosure filings.² The counties represented by these data contained 96 percent of all real estate transactions in the United States during the time period. Most important for our purposes, these data include the physical address of all properties in the foreclosure process and the timing of filings, allowing us to calculate foreclosure rates at any point in time for specific geographic areas.

Using these data, we created a panel file of unique foreclosure events that tracks individual properties through the foreclosure process: from the initial notice of default (i.e., *lis pendens*) to bank repossession. To do so, we used a rule-based, fuzzy matching algorithm (Elmagarmid, Ipeirotis, and Verykios 2007) based on multiple fields—including address, tax parcel number, and transaction and judicial case IDs—that identify unique properties, remove sources of redundancy, and impute any incomplete information. Using our algorithm, we found that fuzzy matches—records that do not match on address but match on the other criteria and likely represent the same property and foreclosure process—represent 1.82 percent of the original data.³ Because we are interested in effects on residential neighborhoods, we exclude non-residential properties from the file (.9 percent of all properties). Although our panel file includes all events in the foreclosure process, we also restrict our analyses to cases representing the first visible sign of housing distress—a listing

for public auction (i.e., Notice of Trustee Sale or Notice of Foreclosure Sale) or repossession by a bank (i.e., Real Estate Owned). Doing so serves multiple purposes: most important, it prevents counting the same property multiple times in calculating foreclosure rates; second, it normalizes the foreclosure process across states because all states require public filings for these events; and third, it follows from our theoretical interest in broader neighborhood responses to discernible foreclosures. The final point is supported by research showing that the effect of foreclosures on local crime is limited largely to properties that complete the foreclosure process and thus represent visible signs of distress (Ellen et al. 2013). The resulting file indicates that between 2005 and 2012, there were 9.3 million unique visible foreclosures.

Geographic coordinates for each record were determined using Bing's Maps REST Services API. With these geocodes, we used GIS tools to assign each observation its census block group (using 2000 TIGER/Line files) and calculated the total number of foreclosures within each block group for each month. For the purposes of this analysis, we limited neighborhood foreclosure counts to years 2005 to 2009. While we recognize that repercussions of the crisis likely continued beyond 2009, we focus on these years because census data on neighborhood racial compositions were measured in 2010, and inclusion of foreclosures beyond this point would confuse temporal ordering. Including foreclosures in the years prior to the height of the crisis comes at the cost of reducing the number of metropolitan areas being analyzed, but it ensures we capture the full extent of the crisis, even for Rustbelt cities like Indianapolis and Akron where foreclosures peaked in 2005 or 2006 (Hall, Crowder, and Spring forthcoming).⁴ We used these data to calculate neighborhood foreclosure rates during the crisis period by dividing the cumulative number of foreclosures between January 2005 and December 2009 by 100s of housing units in the block group at the start of the interval. Although the resulting measure is not strictly a rate, for brevity we interpret this measure as the percent of housing units that were foreclosed on between 2005 and 2009. For descriptive purposes, we classify foreclosure rates into one of five categories: none; low (0 to 1 foreclosures per 100 homes); moderate (1 to 5 percent); high (5 to 10 percent); and very high (over 10 percent).

Data on neighborhood racial/ethnic composition and various measures of neighborhood and metropolitan demographic and socioeconomic conditions come from the 1990, 2000, and 2010 decennial censuses (U.S. Census Bureau 1992, 2001, 2011). Our neighborhood units—block groups—are normalized to 2000 boundaries using tabulations from GeoLytics (2008, 2012). To classify neighborhood racial/ethnic structures, we used a modified version of the typology developed by Farrell and Lee (2011), which defines neighborhood racial/ethnic types consistently across years and metropolitan areas using information from four racial groups: Hispanics, and non-Hispanic whites, blacks, and Asian and Pacific Islanders.⁵ Specifically, we initially defined 16 types of neighborhoods: all white (over 90 percent white); mostly black (over 70 percent black); mostly Asian (over 70 percent Asian); mostly Hispanic (over 70 percent Hispanic); white-shared (less than 90 percent white, no other group over 10 percent); and six two-group types (e.g., white-black [10 to 90 percent white, 10 to 70 percent black, and no other group over 10 percent]); four three-group types (e.g., black-Hispanic-Asian); and multiethnic (i.e., white-black-Hispanic-Asian). Because some of these initial categories were few in numerical size, we reduced them to 10 types by (1)

combining mostly Asian and white-Asian neighborhoods; (2) collapsing the three-group types including whites into a combined white-mixed group; and (3) collapsing the two- and three-group types excluding whites into a combined all-minority group.⁶ Table A1 in the Appendix shows the average racial composition of each type in 2000. To avoid problems associated with small-population bias, and because of our interest in residential neighborhoods, we limit our analysis to block groups with total populations in excess of 20 in 1990, 2000, and 2010, and we exclude seven block groups with estimated foreclosure rates above 100.

Our multivariate analyses incorporate several additional block-group-level characteristics from 1990 and 2000 as statistical controls: total population, population density, median family income, poverty rate, percent of residents living in the neighborhood for five or fewer years, percent of housing units that are owner-occupied, and percent of housing units built in the preceding 10 years. Metropolitan-level measures include racial-group representation and the 2005 to 2009 foreclosure rate.

Analytic Approach

Our analysis includes two main steps. In the first, we examine the connection between foreclosure concentrations and neighborhood racial change by estimating models that predict changes in white, black, and Latino neighborhood shares and group totals between 2000 and 2010 as a function of the concentration of foreclosures, the initial racial/ethnic type (in 2000), and the underlying trend in racial change from the preceding decade (1990 to 2000).⁷ While transition matrices are common in the neighborhood change literature for documenting patterns of racial change, this approach has the advantage of being able to quantify the link between foreclosures and racial-group change and allows us to partially guard against the endogeneity of foreclosures to racial change. Nevertheless, transition matrices showing changes in racial/ethnic types between 2000 and 2010 by foreclosure level are available on request. Our multivariate models of neighborhood change include controls for changes between 1990 and 2000 in median family income, poverty and homeownership. To account for state variation in the regulations and practices that govern the foreclosure process, all models also include state fixed effects. These models are estimated as random-intercept models that can be expressed as follows:

$$(y_{kjm10} - y_{kjm00}) = \beta_{0m} + \beta_1 \text{frate}_{jm} + \beta_2 \text{frate}_{jm}^2 + \beta_3 \text{frate}_{jm}^3 + \beta_4 (y_{kjm00} - y_{kjm90}) + \beta_5 \mathbf{R}_{jm} + \beta_6 \mathbf{W}_{jm} + e_{jm}$$

$$\beta_{0m} = \gamma_{00} + \gamma_{01} \text{frate}_m + \gamma_{02} (y_{km10} - y_{km00}) + u_{0m}$$

where y_{kjm} represents the percent or size of racial/ethnic group k in block-group j located in metropolitan area m (in 2010, 2000, or 1990); frate_{jm} is the block-group foreclosure rate and is expressed as a third-order polynomial to account for nonlinearity in the association between foreclosure concentrations and racial change;⁸ \mathbf{R}_{jm} is a vector of neighborhood racial/ethnic types in 2000; and \mathbf{W}_{jm} represents neighborhood characteristics, including

measures of socioeconomic change between 1990 and 2000. The intercept is allowed to vary across metros and is a function of the metropolitan foreclosure rate and the metropolitan trend in racial group k during the 2000s. Consistent with past segregation research, these models are restricted to metros in which 10,000 members of each racial group reside; the analytic sample thus differs across models for different racial groups.⁹

In the second stage of our analysis, we evaluate how the impact of foreclosure concentrations on neighborhood racial compositions modified broader patterns of metropolitan segregation. To do so, we estimate random-intercept models predicting racial/ethnic populations in block groups in 2010. These models are expressed similarly to those defined above and include the following set of block-group-level covariates in addition to the foreclosure polynomial: racial group population in 1990 and 2000, racial/ethnic group type, population density, percent of homes built in the past 10 years, percent of residents in the neighborhood for five or fewer years, median family income, poverty rate, and ownership rate. We then predict the racial group count for each block group had the foreclosure rate observed in 2005 and stayed constant through the 2005 to 2009 period. We used these simulated counts to calculate white-black and white-Hispanic dissimilarity, comparing the estimated segregation scores to observed dissimilarity values in 2010.¹⁰ As with our models of racial change, we carried out this exercise only for metropolitan areas with 10,000 minority group members.

Results

Before considering the association between foreclosure concentrations and racial change, we highlight the racialized backdrop to the foreclosure crisis by summarizing foreclosure rates across types of neighborhoods. Table 1 shows mean foreclosure rates (and standard deviations) for block groups across the 10 racial/ethnic neighborhood types (in 2000), as well as the distribution of neighborhood foreclosure rates across foreclosure categories. For the total set of metropolitan block groups, the average neighborhood experienced 4.45 foreclosures for every 100 homes during 2005 to 2009. This number can be somewhat crudely interpreted as indicating that about 4.5 percent of homes in the typical neighborhood were either put up for auction or repossessed by a bank between 2005 and 2009. It is striking that during this time, 91 percent of all block groups had at least one visible foreclosure, and a solid majority had at least moderate foreclosure rates (greater than 5 percent).

The table shows substantial variation across racial/ethnic types in foreclosure levels, with all-white neighborhoods having an average rate of 2.3 percent, but mostly-black and mostly-Hispanic neighborhoods having rates about three times as high (8.1 and 6.2 percent, respectively). Foreclosure rates were also especially high in white-Hispanic neighborhoods and in all neighborhood types with representation of at least three groups (all-minority and integrated). We see the same racial patterning to foreclosure concentrations in the categorical representation, with nearly half of mostly-black, mostly-Hispanic, Hispanic-white, and integrated neighborhoods having high or very high foreclosure rates, whereas just 12 percent of all-white neighborhoods did. The upshot is that there was a clear racial/ethnic patterning to the concentration of foreclosures during the crisis. Confirming local studies and media reports, foreclosures were heightened in neighborhoods with large black and

Latino populations, and neighborhoods with large white (and to some extent, Asian) populations were relatively shielded from the crisis. But these data also reveal that the most racially diverse neighborhoods experienced exceedingly high rates of foreclosure, with nearly one-third of these neighborhoods falling into the very high range.¹¹

Multivariate Models of Change in Racial/Ethnic Shares

The descriptive patterns suggest that the foreclosure crisis was highly racially differentiated. The next set of models seeks to assess how these racialized patterns of foreclosure affected trajectories of neighborhood racial change in a way that accounts for underlying trends in racial and socioeconomic change. Our multivariate models seek to do this by regressing racial change during the 2000s on foreclosure levels and a host of statistical controls, including the pre-trend in racial change. Table 2 presents results for models assessing change in racial group percents (i.e., percent of the neighborhood composed of whites, black, and Hispanics), and Table 3 shows corresponding models for changes in racial group populations. We report average marginal effects (AMEs), representing the mean effect of a one-unit change in the predictor across neighborhoods; this facilitates interpretation of the total effect of foreclosure concentrations (the sum of the linear, squared, and cubic effects) by averaging the predicted total impact of foreclosures on racial change across neighborhoods (standard errors are calculated using the Delta Method) (Williams 2012). To conserve space, we placed the coefficients and standard errors for main control variables in Appendix Table A2.

The association between foreclosure concentrations and change in neighborhood percent white during the 2000s is shown in the first set of columns in Table 2. The first model, which adjusts for changes in percent white during the 1990s and a neighborhood's racial/ethnic type in 2000, shows a negative association between foreclosure rates and white population shares. Specifically, we estimate that a one-point difference in the percent of homes that were foreclosed on between 2005 and 2009 tended, on average, to reduce the percentage of white residents by about half of a percentage point (-.52).

The second model partially addresses arguments that foreclosures were concentrated in already deteriorating neighborhoods through the inclusion of controls for the trend in socioeconomic change, as well as measures of racial change and foreclosure rates in the broader metropolitan area. Inclusion of these additional covariates does not alter the estimated foreclosure impact. The average effect, however, conceals some nonlinearity in the association between foreclosure concentrations and changes in white shares. Figure 1 plots the estimated impact of foreclosure levels on change in percent white during the 2000s (represented by the solid line) for the 96.3 percent of neighborhoods with foreclosure rates of 20 percent or lower. (The embedded figure in the top-right corner of Figure 1 shows the association for the full distribution.) Figure 1 shows that white shares decline in a mostly linear way as foreclosure rates increase, with neighborhoods with foreclosure rates of 20 percent estimated to have white shares decline by about 10 percentage points. The embedded panel in Figure 1 also indicates that white population shares decline rapidly as foreclosures increase in neighborhoods with exceedingly high foreclosure rates (i.e., in highly distressed neighborhoods).

To assess differential changes in white population shares across types of racial/ethnic neighborhoods, Model 3 shows AMEs from models that allow the effect of foreclosure concentrations to differ across neighborhood racial/ethnic types (in 2000). (Note that the marginal effects represent the total effect of foreclosures in each neighborhood type and there is no omitted reference group.) These results indicate that foreclosures are associated with shrinking white shares in all types of neighborhoods, but especially in black-white neighborhoods. The AME in these neighborhoods suggests that a one-point increase in the foreclosure rate reduces the share of whites by nearly one percentage point ($-.85$), an effect that is close to twice as large as the mean effect for all neighborhoods.

Results for the effect of foreclosure concentrations on changes in neighborhood percent black are shown in the middle set of columns in Table 2. The estimated AME on foreclosure rates suggests that a one-point difference in the foreclosure rate during the crisis was associated with a .21 point increase in the percent of the block group that was black. Inclusion of controls for socioeconomic change in the block group, and racial change and foreclosure rates in the metropolitan area, does not alter the estimated impact of local foreclosure levels on changes in black shares. The dotted line in Figure 1 displays this association, showing that foreclosures are associated with growing black shares in a mostly linear way. The embedded panel in the figure also indicates that black shares tend to increase quickly in neighborhoods with extremely high foreclosure levels. The multiplicative results summarized in the third model for blacks (column 6) suggest that foreclosures are linked to growing black population shares in all but a few neighborhood types, but most strongly in black-white neighborhoods, where a one-point increase in the foreclosure rate is estimated to have increased the share of neighborhood blacks by .7 percentage points.

Models that estimate change in neighborhood percent Hispanic are shown in the right-hand columns of Table 2. As in the models for black population shares, foreclosures were positively associated with changes in Hispanic shares, but the magnitude of the foreclosure effect on Hispanic change is noticeably larger than the effect on black change. Specifically, our models indicate that a one-point increase in the foreclosure rate increased, on average, the trend in block-group percent Hispanic by about one-third of a percentage point. Also similar to estimates for other racial groups, incorporation of controls for neighborhood socioeconomic change and metropolitan factors does not change the estimated foreclosure effect. As with the other groups, we plot the predicted change in Hispanic shares at various foreclosure concentrations in Figure 1. The dashed line for Hispanic change takes a similar shape to the trend for black shares, but it is scaled up and is slightly steeper. Specifically, the line suggests that neighborhoods with foreclosure rates of 20 percent are estimated to have expanded Hispanic shares by about 7.5 points. As with black change, Hispanic shares are estimated to rise rapidly in neighborhoods with extremely high foreclosure levels. Finally, the last column in Table 2 shows the differential impact of foreclosures on Latino change across neighborhoods of different racial/ethnic types. Results from these models indicate that foreclosures are associated with growing Hispanic shares in all neighborhood types, but the strongest effects are observed in neighborhoods with substantial Hispanic populations and in more racially diverse settings. In particular, a one-point difference in the foreclosure rate corresponds roughly with a .4 percentage point increase in neighborhood percent

Hispanic in mostly-Hispanic, Hispanic-white, white-mixed, all-minority, and integrated neighborhoods, but smaller (although still positive) associations in neighborhoods with large white and black populations.

Multivariate Models of Change in Racial/Ethnic Counts

The results in Table 2 are useful in demonstrating how the racial/ethnic composition of neighborhoods has potentially been altered by the geographic concentration of foreclosures in minority and integrated neighborhoods, but they do not identify the demographic sources of those changes. That is, they do not indicate whether shrinking white population shares in high-foreclosure neighborhoods were driven primarily by the out-migration of whites or the in-migration of nonwhites. Aggregate census data do not allow us to fully disentangle these sources of demographic change, but these flows can be partially unraveled by assessing the link between foreclosures and changes in racial group counts. Accordingly, Table 3 shows models predicting change in racial group totals during the 2000s. The structure of these models is identical to those shown in Table 2, with the same set of covariates and elaboration strategy.

The first set of columns in Table 3 summarizes change in white populations between 2000 and 2010. The first model shows a negative association between foreclosures and white population change. Specifically, we estimate that a one-point increase in a neighborhood's foreclosure rate was associated with an average loss of 3.2 white persons. To put this number in perspective, over the same period (2000 to 2010), the average block group saw an increase of 3.7 white persons. Incorporating controls for socioeconomic change at the neighborhood level, as well as white population change and foreclosure rates at the metro level, does not alter the estimate.

As in Table 2, we allow the foreclosure effect to vary across types of racial/ethnic neighborhoods in Model 3 of Table 3. Results from this multiplicative specification for white racial change suggest that foreclosure concentrations correspond with declining white populations in most neighborhood types, but most prominently in neighborhoods with substantial minority concentrations. In Hispanic-white neighborhoods, a one-point increase in the foreclosure rate was associated with the loss of 10.7 whites. We find similarly sized effects in mostly-Hispanic and integrated neighborhoods, and smaller but still substantial associations in black-white, white-shared, and white-mixed ones.

The association between foreclosures and black population change is shown in columns 4, 5, and 6 of Table 3. The first model for blacks shows a positive relationship between foreclosures and black population change during the 2000s. More specifically, our models estimate that a one-point increase in the local neighborhood foreclosure rate corresponds with an average increase in the black population of about 2.3 persons. Controls for socioeconomic change and metropolitan characteristics, introduced in column 5, suppress the foreclosure effect slightly, but its interpretation remains about the same. When we allow the impact of foreclosure concentrations to vary across racial/ethnic neighborhood types (column 6), it becomes clear that black populations increase with foreclosures in most neighborhood types. The comparatively large effect in black-white neighborhoods stands

out: a one-point difference in block-group foreclosures was associated with growth in the black population of about 9.6 persons.

The last set of models (columns 7, 8, and 9) in Table 3 evaluates Hispanic racial change. The first model indicates that foreclosure concentrations were associated with growing Hispanic populations. Specifically, the AME suggests that a one-point increase in the local foreclosure rate was associated with an average increase of about 5.8 Hispanic residents. Including block-group and metropolitan-level controls (column 8) increases the foreclosure effect very slightly. When we allow the effect of foreclosures to vary across neighborhood racial/ethnic types (column 9), these data reveal that in all but Asian-white neighborhoods (where the estimate was not statistically significant), foreclosures were associated with growing Hispanic populations. This positive effect was especially pronounced in neighborhoods with substantial Hispanic populations in 2000 and in more diverse neighborhoods. For example, in all-minority neighborhoods, a one-point increase in the foreclosure level corresponds with a 12.0 person increase in the Hispanic population.

Simulated Segregation

To assess the potential impact of these foreclosure-related changes in neighborhood racial compositions on patterns of racial residential segregation, we estimated mixed effects models predicting racial/ethnic group population counts in 2010 as a function of foreclosure concentrations and other block-group and metropolitan covariates. For each block-group, we then predicted racial group population counts assuming foreclosure rates remained fixed at their 2005 values.¹² Using these predicted racial counts, we simulate dissimilarity scores for metropolitan areas with at least 10,000 minority group members. Table 4 summarizes results from these simulations.

Overall, our analysis implies that the foreclosure crisis increased the average black-white dissimilarity score in metropolitan areas by about 1.1 points, and Hispanic-white dissimilarity by about 2.1 points. While these estimates of the implied foreclosure effect on segregation may seem unexceptional, it is important to keep in mind that segregation declines quite slowly, with (observed) black-white dissimilarity decreasing by 4.9 points during the 1990s and 4.6 points during the 2000s. Thus, our estimates suggest that racially selective migration patterns generated by the foreclosure crisis slowed declines in black-white segregation by about 19 percent. The impact was even larger for Hispanic segregation, with the foreclosure crisis impeding declines in Hispanic-white dissimilarity by nearly 50 percent. Figure 2 shows the long-term view of this implied effect. The figure plots unweighted mean dissimilarity scores observed in 1990, 2000, and 2010, and the simulated 2010 scores for blacks (grey lines) and Hispanics (black lines) from whites. The primary implication from both trends is that the foreclosure crisis appears to have moderately stalled progress toward integration across metropolitan areas. In other words, in the absence of the foreclosure crisis, segregation would likely have declined even further during the 2000s than was actually observed.

Table 4 also provides a summarized breakdown of how the foreclosure crisis is estimated to have altered segregation across regions and in metropolitan areas with varying minority group shares. For black-white segregation, our models imply that segregation was most

strongly affected by the foreclosure crisis in western metropolitan areas, where the crisis is estimated to have increased segregation by 7.7 points. For example, the foreclosure crisis is estimated to have increased black-white dissimilarity by 8.9 points in Las Vegas and by 7.5 points in Sacramento. The segregating effect of the foreclosure crisis was also most pronounced in metros with smaller black populations, which at least partially reflects the regional concentrations of foreclosures and regional variation in racial group populations. For Latinos, segregation was most strongly affected in southern metros, where it is estimated that the foreclosure crisis increased dissimilarity by 6.3 points. Atlanta, for example, where the overall foreclosure rate during 2005 to 2009 was 16.0, had an estimated increase in Hispanic-white dissimilarity of 7.8 points. As with blacks, the effect of foreclosures on segregation was strongest in metros with small Hispanic populations, increasing dissimilarity in metros where Hispanics were less than 5 percent of the total by an average of 3.5 points, versus .5 points in metro areas where the Hispanic population was over 20 percent of the population. These differences in the extent to which the foreclosure crisis altered patterns of segregation underscore how the effects of the crisis were highly variable (Hall et al. forthcoming). In particular, the comparatively small effect of the crisis on segregation in northeastern and midwestern metros likely reflects the combination of relatively few foreclosures and deeply entrenched patterns of residential segregation (Logan, Stults, and Farley 2004). By contrast, the pronounced effects in the West and South may have been foreshadowed by the depth of the foreclosure crisis and more flexible patterns of segregation (Iceland et al. 2013).

Conclusions

The U.S. housing crisis of the late 2000s was one of the most profound residential disasters of the past century, pushing millions of families into foreclosure and many more into financial distress. Yet, the burden of the foreclosure crisis was not evenly distributed, with black and Latino households much more likely than white households to experience foreclosure, losing ground on long-term socioeconomic gains in the process. With these racial disparities and more general patterns of residential stratification as the backdrop, this article aimed to provide a stronger understanding of the distribution of foreclosures across neighborhoods, the effects of these foreclosure concentrations on patterns of neighborhood racial change, and the implications for broader trends in segregation by race/ethnicity.

Using data on nearly all foreclosure events in the United States between 2005 and 2009, we showed that the foreclosure crisis was structured strongly along racial/ethnic lines and likely spawned racially selective migration patterns that hardened racial/ethnic boundaries between neighborhoods and increased residential segregation beyond what it otherwise would have been. We found that neighborhood foreclosure rates during the crisis were about three times higher in mostly-black and mostly-Latino neighborhoods than in all-white ones, and the majority of black and Latino neighborhoods had foreclosure rates well above average. Perhaps more surprising is the finding that more diverse neighborhoods were among the hardest hit by the foreclosure crisis; the highest rates of foreclosure were in racially integrated neighborhoods, where long histories of instability may have made them prime targets for risky lending and borrowing. Given prior research exploring group differences in foreclosures (see Bayer et al. 2013; Bocian et al. 2010; Rugh 2014), it is no surprise that

minority households were at increased risk of foreclosure, but our work demonstrates the neighborhood-level burden experienced by these groups. Foreclosures became a common occurrence in neighborhoods in which black and Latino households lived and, especially, where they shared space with members of other groups.

Our results also indicate that the disproportionate concentration of foreclosures in neighborhoods occupied by black and Latino households had important repercussions for the compositional stability of those neighborhoods. More specifically, our models provide consistent evidence that neighborhood foreclosures were linked to shrinking white populations and expanding black and Latino populations. For example, after controlling for the influence of earlier compositional trajectories and socioeconomic change, a one-point increase in the percent of foreclosed homes in a block group reduced the share of white residents by, on average, .5 percentage points and increased black and Latino shares by .2 and .3 percentage points, respectively. By themselves, these results have important implications for broader systems of stratification, with white families better able than black and Latino families to shield themselves from the social and economic distress often accompanying high concentrations of foreclosure.

While our models of population change implicate both minority population growth and white population loss as key mechanisms through which foreclosure concentrations affected neighborhood racial composition, our analysis is not able to fully disentangle their relative contributions to neighborhood change. Nor can we identify whether these racially distinct migration patterns resulted from the direct effects of foreclosure or the indirect effects of neighborhood-level concentrations of foreclosures and related neighborhood conditions. Future scholarship would do well to examine patterns of mobility among individual households—both those experiencing foreclosure and those simply exposed to foreclosures in the surrounding area—focusing on racial differences in the likelihood of leaving the neighborhood and the residential destinations of households that do leave. Doing so would, for example, indicate whether white population loss from diverse neighborhoods is due to white foreclosed households moving to whiter neighborhoods or to other white households living in these neighborhoods fleeing in the face of growing neighborhood distress. Similarly, a more detailed migration analysis could offer evidence on arguments that the foreclosure crisis provided opportunities for minority households to move into previously unaffordable neighborhood settings. Ideally, this individual-level research would also allow for an assessment of the roles of economic resources and other micro-level characteristics in explaining racial/ethnic differences in the ability to avoid exposure to high foreclosure concentrations and associated patterns of neighborhood distress.

Among the more striking results of our analysis is that not only were foreclosures disproportionately concentrated in minority-populated and integrated areas during the foreclosure crisis, but the impacts of foreclosures on racial change were especially strong in these neighborhoods. In other words, white population loss and minority population gain were significantly more responsive to high foreclosure concentrations in integrated areas and areas with strong black and Latino representation. Integrated neighborhoods' heightened vulnerability to the effects of the foreclosure crisis has important implications for broader patterns of residential stratification. As Logan and Zhang (2010) argue, these integrated

neighborhoods represent an important pathway to stable integration, and they contributed substantially to declining aggregate levels of segregation across many metropolitan areas in recent decades. Yet our findings suggest this pathway may have been significantly damaged during the foreclosure crisis, with housing distress piling up in these neighborhoods and white populations abandoning these areas at a quicker pace.

In this way, our results speak to the broader debate about the continuing salience of segregation. While some authors claim that the expanding number of diverse neighborhoods spells the end of segregation (Glaeser and Vigdor 2012), these neighborhoods appear to remain highly vulnerable to the effects of economic crisis, and white populations appear primed to flee such neighborhoods when crisis hits. Illustrating the broader implications of this dynamic, our research indicates that the race-specific inter-neighborhood migration streams produced by the foreclosure crisis increased residential segregation between both blacks and whites, and Latinos and whites. More specifically, we find that black-white dissimilarity in 2010 was 1.1 points higher than it otherwise would have been. Similarly, Hispanic-white dissimilarity was estimated to have been 2.1 points higher as a result of the foreclosure crisis. These impacts on segregation were particularly sharp in southern and western metropolises that had seen past declines in segregation but where the foreclosure crisis was particularly deep. Overall, the findings presented here lend support to arguments that segregation by race/ethnicity remains a dominant organizing feature of U.S. cities (cf. Lichter 2013; Logan 2013; Rugh and Massey 2014; Tienda and Fuentes 2014).

At the same time, our findings lend support to theoretical claims that this segregation is maintained, at least in part, by discriminatory practices and racially stratified opportunity structures (Charles 2003; Massey and Denton 1993). There is strong evidence that the U.S. foreclosure crisis was predicated at least partly on discriminatory lending behaviors and racially targeted, predatory marketing (Been, Ellen, and Madar 2009; Engel and McCoy 2011; Hyra et al. 2013; Immergluck 2009; Rugh and Massey 2010; Squires et al. 2009). Our results indicate that racial stratification not only structured the concentration of foreclosures, but racial inequality in the residential context has been exacerbated as a result of the crisis. While it is unclear whether the racial changes brought about by the foreclosure crisis simply rolled back gains in residential attainment that were feebly supported by unscrupulous and unsustainable lending, or whether these changes actually derailed progress toward residential integration, this analysis suggests the foreclosure crisis further stratified U.S. neighborhoods along racial/ethnic lines.

Notes

1. Nationally, local mobility increased by 11.5 percent for Hispanics, compared to 9.5 percent for whites, between 2007 and 2010.
2. RealtyTrac provided us with the date the foreclosure-filing collection process was initialized in each county.
3. We estimate that our algorithm matches records that do not match on address alone at an accuracy rate of about 78 percent. Without adjustment, these records would be counted as separate foreclosures, producing a foreclosure overcount of

approximately 1.21 percent. In contrast, our algorithm produces an undercount of approximately .4 percent; in the interest of producing more conservative estimates, we opt for a small undercount rather than a larger overcount. Because multiple unique foreclosures can occur at the same property, we compare the time between two foreclosure events against the minimum processing time reported by each state to distinguish whether the event represents the continuation of a foreclosure process or the beginning of a new one.

4. We exclude 75 metropolitan areas for which RealtyTrac did not have complete coverage of all constituent counties by the end of 2005. For the most part, the omitted metros are relatively small areas with lower average neighborhood foreclosure rates. We reanalyzed our data including information on the counties that, in these metros, were covered by RealtyTrac and found nearly identical results to those presented here.
5. Using a time- and place-invariant approach is necessary for making comparisons across these dimensions and is in contrast to approaches that define neighborhood racial/ethnic composition relative to national totals or metropolitan group size (e.g., Logan and Zhang 2010).
6. Reducing neighborhood types in this way does not alter the substantive interpretations drawn from our analysis.
7. As noted earlier, predicting racial change during the 2000s as a function of foreclosures between 2005 and 2009 means our foreclosure estimate is potentially confounded by racial change during the housing boom. While our inclusion of racial change during the 1990s partially addresses this issue, racial change between 2001 and 2004 that is correlated with foreclosure concentrations (e.g., in neighborhoods where risky mortgages may have originated) will bias our estimates. We explored two alternative data structures to assess this potential source of bias. First, using the 2005 to 2009 American Community Survey block-group summary tables—assumed to have a 2007 midpoint—we estimated models predicting racial change between 2007 and 2010 as a function of foreclosures between 2008 and 2009, and racial change between 2000 and 2007. Results from these models are very similar to those reported in our main analysis, but sampling error associated with use of the block-group ACS tables and the rolling timing of the data raise additional measurement issues. Second, we used population change implied in home-purchase data from the Home Mortgage Disclosure Act to attempt to impute racial counts in periods before and after the onset of the recession. Models based on imputed counts also produce substantively similar findings, but the overall utility of the approach is limited by its omission of other sources of neighborhood change (e.g., out-migration of owners, migration of non-owners, and natural increase). Results from these supplemental models are available on request.
8. Diagnostic models reveal the cubic expression best fits these data, but models using a linear, squared, or logged operationalization produce substantively equivalent results.

9. The size restriction does not alter our results or conclusions in any meaningful way.
10. The dissimilarity index is often considered the standard measure of residential segregation (see Iceland et al. 2013; Logan and Stults 2011; Rugh and Massey

2010) and is expressed as $D_{jk} = \frac{1}{2} \sum_{b=1}^B \left| \frac{p_{bj}}{P_j} - \frac{p_{bk}}{P_k} \right|$, where b refers to block groups within a metro area, j and k to racial groups, p_{bj} is the population of group j in block group b , and P_j is the population of group j in the metro. The index ranges from 0 (no segregation) to 1 (total segregation) and is interpreted as the proportion of one group that would have to move in order for the racial composition of each neighborhood to match the racial composition of the metropolitan area.

11. Integrated neighborhoods with higher foreclosure rates had slightly smaller white shares than integrated neighborhoods with lower foreclosure rates, but even those with very high rates had fairly substantial average white shares (30.3 percent).
12. We considered several alternative baselines for this counterfactual, including one assuming no foreclosures during the 2005 to 2009 period. This approach produced estimates of effects on segregation that were modestly larger but still in line with our main conclusions. Results from these alternative models are available on request.

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Biographies

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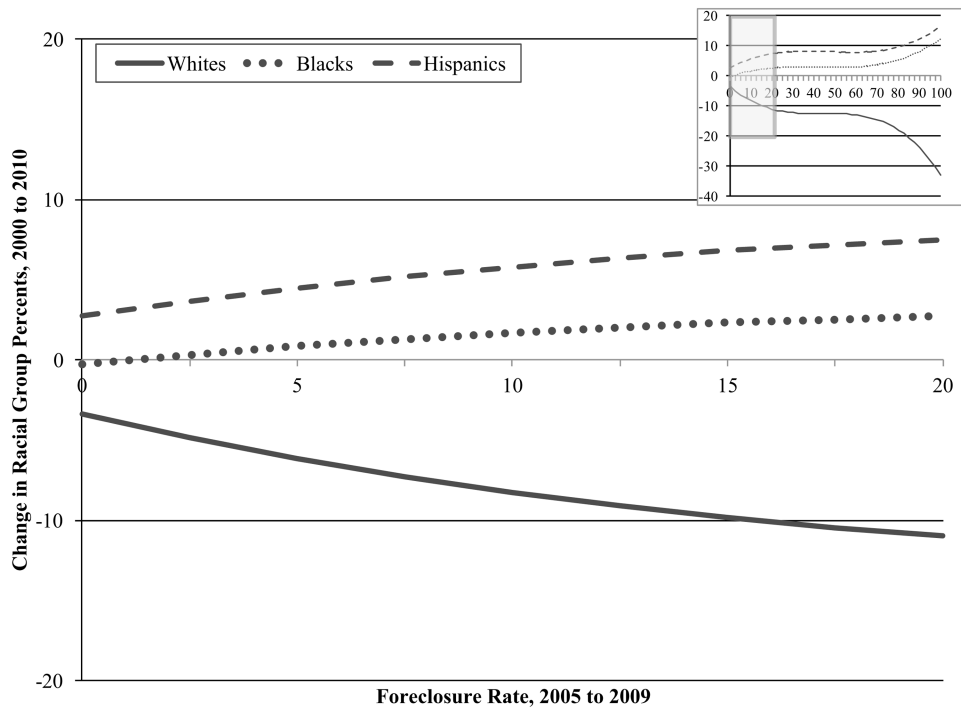


Figure 1. Association between Neighborhood Foreclosure Rates and Racial-Group Change
Note: Predicted change based on Models 2 (for percent white), 5 (for percent black), and 8 (for percent Hispanic) in Table 2. The embedded figure in the top-right corner shows the association for the full distribution.

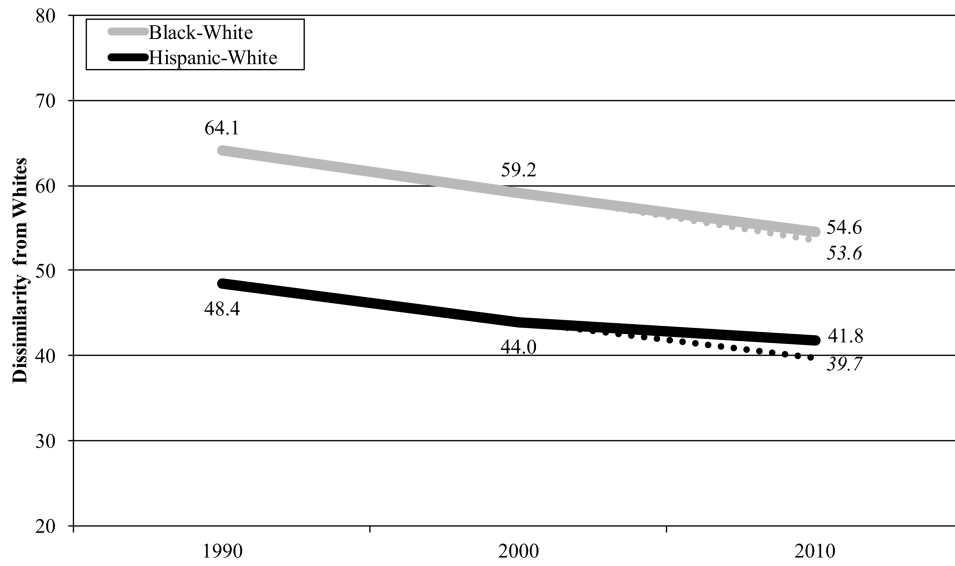


Figure 2. Observed and Simulated (Dotted) Dissimilarity Scores, 1990 to 2010

Note: Based on observed (solid) and simulated (dotted) block-group data; restricted to metros with more than 10,000 minority group members; unweighted means shown.

Table 1
Foreclosure Levels in 2005 to 2009, by Neighborhood Racial/Ethnic Structure in 2000

	Foreclosure Rate		Foreclosure Levels					
	Mean	SD	None (0%)	Low (<1%)	Moderate (1 to <5%)	High (5 to <10%)	Very High (10%+)	
All Neighborhoods	4.45	6.77	.09	.24	.41	.14	.12	
All White	2.31	3.38	.11	.32	.45	.09	.03	
Mostly Black	8.08	9.70	.05	.11	.35	.21	.27	
Mostly Hispanic	6.18	7.54	.08	.15	.36	.20	.21	
White-Shared	3.39	4.77	.08	.25	.46	.14	.07	
Black-White	4.40	6.71	.09	.25	.40	.15	.12	
Hispanic-White	7.26	9.13	.05	.13	.37	.21	.24	
Asian-White	1.99	2.62	.15	.33	.42	.08	.02	
White-Mixed	5.90	7.96	.07	.18	.38	.19	.18	
All Minority	6.43	7.83	.11	.16	.31	.19	.23	
Integrated	8.55	9.61	.08	.15	.27	.19	.31	

Note: We include block groups with total populations of at least 20 in 1990, 2000, and 2010 that were located in the 291 metropolitan areas with complete foreclosure data in 2005.

Table 2
Average Marginal Effects from Multilevel Regression Models of Change in Racial Group Neighborhood Shares, 2000 to 2010

	Change in Percent White			Change in Percent Black			Change in Percent Hispanic		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Foreclosure Rate, 2005 to 2009	-.517*** (.009)	-.517*** (.009)	-.523*** (.011)	.214*** (.007)	.212*** (.007)	.212*** (.008)	.326*** (.007)	.323*** (.007)	.334*** (.008)
Racial Change, 1990 to 2000	.198*** (.002)	.187*** (.002)	.184*** (.002)	.208*** (.002)	.204*** (.002)	.187*** (.002)	.157*** (.002)	.150*** (.002)	.141*** (.002)
Neighborhood Racial Structure, 2000	Y	Y	Y	Y	Y	Y	Y	Y	Y
Neighborhood SES Change, 1990 to 2000		Y	Y		Y	Y		Y	Y
Metro Racial Change and Foreclosures		Y	Y		Y	Y		Y	Y
State Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Foreclosure × Racial Structure									
All White			-.578*** (.022)			.186*** (.018)			.352*** (.017)
Mostly Black			-.268*** (.016)			.234*** (.013)			.014 (.013)
Mostly Hispanic			-.331*** (.025)			-.013 (.020)			.423*** (.020)
White-Shared			-.585*** (.022)			.246*** (.018)			.348*** (.018)
Black-White			-.850*** (.023)			.701*** (.018)			.185*** (.020)
Hispanic-White			-.405*** (.013)			.051*** (.011)			.346*** (.010)
Asian-White			-.426*** (.079)			.234*** (.063)			.429*** (.062)
White-Mixed			-.505*** (.018)			.119*** (.014)			.458*** (.014)
All Minority			-.183*** (.036)			-.167*** (.029)			.469*** (.028)
Integrated			-.285*** (.036)			-.040 (.029)			.447*** (.029)
N of Block Groups (Metros)		127,271 (291)		112,788 (177)			116,141 (191)		

Note: Foreclosure rate is expressed as a cubic polynomial in all models; we include block groups with total populations of at least 20 in 1990, 2000, and 2010 that were located in metropolitan areas with complete foreclosure data in 2005 and had racial group populations of at least 10,000.

* $p < .05$;

** $p < .01$;

$p < .000$ (two-tailed tests).

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Table 3
Average Marginal Effects from Multilevel Regression Models of Change in Racial Group Neighborhood Population, 2000 to 2010

	Change in White Population			Change in Black Population			Change in Hispanic Population		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Foreclosure Rate, 2005 to 2009	-3.192*** (.498)	-2.576*** (.500)	-3.630*** (.611)	2.289*** (.206)	2.304*** (.208)	2.152*** (.250)	5.824*** (.275)	5.891*** (.278)	5.505*** (.335)
Racial Change, 1990 to 2000	.057*** (.003)	.047*** (.003)	.046*** (.003)	.166*** (.003)	.165*** (.003)	.157*** (.003)	.232*** (.004)	.231*** (.004)	.226*** (.004)
Neighborhood Racial Structure, 2000	Y	Y	Y	Y	Y	Y	Y	Y	Y
Neighborhood SES Change, 1990 to 2000		Y	Y		Y	Y		Y	Y
Metro Racial Change and Foreclosures		Y	Y		Y	Y		Y	Y
State Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Foreclosure × Racial Structure									
All White			1.626 (1.268)			3.049*** (.536)			5.533*** (.718)
Mostly Black			1.572 (.954)			-2.717*** (.388)			2.174*** (.535)
Mostly Hispanic			-11.637*** (1.474)			-1.269* (.596)			12.676*** (.820)
White-Shared			-4.295** (1.292)			2.037*** (.545)			4.846*** (.728)
Black-White			-4.499** (1.331)			9.608*** (.542)			5.079*** (.828)
Hispanic-White			-10.745*** (.774)			.058 (.326)			6.206*** (.432)
Asian-White			-18.829 (9.169)			-.081 (1.910)			-1.733 (2.581)
White-Mixed			-6.151*** (1.047)			1.273** (.429)			5.788*** (.585)
All Minority			3.906 (2.098)			1.833* (.858)			12.036*** (1.169)
Integrated			-10.708*** (2.130)			-.259 (.871)			8.428*** (1.186)
N of Block Groups (Metros)		127,271 (291)		112,788 (177)			116,141 (191)		

Note: Foreclosure rate is expressed as a cubic polynomial in all models; we include block groups with total populations of at least 20 in 1990, 2000, and 2010 that were located in metropolitan areas with complete foreclosure data in 2005 and had racial group populations of at least 10,000.

$p < .001$ (two-tailed tests).

$.10 > d$

**

$.50 > d$

*

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Table 4
Simulated Residential Segregation in 2010

	Observed Dissimilarity	Simulated Dissimilarity	Implied Foreclosure Effect
Black-White <i>D</i> (<i>N</i> = 177)	.546	.536	.011
Region			
Northeast	.633	.651	-.018
Midwest	.620	.633	-.013
South	.502	.490	.011
West	.480	.403	.077
Metro Percent Black (2000)			
Less than 5 percent	.491	.423	.068
5 to 10 percent	.554	.536	.018
10 to 20 percent	.575	.593	-.018
Over 20 percent	.527	.520	.007
Hispanic-White <i>D</i> (<i>N</i> = 191)	.418	.397	.021
Region			
Northeast	.531	.555	-.024
Midwest	.425	.422	.002
South	.410	.347	.063
West	.378	.361	.016
Metro Percent Hispanic (2000)			
Less than 5 percent	.394	.359	.035
5 to 10 percent	.419	.392	.027
10 to 20 percent	.430	.430	.000
Over 20 percent	.450	.445	.005

Note: *D* refers to metropolitan dissimilarity.

Table A1
Average Racial/Ethnic Composition by Type, 2000

Racial/Ethnic Type	Mean Neighborhood Percent			
	White	Black	Asian	Hispanic
All White	95.0	1.1	1.0	1.8
Mostly Black	5.5	88.8	.5	3.4
Mostly Hispanic	9.1	3.8	1.8	84.2
White-Shared	85.4	3.6	3.4	5.0
White-Black	62.5	29.9	1.8	3.4
White-Hispanic	63.0	3.1	3.0	28.1
White-Asian/Asian	66.0	2.7	22.9	5.2
White-Mixed	42.2	18.2	10.6	25.5
All Minority	4.3	38.7	8.9	45.6
Integrated	32.6	20.0	18.6	24.3

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Table A2
Coefficients and Standard Errors for Controls in Models of Neighborhood Racial Change

	Percent White	Percent Black	Percent Hispanic	White Population	Black Population	Hispanic Population
Median family income change, 1990 to 2000 (in \$1,000s)	.017*** (.001)	-.009*** (.001)	-.013*** (.001)	1.442*** (.076)	-.062 (.032)	-.287*** (.043)
Poverty rate change, 1990 to 2000	-.024*** (.003)	.019*** (.002)	.016*** (.002)	-1.456*** (.148)	-.169** (.064)	-.521*** (.086)
Ownership rate change, 1990 to 2000	.016*** (.002)	-.006*** (.002)	-.002*** (.002)	.299* (.133)	-.159** (.057)	-.310*** (.076)
Metro foreclosure rate, 2005 to 2009	.191 (.134)	-.167*** (.040)	-.126*** (.022)	-4.127* (1.682)	-1.729** (.666)	-2.984*** (.759)
Metro racial-group change, 1990 to 2000 ^a	.005*** (.000)	.008*** (.001)	.006*** (.000)	.204** (.060)	.178*** (.031)	.031* (.002)

Note: Models correspond with the “final” models for each group shown in Tables 2 and 3 and include state fixed effects.

^a Metro racial change during the 1990s is expressed in 1,000s for models predicting change in group counts (last three columns).