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Growth in the Residential Segregation of Families by Income, 1970-2009

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Report Abstract

As overall income inequality grew in the last four decades, high- and low-income families have become increasingly less likely to live near one another. Mixed income neighborhoods have grown rarer, while affluent and poor neighborhoods have grown much more common. In fact, the share of the population in large and moderate-sized metropolitan areas who live in the poorest and most affluent neighborhoods has more than doubled since 1970, while the share of families living in middle-income neighborhoods dropped from 65 percent to 44 percent. The residential isolation of the both poor and affluent families has grown over the last four decades, though affluent families have been generally more residentially isolated than poor families during this period. Income segregation among African Americans and Hispanics grew more rapidly than among non-Hispanic whites, especially since 2000. These trends are consequential because people are affected by the character of the local areas in which they live. The increasing concentration of income and wealth (and therefore of resources such as schools, parks, and public services) in a small number of neighborhoods results in greater disadvantages for the remaining neighborhoods where low- and middle-income families live.

More Unequal and More Separate: Growth in the Residential Segregation of Families by Income, 1970-2009

Summary of Major Findings

- From 2000 to 2007, family income segregation grew significantly in almost all metropolitan areas (in 89 percent of the large and moderate-sized metropolitan areas). This extends a trend over the period 1970-2000 during which income segregation grew dramatically. In 1970 only 15 percent of families were in neighborhoods that we classify as either *affluent* (neighborhoods where median incomes were greater than 150 percent of median income in their metropolitan areas) or *poor* (neighborhoods where median incomes were less than 67 percent of metropolitan median income). By 2007, 31 percent of families lived in such neighborhoods.

- The affluent are more segregated from other Americans than the poor are. That is, high-income families are much less likely to live in neighborhoods with middle- and low-income families than low-income families are to live in neighborhoods with middle- and high-income families. This has been true for the last 40 years.

- Income segregation among black and Hispanic families increased much more than did income segregation among white families from 1970 to 2007. Notably, income segregation among black and Hispanic families grew very sharply from 2000 to 2007. Income segregation among black and Hispanic families is now much higher than among white families.

Introduction

In every city or metropolitan area in the U.S., there are some neighborhoods inhabited primarily by families with above-average income and wealth, and other neighborhoods that are home primarily to families with below average income and wealth. The extent to which neighborhoods within a city or metropolitan area differ in their average income levels, however, varies considerably among U.S. metropolitan areas. More importantly, the extent of this economic variation among neighborhoods has grown substantially over the last 40 years.

In this research brief, we refer to the uneven geographic distribution of families of different income levels within a metropolitan area as "family income segregation" or, more simply, "income segregation."[1] This brief describes recent trends in residential family income segregation within large and moderate-sized metropolitan areas (those with populations of at least 500,000 in 2007). Although prior studies described the trends in income segregation from 1970-2000 (Jargowsky, 1996; Reardon & Bischoff, 2011; Watson, 2009; Yang & Jargowsky, 2006), the analyses here are the first to show how family income segregation patterns have changed since 2000. We focus on the segregation of families by income here primarily because we are interested in children's neighborhood contexts.[2] Income segregation is particularly salient for children because it leads to disparities in social context and access to public goods that are particularly relevant for children, such as educational opportunities and school quality.

Prior research has shown that average levels of overall family income segregation in metropolitan areas changed little in the 1970s and 1990s but grew significantly in the 1980s. Among black families, however, income segregation increased substantially in the 1970s and

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[1] Note that the term "segregation" should be understood here as a *description* of the extent to which families of different incomes live in different neighborhoods than one another; it is not meant to imply any particular

[2] In U.S. Census data, not all persons are counted as members of "families." Persons living alone or with unrelated individuals are counted as members of "households," but not as members of "families." Children, however, generally live in "families" as defined by the Census.

1980s before declining modestly in the 1990s. These trends appear to be explained in large part by patterns of rising income inequality—growing income inequality implies a growing disparity in what high- and low-income families can afford to pay for housing, which leads to increased residential sorting by income (Reardon & Bischoff, 2011; Watson, 2009).

In this brief, we extend and expand these prior studies in several ways. First, we describe trends in income segregation over the last four decades. We use the most recent American Community Survey (ACS) data—which provides tract-level tabulations of families by income level for the period 2005-2009—to estimate recent income segregation levels in all metropolitan areas with at least 500,000 residents. Because the ACS data were collected from 2005-2009 and cannot be disaggregated by year, the income segregation patterns we describe largely reflect patterns prior to the housing market collapse and economic crisis that began in 2008. Although it would be very useful to investigate post-2008 patterns of income segregation, the data needed to describe how income segregation patterns may have changed as a result of the housing crisis and recession will not be available for several years (e.g., ACS tabulations covering the 2008-2012 period will be available in late 2013).

Second, we report trends in income segregation among all families (1970-2005/09) as well as among white families (1970-2005/09), black families (1970-2005/09), and Hispanic families (1980-2005/09) separately. When we describe income segregation within a given racial group, we are referring to the extent to which high- and low-income members of a given racial group tend to live in different neighborhoods. An understanding of how within-group segregation has changed is useful for thinking about the processes that affect trends in income segregation (such as the rise of the black middle class, or changes in mortgage lending practices that impact specific race groups). Third, we describe recent trends in the segregation of poverty

(the extent to which the lowest-income families are isolated from middle- and upper-income families) and the segregation of affluence (the extent to which the highest-income families are isolated from middle- and lower-income families).

Why Does Income Segregation Matter?

As anyone who has ever bought or rented a home knows, housing prices and rental costs are spatially patterned. People select where to live in large part based on their ability to afford housing in a particular area and, conditional on that, their preferences for location and neighborhood amenities, such as schools, parks, safety, and proximity to work. Because the ability to afford housing in a given community or neighborhood is tied to income, the fact that some families have more or less income than others leads to a some residential sorting of families by income: high-income families tend to live in neighborhoods with other high-income families; low-income families tend to live in neighborhood with other low-income families. The linkage between a family's income and the income of its neighbors is not perfect, however. There are many factors that determine how segregated a region may be by income, including the extent of income inequality in a region; patterns of family residential preferences; the location of cultural, institutional, and environmental amenities; patterns of suburbanization; the extent of family income volatility; variation in the type and quality of housing stock; and zoning and housing policies (Jargowsky, 1996; Reardon & Bischoff, 2011; Watson, 2009; Yang & Jargowsky, 2006).

Income segregation may lead to inequality in social outcomes. Income segregation implies, by definition, that lower-income households will live in neighborhoods with lower average incomes than do higher-income households. A large body of research suggests that the

neighborhood context one lives in can directly affect that person's social, economic, or physical outcomes (and a large range of sociological theories predict such contextual effects; see, for example, Burdick-Will et al., 2011; Jencks & Mayer, 1990; Leventhal & Brooks-Gunn, 2000; Sampson, Raudenbush, & Earls, 1997). For instance, living in a severely disadvantaged neighborhood context is associated with a loss in learning equivalent to a full year of school among black children (Sampson, Sharkey, & Raudenbush, 2008) and lowers high school graduation rates by as much as 20 percentage points (Wodtke, Harding, & Elwert, 2011). Moreover, neighborhood violent crime rates as well as the prevalence of neighborhood associations are robust predictors of birth weight, an important health outcome among infants (Morenoff 2003). This suggests that income segregation will lead to more unequal outcomes between low- and high-income households than their differences in income alone would predict because households are also influenced by the incomes of others in their community.

There are a number of ways in which income segregation may exacerbate the economic advantages of high-income families and the economic disadvantages of low-income families. The quality of public goods and local social institutions, such as schools, are affected by a jurisdiction's tax base and by the involvement of the community in the maintenance and investment of these public resources. Higher-income neighborhoods often have more green space, better-funded schools, better social services, and more of any number of other amenities that affect quality of life. Income segregation creates disparities in these public goods and amenities across high- and low-income communities, meaning that low-income families have decreased access to such resources. This limits opportunities of low-income children for upward social and economic mobility and reinforces the reproduction of inequality over time and across generations (Durlauf, 1996). Conversely, greater dispersion of high-income households

throughout a region (i.e., lower income segregation), is likely to lead to greater public and private investment in broadly accessible social services, public goods, and neighborhood amenities. This would lead to more equal patterns of opportunity, particularly for children, for whom neighborhood context and local institutions (such as schools) are particularly important.

Data

To measure income segregation levels, we use U.S. Census data from the 1970 Summary Tape Files 3A, the 1980 Summary Tape Files 3A, the 1990 Summary Tape Files 4A, and the 2000 Summary Files 3A (GeoLytics, 2004; Minnesota Population Center, 2004). The most recent data we use are from the American Community Survey (ACS) 5-year estimates for 2005-2009. We measure segregation among neighborhoods within metropolitan areas, using census tract boundaries to approximate "neighborhoods."[3] The 2000 Census marked the last available point-in-time estimates for small geographic units, such as tracts. The ACS, which provides annual data for larger geographic areas such as states and some counties, provides rolling five-year average estimates for minor geographic units, such as tracts, due to smaller sample sizes within any given year. Because our analyses require the use of tract-level data, we use 2005-2009 estimates, the first available small-geography data from the ACS. The interpretations of the 2005-2009 data points, therefore, are slightly different than for the previous decennial estimates because they represent averages instead of sharp cross-sections. To simplify our language in the remainder of the brief, we refer to the 2005-2009 period as 2007, the midpoint of the time period during which the 2005-2009 ACS data were gathered.

We restrict our analyses here to 117 large and moderate-sized metropolitan areas (those

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[3] Census tracts are small subdivisions of a county. They usually have between 2,500 and 8,000 persons and are designed to approximate neighborhoods. See http://www.census.gov/geo/www/cen_tract.html.

with total populations of 500,000 or more in 2007).[4] These metropolitan areas were home to 197

million people in 2007, roughly two thirds (65 percent) of the total US population (and 78

percent of the total population living in metropolitan areas).[5] Though we use all 117

metropolitan areas for our overall calculations of income segregation, we must omit metropolitan

areas in the group-specific analyses that have very small group-specific populations because we

cannot compute accurate measures of income segregation in such places. Following Jargowsky

(1996), we include in our within-racial/ethnic group income segregation analyses only

metropolitan areas in which there were at least 10,000 families of a given group in all relevant

years from 1970-2007 (or from 1980-2007 for Hispanic families, as the Census did not provide a

Hispanic category in 1970). This creates a stable sample of metropolitan areas to compare over

time. Of the 117 metropolitan areas with 500,000 or more residents in 2007, 65 had at least

10,000 black families in each year from 1970-2007 and 37 had at least 10,000 Hispanic families

in each year from 1980-2007 (all had at least 10,000 white families in each year).

We focus in this brief on the income segregation of *families* rather than *households*. We

do this for two reasons. First, as we stated above, income segregation is particularly salient for

children because of the importance of resources and neighborhood context for early development

(Leventhal & Brooks-Gunn, 2000; Wodtke, et al., 2011). In Census tabulations, children are

embedded in families whereas households may contain just one adult or groups of unrelated

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[4] Reardon and Bischoff (2011) show that income segregation was lower and grew less from 1970-2000 in
small metropolitan areas than in large ones. Because there is less geographic area in small metropolitan
areas, the possibility for spatial separation between high and low-income families is more constrained.
[5] We use the OMB June, 2003 metropolitan area definitions, the first definitions based on the 2000 Census, to
define metropolitan areas (see http://www.census.gov/population/metro/index.html). We use these same
definitions in each year 1970-2007, to ensure comparability over time. In cases where a metropolitan area is
comprised of multiple metropolitan divisions, we treat each division as a distinct metropolitan area (e.g., the
New York-Newark-Edison, NY-NJ-PA metropolitan area is made up of four metropolitan divisions: the New
York-Wayne-White Plains NY-NJ; Newark-Union NJ-PA; Edison, NJ; and Suffolk County-Nassau County, NY
metropolitan divisions, each of which we treat as a separate metropolitan area). The 117 metropolitan areas
with population of at least 500,000 in 2007 range in population from 11.6 million (New York-White Plains,
NY-NJ) to 505,000 (Modesto, CA).

adults, so families are the relevant unit if our interest is in children's experiences. Second, income data for households by race is unavailable for all Census years.

Measuring Income Segregation

Income segregation—the extent to which high- and low-income families live in separate neighborhoods—can be measured in a number of ways. In this brief, we report four different measures of income segregation, each of which has a somewhat different interpretation. First, we compute the proportions of families who live in several categories of high-, moderate-, or low-income neighborhoods. Specifically, for each neighborhood (census tract) in each metropolitan area, we compute the ratio of the neighborhood median family income to the metropolitan area median income. We use this ratio to classify neighborhoods as *poor* (median income ratio < 0.67), *low income* (ratio between 0.67 and 0.80), *low-middle income* (ratio between 0.80 and 1.0), *high-middle income* (ratio between 1.0 and 1.25), *high income* (ratio between 1.25 and 1.5), or *affluent* (ratio > 1.5). We then compute the proportion of families in each metropolitan area who live in each of these six categories of neighborhoods. In a highly-segregated metropolitan area, many families will live in *poor* or *affluent* neighborhoods and relatively few will live in middle-income neighborhoods. Thus, we add together the proportion of families living in poor and affluent neighborhoods to construct a measure of income segregation.

Note that this definition of neighborhood poverty and affluence is defined relative to the median income of the metropolitan area. A typical metropolitan area in 2007 had a median family income of roughly $75,000; in such a metropolitan area, a poor neighborhood (by our definition here) would be one in which more than half the families had incomes below $50,000;

an affluent neighborhood would be one in which more than half the families had incomes above $112,500. The advantage of this measure is that it is relatively intuitive and readily interpretable. Two disadvantages of this measure are that it relies on somewhat arbitrary definitions of neighborhood poverty and affluence and that it may confound changes in income inequality with changes in segregation. If every family stayed in the same neighborhood but income inequality grew (high-income families' incomes rose while low-income families' incomes declined), we would observe an increase in the number of poor and affluent neighborhoods, simply because median incomes would rise, on average, in higher-income neighborhoods and decline in lower-income neighborhoods.

The second measure of income segregation that we report here—the *rank-order information theory index* (denoted *H*)—is somewhat less intuitive than the first measure, but does not confound changes in income inequality with changes in income segregation (Reardon, 2011; Reardon & Bischoff, 2011). This measure compares the variation in family incomes within census tracts to the variation in family incomes in the metropolitan area. It can range from a theoretical minimum of 0 (no segregation) to a theoretical maximum of 1 (total segregation). In a hypothetical metropolitan area in which the income distribution among families within every census tract was identical (and therefore identical to the overall metro income distribution), the index would equal 0, indicating no segregation by income. In such a metropolitan area, a family's income would have no correlation with the average income of its neighbors. In contrast, in a hypothetical metropolitan area in which each tract contained families of only a single income level, the index would equal 1. In such a metropolitan area, segregation would be at its absolute maximum; no family would have a neighbor with a different income than its own. Although the magnitude of *H* does not have a particularly intuitive meaning,

differences in H between metropolitan areas or changes over time indicate where and when segregation is higher or lower. Moreover, H is not influenced by the level of income inequality in a metropolitan area, so it more accurately measures the extent to which families of different incomes are sorted among neighborhoods than does our first measure.[6]

The third and fourth measures that we report describe the extent to which either low- or high-income families are segregated from all other families. The *segregation of poverty* (denoted $H10$) is measured by using a variant of the H that describes the extent to which the lowest-earning families (specifically, the bottom 10 percent) in a metropolitan area live in separate neighborhoods from all other, higher-earning families (the remaining 90 percent). Likewise, the *segregation of affluence* (denoted $H90$) describes the extent to which the highest-earning families (the top 10 percent) in a metropolitan area live in separate neighborhoods from all other, lower-earning families (the remaining 90 percent).

Together, these four measures of income segregation provide a detailed picture of how income segregation varies among metropolitan areas and how it has changed over the last four decades.

Trends in Income Segregation

We now turn to the results of our analyses. We begin by describing trends in the proportions of families who lived in neighborhoods with high-, moderate-, or low-income neighborhoods from 1970-2007. We then describe trends in the segregation of high-income families and of low-income families. Third, we describe overall and racial/ethnic group-specific income segregation from 1970-2007 using the rank-order information theory index. Finally, we
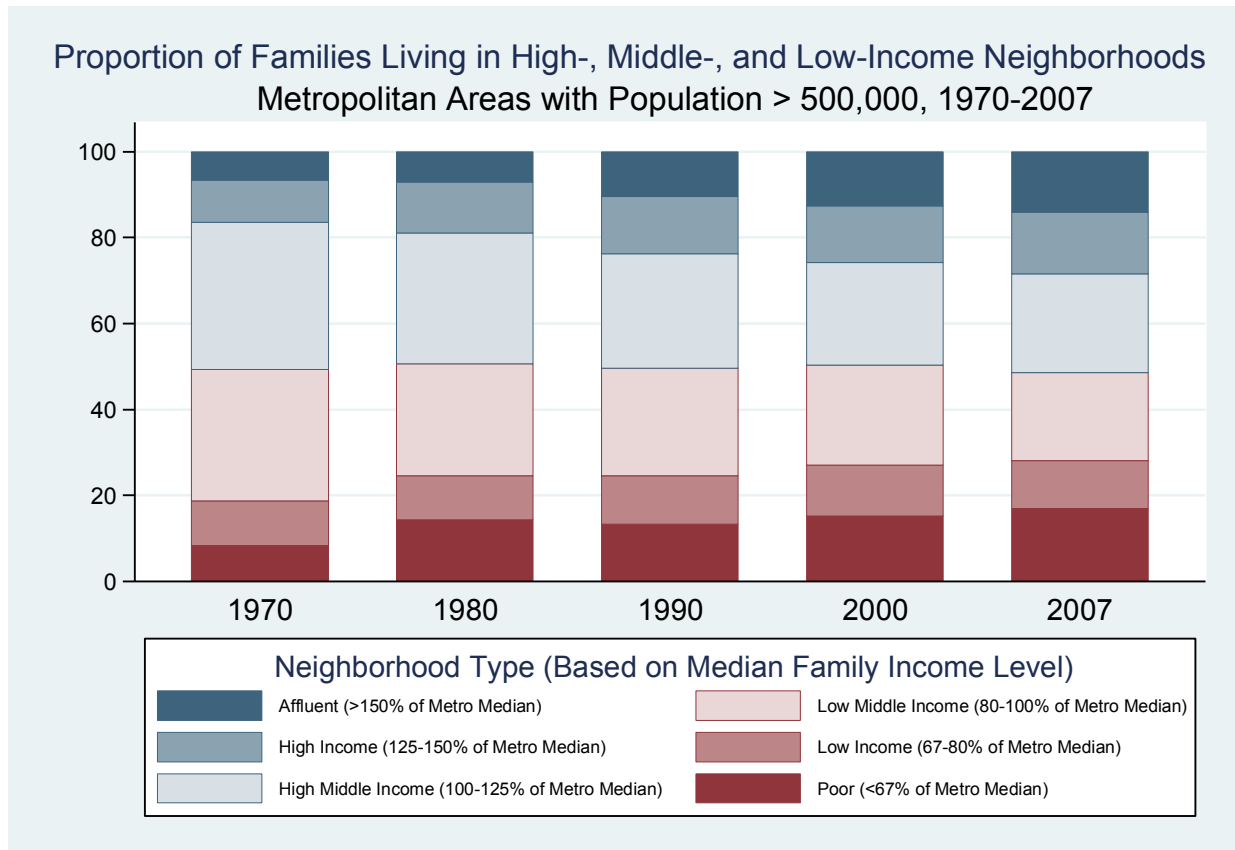
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[6] We describe the technical details of calculating the rank-order information theory income segregation index in the appendix.

provide lists of the most and least segregated metropolitan areas and of the metropolitan areas

that have experienced the largest changes in income segregation. We conclude with a brief

discussion of some possible reasons for the observed trends.

How has the proportion of families living in poor and affluent neighborhoods changed since 1970?

Figure 1 shows the proportion of families that reside in six categories of high-, middle-,

and low-income neighborhoods from 1970-2007. The figure clearly shows a steady decline in

the proportion of families living in middle-class neighborhoods from 1970-2007, and a

corresponding increase in the number of families in neighborhoods at the extremes of the

neighborhood income distribution. In 1970, 65 percent of families lived in "middle-income"

neighborhoods (neighborhoods in one of the two middle categories); by 2007, only 44 percent of

families lived in such neighborhoods. The proportion of families living in affluent

neighborhoods doubled from 7 percent in 1970 to 14 percent in 2007.   Likewise, the proportion

of families in poor neighborhoods doubled from 8 percent to 17 percent over the same period.

Thus, only 15 percent of families in 1970 lived in one of the two extreme types of

neighborhoods, but by 2007 that number had more than doubled to 31 percent of families.

Figure 1

Proportion of Families Living in High-, Middle-, and Low-Income Neighborhoods
Metropolitan Areas with Population > 500,000, 1970-2007

Neighborhood Type (Based on Median Family Income Level)

Affluent (>150% of Metro Median)

High Income (125-150% of Metro Median)

High Middle Income (100-125% of Metro Median)

Low Middle Income (80-100% of Metro Median)

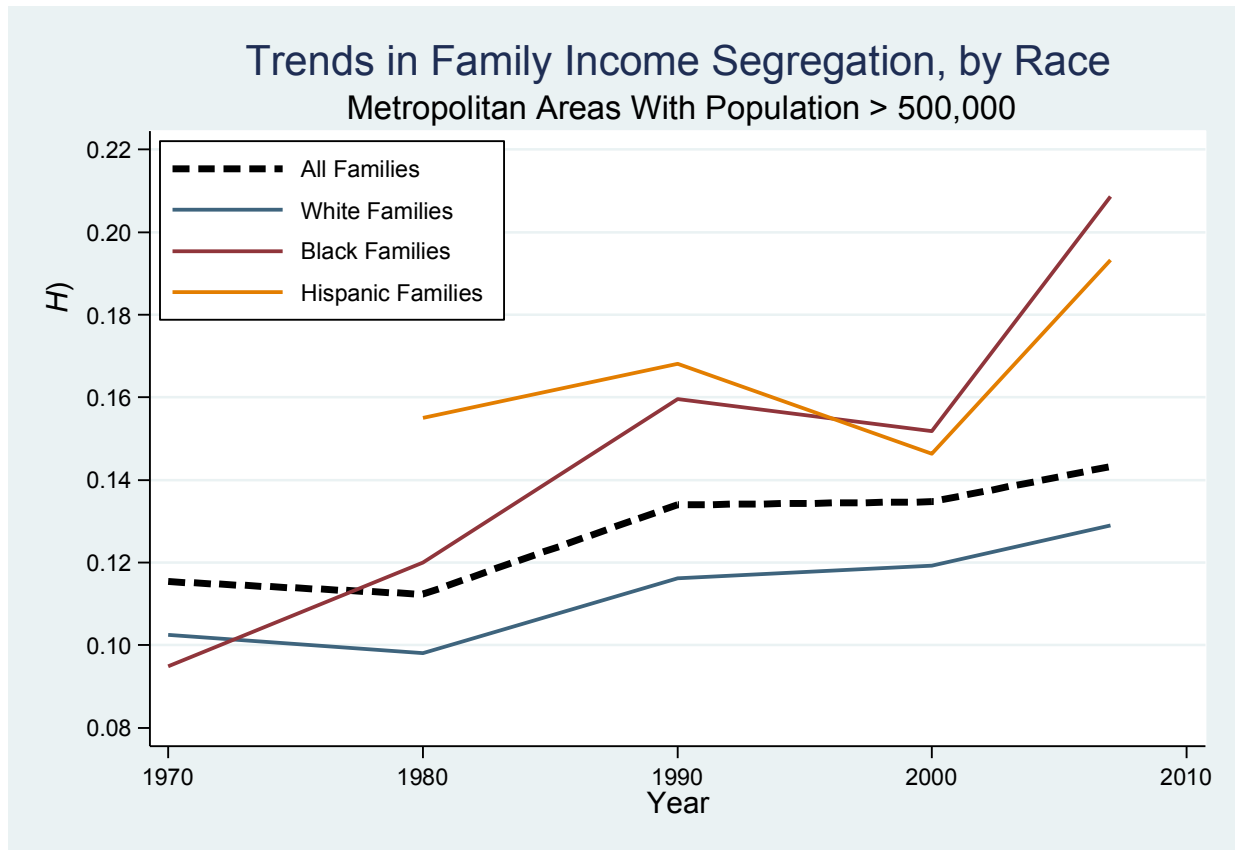Low Income (67-80% of Metro Median)

Poor (<67% of Metro Median)

Source: Authors' tabulations of data from U.S. Census (1970-2000) and American Community Survey (2005-2009). Proportions based on all families in 117 metropolitan areas with at least 500,000 residents in 2007.

By this measure, income segregation grew significantly from 1970-2007. Moreover, family income segregation grew in every decade from 1970-2007. The proportion in poor or affluent neighborhoods increased by 6.6 percentage points in the 1970s, by 2.3 percentage points in the 1980; by 4.2 percentage points in the 1990s, and by 3.2 percentage points from 2000-2007 (see Appendix Table A1 for details). Because only seven years elapsed between the 2000 Census and the 2007 ACS, however, the rate of growth in segregation in recent years was actually faster than in the 1980s and 1990s (if the 3.2 percentage point change from 2000-2007 is annualized, it corresponds to a change of 4.6 percentage points over a decade).

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How has residential segregation by family income changed since 1970?

Figure 2 shows the trend in average segregation, as measured by H, from 1970 to 2007 in the 117 large and moderate-sized metropolitan areas. In addition to showing the trend in income segregation for the full population of families, Figure 2 shows trends in income segregation among white, black, and Hispanic families separately. Segregation by income among all families was 0.115 in 1970 and 0.143 in 2007, an increase of 0.028 (see Appendix Table A2 for details). In the metric of H, this is a substantial change, roughly equal to a one-standard deviation increase (the standard deviation of H was 0.027 in 1970). Note that, by this measure, segregation of families by income changed little in the 1970s or 1990s but grew substantially in the 1980s (from 0.112 in 1980 to 0.134 in 1990) and grew again in the 2000s (from 0.135 to 0.143). One reason the trend in income segregation as measured by H appears different from the trend in the proportion of families in poor and affluent neighborhoods is that H measures the extent of income segregation, independent of income inequality, while the other measure does not.

Figure 2

Trends in Family Income Segregation, by Race

Metropolitan Areas With Population > 500,000

Source: Authors' tabulations of data from U.S. Census (1970-2000) and American Community Survey (2005-2009). Averages include all metropolitan areas with at least 500,000 residents in 2007 and at least 10,000 families of a given race in each year 1970-2007 (or each year 1980-2007 for Hispanics). This includes 117 metropolitan areas for the trends in total and white income segregation, 65 metropolitan areas for the trends in income segregation among black families, and 37 metropolitan areas for the trends in income segregation among Hispanic families. Note: the averages presented here are unweighted. The trends are very similar if metropolitan areas are weighted by the population of the group of interest.

The trends in income segregation among black and Hispanic families are much more striking than those among white families, which mirror those of all families. Segregation by income among black families was lower than among white families in 1970, but grew four times as much between 1970 and 2007. By 2007, income segregation among black families was 60 percent greater than among white families. Although income segregation among blacks grew

substantially in the 1970s and 1980s, it grew at an ever faster rate from 2000 to 2007, after declining slightly in the 1990s. Indeed, in the seven years from 2000 to 2007, income segregation among black families grew by over 1.5 standard deviations (the 2000 standard deviation of income segregation among blacks was 0.036; the change from 2000-2007 was 0.057).
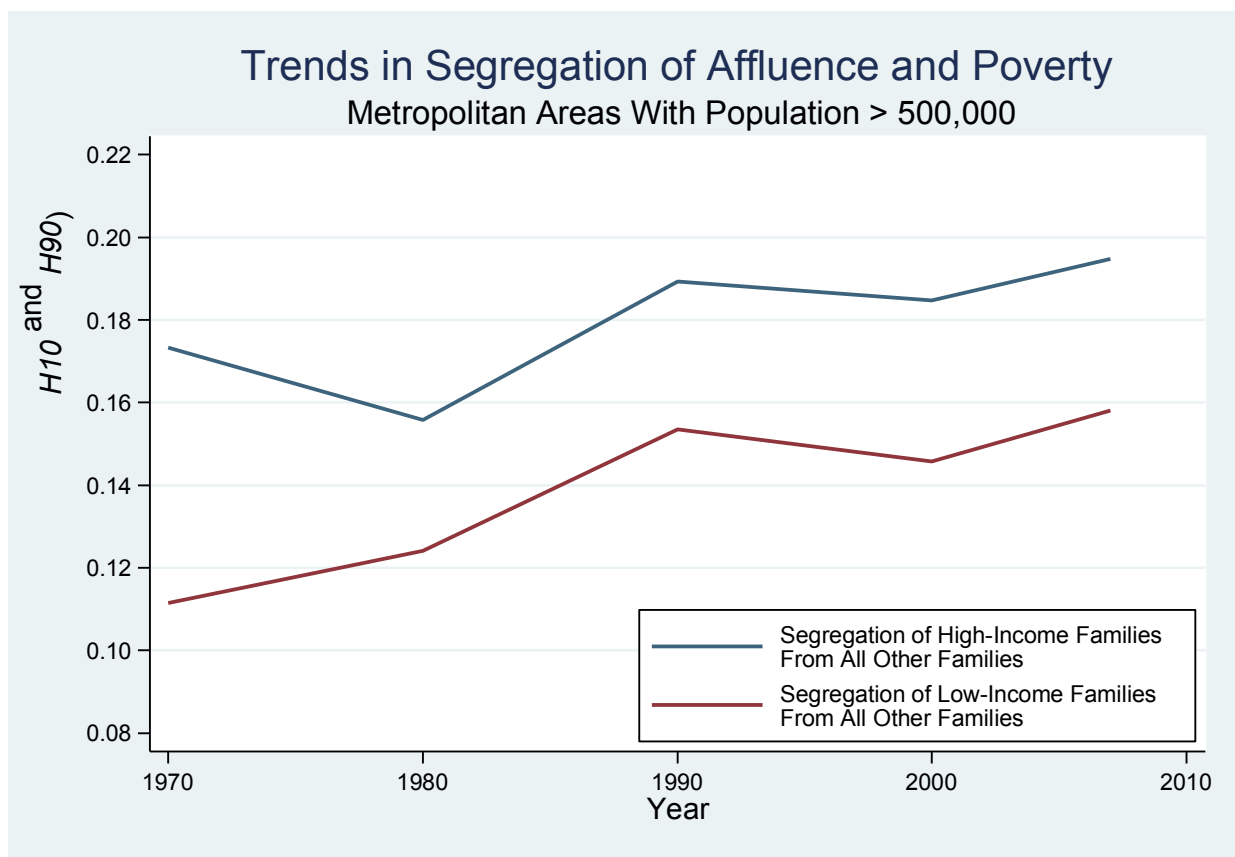
The trend in income segregation among Hispanic families is similar to that among black families, though the growth of Hispanic income segregation in the 1980s and 2000s was somewhat less than the growth for black families during those time periods, and the decline of segregation among Hispanic families was greater in the 1990s than among black families. In the 2000s, income segregation among Hispanic families grew roughly one standard deviation (by 0.047 points, compared to a 2000 standard deviation of 0.044).

How has the residential segregation of the affluent and the poor changed since 1970?

Another way to examine income segregation is to examine the extent to which very high-income or very low-income families are isolated from other families within a metropolitan area. Figure 3 displays the trends in the extent of segregation of affluence ($H90$) and segregation of poverty ($H10$) from 1970 through 2007. In all years, the segregation of affluence (the extent to which the 10 percent of families with the highest incomes in a metropolitan area are isolated from all lower-income families) is considerably higher than the segregation of poverty (the extent to which the 10 percent of families with the lowest incomes in a metropolitan area are isolated from all higher-income families). Moreover, the trends in both the segregation of

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poverty and affluence have followed a similar pattern for the last 30 years (though in the 1970s, the segregation of the poor grew rapidly while the segregation of the rich declined substantially). In the 2000s, both high- and low-income families became increasingly isolated from all other families, reversing the pattern of declining isolation of the 1990s (see Jargowsky, 2003, for a discussion of the decline in concentrated poverty in the 1990s).

Figure 3

Source: Authors' tabulations of data from U.S. Census (1970-2000) and American Community Survey (2005-2009). Averages include all metropolitan areas with at least 500,000 residents in 2007. High-income families are those with incomes at or above the 90th percentile of the income distribution within a given metropolitan area; low-income families are those within incomes below the 10th percentile of the income distribution with a given metropolitan area. Note: the averages presented here are unweighted. The trends are very similar if metropolitan areas are weighted by the population of the group of interest.

Most Segregated Metropolitan Areas

It is useful to examine the segregation levels in the 117 metropolitan areas because averages obscure extreme values and do not help us to understand the types of metropolitan areas that are highly segregated by income. Table 1 lists the most segregated of the 117 large and moderate-sized metropolitan areas, ranked by their segregation levels (*H*) in 2007. Most of the metropolitan areas with high levels of income segregation are large metropolitan areas: among the 10 most segregated metropolitan areas are New York, Philadelphia, Dallas, Detroit, Houston, and Los Angeles. Conversely, although we do not show them here, most of the metropolitan areas with low levels of income segregation are relatively small: of the 10 least segregated metropolitan areas, only two (Nassau-Suffolk, NY and McAllen-Edinburg-Pharr, TX) have more than 600,000 residents. Three of the four most segregated metropolitan areas are in the New York City region—Bridgeport-Stamford-Norwalk, CT; New York-Wayne-White Plains, NY-NJ; and Newark-Union, NJ, and an additional three of the top 10 most segregated metropolitan areas are in Texas (Dallas-Plano-Irving, TX; Houston-Baytown-Sugar Land, TX; and Austin-Round Rock, TX). Philadelphia, PA; Memphis, TN-MS-AR; Detroit-Livonia-Dearborn, MI; and Los Angeles-Long Beach-Glendale, CA round out the top 10.[7]

In the second column of Table 1, we list the corresponding proportion of families who live in affluent or poor neighborhoods. This alternative measure of segregation is highly correlated with *H*, and so the ordering is largely the same, although it does not exactly match the ranking of cities by *H*. Strikingly, nine of the top 10 most segregated cities have over 40 percent of their families living in neighborhoods that represent the extremes of the income distribution.

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[7] Tables of segregation levels for all metropolitan areas are available online at the US2010 website, at http://www.s4.brown.edu/us2010/.

In New York-Wayne-White Plains, NY-NJ, half of all families live in poor or affluent

neighborhoods.

Table 1: Metropolitan Areas With the Highest Levels of Family Income Segregation, Ranked by Segregation Level (H), 2007

Rank	Metropolitan Area	Segregation (H)	Proportion in Poor or Affluent Neighborhoods
1	Bridgeport-Stamford-Norwalk, CT	0.221	44.4
2	New York-Wayne-White Plains, NY-NJ	0.209	50.2
3	Philadelphia, PA	0.208	42.9
4	Newark-Union, NJ-PA	0.206	43.6
5	Dallas-Plano-Irving, TX	0.203	45.1
6	Memphis, TN-MS-AR	0.196	43.5
7	Detroit-Livonia-Dearborn, MI	0.194	45.9
8	Houston-Baytown-Sugar, Land TX	0.188	46.1
9	Austin-Round Rock, TX	0.184	38.2
10	Los Angeles-Long Beach-Glendale, CA	0.181	45.7
11	Milwaukee-Waukesha-West Allis, WI	0.180	30.0
12	Denver-Aurora, CO	0.180	34.2
13	Lake County-Kenosha County, IL-WI	0.178	33.7
14	San Antonio, TX	0.176	39.2
15	Columbus, OH	0.175	32.1
16	Fresno, CA	0.175	47.8
17	Cleveland-Elyria-Mentor, OH	0.173	32.0
18	Baltimore-Towson, MD	0.172	29.1
19	Oakland-Fremont-Hayward, CA	0.171	37.0
20	Chicago-Naperville-Joliet, IL	0.170	32.8

Metropolitan Areas with the Largest Changes in Family Income Segregation

Table 2 lists the metropolitan areas that experienced the greatest changes in segregation levels

between 2000 and 2007. At the top of the list is the Detroit-Livonia-Dearborn, MI metropolitan

area, where income segregation increased by 0.032 points (more than a standard deviation) in

only seven years, moving Detroit up from 19th to 7th in the ranking of most segregated metros.

Three of the most segregated metropolitan areas in 2000 were also those that experienced the

greatest increase in segregation by 2007 (Bridgeport-Stamford-Norwalk, CT; Philadelphia, PA; and New York-Wayne-White Plains, NY-NJ). However, many of the metropolitan areas with the largest increases in segregation were relatively small metropolitan areas in the rust belt (Toledo, OH; Scranton-Wilkes-Barre, PA; Syracuse, NY; Youngstown, OH; Gary, IN; and Grand Rapids-Wyoming, MI), New England (Bridgeport-Stamford-Norwalk, CT; Essex County, MA; and New Haven-Milford, CT), and in Texas and the Southern Plains (Oklahoma City, OK; San Antonio, TX; Wichita, KS; and Tulsa, OK).

Table 2: Metropolitan Areas with the Largest Changes in Family Income Segregation, Ranked By Change in Segregation, 2000-2007

		Segregation (*H*)			Proportion in Poor or Affluent Neighborhoods		
Rank	Metropolitan Area	2000	2007	Change 2000-07	2000	2007	Change 2000-07
1	Detroit-Livonia-Dearborn, MI	0.162	0.194	+0.032	41.7	45.9	+4.2
2	Oklahoma City, OK	0.130	0.152	+0.022	22.2	31.2	+9.0
3	Toledo, OH	0.124	0.145	+0.021	24.5	24.9	+0.4
4	Greensboro-High Point, NC	0.120	0.141	+0.021	15.8	30.2	+14.5
5	Scranton--Wilkes-Barre, PA	0.064	0.085	+0.021	5.2	13.2	+8.0
6	Syracuse, NY	0.117	0.137	+0.020	18.6	21.4	+2.8
7	Bridgeport-Stamford-Norwalk, CT	0.201	0.221	+0.020	41.4	44.4	+3.1
8	San Antonio, TX	0.156	0.176	+0.020	35.2	39.2	+4.1
9	Youngstown-Warren-Boardman, OH-PA	0.095	0.114	+0.020	14.3	16.4	+2.1
10	Philadelphia, PA	0.189	0.208	+0.019	38.5	42.9	+4.4
11	Essex County MA	0.141	0.160	+0.019	29.5	30.6	+1.2
12	Gary, IN	0.110	0.129	+0.019	14.3	22.6	+8.2
13	Fresno, CA	0.157	0.175	+0.018	37.8	47.8	+10.0
14	New York-Wayne-White Plains, NY-NJ	0.192	0.209	+0.017	48.0	50.2	+2.2
15	Nashville-Davidson--Murfreesboro, TN	0.135	0.152	+0.017	20.6	28.1	+7.4
16	Wichita, KS	0.131	0.148	+0.017	18.8	25.1	+6.3
17	Tulsa, OK	0.135	0.152	+0.017	25.5	28.1	+2.6
18	New Haven-Milford, CT	0.137	0.153	+0.016	22.4	30.5	+8.1
19	Modesto, CA	0.083	0.100	+0.016	12.0	18.2	+6.2
20	Grand Rapids-Wyoming, MI	0.105	0.121	+0.016	15.7	20.9	+5.1

Among the 117 large and moderate-sized metropolitan areas, only 13 experienced a decline in family income segregation (as measured by *H*) from 2000-2007. Most of these were

in the South, and a number of them were very large metropolitan areas (Atlanta-Sandy Springs-Marietta, GA; Washington-Arlington-Alexandria, DC-VA-MD-WV; and Phoenix, AZ). Notably, the New Orleans-Metairie-Kenner, LA metropolitan area experienced the third largest decline in income segregation from 2000-2007 (as measured by H; it experienced the largest decline as measured by the proportion of families in poor or affluent neighborhoods), likely largely a result of the dramatic change in the population distribution following Hurricane Katrina.

Table 3 reports the changes in family income segregation over a much longer time period, from 1970-2007.   In 20 metropolitan areas, income segregation increased by 0.050 points or more (roughly two standard deviations or more, a very significant increase). Philadelphia saw the greatest increase in income segregation, an increase of 0.081 points — a change equivalent to three standard deviations. Philadelphia was the 43rd most segregated metropolitan area in 1970 and the 3rd most segregated by 2007. In 1970 only 16 percent of Philadelphia families lived in poor or affluent neighborhoods; in 2007, 43 percent of families lived in such neighborhoods. Most of the metros that experienced large increases in segregation from 1970-2007 were in the Northeast or the Rust Belt. The long-term increases in income segregation in these metropolitan areas may have been fueled by both the growth of the suburbs in many of these places and by the rising income inequality that accompanied the decline of the manufacturing sector in the Rust Belt and the mill towns of the Northeast (in Detroit, for example, the proportion of families living in poor or affluent neighborhoods more than tripled from 1970-2007, rising from 13 percent to 45 percent).

Income segregation (as measured by H) declined since 1970 in only 18 of the large and moderate-sized metropolitan areas. Most of these metropolitan areas with declining income

segregation were in the South. Jackson, MS, for example, was the second most segregated

metropolitan area in 1970, but only the 48th most segregated in 2007.

Table 3: Metropolitan Areas with the Largest Changes in Family Income Segregation, Ranked By Change in Segregation, 1970-2007

		Segregation (*H*)			Proportion in Poor or Affluent Neighborhoods		
Rank	**Metropolitan Area**	**1970**	**2007**	**Change 1970-07**	**1970**	**2007**	**Change 1970-07**
1	Philadelphia, PA	0.127	0.208	+0.081	15.6	42.9	+27.3
2	Milwaukee-Waukesha-West Allis, WI	0.105	0.180	+0.075	7.4	30.0	+22.7
3	Essex County, MA	0.087	0.160	+0.073	7.2	30.6	+23.5
4	Detroit-Livonia-Dearborn, MI	0.123	0.194	+0.071	13.2	45.9	+32.7
5	Worcester, MA	0.064	0.128	+0.064	1.7	22.4	+20.7
6	New Haven-Milford, CT	0.090	0.153	+0.064	6.4	30.5	+24.1
7	Allentown-Bethlehem-Easton, PA-NJ	0.064	0.127	+0.063	1.4	18.2	+16.8
8	Fresno, CA	0.114	0.175	+0.061	17.8	47.8	+30.0
9	Providence-New Bedford-Fall River, RI-M.	0.077	0.137	+0.060	5.0	27.4	+22.4
10	New York-Wayne-White Plains, NY-NJ	0.151	0.209	+0.058	25.6	50.2	+24.6
11	Fort Lauderdale-Pompano Beach-Deerfiel	0.085	0.142	+0.057	9.1	37.7	+28.6
12	Newark-Union, NJ-PA	0.149	0.206	+0.056	21.1	43.6	+22.6
13	Akron, OH	0.094	0.150	+0.056	8.8	26.3	+17.6
14	Buffalo-Niagara Falls, NY	0.095	0.150	+0.056	8.3	25.6	+17.3
15	San Diego-Carlsbad-San Marcos, CA	0.109	0.164	+0.055	12.1	34.2	+22.1
16	Bridgeport-Stamford-Norwalk, CT	0.167	0.221	+0.054	24.2	44.4	+20.2
17	Cleveland-Elyria-Mentor, OH	0.120	0.173	+0.053	11.8	32.0	+20.2
18	Springfield, MA	0.084	0.136	+0.053	6.9	26.4	+19.5
19	Hartford-West Hartford-East Hartford, CT	0.104	0.156	+0.052	8.6	22.6	+14.0
20	Provo-Orem, UT	0.075	0.125	+0.050	10.4	17.4	+7.0

Conclusion

By any of the measures we examine, segregation of families by income has grown

significantly in the last 40 years. The proportion of families living in poor or affluent

neighborhoods doubled from 15 percent to 31 percent and the proportion of families living in

middle-income neighborhoods declined from 65 percent to 44 percent. Similarly, income

segregation as measured by *H* rose by a full standard deviation between 1970 and 2007. This

increase in segregation was a result of the increasing spatial concentration of both low- and high-

income families.

Three of the measures we use (H, $H10$, and $H90$) indicate that income segregation did not grow in the 1990s, but began to grow again after 2000. Although the recent growth of income segregation in the 2000s has not been as quite as rapid as the increase during the 1980s, it nonetheless represents a significant reversal from the slow decline in income segregation that occurred in the 1990s. The increase in segregation occurred at both ends of the income distribution: both high- and low-income families became increasingly residentially isolated in the 2000s, resulting in greater polarization of neighborhoods by income. The fourth measure—the proportion of families in affluent or poor neighborhoods—differs from the H measures in that it captures changes in income segregation that are due both to increased income inequality and to increased residential sorting by income. By this measure, income segregation grew in every decade. The rate of increase in the 2000s, however, was greater than the rate in the 1980s and 1990s, indicating an accelerating trend toward greater residential polarization over the last 30 years.

During the last four decades, the isolation of the rich has been consistently greater than the isolation of the poor. Although much of the scholarly and policy discussion about the effects of segregation and neighborhood conditions focuses on the isolation of poor families in neighborhoods of concentrated disadvantage, it is perhaps equally important to consider the implications of the substantial, and growing, isolation of high-income families. Given that in 2008 the top 10 percent of earners controlled approximately 48 percent of all income in the United States (Piketty & Saez, 2010), the increasing isolation of the affluent from low- and moderate-income families means that a significant proportion of society's resources are concentrated in a smaller and smaller proportion of neighborhoods. As we argued above, this has significant consequences for low- and middle-income families, because the isolation of the

rich may lead to lower public and private investments in resources, services, and amenities that benefit large shares of the population, such as schools, parks, and public services.

One additional and striking pattern evident in the Census and ACS data is the very large increase in income segregation among black and Hispanic families over the last four decades (and the particularly large increase in the last decade). Low-income black and Hispanic families are much more isolated from middle-class black and Hispanic families than are low-income white families from middle- and high-income white families. This rapid growth of income segregation among black families exacerbated the extent to which poor black families lived in neighborhoods with very high poverty rates. This concentration of disadvantage likely has had negative consequences for poor black families. And while this increasing income segregation means that middle-class black families were less likely to live in neighborhoods with low-income black families, it is still true that middle-class black families are much more likely to live in neighborhoods with low-income white neighbors than are comparable middle-class white families (Logan, 2011; Sharkey, 2011).

The reasons for the rapid increase in income segregation among black and Hispanic families are not entirely clear. Reardon and Bischoff (2011) showed that increases in income inequality from 1970-2000 were responsible for a significant portion of the growth in income segregation during that period. The growth of the black middle class led to a rapid rise in income inequality *among* black families from 1970-1990, meaning that the difference in incomes between high- and low-income black families grew during this time period. At the same time, reductions in housing discrimination opened up new opportunities for middle-class black families to live in less poor neighborhoods than they had previously. The combination of the growth in income inequality among black families and the decline in housing discrimination was

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likely the primary reason that income segregation among black families grew so rapidly in the 1970s and 1980s.

The same explanation, however, does not hold for the 2000s. Metropolitan area income inequality among black families did not grow from 1990-2007; for Hispanic families, income inequality grew slightly in the 1990s, but not at all in the 2000s. Thus, we cannot attribute the rapid growth in income segregation among black and Hispanic families to rising within-group income inequality. One possible explanation for the growth, however, is the lenient mortgage lending practices that were increasingly common in the early part of the 2000s. These practices provided many moderate-income families with increased access to homeownership, particularly in middle- and upper-income neighborhoods, and so increased the residential distance between low- and middle-income families. Although many moderate income families of all races/ethnicities were affected by this practice, evidence suggests that black and Hispanic families were disproportionately affected by the sub-prime mortgage market (Armstrong, Been, Ellen & Mada, 2009). In addition, a large percentage of Hispanics live in the so-called "sand states" (California, Florida, Nevada, and Arizona) where the housing bubble was most pronounced. This means that Hispanics in these states likely had increased access to homeownership in the early part of the decade, but then also experienced the biggest losses in assets as a result of the housing crisis beginning in 2007 (Taylor, Fry, & Kochhar, 2011). These patterns suggest that the rise in income segregation among black and Hispanic families may be at least partly a result of the disproportionate impact of these mortgage lending and housing market forces. However, our present analyses are primarily descriptive and do not provide a full explanation regarding the causes of the trends we present. Further investigation would be very useful for understanding why income segregation, particularly among black and Hispanic

families, grew so sharply in the 2000s.

Finally, because tract-level ACS data are averaged over five years, and because data for the most recent years are not yet available, our analyses here do not describe how patterns of income segregation may have been affected by the housing market collapse and the subsequent recession. The enormous number of housing foreclosures in the last few years has likely led many low-income families to move to lower-income neighborhoods, which would lead to increased income segregation. Conversely, declining incomes and income volatility among the middle-class may lead to lowered income segregation, because it may widen the income distribution within previously middle-class neighborhoods, or force these families to move into lower-income neighborhoods. We expect that the availability of ACS data in the next two years will begin to shed light on these more recent trends.

Data and Measurement Appendix

Income Segregation

The Census Bureau provides counts of families/households within income categories in each decennial census. For the total population there are 15 income bins in 1970, 17 in 1980, 25 in 1990, and 16 in both 2000 and 2005-2009. The income-by-race bins are the same except for in 1980 when there are only nine income bins by race. Our approach to measuring income segregation is insensitive to these differences (Reardon, 2011).

To measure income segregation, we use the *rank-order information theory index* (Reardon, 2011), which measures the ratio of within-unit (tract) income rank variation to overall (metropolitan area) income rank variation. For any given value of p, we can dichotomize the income distribution at p and compute the residential (pairwise) segregation between those with income ranks less than p and those with income ranks greater than or equal to p. Let $H(p)$ denote the value of the traditional information theory index (James & Taeuber, 1985; Theil, 1972; Theil & Finezza, 1971; Zoloth, 1976) of segregation computed between the two groups so defined. Likewise, let $E(p)$ denote the entropy of the population when divided into these two groups (Pielou, 1977; Theil, 1972; Theil & Finezza, 1971). That is,

$$E(p) = p\log_2\frac{1}{p} + (1-p)\log_2\frac{1}{(1-p)}$$

and

$$H(p) = 1 - \sum_j \frac{t_j E_j(p)}{TE(p)},$$

where T is the population of the metropolitan area and t_j is the population of neighborhood j. Then the rank-order information theory index (H^R) can be written as

$$H^R = 2\ln(2) \int_0^1 \mathrm{E}(p)H(p)dp$$

Thus, if we computed the segregation between those families above and below each point

in the income distribution and averaged these segregation values, weighting the segregation

between families with above-median income and below-median income the most, we get the

rank-order information theory index. The rank-order information theory index ranges from a

minimum of 0, obtained in the case of no income segregation (when the income distribution in

each local environment (e.g. census tract) mirrors that of the region as a whole), to a maximum

of 1, obtained in the case of complete income segregation (when there is no income variation in

any local environment). In order to obtain estimates of income segregation at points in the

income distribution for which we do not have exact data (because we only have counts of

families in certain income ranges), we can use an estimate of the function $H(p)$ to obtain a

measure of segregation at any threshold. For instance, to compute the level of income

segregation between those families above and below the 90th percentile of the income

distribution (H90), we calculate $H(0.9)$ from our estimated parameters of the function $H(p)$.

Likewise, to compute the level of income segregation between those families above and below

the 10th percentile of the income distribution (H10), we calculate $H(0.1)$ from our estimated

parameters of the function $H(p)$. To compare the levels of within-group income segregation

among racial groups, we compute the rank-order information theory index for each racial group

separately. A more thorough explanation of our technique (and its rationale) is provided

elsewhere (Reardon, 2011; Reardon & Bischoff, 2011).

Table A1: Proportion of Families in Low-, Middle-, and High-Income Neighborhoods, 1970-2007, Metropolitan Areas with Population > 500,000

	1970	1980	1990	2000	2007
Poor	8.4%	14.3%	13.3%	15.2%	17.0%
Low-Income	10.4%	10.3%	11.3%	11.9%	11.1%
Low-Middle Income	30.6%	26.1%	25.0%	23.2%	20.6%
High-Middle Income	34.1%	30.4%	26.7%	23.9%	22.9%
High-Income	9.9%	11.8%	13.3%	13.1%	14.3%
Affluent	6.6%	7.1%	10.4%	12.7%	14.1%
Middle Income	64.7%	56.5%	51.7%	47.1%	43.5%
Poor + Affluent	15.0%	21.4%	23.7%	27.9%	31.1%

Note: See text for definitions of six neighborhood types. "Middle income" category includes both low-middle and high-middle income neighborhoods. "Poor+affluent" category is self-explanatory.

Table A2: Average Family Income Segregation (H) and Segregation of Poverty ($H10$) and Affluence ($H90$), 1970-2007, Metropolitan Areas with Population > 500,000

	1970	1980	1990	2000	2007
Overall Segregation (H)	0.115	0.112	0.134	0.135	0.143
	(0.027)	(0.027)	(0.029)	(0.027)	(0.028)
Segregation of Poverty ($H10$)	0.112	0.124	0.153	0.146	0.158
	(0.023)	(0.030)	(0.038)	(0.031)	(0.031)
Segregation of Affluence ($H90$)	0.173	0.156	0.189	0.185	0.195
	(0.037)	(0.037)	(0.039)	(0.036)	(0.038)

Note: N=117 Metrropolitan Areas. Standard deviations in parentheses.

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