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Chapter 7

Residential Segregation by Income, 1970-2009

Kendra Bischoff and Sean F. Reardon

Every city or metropolitan area in the United States has higher- and lower-income neighborhoods.¹ The average socioeconomic status of these neighborhoods, however, varies considerably. Moreover, socioeconomic residential sorting has grown substantially in the last forty years (Reardon and Bischoff 2011a, 2011b; Watson 2009), and the bulk of that growth occurred in the 1980s and in the 2000s.

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.” Our use of the term “segregation” is descriptive: it denotes the extent to which families of different incomes live in different neighborhoods and does not imply any particular cause of these residential patterns.² We focus on the segregation of families by income primarily because children generally live in family households. Segregation is likely to be more consequential for children than for adults for two reasons.³ First, most children spend a great deal of time in their neighborhood, making that immediate context particularly salient for them, while adults generally work and socialize within a larger geographic area. Second, for children, income segregation can lead to disparities in the quality and quantity of crucial public amenities like schools, parks, libraries, and recreation.

In this chapter, we describe the patterns and trends in family income segregation over the last forty years. We begin with a discussion of several different measures of income segregation, each of which provides insight into one aspect of the patterns. Then we describe the trends in family income segregation from 1970 to 2009. Here we find clear evidence that income segregation has grown rapidly, particularly in the last decade and particularly among black and Hispanic families. Next we describe the variation in income segregation among the 117 metropolitan areas with populations of at least 500,000 in 2007. We document considerable variation in income segregation among metropolitan areas—a variation systematically related to several key features of metropolitan areas, including their size, level of income inequality, age composition, and average educational levels. From there we go on to investigate the metropolitan area correlates of changes in income segregation, exploring whether changes in these characteristics over time are systematically related to changes in income segregation levels. Again, we find that segregation has grown most rapidly in metropolitan areas characterized by growing income inequality, growing proportions of children, and increasing average educational attainment levels. The longitudinal analyses also show that changes in unemployment and manufacturing jobs are inversely related to income segregation.

WHY DOES INCOME SEGREGATION MATTER?

As anyone who has bought or rented a home knows, housing prices and rental costs are spatially patterned. People choose their neighborhood in large part based on their ability to afford housing in that area and, conditional on that, their preferences for location (for instance, proximity to work) and neighborhood amenities, such as schools, parks, and safety. Because the ability to afford housing in a given neighborhood is generally tied to income, the fact that some families have more or less income leads to residential sorting by income: high-income families tend to live in neighborhoods with other high-income families, and low-income families with other low-income families. However, the linkage between a family's income and the income of its neighbors is not perfect. Many factors determine the income segregation of a region, including: the extent of income inequality in the region; the patterns of family residential preferences (such as preferences for neighbors of similar ethnicity); the location of cultural, institutional, and environmental amenities; suburbanization patterns; the extent of family income volatility; variation in the type and quality of the housing stock; topography and geography; school and municipal boundaries; and zoning and housing policies (Bischoff 2008; Cutler and Glaeser 1997; Jargowsky 1996; Reardon and Bischoff 2011b; Rothwell and Massey 2010; Watson 2009; Yang and Jargowsky 2006).

Income segregation may accentuate the economic advantages of high-income families and exacerbate the economic disadvantages of low-income families. It is useful to distinguish between two categories of mechanisms by which this occurs: neighborhood composition mechanisms and spatial resource distribution mechanisms. Neighborhood composition effects stem from the demographic composition of neighborhoods—for example, poverty rates, average educational attainment levels, and the proportion of single-parent families. Spatial resource distribution effects operate when segregation leads to the unequal distribution of collective resources (such as high-quality schools and public parks) and/or public hazards (such as pollution and crime) among neighborhoods. Although both of these distinct processes are often implied in the “neighborhood effects” literature in the social sciences, they are rarely disentangled for theoretical or empirical purposes.

This distinction is not sharp, but a stylized example will make it clearer. Suppose that low-income neighbors hinder children's educational success because children observe fewer adults in their neighborhood with high educational attainment, and, by extension, fewer adults who have reaped the benefits of higher education. Children in high-income neighborhoods observe just the opposite. In this case, income segregation will lead to educational inequality between high- and low-income children because it produces large differences in children's access to adult role models. We consider this a neighborhood compositional effect.

Suppose instead that one's neighbors do not influence school success, but that it is largely determined by the resources in the school—for example, highly skilled teachers. If high-income communities attract those highly skilled teachers—for instance, by paying higher salaries—then residential income segregation will lead to unequal school resources among communities, which will in turn lead to inequalities in educational success among high- and low-income children. We consider this a spatial resource distribution effect. In practice, the effects of segregation may include both compositional and distributional components.

A considerable body of scholarship discusses neighborhood composition effects. In sociology, much of this literature predicts that neighborhood composition—particularly neighborhood poverty and concentrated economic disadvantage—will affect residents' social, economic, educational, psychological, and physical outcomes through a variety of mechanisms (for discussions of these mechanisms, see, for example, Burdick-Will et al. 2011; Jencks and Mayer 1990; Leventhal and Brooks-Gunn 2000; Sampson, Raudenbush, and Earls 1997).

The empirical evidence on the effects of neighborhood composition, however, is more mixed. A number of carefully designed observational (non-experimental) studies find evidence that prolonged residence in very poor neighborhoods harms schooling outcomes (Burdick-Will et al. 2011; Harding 2003; Sampson, Sharkey, and Raudenbush 2008; Wodtke, Harding, and Elwert 2011), though other observational studies find smaller or insignificant neighborhood compositional effects (Jencks and Mayer 1990; Sampson, Morenoff, and Gannon-Rowley 2002). In addition, studies of the Moving to Opportunity (MTO) experiment, in which a random sample of low-income families were offered housing vouchers to encourage them to move to low-poverty neighborhoods, show few significant or long-term impacts of reduced exposure to neighborhood poverty (Kling, Liebman, and Katz 2007; Ludwig et al. 2013). Some of the discrepancies among the observational studies and the MTO experiment may arise from differences in the types of neighborhoods studied, differences in the duration of exposure to high-poverty neighborhoods experienced by families in each of the studies, or the observational studies' failure to account fully for family differences among those in high- and low-poverty neighborhoods.⁴ There is no clear consensus in the literature, however, regarding the differences in estimated neighborhood compositional effects. In short, it is unclear whether income segregation operates through neighborhood composition mechanisms to exacerbate social, economic, educational, and health disparities between high- and low-income families.

On the question of whether income segregation operates through spatial resource distribution mechanisms, the theory and evidence are even less well developed. Susan Mayer (2002) suggests that income segregation leads to greater inequality in school funding, as states with rising income segregation have experienced rising disparities in educational attainment. More broadly, we might expect the local tax base and the involvement of the community in the maintenance of and investment in shared public resources (such as community centers and playgrounds) and local social institutions (such as schools) to influence the quality of those resources and institutions. Income segregation therefore may create disparities in these public resources and institutions among high- and low-income communities.

Another possibility is that income segregation concentrates political power in a small number of local areas. Research in political science has shown that high-income individuals wield more political influence than low-income individuals (Bartels 2008); thus, more affluent communities may have undue influence in the distribution of collective goods (and hazards). Regional decisions about where to site train, subway, and bus lines, for example, or where to locate a new hospital or a new landfill, all have implications for those who live near these amenities or hazards. If residents of high-income communities are collectively more effective at influencing these decisions than residents of low-income communities, then income segregation may lead to unequal control over regional decision-making. There is little research, however, that empirically investigates this possibility. More generally, there is little research examining the effects of segregation per se: although several studies credibly identify the effects of racial segregation on racial disparities in education and earnings (Ananat 2009; Card and Rothstein 2007; Cutler and Glaeser 1997), no similarly rigorous studies examine the effects of income segregation.

DATA AND MEASUREMENT

This study uses decennial U.S. census data from 1970 to 2000 (GeoLytics 2004; Minnesota Population Center 2011), as well as American Community Survey (ACS) data from 2005 to 2011. We use these data to compute measures of metropolitan-level income segregation as well as to construct measures of other metropolitan-level characteristics that are included in the multivariate analyses. We measure income segregation among neighborhoods within metro-

politan areas, using census tract boundaries to approximate neighborhoods.⁵ The 2000 census marked the last available single-year estimates of tract-level income distributions; tract-level data from the ACS are available only as five-year moving averages, covering the years 2005–2009, 2006–2010, and 2007–2011.⁶ The interpretations of the ACS estimates therefore differ from the previous decennial estimates because they represent rolling averages instead of sharp cross-sections. To simplify our language in the remainder of this chapter, we refer to the ACS estimates by the middle of the five-year time span. Thus, “2007” refers to the 2005–2009 period, “2008” refers to the 2006–2010 period, and “2009” refers to the 2007–2011 period.

We restrict our analyses to metropolitan areas with total populations of 500,000 or more in 2007. This creates a sample of 117 large- and moderate-sized metropolitan areas.⁷ These areas were home to 197 million people in 2007 and represent roughly 65 percent of the total U.S. population and 78 percent of the total population living in metropolitan areas.⁸ Though we use all 117 metropolitan areas for our overall calculations of income segregation, we use fewer metropolitan areas in the racial-ethnic group-specific analyses.⁹

As we stated earlier, we focus on the income segregation of *families* rather than *households*. We do this for two reasons. First, income segregation may be particularly salient for children because neighborhood resources and neighborhood context are important for early development (Leventhal and 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 adults. Because we are particularly interested in children’s experiences, families are the relevant unit. The second reason is pragmatic: family income by race-ethnicity is available for all census years, while income for households by race-ethnicity is not.

Income segregation—the extent to which high- and low-income families live in separate neighborhoods—can be measured in several ways. We report four different measures, each of which has a different interpretation.

The Proportions of Families in Poor and Affluent Neighborhoods

We compute the proportions of families who live in 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 less than 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 more than 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 neighborhood poverty and affluence are defined here relative to the median income of the metropolitan area. A typical metropolitan area in 2009 had a median family income of roughly \$75,000; in a poor neighborhood (by our definition), more than half the families would have incomes below \$50,000; in an affluent neighborhood, more than half the families would have incomes above \$112,500. The advantage of this measure is that it is relatively intuitive and readily interpretable. However, it has two disadvantages: it relies on somewhat arbitrary definitions of neighborhood poverty and affluence, and it may confound changes in income inequality with changes in segregation. If every family stayed in the same neighborhood but in-

come inequality grew (high-income families' incomes rose while low-income families' incomes declined), the number of poor and affluent neighborhoods would increase simply because median incomes would rise, on average, in higher-income neighborhoods and decline in lower-income neighborhoods.

The Rank-Order Information Theory Index

The second measure of income segregation—the rank-order information theory index (denoted H)—is less intuitive than the first, but does not confound changes in income inequality with changes in income segregation (Reardon 2011; Reardon and Bischoff 2011b). 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 is 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 contains 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, the level of income inequality in a metropolitan area does not influence H , so it more accurately measures the extent to which families of different incomes are sorted among neighborhoods than does our first measure.¹⁰

Segregation of Poverty, Segregation of Affluence

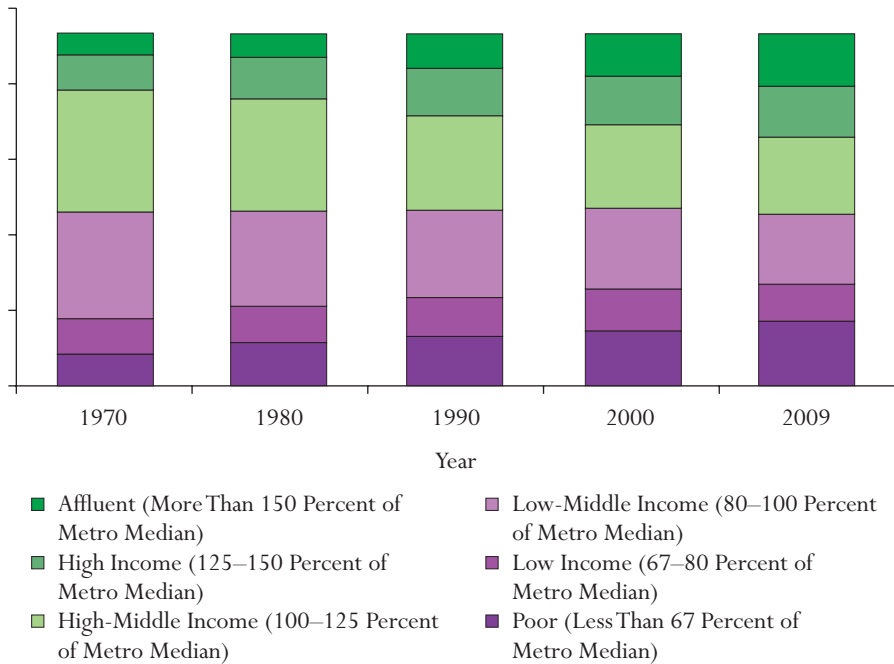
The third and fourth measures describe the extent to which either low- or high-income families are segregated from all other families. The segregation of poverty (denoted as H_{10}) is measured by using a variant of H that describes the extent to which the lowest-earning families (the bottom 10 percent) in a metropolitan area live in neighborhoods separate from all other, higher-earning families (the remaining 90 percent). Likewise, the segregation of affluence (denoted as H_{90}) describes the extent to which the highest-earning families (the top 10 percent) in a metropolitan area live in neighborhoods separate from all other, lower-earning families (the remaining 90 percent). For instance, if H_{10} is close to 0, it means that the poorest families are scattered fairly evenly throughout the area; in theory, as H_{10} approaches 1, those families are increasingly clustered.

Together, these four measures provide a detailed picture of variations in income segregation among metropolitan areas and the changes over the last four decades.

INCOME SEGREGATION TRENDS

We now turn to the results of our analyses. We begin by describing trends in the proportions of families who lived in high-, moderate-, or low-income neighborhoods from 1970 to 2009. We then describe trends in overall and racial-ethnic group-specific income segregation from 1970 to 2009 using the rank-order information theory index. Third, we report the trends in the segregation of affluence and poverty.

FIGURE 7.1 *Proportion of Families Living in High-, Middle-, and Low-Income Neighborhoods in Metropolitan Areas with Population Greater Than 500,000, 1970–2009*



Source: Authors' tabulations of data from U.S. Census (1970–2000) and American Community Survey (2005–2011). Figure is based on data from all 117 metropolitan areas with at least 500,000 residents in 2007.

Figure 7.1 shows the proportion of families who resided in the six categories of high-, middle-, and low-income neighborhoods from 1970 to 2009. The figure shows a steady decline in the proportion of families living in middle-income neighborhoods from 1970 to 2009 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 2009, only 42 percent of families lived in such neighborhoods. The proportion of families living in affluent neighborhoods more than doubled, from 7 percent in 1970 to 15 percent in 2009. Likewise, the proportion of families in poor neighborhoods doubled, from 8 percent to 18 percent, over the same period. Thus, in 1970 only 15 percent of families lived in one of the two extreme types of neighborhoods; by 2009, that number had more than doubled, to 33 percent of families.

By this measure, income segregation grew significantly from 1970 to 2009. Moreover, family income segregation grew in every decade from 1970 to 2009. The proportion living in poor or affluent neighborhoods increased by 4.1 percentage points in the 1970s, by 4.6 percentage points in the 1980s, by 4.2 percentage points in the 1990s, and by 5.1 percentage points from 2000 to 2009 (see appendix table 7A.1 for details). The rate of growth in segregation in the 2000s was faster than in any of the three prior decades. Although Americans may still have believed in middle-class communities, our metropolitan areas were dividing by income.

TABLE 7.1 *Average Family Income Segregation and Segregation of Poverty and Affluence in Metropolitan Areas with Population Greater than 500,000, 1970–2009*

	1970	1980	1990	2000	2007	2008	2009
Overall segregation (<i>H</i>)	0.115 (0.027)	0.112 (0.027)	0.134 (0.029)	0.135 (0.027)	0.143 (0.028)	0.148 (0.027)	0.148 (0.027)
Segregation of poverty (<i>H</i> 10)	0.112 (0.023)	0.124 (0.030)	0.153 (0.038)	0.146 (0.031)	0.158 (0.031)	0.163 (0.029)	0.163 (0.029)
Segregation of affluence (<i>H</i> 90)	0.173 (0.037)	0.156 (0.037)	0.189 (0.039)	0.185 (0.036)	0.195 (0.038)	0.202 (0.037)	0.200 (0.036)

Source: Authors' tabulations of data from U.S. Census (1970–2000) and American Community Survey (2005–2011).

Note: *N* = 117. Standard deviations are in parentheses.

The trends in average income segregation, the segregation of poverty, and the segregation of affluence repeat the pattern of residential cleavage. Table 7.1 presents descriptive statistics on levels and changes in *H*, the segregation of poverty, and the segregation of affluence from 1970 to 2009 in the 117 large- and moderate-sized metropolitan areas in this study.

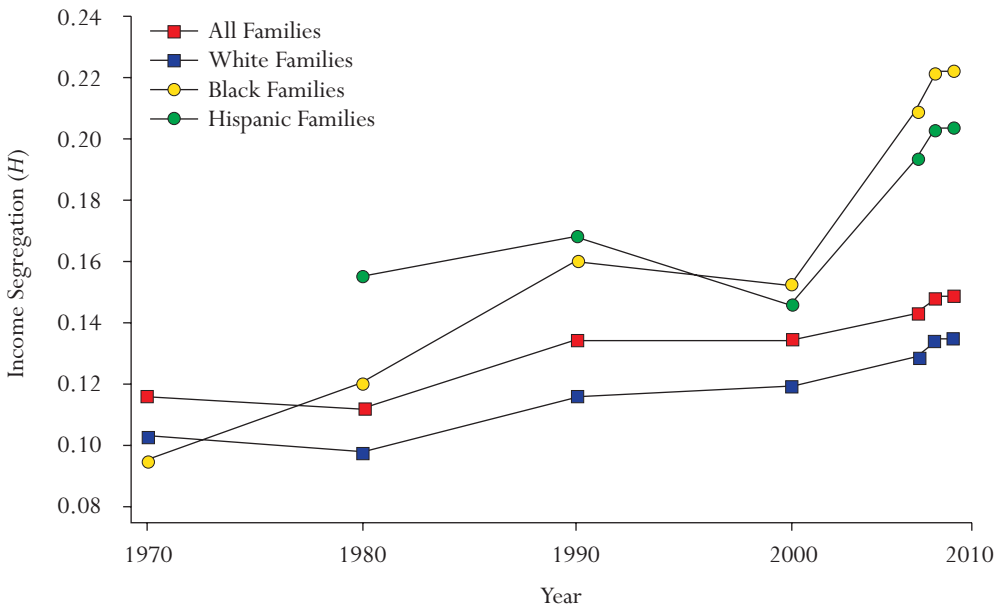
Segregation by income among all families increased from 0.115 in 1970 to 0.148 in 2009, a change of 0.033. In the metric of *H*, this is a substantial change, roughly equal to a 1.2 standard deviation increase. Put differently, overall income segregation increased by approximately 29 percent over this forty-year period. Figure 7.2 shows the trend in average segregation, as measured by *H*, from 1970 to 2009. Note that, by this measure, the 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 0.148).

One reason the trend in income segregation, as measured by *H*, differs from the trend based on the proportion of families in poor and affluent neighborhoods is that the proportion of families living in these neighborhoods is affected by *both* the level of income inequality and the degree to which families of different incomes are sorted among neighborhoods. The rank-order index (*H*), in contrast, is not affected by changes in income inequality, so it is a clearer measure of the degree of sorting alone.¹¹

Black and Hispanic families lived in increasingly income-segregated communities. In addition to showing the trend in income segregation for the full population of families, figure 7.2 presents trends in within-race income segregation among white, black, and Hispanic families separately. The line for black families represents the trend in residential segregation among black families of differing income levels (not the trend in segregation between white and black families). The different lines in the figure compare trends in within-group income segregation across racial-ethnic groups. These trend lines can be thought of as describing the extent to which families' exposure to same-race neighbors of varying income levels has changed over time. Increasing income segregation among black families means that low-income black families had fewer middle-class neighbors who were black in 2009 than in 1970.

The rapid rise in income segregation among black families in the 1970s and 1980s may have stemmed in part from changes in housing legislation, increases in the suburbanization of black families (see, for example, Logan and Schneider 1984; Schneider and Phelan 1993), and the emergence of a more substantial black middle class (Landry 1987; Pattillo-McCoy 2000).¹² The combination of these forces created opportunities for black families of differing socioeconomic statuses to live in a variety of places throughout the metropolitan area.¹³ The interaction among racial segregation, between-group differences in income, and within-group income segregation

FIGURE 7.2 Trends in Family Income Segregation in Metropolitan Areas with Population Greater Than 500,000, by Race, 1970–2009



Source: Authors' tabulations of data from U.S. Census (1970–2000) and American Community Survey (2005–2011). Note: Figure presents unweighted average segregation levels in all metropolitan areas with at least 500,000 residents in 2007 and at least 10,000 families of a given race in each year 1970–2009 (or each year 1980–2009 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 that the trends are very similar if metropolitan areas are weighted by the group population of interest.

complicates any straightforward interpretation of the implications of these trends for individual- and group-level outcomes.¹⁴ The sociologist William Julius Wilson argues in *The Truly Disadvantaged* (1987) that formerly mixed-income black neighborhoods in inner cities became impoverished during this period at least in part because of high levels of racial segregation coupled with the outward migration of the black middle class.

The trends in income segregation among black and Hispanic families are much more striking than those among white families. Segregation by income among black families was lower than among white families in 1970, but grew four times as much between 1970 and 2009. By 2009, income segregation among black families was 65 percent greater than among white families. Although income segregation among blacks grew substantially in the 1970s and 1980s, it grew at an even faster rate from 2000 to 2009, after declining slightly in the 1990s. Indeed, in the nine years from 2000 to 2009, income segregation among black families grew by almost two standard deviations. (The 2000 standard deviation of income segregation among blacks was 0.036; the change from 2000 to 2009 was 0.069.)

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 less than the growth for black families during those time periods. In the 1990s, the decline of segregation

was greater among Hispanic families than among black families. In the 2000s, income segregation among Hispanic families grew more than one standard deviation (by 0.057 points, compared to a 2000 standard deviation of 0.044). The trends presented in figure 7.2 highlight the growing socioeconomic diversity within historically disadvantaged groups and their corresponding spatial separation. This pattern among black and Hispanic families may exacerbate “concentrated disadvantage” when coupled with the persistent racial segregation that pervades most American metropolitan areas.¹⁵ In short, racial segregation coupled with income segregation means that low-income black and Hispanic families will tend to cluster in communities that are disadvantaged along a number of dimensions, such as average educational attainment, family structure, and unemployment.

In contrast, low-income white families, although affected by income segregation as well, tend to live in neighborhoods with higher average incomes than even middle-class black and Hispanic families do (Logan 2011). Thus, white families are able to “buy up” while black and Hispanic families “buy down.” Long-standing racial wealth differentials may explain some of this disparity in neighborhood attainment (Oliver and Shapiro 1995; Taylor, Fry, and Kochhar 2011), though it is likely that racial discrimination in the housing market, individual preferences, and “white flight” also contribute to the creation of neighborhoods characterized by concentrated disadvantage.

Consider the extent to which very high-income or very low-income families are isolated from other families within a metropolitan area. Table 7.1 shows that between 1970 and 2009, 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) increased by 0.051 and 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) increased by 0.027. Although the rise in the segregation of poverty is greater than that for the segregation of affluence, in all years the level of the segregation of affluence is considerably higher than the level of the segregation of poverty. Figure 7.3 displays trends in the segregation of affluence (*H90*) and the segregation of poverty (*H10*) from 1970 through 2009.

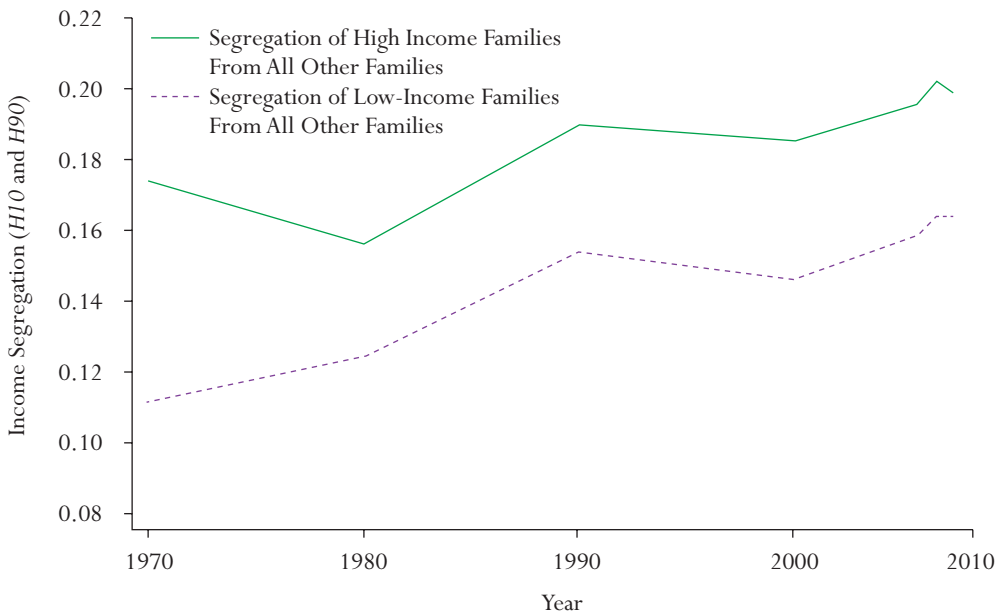
Although the segregation of poverty grew rapidly in the 1970s while the segregation of affluence declined substantially, figure 7.3 clearly shows that the trends in the segregation of both poverty and affluence have followed a similar pattern for the last thirty years. In the 1980s, segregation levels rose substantially; in the 1990s, they declined slightly. Paul Jargowsky (1996) also found increases in the isolation of poverty through the 1980s and reported significant declines in concentrated poverty in the 1990s. He attributed the declines in concentrated poverty in the 1990s largely to the strong economic upswing the nation experienced through much of the decade (Jargowsky 2003). Predictably, in the 2000s both high- and low-income families became increasingly isolated from all other families, reversing the pattern of declining isolation through the 1990s. Macroeconomic conditions surely played a role in this sharp increase in economic segregation over the past decade, with the Great Recession likely shaping the decade-long trends. Later in the chapter, we discuss possible reasons for these shifting trends.

METROPOLITAN CHARACTERISTICS AND INCOME SEGREGATION

We have shown the increasing income segregation in American metropolitan areas (figures 7.2 and 7.3), but those trends mask substantial variation among metropolitan areas. In any given year, segregation is two to three times as high in the most segregated 10 percent of metropolitan areas as in the least segregated 10 percent.

We next examine whether this variation is systematically associated with demographic and structural features of metropolitan areas. This section explores the relationship between selected

FIGURE 7.3 Trends in Segregation of Affluence and Poverty in Metropolitan Areas with Population Greater Than 500,000, 1970–2009



Source: Authors' tabulations of data from U.S. Census (1970–2000) and American Community Survey (2005–2011). Note: Figure presents unweighted average segregation levels in all 117 metropolitan areas with at least 500,000 residents in 2007. Note that the trends are very similar if metropolitan areas are weighted by the group population of interest.

metropolitan characteristics and three measures of income segregation—overall income segregation (H), the segregation of poverty ($H10$), and the segregation of affluence ($H90$). Consistent with the previous analyses, we present estimates only for the most populous 117 metropolitan areas in 2007.

Although there are many hypotheses regarding the metropolitan characteristics most strongly associated with income segregation, we focus on a small set of characteristics that theory and prior research suggest may be strongly related to income segregation. First is metropolitan family income inequality. Although income inequality is a necessary condition for income segregation, it is not a sufficient explanation. In theory, families of different income levels can spread equally across a metropolitan area to create mixed-income neighborhoods. However, prior research has established a strong—and arguably causal—link between the rise in income inequality and the rise in income segregation from 1970 to 2000 (Reardon and Bischoff 2011b; Watson 2009). We expect the same positive relationship to persist through the 2000s, as both inequality and income segregation increased in the past decade.

Second, because the potential for residential sorting is greater in larger metropolitan areas, we expect income segregation to be higher in larger metropolitan areas, a pattern found in prior research (Jargowsky 1996; Reardon and Bischoff 2011b; Watson 2009).

Third, based on the argument that residential location is more consequential for children than for adults, we expect that families with children will be more segregated by income than

families and households without children. Residential location often determines the school a child attends. In addition, residential location may affect other factors important to parents, including access to parks and playgrounds and exposure to crime and violence. If parents care more about these factors than do nonparents, they may be willing to pay more to live in neighborhoods with better schools and parks and lower crime rates; this in turn will increase levels of income segregation. If this pattern holds, we would expect higher levels of income segregation in metropolitan areas with a larger proportion of children than in those with fewer children.

Fourth, we expect income segregation to be higher in metropolitan areas with higher levels of educational attainment inequality. As the returns to education have increased in recent decades (Goldin and Katz 2008; Oreopoulos and Petronijevic 2013), the income gap between those with college degrees and those with high school degrees or less has grown. In addition, as average education levels continue to rise, those without a high school diploma struggle to find well-paying, stable jobs. As a result, income segregation is likely increasingly correlated with educational segregation. Though we do not test this hypothesis explicitly, we do examine whether income segregation is higher in metropolitan areas with larger shares of both college graduates and high school dropouts than in metropolitan areas with less inequality in educational attainment.

Fifth, we want to understand recent changes in income segregation. Since unemployment rose dramatically during the Great Recession, we examine the association between metropolitan-area unemployment rates and income segregation. Tara Watson (2009) found that higher *employment* rates are associated with lower levels of income segregation: unemployment among less-skilled men is associated with an exodus of middle- and upper-income families from central cities, thereby increasing income segregation. However, it is also possible that unemployment decreases income segregation if it is spread across the income distribution instead of affecting mostly low-wage workers. In this case, some high- and middle-income families would suffer a loss of income, even as they stay put in their neighborhoods. Since our last data point coincides with the end of a major economic recession, it is possible that unemployment in 2009 affected families across the income distribution and therefore decreased income segregation.

Finally, we examine the association between income segregation and the percentage of workers in a metropolitan area employed in the manufacturing sector. Traditionally, that sector has paid relatively high wages for those with low educational attainment, leading to lowered income inequality (Cloutier 1997) and so, perhaps, to lowered income segregation. Moreover, manufacturing industries often cluster within metropolitan areas, with workers living nearby. Over the last forty years, manufacturing in this country has declined. When a plant closes, the incomes of families living relatively near each other may decline. As formerly mixed-income neighborhoods become low-income neighborhoods, income segregation increases. Thus, we expect declines in manufacturing to be associated with increases in income segregation.

In addition to these explanatory variables of theoretical interest, we include in our analyses a small number of metropolitan-level covariates that are related to both income segregation and the other explanatory variables: per capita income, percentage black, percentage Hispanic/Latino, percentage foreign-born, percentage female-headed families (no husband present), and percentage of the population age sixty-five and older.

Although the measurement of some of the metropolitan-level factors is straightforward, others may require clarification. We measure income inequality with the Gini index, which measures the extent to which the actual income distribution deviates from a hypothetical distribution in which each family receives an equal proportion of total income. The measure ranges from 0 (perfect equality) to 1 (maximum inequality).¹⁶ Population size is logged in the analyses to correct for positive skew in the distribution of population size among metropolitan areas.

Average educational attainment is measured among adults age twenty-five and older, and unemployment is measured among individuals in the labor force age sixteen and older.¹⁷ Per capita income, adjusted for inflation, is presented in 2009 dollars. Finally, our measure of female-headed families includes all families headed by women with no husband present. Besides a woman's own children, these families can include other children who live with her (for example, a grandmother caring for a grandchild).

CORRELATES OF METROPOLITAN-AREA FAMILY INCOME SEGREGATION

Table 7.2 presents simple bivariate correlations between three measures of metropolitan income segregation and metropolitan-level characteristics in 2009. First, note that income inequality is moderately positively correlated with *H* (overall income segregation), highly positively correlated with the segregation of affluence, and uncorrelated with the segregation of poverty. This is consistent with our finding elsewhere (Reardon and Bischoff 2011b) that income inequality is most strongly associated with the spatial separation of affluent families from all other families, as opposed to the spatial isolation of the poor. Second, income segregation is higher, on average, in larger metropolitan areas, though this appears to be due primarily to the high correlation between metropolitan-area size and the segregation of affluence. Income segregation is only weakly correlated with most of the other key characteristics of interest—age composition, educational attainment levels, unemployment rates, and the percentage of workers in the manufacturing sector.

The bivariate associations between income segregation and metropolitan-area characteristics do not take into account the relationships among the metropolitan-level characteristics. Many of these characteristics are correlated with one another, which confounds interpretation of their independent associations. To isolate the independent association (holding all of the other

TABLE 7.2 *Bivariate Correlations Between Metropolitan Characteristics and Measures of Income Segregation, 2009*

	Segregation (<i>H</i>)	Segregation of Poverty	Segregation of Affluence
Income inequality (Gini)	0.46*	-0.07	0.63*
Population (log)	0.54*	0.21*	0.63
Age eighteen and under (percentage)	0.16	-0.17	0.11
With a BA degree or higher (percentage)	0.28*	0.25*	0.29*
With less than a high school degree (percentage)	0.09	-0.29*	0.18
Unemployed (percentage)	0.05	-0.11	0.08
Workers in manufacturing (percentage)	-0.02	0.22*	-0.15
Per capita income (2009 dollars)	0.26*	0.28*	0.26*
Black (percentage)	0.33*	0.26*	0.33*
Hispanic/Latino (percentage)	0.12	-0.37*	0.24*
Foreign-born (percentage)	0.21*	-0.25*	0.38*
Female-headed families (percentage)	0.36*	0.23*	0.33*
Age sixty-five and older (percentage)	-0.33*	-0.04	-0.25*

Source: Authors' tabulations of data from U.S. Census (1970–2000) and American Community Survey (2005–2011).

Note: N = 117. Metropolitan areas are those with at least 500,000 residents in 2007.

* $p < 0.05$

TABLE 7.3 *Estimated Partial Associations Between Selected Metropolitan Characteristics and Income Segregation, 2009*

	Segregation (<i>H</i>)		Segregation of Poverty		Segregation of Affluence	
Income inequality (Gini)	0.734***	(0.142)	-0.115	(0.187)	1.290***	(0.161)
Population (log)	0.025***	(0.006)	0.022*	(0.009)	0.038***	(0.007)
Age eighteen and under (percentage)	0.467***	(0.124)	0.439**	(0.163)	0.391**	(0.140)
With a BA degree or higher (percentage)	-0.041	(0.074)	0.104	(0.097)	-0.047	(0.084)
With less than a high school degree (percentage)	-0.287**	(0.090)	-0.025	(0.118)	-0.386***	(0.102)
Unemployed (percentage)	-0.032	(0.116)	-0.008	(0.153)	-0.103	(0.132)
Workers in manufacturing (percentage)	0.06	(0.048)	0.098	(0.064)	0.037	(0.055)
Per capita income (2009 dollars)	0.003***	(0.001)	0.003**	(0.001)	0.003**	(0.001)
Black (percentage)	-0.039	(0.031)	-0.129**	(0.041)	0.033	(0.035)
Hispanic/Latino (percentage)	0.029	(0.029)	-0.047	(0.038)	0.061	(0.032)
Foreign-born (percentage)	-0.093*	(0.040)	-0.138**	(0.052)	-0.077	(0.045)
Female-headed families (percentage)	0.401***	(0.098)	0.796***	(0.129)	0.12	(0.111)
Age sixty-five and older (percentage)	-0.042	(0.111)	0.207	(0.146)	-0.026	(0.126)
Adjusted R-squared	0.64		0.459		0.734	
N	117		117		117	

Source: Authors' tabulations of data from U.S. Census (1970–2000) and American Community Survey (2005–2011).

Note: Metropolitan areas are those with at least 500,000 residents in 2007. Standard errors are in parentheses.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

characteristics constant) between the metropolitan-area characteristics and income segregation levels, we estimate three ordinary least squares (OLS) regression models using metropolitan-area data from 2009. These models estimate the cross-sectional associations between income segregation and each metropolitan characteristic, net of the other factors in the model. Table 7.3 presents results from these three models.

The first model, which regresses overall income segregation (*H*) on metropolitan-area characteristics, produces a large and highly statistically significant estimated association between income inequality and income segregation of 0.734 (standard error = 0.142; $p < 0.001$), controlling for the other metropolitan characteristics. A difference of one point in income inequality is associated with a difference of approximately three-quarters of a point in income segregation. This pattern is consistent with prior findings that metropolitan areas with high levels of income inequality also have high levels of income segregation. The first model also confirms our hypotheses regarding population size and age structure. Metropolitan population size is positively and significantly associated with income segregation ($\beta = 0.025$; standard error = 0.006; $p < 0.001$), as is the share of the population age eighteen or younger ($\beta = 0.467$; standard error = 0.124; $p < 0.001$). A one-point difference in the proportion of children in a metropolitan area is associated with a roughly half-point difference in income segregation. The results of this cross-sectional model do not support our hypothesis regarding the association between diversity in educational attainment and segregation: the proportion of the population with a college degree is not significantly associated with segregation, and the proportion with less than a high school degree is negatively associated with income segregation. Finally, these models show no significant association between income segregation and unemployment or between income segregation and the percentage of workers in manufacturing.

The second and third models present results for the estimated associations between the metropolitan characteristics and the segregation of poverty and of affluence. In general, the same patterns evident in the first models hold here, with several key exceptions. Most notably, income inequality is not significantly associated with the segregation of poverty, but is strongly associated with the segregation of affluence ($\beta = 1.290$; standard error = 0.161; $p < 0.001$), a pattern that mirrors our analysis in Reardon and Bischoff (2011b) of 1970–2000 income segregation. In that earlier work, we argue that this may be because the segregation of affluence is more responsive to upper-tail income inequality, which comprises a larger component of overall income inequality, or perhaps because housing policy has a greater impact on the segregation of poverty than income inequality does.

CORRELATES OF CHANGES IN INCOME SEGREGATION, 1970–2009

The cross-sectional associations between metropolitan-area characteristics and income segregation levels in 2009 should not be interpreted as causal relationships. Other unobserved features of metropolitan areas may lead to both high income segregation and high inequality or high proportions of children in the population. To address this possibility, we use multiple years of data from each metropolitan area to estimate the average within–metropolitan area associations between changes in metropolitan characteristics and changes in income segregation levels. Because this strategy focuses only on changes over time within metropolitan areas, it has a stronger causal warrant than the cross-sectional models. Nonetheless, the estimates from these models may still not represent causal relationships if there are unobserved time-varying features of metropolitan areas that are not only correlated with the metropolitan-area characteristics of interest but also affect income segregation. That said, the estimates from these within–metropolitan area models are useful for understanding how changes in metropolitan-area characteristics are associated with changes in income segregation.

To begin, we examine the substantial changes in key metropolitan-area characteristics between 1970 and 2009 (table 7.4). Average family income inequality rose 15 percent in our sample of metropolitan areas, while the proportion of the population under age nineteen declined by 28 percent. As for educational attainment, the share of college graduates increased by more than 150 percent. Unemployment nearly doubled, although this is partly an artifact of the timing of our initial and final time points, as unemployment was historically low in 1970 and unusually high in 2009. Moreover, the share of workers employed in manufacturing declined by nearly 60 percent during this period, a result of the general deindustrialization in American cities over the last four decades. Notable among the control variables, the Hispanic population tripled, and the percentage of female-headed families grew by 80 percent. Taken as a whole, this table depicts a broadly changing metropolitan landscape over the last forty years.

Table 7.5 offers yet another perspective on the changing metropolitan landscape: it reports estimates from a series of regression models where data were pooled across decades between 1970 and 2009. These models include metropolitan fixed effects and therefore control for any time-invariant characteristics of metropolitan areas. One way to think about the coefficients from these models is as estimates of the average within–metropolitan area associations (over time) between the metropolitan covariates and income segregation. For example, a coefficient of 0.443 (the coefficient of income inequality in the first model) means that, on average, each unit of change in the Gini index within a metropolitan area is associated with a contemporaneous

TABLE 7.4 Metropolitan Characteristic Means, 1970–2009

	1970	1980	1990	2000	2009	Unit Change	Percentage Change
Income inequality (Gini)	0.352 (0.029)	0.360 (0.023)	0.383 (0.026)	0.399 (0.025)	0.405 (0.022)	0.05	15%
Population (log)	5.868 (0.352)	5.941 (0.324)	6.001 (0.313)	6.051 (0.307)	6.108 (0.304)	0.24	4%
Age eighteen and under (percentage)	0.339 (0.027)	0.272 (0.030)	0.256 (0.033)	0.266 (0.030)	0.245 (0.028)	-0.09	-28%
With a BA or higher (percentage)	0.119 (0.033)	0.176 (0.044)	0.22 (0.055)	0.263 (0.064)	0.303 (0.070)	0.18	155%
With less than a high school degree (percentage)	0.446 (0.083)	0.307 (0.072)	0.226 (0.060)	0.179 (0.057)	0.134 (0.049)	-0.31	-70%
Unemployed (percentage)	0.042 (0.015)	0.061 (0.019)	0.06 (0.017)	0.055 (0.017)	0.086 (0.019)	0.04	105%
Workers in manufacturing (percentage)	0.242 (0.099)	0.212 (0.081)	0.167 (0.056)	0.131 (0.049)	0.103 (0.038)	-0.14	-57%
Per capita income (2009 dollars)	19,419 (2,966)	22,333 (3,121)	26,109 (5,011)	29,134 (5,422)	29,043 (5,565)	9.62	50%
Black (percentage)	0.106 (0.092)	0.112 (0.094)	0.116 (0.095)	0.122 (0.100)	0.127 (0.100)	0.02	20%
Hispanic/Latino (percentage)	0.053 (0.098)	0.07 (0.119)	0.09 (0.135)	0.123 (0.151)	0.159 (0.161)	0.11	200%
Foreign-born (percentage)	0.046 (0.039)	0.062 (0.054)	0.075 (0.074)	0.11 (0.092)	0.127 (0.089)	0.08	176%
Female-headed families (percentage)	0.108 (0.019)	0.14 (0.025)	0.161 (0.031)	0.182 (0.034)	0.194 (0.034)	0.09	80%
Age sixty-five and older (percentage)	0.091 (0.030)	0.104 (0.035)	0.121 (0.035)	0.125 (0.034)	0.125 (0.029)	0.03	37%

Source: Authors' tabulations of data from U.S. Census (1970–2000) and American Community Survey (2005–2011).

Note: N = 117. Metropolitan areas are those with at least 500,000 residents in 2007. Standard deviations are in parentheses.

TABLE 7.5 *Effects of Change in Metropolitan Characteristics on Change in Income Segregation, 1970–2009*

	Change in Segregation (<i>H</i>)		Change in Segregation of Poverty		Change in Segregation of Affluence	
Decadal change in:						
Income inequality (Gini)	0.443***	(0.090)	0.104	(0.082)	0.658***	(0.085)
Population (log)	0.028*	(0.012)	0.022	(0.019)	0.038***	(0.010)
Age eighteen and under (percentage)	0.252***	(0.040)	0.270***	(0.054)	0.129*	(0.065)
With a BA degree or higher (percentage)	0.226***	(0.064)	0.286***	(0.061)	0.172*	(0.069)
With less than a high school degree (percentage)	0.025	(0.030)	0.135***	(0.040)	–0.096*	(0.040)
Unemployed (percentage)	–0.128**	(0.046)	–0.047	(0.065)	–0.176**	(0.065)
Workers in manufacturing (percentage)	–0.060*	(0.030)	–0.151***	(0.045)	0.061	(0.035)
Per capita income (2009 dollars)	–0.001	(0.001)	0.000	(0.001)	–0.001	(0.001)
Black (percentage)	0.027	(0.072)	0.037	(0.092)	0.005	(0.090)
Hispanic/Latino (percentage)	0.118**	(0.041)	0.119*	(0.049)	0.107*	(0.044)
Foreign-born (percentage)	–0.185***	(0.035)	–0.312***	(0.055)	–0.077	(0.047)
Female-headed families (percentage)	0.094	(0.100)	0.213	(0.120)	0.109	(0.088)
Age sixty-five and older (percentage)	–0.061	(0.083)	0.041	(0.090)	–0.059	(0.092)
National metro change: 1970s	0.000	(0.008)	0.023**	(0.008)	–0.035***	(0.009)
National metro change: 1980s	0.006	(0.005)	0.020***	(0.006)	0.007	(0.005)
National metro change: 1990s	–0.018***	(0.004)	–0.021***	(0.005)	–0.028***	(0.004)
National metro change: 2000s	0.006	(0.005)	0.011*	(0.005)	0.003	(0.005)
Metropolitan-area fixed effects	Included		Included		Included	
Adjusted R-squared	0.905		0.875		0.912	
N	584		584		584	

Source: Authors' tabulations of data from U.S. Census (1970–2000) and American Community Survey (2005–2011).

Note: Bootstrapped standard errors are in parentheses.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

0.443 unit change in segregation.¹⁸ We also include a set of indicator variables that capture the average metropolitan-area change in income segregation within each decade across the nation, net of changes in the covariates in the models.¹⁹

The first model shows that changes in income inequality are positively related to changes in overall income segregation (H), net of other time-varying metropolitan-area factors and decade fixed effects ($H = 0.443$, standard error = 0.090; $p < 0.001$). This effect accounts for approximately 70 percent of the average change in overall income segregation. In terms of effect size, a one-standard-deviation change in inequality leads to a roughly 0.40 standard deviation change in income segregation.²⁰ Similar to the cross-sectional results, the association between inequality and segregation is much larger for the segregation of affluence ($H = 0.658$; standard error = 0.085; $p < 0.001$) than it is for overall segregation; there is no significant association between changes in inequality and changes in the segregation of poverty.

Children, like income inequality, emerge as a key factor. As predicted, changes in the proportion of children in metropolitan areas strongly predict changes in income segregation at all

points in the income distribution. The estimated association between the percentage of children and overall segregation is 0.252 (standard error = 0.040; $p < 0.001$). In other words, a decrease of ten percentage points in the percentage of children (roughly the average change from 1970 to 2009) is associated with a corresponding decrease in income segregation of 0.025, or approximately one standard deviation. Given that income segregation increased, on average, by 0.033 points from 1970–2009, it appears that this growth was less than it might have been had the proportion of children not declined so sharply. As described earlier, this relationship provides evidence that the presence of children makes residential location more important and thereby aggravates residential sorting by income.

In addition, the estimated association between changes in educational attainment inequality and changes in income segregation is positive and significant. That is, the models indicate that, holding constant the proportion of the population without a high school diploma, increases in the proportion of the population with a college degree are positively associated with increases in income segregation. This may be because families tend to segregate by educational attainment levels as well as by income. Given the correlation between educational attainment and income, greater inequality in educational attainment may lead to more segregation by education levels, which in turn produces greater segregation by income. This is a speculative explanation, however, because we have no evidence regarding the relationships among educational inequality, educational segregation, and income segregation. The models also provide estimates of the association between the proportion of adults without high school diplomas and income segregation. These estimates differ considerably across the three models and are difficult to interpret.

Although the cross-sectional results show no significant association between unemployment levels and income segregation, the longitudinal models in table 7.5 show a negative, statistically significant association between changes in unemployment rates and changes in both overall income segregation ($\beta = -0.128$; standard error = 0.046; $p < 0.01$) and changes in the segregation of the affluent ($\beta = -0.176$; standard error = 0.065; $p < 0.01$). It is possible that within-metropolitan area increases in unemployment reduce income among some middle- and high-income families, thereby creating mixed-income neighborhoods, at least in the short term.²¹

Similarly, the cross-sectional models reveal no significant association between income segregation and the percentage of the labor force in the manufacturing sector. The panel models, however, show significant negative associations between changes in manufacturing and changes in both overall segregation ($\beta = -0.060$; standard error = 0.030; $p < 0.05$) and changes in the segregation of poverty ($\beta = -0.151$; standard error = 0.045; $p < 0.001$). Consistent with our predictions, these findings suggest that declining local manufacturing sectors may lead not only to increases in inequality (by reducing the size of the middle class) but also to increases in income segregation, net of changes in income inequality. The effect is especially pronounced for the segregation of the poor, a finding consistent with Wilson's (1987) hypothesis that deindustrialization harmed minority and low-education workers the most and caused high- and middle-income families to leave urban centers for the suburbs.

Finally, consistent with previous studies, we also find a significant positive relationship between changes in population size and changes in both overall income segregation ($\beta = 0.028$; standard error = 0.012; $p < 0.05$) and the segregation of the affluent ($\beta = 0.038$; standard error = 0.010; $p < 0.001$), although the coefficients are modest. Metropolitan areas with population growth experienced moderate increases in overall income segregation and slightly larger increases in the segregation of affluence, perhaps owing to the construction of gated communities and other outlying enclaves as middle- and high-income families moved away from city centers during this period.

In sum, the multivariate regression results show that in 2009 income segregation was strongly associated with income inequality, population size, the proportion of children in a metropolitan area, and average educational attainment, but that it had no relationship with unemployment or the percentage of workers in manufacturing. The panel models, which control for time-variant confounding characteristics of metropolitan areas, largely corroborate the cross-sectional results: income segregation grew in metropolitan areas with growing income inequality, with increasing proportions of children, and with increasing average educational attainment levels. These models also reveal, however, that areas with decreasing unemployment (hence, rising employment) experienced growth in income segregation, as did areas with decreasing proportions of workers in manufacturing.

Recall that the descriptive trends presented earlier showed a rapid rise in income segregation in the 1980s and 2000s and stagnation in the 1990s. We examine the decade-specific indicators included in the longitudinal models to assess the capacity of our models to account for these trends. These indicators can be interpreted as the average within-metropolitan area change in income segregation in each decade, net of the changes associated with the time-varying covariates included in the model. In the first model, in which overall segregation is the dependent variable, the coefficients for the 1970s, 1980s, and 2000s are not statistically significant and are close to 0. This implies that our models explain most of the change in overall income segregation in these decades. The coefficient for the 1990s, however, is -0.018 , and it is statistically significant (standard error = 0.004; $p < 0.001$), indicating that the processes driving the stagnation in income segregation during this decade are not well represented in this model. Our model would have predicted that income segregation would continue to rise in the 1990s at about the same rate as in the 1980s, but this was not the case. Similarly, in the second and third models, in which the segregation of poverty and the segregation of affluence are the dependent variables, respectively, the coefficients for the 1990s are both negative and significant. Again, this shows a lower rate of change for the segregation of poverty and affluence in the 1990s than our models would have predicted. Although previous research has also found declines in concentrated poverty in the 1990s (Jargowsky 2003; Reardon and Bischoff 2011b), the cause is not clear. Because the factors included in our models do explain much of the trend in income segregation in the other decades, the temporary flattening of the trend in the 1990s remains somewhat of a puzzle. One possibility is that the destruction of some large public housing projects and the subsequent growth in scattered-site public housing and Section 8 vouchers may have contributed to this trend.

The increases in income segregation that occurred in the 2000s are largely explained by the covariates included in our models, as evidenced by the insignificant coefficients for the 2000 indicator when predicting overall segregation and the segregation of affluence (models 1 and 3). The coefficient is small but significant in the second model ($\beta = 0.011$; standard error = 0.005; $p < 0.05$), however, indicating that our model slightly underestimates the increase in the segregation of poverty in the 2000s. It may be that the housing bubble led to an increase in the segregation of the poor by pricing them out of middle-income neighborhoods, where the availability of low-interest mortgages led to inflated home prices.

CONCLUSION

By any of the measures we examine, the segregation of families by socioeconomic status has grown significantly in the last forty years. The proportion of families living in poor or affluent neighborhoods doubled, from 15 percent to 33 percent, and the proportion of families living in middle-income neighborhoods declined, from 65 percent to 42 percent. Similarly, income seg-

regation as measured by *H* rose by 1.2 standard deviations between 1970 and 2009. This increase marked the increasing segregation of both low- and high-income families. In addition, we find a strong and consistent positive association between income inequality and income segregation. In both the cross-sectional and longitudinal models, income inequality is significantly associated with overall income segregation, as well as with the segregation of affluence. Also, metropolitan areas with larger proportions of children tended to have higher levels of income segregation, on average, a pattern consistent with the idea that parents are more sensitive than nonparents to neighborhood context and place-based amenities, such as schools, when making residential decisions. Finally, the deindustrialization of American cities over the past forty years was associated with increases in income segregation.

Three of the measures—*H*, the segregation of poverty (*H10*), and the segregation of affluence (*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 rapid as the increase during the 1980s, it nonetheless represents a significant reversal from the flattening of the trend 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* measure in that it captures absolute differences in median incomes among neighborhoods rather than only the sorting of families by their rank in the income distribution. As a result, it is sensitive to 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, with the fastest growth in the last decade.

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. In 2010 the 10 percent of families with the highest incomes controlled approximately 46 percent of all income in the United States (Saez 2012). The increasing geographic isolation of affluent families means that a significant proportion of society's resources are concentrated in a smaller and smaller proportion of neighborhoods. This has consequences for low- and middle-income families: 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, particularly in the 2000s. 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. The rapid growth of income segregation among black families has exacerbated the clustering of poor black families in neighborhoods with very high poverty rates. And while middle-class black families were less likely to live in neighborhoods with low-income black families, this does not mean that middle-class blacks gained access to middle-class white neighborhoods: 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). Similarly, even high-income black families live in neighborhoods with levels of concentrated disadvantage that are higher than the national average (Sharkey forthcoming).

The reasons for the rapid increase in income segregation among black and Hispanic families are not entirely clear. Prior research on trends from 1970 to 2000 (Reardon and Bischoff 2011b),

as well as the multivariate analyses presented in this chapter, which extend through 2009, show that increases in income inequality are responsible for a significant portion of the growth in income segregation from 1970 to 2009. The growth of the black middle class led to a rapid rise in income inequality *among* black families from 1970 to 1990; in short, 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 a wider range of neighborhoods. The combination of the growth in income inequality among black families and the decline in housing discrimination was likely the primary reason why income segregation among black families grew so rapidly in the 1970s and 1980s.

The same explanation, however, does not hold for the 2000s. In analyses not shown here, we find that metropolitan-area income inequality among black families did not grow from 1990 to 2009; 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 is the lenient mortgage lending practices that were common in the early part of the 2000s. These practices provided many moderate-income families with increased access to homeownership and therefore may have increased the residential distance between low- and middle-income families. Although many moderate-income families of all races and ethnicities were affected by this practice, evidence suggests that the subprime mortgage market disproportionately affected black and Hispanic families (Armstrong et al. 2009). In addition, a large percentage of Hispanic families live in California, Florida, Nevada, and Arizona, where the housing bubble was most pronounced. Hispanics in these states probably had increased access to homeownership in the early part of the decade, but then also suffered the biggest losses in assets as a result of the housing crisis beginning in 2007 (Taylor, Fry, and 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 effects of these mortgage lending and housing market forces.

The impacts of increasing socioeconomic segregation may be substantial. Much of the research on the impact of neighborhood context has focused on the impact of income segregation on the neighborhood contexts of children from low-income families, their access to high-quality schools and to adults with high levels of education, and their social and educational development. But perhaps equally important is the impact of segregation on the attitudes, actions, and investments of the most-advantaged families. If socioeconomic segregation means that more advantaged families do not share social environments and public institutions such as schools, public services, and parks with low-income families, advantaged families may hold back their support for investments in shared resources. Such a shift in commitment may have far-reaching consequences. Understanding the connection between income segregation and social attitudes and the willingness to support investment in public goods is an important topic for future research.

APPENDIX: MEASURING INCOME SEGREGATION

The U.S. Census Bureau provides counts of families and households within income categories in each decennial census. For the total population there were fifteen income bins in 1970, seventeen in 1980, twenty-five in 1990, and sixteen in both 2000 and 2005–2009. The income-by-race bins are the same except for in 1980, when there were 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 of segregation (James and Taeuber 1985; Theil 1972; Theil and Finezza 1971; Zoloth 1976) 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 and 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

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

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 would 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, such as a 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).

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 ninetieth percentile of the income distribution (what we refer to in the text as “segregation of affluence”), 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 tenth percentile of the income distribution (“segregation of poverty”), 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 and Bischoff 2011b).

APPENDIX

TABLE 7A.1 *Proportion of Families in Low-, Middle-, and High-Income Neighborhoods in Metropolitan Areas with Population Greater Than 500,000, 1970–2009*

	1970	1980	1990	2000	2007	2008	2009
Poor	8.4%	11.8%	13.3%	15.2%	17.0%	17.5%	17.9%
Low-income	10.4%	10.6%	11.3%	11.9%	11.1%	11.1%	10.9%
Low-middle income	30.6%	26.9%	25.0%	23.2%	20.6%	20.2%	19.8%
High-middle income	34.1%	31.3%	26.7%	23.9%	22.9%	22.6%	22.2%
High-income	9.9%	12.2%	13.3%	13.1%	14.3%	13.9%	14.0%
Affluent	6.6%	7.3%	10.4%	12.7%	14.1%	14.6%	15.1%
Middle income	64.7%	58.2%	51.7%	47.1%	43.5%	42.8%	42.0%
Poor + affluent	15.0%	19.1%	23.7%	27.9%	31.1%	32.1%	33.0%

Source: Authors' tabulations of data from U.S. Census (1970–2000) and American Community Survey (2005–2011).
 Note: N = 117.

NOTES

1. The research reported here was supported by the US2010 Project of the Russell Sage Foundation and Brown University. We are grateful to John Logan for leading the US2010 Project, Claude Fischer for helpful comments on earlier drafts, Brian Stults for providing data support, and Lindsay Fox for her outstanding research assistance.
2. In particular, our use of the term “segregation” is not meant to imply that residential patterns result from forced separation of high- and low-income families. Unlike the legally mandated racial segregation of schools in the South prior to the 1954 *Brown v. Board of Education* decision, residential segregation of families with respect to income has never been an explicit legal or policy mandate, though it certainly may be exacerbated or ameliorated by housing, zoning, and lending practices.
3. 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. Because children rarely live alone or with unrelated adults, they are generally members of census-defined families.
4. In addition, there are important differences in the ways in which neighborhood effects are measured in different studies. In the MTO experiment, neighborhood effects were measured by moving some families into lower-poverty neighborhoods and comparing their outcomes to those of similar families who did not move. Observational studies sometimes rely on families who move; however, they often compare similar types of families who have selected into different kinds of neighborhoods, or they examine individual families who do not change their residence but experience changes in their neighborhood context over time (as a result of gentrification processes, social policy programs, law enforcement initiatives, or other factors that may alter a neighborhood environment). These differences across studies in the sources of variation in neighborhood context—people changing neighborhoods versus neighborhoods changing around people—also make it difficult to compare the results of different studies.
5. 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 U.S. Census Bureau, “Geographic Terms and Concepts—Census Tract,” available at: http://www.census.gov/geo/reference/gtc/gtc_ct.html (accessed September 1, 2014).
6. The 2005–2009 estimates are the first available from the ACS.
7. We have shown elsewhere (Reardon and Bischoff 2011b) that income segregation was lower and grew less from 1970 to 2000 in small metropolitan areas than in large ones. Because there is less geographic area in small metropolitan areas, there is less possibility for spatial separation between high- and low-income families. We focus on the largest metro areas as defined by their 2007 populations (rather than more recent years) for consistency with our earlier published report (Reardon and Bischoff 2011a).

8. We use the Office of Management and Budget (OMB) June 2003 metropolitan-area definitions; based on the 2000 census, these were the first definitions of metropolitan areas; see U.S. Census Bureau, "Metropolitan and Micropolitan Statistical Areas Main," available at: <http://www.census.gov/population/metro/index.html> (accessed September 1, 2014). We use these same definitions in each year from 1970 to 2009 to ensure comparability over time. In cases where a metropolitan area comprises multiple metropolitan divisions, we treat each division as a distinct metropolitan area. For instance, the New York (N.Y.)–Newark (N.J.)–Edison (Penn.) metropolitan area is made up of four metropolitan divisions—New York (N.Y.)–Wayne (N.J.)–White Plains (N.Y.); Newark (N.J.)–Union (Penn.); Edison (N.J.); and Suffolk County–Nassau County (N.Y.)—each of which we treat as a separate metropolitan area. The 117 metropolitan areas with populations of at least 500,000 in 2007 range in population from 11.6 million (New York [N.Y.]–White Plains [N.J.]) to 505,000 (Modesto, Calif.).
9. We exclude metropolitan areas with small black or Hispanic subpopulations because the income segregation measures we use require moderately large populations to compute income segregation accurately. Specifically, 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 black or Hispanic families in each census from 1970 to 2009 (or from 1980 to 2009 for Hispanic families, as the census did not provide data for 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 to 2009, and 37 had at least 10,000 Hispanic families in each year from 1980 to 2009.
10. We briefly describe the rank-order information theory index in the appendix. The technical details of calculating the index are described elsewhere (Reardon 2011; Reardon and Bischoff 2011a, 2011b).
11. Because H relies only on information about each family's rank in the metropolitan-area income distribution, changes in income inequality that leave each family's rank and residential location unchanged will not alter H . Such changes would, however, alter the proportion of neighborhoods of each type. To see this, suppose the incomes of all families with above-median income are doubled and the incomes of all below-median income families are cut in half, but all families remain in their original neighborhoods. This would change income inequality, but leave each family's rank in the income distribution unchanged, so H would be unchanged. However, because each neighborhood's median income would be either doubled or halved (depending on whether the median resident of the neighborhood had an income above or below the metropolitan median), all neighborhoods would now be poor or affluent by our definitions. This would register as a large increase in income segregation, as measured by the proportion of families living in poor or affluent neighborhoods.
12. For a history of fair housing regulations, see U.S. Department of Housing and Urban Development, "Fair Housing Laws and Presidential Executive Orders," available at: http://portal.hud.gov/hudportal/HUD?src=/program_offices/fair_housing_equal_opp/FHLaws.
13. Although great strides were made in fair housing legislation from the late 1960s through the 1990s, there have been serious and ongoing issues regarding enforcement of these laws (for a thorough discussion of these issues, see Massey and Denton 1993), and recent evidence suggests that discrimination in the housing market has not been eliminated (Ross and Turner 2005; Turner 2008).
14. Discussions of these interactions are beyond the scope of this chapter. For a more extensive discussion, see Bruch (2014).
15. Although racial segregation has declined some in recent decades, evidence from the 2010 census shows that the changes are slow and the historical patterns entrenched (Logan and Stults 2011).
16. Because individual-level data are unavailable from publicly available census files, we use a procedure described in detail in Nielsen and Alderson (1997).
17. To obtain the most accurate measure of unemployment, it may be optimal to calculate unemployment only among those of prime working age, and perhaps only among men. But to maintain consistency over our five time points, we use the entire universe of those in the labor market who are of working age.
18. We use bootstrapped standard errors in all of the regression models to take into account the clustered nature of the observations. We are missing data for one moderately sized metropolitan area in 1970—Cape Coral–Fort Myers, Florida. This reduces our sample size from 585 (117 metropolitan areas multiplied by five time points) to 584.
19. These indicator variables are constructed as follows: the "1970s" variable is coded 0 in 1970 and 1 in each year from 1980 onward. The "1980s" variable is coded 0 in 1970 and 1980, and 1 in each year following, and so on.

By coding the year fixed effects in this way, their coefficients can be interpreted as the average change in segregation in a given decade, net of the changes in segregation associated with changes in the other covariates in the models.

20. These are computed from the changes in inequality and segregation from 1970 to 2009. Inequality grew by 0.053 and segregation grew by 0.033 from 1970 to 2009. The effect of income inequality on income segregation is 0.443, and thus the change in income segregation over this time period is $0.443 \times 0.053 = 0.023$. This accounts for approximately 70 percent of the total change in income segregation (0.033). In addition, the standard deviation of income inequality within a given year is 0.025 on average, while the standard deviation of income segregation is roughly 0.027 on average. This implies that an effect of 0.443 corresponds to an effect size of 0.41.
21. Alternatively, it is possible that some other time-varying metropolitan characteristic correlated with unemployment, but not included in our models, is leading to a reduction in income segregation. The fixed-effects models do not control for this possibility.

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