Race and Space in the 1990s:
Changes in the Spatial Scale of Racial Residential Segregation, 1990-2000

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Abstract

In this paper, we use newly developed methods of measuring spatial segregation across a range of spatial scales to changes in racial residential segregation patterns in the 100 largest U.S. metropolitan areas from 1990 to 2000. Our results point to three notable trends in segregation from 1990 to 2000: 1) Hispanic-white and Asian-white segregation levels increased at both micro- and macro-scales; 2) black-white segregation declined at a micro-scale, but was unchanged at a macro-scale; and 3) for all three racial groups and for almost all metropolitan areas, macro-scale segregation accounted for more of the total metropolitan area segregation in 2000 than in 1990. Our examination of the variation in these trends among the metropolitan areas suggests that Hispanic-white and Asian-white segregation changes have been driven largely by increases in macro-scale segregation resulting from the rapid growth of the Hispanic and Asian foreign-born populations and their settlement in ethnic enclave neighborhoods in urban areas. The changes in black-white segregation, in contrast, appear to be driven more by the continuation of a 30-year trend in declining micro-segregation, coupled with persistent and largely stable patterns of macro-segregation.

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Introduction

Residential segregation is an inherently spatial phenomenon. While the extent of spatial proximity of members of different population groups does not alone determine patterns of social interaction and access to spatially-located social resources, it certainly serves as an important facilitator or constraint. Individuals who live far from one another are much less likely to have face-to-face interactions, utilize the same social institutions (schools, child care centers, parks, medical facilities, etc.), and encounter the same social and environmental conditions in their neighborhoods than are individuals who live near one another. Moreover, the likelihood and extent of social interaction and exposure to shared institutional and social conditions certainly increases with increasing spatial proximity. Thus, any understanding of the causes, patterns, and consequences of residential segregation must account for the extent of spatial proximity among members of different groups.

Proximity is, of course, a matter of degree, not a binary condition. Any description of one's local environment—and the opportunities and constraints it creates—depends on the choice of a relevant spatial scale. The racial or socioeconomic composition of the population within one's immediate neighborhood may be quite different than the composition of the population within a larger region around one's home. As a result, the segregation among micro-neighborhoods may be much higher than the segregation among larger macro-neighborhood. Implicitly, then, any effort to measure and describe patterns of segregation likewise depends on the choice of a spatial scale. Likewise, attention to the spatial scale of segregation patterns is necessary to understand both the causes and consequences of residential segregation.

In this paper, we use newly developed methods of measuring spatial segregation across a range of scales to investigate how racial residential segregation patterns in U.S. metropolitan areas have changed from 1990 to 2000 (Reardon et al., 2006; Reardon & O'Sullivan, 2004). By *scale*, we mean to indicate our attention to the granularity of residential patterns. Regions containing large subareas of differing racial compositions may be said to show large-scale granularity, while regions where racial composition varies substantially over relatively short distances may be said to show small-scale granularity. Such small-scale granularity may occur in addition to, or in the absence of, large-scale granularity. Existing studies of patterns and trends in racial segregation have been largely limited to analyzing segregation at the scale of the census tract (or block group, in some cases), and so do not provide information on the extent of segregation at different granularities. No prior research has examined trends in large-scale segregation, nor if and how segregation trends vary by scale.

This paper proceeds as follows. In the first section, we briefly review existing research on the trends in racial segregation in U.S. metropolitan areas in recent decades. In the second section, we describe the methods and data we use to investigate trends in racial segregation at multiple scales. The third section describes our findings. In the fourth section, we conclude with a discussion of our findings and their implications for future research.

1. Prior research on trends in racial residential segregation

A relatively large body of research has examined trends in residential racial/ethnic segregation patterns over the last few decades. This research varies in the units of analysis (metropolitan areas, cities, counties), the group comparisons of interest (e.g., black-white segregation vs. black-non-black segregation), and the dimensions of segregation (e.g., evenness or exposure) examined. We focus here on research that examines metropolitan area black-, Hispanic-, and Asian-white segregation, using measures of evenness (dissimilarity index, information theory index).

A set of studies examining trends in black-white residential segregation from 1980 to 2000 has consistently found evidence of a two-decade (or longer) decline in segregation among census tracts, despite the fact that the studies rely on different samples of metropolitan areas and different measures of segregation (see, for example, Charles, 2003; Farley & Frey, 1994; Frey & Farley, 1996; Frey & Myers, 2005; Glaeser & Vigdor, 2001; Iceland, Weinberg, & Steinmetz, 2002; Logan, 2001; Logan, Stults, & Farley, 2004). Generally, these studies find black-white segregation declined at a moderate rate through the 1980s and 1990s, yet remains very high in many metropolitan areas. It is important to note, however, that although segregation declined, on average, in metropolitan areas during the 1980s and 1990s, changes were not uniform among metropolitan areas, many of which experienced only slight changes in segregation. Large metropolitan areas with substantial black populations remain highly segregated while metropolitan areas with smaller black populations have experienced increased integration.

With regard to Hispanic-white residential segregation, most studies report either no change or a small increase, on average, in segregation between 1980 and 2000 (Charles, 2003; Frey & Myers, 2005; Iceland, 2004; Iceland, Weinberg, & Steinmetz, 2002; Logan, 2001), though Hispanic-white segregation levels remain well below black-white segregation, on average. Nonetheless, there is considerable variation among metropolitan areas in trends in racial segregation. Several studies note that Hispanic-white segregation grew most rapidly from 1980 to 2000 in metropolitan areas with initially small, but rapidly growing, proportions of Hispanics, a pattern that presumably results from the formation and expansion of enclave communities (Frey & Myers, 2005; Iceland, 2004; Logan, 2001).

Most studies of Asian-white residential patterns find trends similar to those of Hispanic-white segregation: small or insignificant average changes in segregation from 1980 to 2000 (Iceland, Weinberg, & Steinmetz, 2002; Logan, 2001), though there are some differences among studies. Charles (2003) reports a modest average increase in Asian-white segregation from 1980-2000 in the 50 largest metropolitan areas. Likewise, Iceland (2004) finds that Asian segregation increased slowly from 1980 through 2000, but he measures Asian segregation from non-Asians, and so confounds Asian-white segregation with Asian-black and Asian-Hispanic segregation. In contrast, Frey and Myers (2005) find that Asian-white segregation at the block-group level declined during the 1990s, on average, though these declines were less evident in large metropolitan areas and metros with the largest Asian populations, a finding that is relatively consistent with other work.

The slight discrepancies among studies regarding the direction and magnitude of trends in segregation, especially with regard to Hispanic-white and Asian-white segregation, are generally attributable to minor methodological differences among the studies. Most importantly, studies examine different samples of metropolitan areas or use metropolitan area definitions from different census years. The samples used generally include either all metropolitan areas defined in a given year, only a group of the largest metropolitan areas, or a selection of metropolitan areas that meet some racial ethnic composition criteria. Second, while most studies rely on census tract data, some rely on block group data (for example, Frey & Myers, 2005). Since segregation trends may differ by spatial scale, disagreements about trends in segregation may be partly due to the use of different levels of data aggregation. Finally, studies use different measures of segregation, such as the dissimilarity index or the information theory index.[1] Nonetheless, there is a clear consensus in the literature that metropolitan area black-white segregation among census tracts declined from 1980 to 2000, while Hispanic-white and Asian-white segregation increased slightly, particularly in smaller metropolitan areas with rapidly growing proportions of Hispanics and Asians, respectively.

While national-level and large-sample averages provide broad generalizations about the direction of segregation trends, they tell us little about how these trends vary among metropolitan areas of different types. In the case of black-white segregation, levels tend to be highest in metropolitan areas with large populations and a high proportion of black residents; in metropolitan areas in the Midwest and Northeast; and in metropolitan areas that are oldest and have little new construction. Segregation also tends to vary with the "functional specialization" of the urban region—metropolitan areas with large retiree populations have higher than average segregation levels, while those with a large university, government, or military presence tend to have lower levels of segregation (Farley & Frey, 1994). In addition, segregation is lower, on average, in areas where black income levels are closest to whites (Logan, Stults, & Farley, 2004). The sharpest declines in segregation in the 1990s occurred in areas with significant overall population growth and also in places where the black population was either increasing or decreasing (Glaeser & Vigdor, 2001). In addition, multiethnic areas have lower average levels of black-white segregation (Farley & Frey, 1994) and experienced large declines in segregation over the 1990s, possibly because Asian and Hispanic populations provide "buffers" to historical patterns of black-white

[1] In addition, some studies use measures of exposure, such as the isolation index, and/or measures of clustering, centralization, and concentration, but we do not include these in our review here.

segregation (Iceland, 2004).

Some of the same metropolitan characteristics are associated with levels of Hispanic-white segregation, although there is far less research here. Elevated segregation levels are related to large metropolitan areas with a high proportion of Hispanic residents (Iceland, Weinberg, & Steinmetz, 2002). In the 1990s, increases in segregation were related to large urban areas experiencing rapid Hispanic population growth (Logan, 2001; Massey, 2001) and decreases were noted in cities where Hispanics had a higher relative income as compared to whites (Frey & Myers, 2005). The same studies observe nearly identical relationships for Asian-white segregation—areas experiencing rapid immigration and consequent growth in the Asian population exhibit increasing levels of Asian-white segregation. Paralleling black-white segregation, these factors might indicate either self-segregation of whites from a growing minority presence or conversely, a heightened tendency for minority groups to settle in established racial/ethnic enclaves.

While no studies examine trends in spatial segregation at different scales, several recent studies offer some suggestive evidence that points to variation in the magnitude and direction of changes in segregation at different scales. Massey and Hajnal (1995) examine trends from 1900-1990 in black-white segregation at several geographic 'scales': between-tracts/wards, between-cities, and between-counties. They find that segregation between tracts/wards increased from 1900 to 1970, and then began declining after 1970; segregation between cities, in contrast, increased from 1950-1980 and then remained stable between 1980 and 1990. These long-term trends indicate that, since 1970, perhaps, segregation at the scale of the city has been an increasingly dominant component of black-white segregation. Likewise, Fischer and colleagues decompose segregation levels into components corresponding to difference scales, and find that the contribution of between-tract segregation to total segregation has declined over recent decades, while the contribution of between-place (cities and towns) segregation has remained relatively stable (for black-other segregation) or increased slightly (for Hispanic-other segregation) (Fischer, Stockmayer, Stiles, & Hout, 2004). Both of these studies indicate the increasing dominance of large-scale over small-scale residential patterns in shaping segregation levels, though neither uses explicitly spatial measures of segregation or uses consistent definitions of scale (tracts and cities vary widely in spatial size).

The lack of detailed information on the patterns and trends in segregation at a range of spatial scales is due to the fact that most existing studies rely primarily on *aspatial* measures of segregation—measures that were developed prior to the availability of geographical information system (GIS) software and that consequently do not fully account for spatial distributions of race and poverty (for discussion and exceptions, see Dawkins, 2006; Grannis, 2002; Reardon & O'Sullivan, 2004; White, 1983; Wong, 1997, 1999, 2004). Reliance on aspatial measures has two principal drawbacks: first, it ignores the proximity of census tracts to one another; and second, it results in segregation measures that are sensitive only to segregation at the (arbitrary) scale of census tracts (or blocks, etc).

The first limitation has been much remarked on, and a number of measures have been proposed to address this problem (Morrill, 1991; White, 1983; Wong, 1993, 2004). The second drawback—the fact that most methods of measuring segregation (and hence, of assessing its causes and effects) are insensitive to scale—means that they cannot detect patterns of segregation that occur at scales larger and/or smaller than census tracts or blocks. However, with the advent of better tools for spatial analysis, including GIS software, White (1983) and, more recently, Wu and Sui (2001), Jargowsky and Kim (2004), and Reardon and colleagues (Lee et al., 2006; Reardon et al., 2006; Reardon & O'Sullivan, 2004) have developed methodological approaches that yield scalable measures of residential segregation, although these measures have not yet been widely used. In particular, spatial segregation measures have not been used to address issues of scale in segregation, despite the fact that some are tailor-made for such analyses.

2. Data and Methods

In this paper, we describe patterns of change in segregation for the 100 most populous metropolitan areas (as of the 2000 census) in the U.S. Data are derived from block-level race counts[2] from Summary Tape File 1 and Summary File 1 of the 1990 and 2000 censuses, respectively. Metropolitan area definitions change with each Census, so to ensure that we are comparing segregation across constant regions from 1990 to 2000, we use the same metropolitan area boundaries for both years. Specifically, we use OMB 2003 metropolitan area definitions (which are the first set of metropolitan area definitions based on the 2000 census).[3] In the 2003 metropolitan area definitions, 11 very large metropolitan areas are subdivided into multiple metropolitan area divisions; in these cases, we consider each metropolitan area division as a distinct metropolitan area. A list of the 100 metropolitan areas we use is included in Appendix A.

We measure segregation using the spatial information theory index (Reardon & O'Sullivan, 2004), a spatial analog of the Theil information theory index (Theil, 1972; Theil

[2] We use four mutually-exclusive race/ethnic groups for the analyses reported here: White, not Hispanic; Black, not Hispanic; Asian, not Hispanic; and Hispanic, any race. We drop all other categories, including those reporting more than one race (in 2000). Note that because we use total population counts by race/ethnic group from Summary File 1, our counts include both institutionalized and non-institutionalized populations. Restricting our analyses to non-institutionalized populations would require using the population counts from Summary File 3, which are not available at geographies lower than the block group level. Block-level population counts and block boundaries/shapefiles are obtained from GeoLytics (GeoLytics, 2003a, 2003b).
[3] Obtained at http://www.census.gov/population/estimates/metro-city/03msa.txt. Population counts for metropolitan areas and divisions are obtained at http://www.census.gov/population/www/cen2000/phc-t29.html (Table 3a).

& Finezza, 1971). This index enables us to measure segregation at a range of spatial scales, and from this to construct a 'spatial segregation profile' that describes the relationship between spatial scale and segregation levels (Reardon et al., 2006). Below we describe the computation and interpretation of the spatial information theory index and the segregation profile in brief; more detail is available elsewhere (Reardon et al., 2006; Reardon & O'Sullivan, 2004).

Computing the spatial information theory index

The spatial information theory index and related spatial segregation measures are based on the understanding that a racial segregation index is a measure of the extent to which the local environments of individuals differ in their racial composition (Reardon & O'Sullivan, 2004). This approach is operationalized by assuming each individual inhabits a 'local environment' whose population is made up of the spatially-weighted average of the population at each location in the region of interest. Typically, the population at nearby locations will contribute more to the local environment of an individual than will more distant locations (sometimes termed a 'distance-decay' effect). Given a particular spatial weighting function, segregation is measured by computing the spatially-weighted racial composition of the local environment of each person in the study region and then examining how similar, on average, are the racial compositions of all individuals' local environments to the overall composition of the study region. If each person's local environment is relatively similar in composition to the overall population, there is little spatial segregation; conversely, if there is considerable deviation from the overall composition, there is high spatial segregation. One key feature of this approach that makes it useful for investigating issues of scale is that the spatial weighting can accommodate any desired size of local environment, simply by altering the proximity metric used in the spatial weighting.

This approach to measuring spatial segregation requires two types of information: 1) an estimate of the population density of each group at each point in space; and 2) a measure of the spatial proximity between all pairs of points in a region *R*.[4] In practice, we base our calculations here on a finite grid of 50-by-50 meter cells. In order to estimate the population density of each racial group at each grid point in a region, we proceed as follows. We superimpose a grid of 50-by-50 meter cells on the census block map. We then estimate population counts by race group for each cell in the grid by calculating population densities per unit area for each race group in each block, and assigning an estimated population count for each race group to each 50-by-50 meter cell. We assign estimated population counts to cells on the boundaries of blocks based on the population densities of the block in which the greater part of the cell falls. These steps yield a grid of population counts by race group but with abrupt changes in the counts at block boundaries.

Next, to arrive at a more realistic representation of the population distribution, we smooth the population grid using pycnophylactic ('mass preserving') smoothing (Tobler, 1979). This procedure iteratively re-estimates the counts in each grid cell by assigning to each cell the average population count of the cell and its eight neighbors, while readjusting the population counts in cells so that the known total counts in blocks are honored. The smoothing procedure is repeated until the average change in the populations assigned to cells changes between successive iterations by no more than 0.01% of the variance in the cell population counts. We apply the smoothing procedure to grid cell counts for each race group separately so that race group counts as well as total population counts within blocks

[4] All analyses—including estimation of the population densities and computation of segregation levels—are based on a macro written in Visual Basic for Applications (VBA) and run within ArcGIS 9.1 (Environmental Systems Research Institute, 2005).

are preserved. The result of this procedure is an estimate of the population count and density for each race group in each grid cell in the region. These density estimates form the basis for the calculations of the spatial information theory index.

Given the estimated population density surface, computing segregation levels requires that we define a spatial proximity function. Following White's (1983) suggestion, we rely on a distance-decay proximity function that weights nearby locations more heavily than distant ones in computing the composition of each local environment, as this plausibly corresponds to the effect of proximity on patterns of social interaction. Specifically, we use a two-dimensional biweight kernel proximity function, which is similar in shape to a Gaussian function, but is bounded by a finite radius in order to reduce computational requirements. We then compute segregation levels using the biweight kernel proximity function with radii of 500m, 1000m, 2000m, and 4000m. These radii correspond roughly to local environments ranging from 'pedestrian' in size (500m radius) to those that are considerably larger—perhaps the size of a large high-school attendance zone (4000m radius). At each of these radii, we compute three segregation measures—white-black segregation, white-Hispanic segregation, and white-Asian segregation.

<u>Interpreting the spatial information theory index and the segregation profile</u>

The spatial information theory index can be interpreted as a measure of the extent to which the racial diversity of individuals' local environments differs, on average, from the diversity of the region as a whole. The value of the index ranges between zero—indicating no segregation (each person's local environment has a racial composition identical to that of the region as a whole)—and one—indicating complete segregation (each person's local environment is monoracial). In the limiting case, as the scale at which segregation is measured is made arbitrarily small, the index will approach 1, the maximum possible segregation. To see this, consider that at an arbitrarily small scale, the local environment of each location consists only of that location. If each location were a household, for example, then segregation at this minimal scale would be equal to the segregation among households, which would be very close to 1 in most regions of the U.S. (since most households are monoracial). At the other extreme, as the scale at which segregation is measured becomes arbitrarily large, the index will approach zero. At an arbitrarily large scale, the local environment of any location will include all other locations, and all points will be equally proximal to one another. In this case, the racial composition of all local environments will be the same, so segregation will be zero.

In between these two extremes, of course, segregation may take on any value, though it will, in general, always be a non-increasing function of scale.[5] The 'segregation profile' constructed by plotting segregation level against scale describes both the absolute level of segregation at any scale and the rate of change of segregation level with scale. For each metropolitan area, we compute the level of segregation at each of four scales (500m, 1000m, 2000m, and 4000m) and a measure of the slope of the profile—the ratio of segregation measured using a 4000m radius definition of the local environment to segregation measured at a 500m radius (H_{4000m}/H_{500m}). This ratio—which we term the *granularity ratio*—describes the extent to which micro-segregation (segregation when we use a small radius to define local environments) is due to patterns of macro-segregation (Reardon et al., 2006). Granularity ratios will range between zero and one, with ratios close to one indicating that most of the observed segregation among individuals' local micro environments is due to

[5] Reardon and O'Sullivan (2004) note that it is mathematically possible that measured segregation could increase with scale, but only under conditions that are theoretically unreasonable and empirically non-existent. Likewise, it is mathematically possible that measured segregation can take on a value less than zero, in the case of "hyper-integration," but, again, the conditions for this are not empirically observed.

large-scale patterns of segregation, and ratios close to zero indicating that little of the micro-segregation is due to macro-scale segregation.

Because the spatial information theory index uses a well-defined and consistent definition of the 'local environment,' measured segregation levels using it do not correspond exactly to levels obtained from an aspatial measure relying on census tracts, which are arbitrary in shape and vary widely in size. That said, previous work shows that segregation measured among census tracts corresponds roughly to spatial segregation measured using a biweight proximity function with radius of 1000-2000m (Lee et al., 2006). Thus, the range of scales we examine (500m-4000m) encompasses scales both smaller and larger than the typical census tract.

<u>Metropolitan area characteristics</u>

Our aim in this paper is descriptive. In addition to describing the overall trends in racial segregation at multiple spatial scales, we explore the relationships among trends in segregation and a small set of metropolitan area characteristics that have been shown to be associated with residential segregation in past research. The first set of covariates includes constant or cross-sectional indicators such as census *region* (West, Midwest, Northeast, South) and 1990 metropolitan *population size*. Additionally, *group-specific population shares* indicate each metropolitan area's racial/ethnic composition; these include the percent black, percent Hispanic, and percent Asian in 1990.

We also include a set of correlates that measure changes in several potentially relevant metropolitan population characteristics. First, following other researchers (Farley & Frey, 1994; Logan, Stults, & Farley, 2004), we compute each group's *relative population growth rate* as that group's decennial growth rate (in percentage) minus the growth rate of non-

Hispanic whites in each metropolitan area. Relative rates greater than zero indicate that the population of a given group grew faster than that of whites during the 1990s. Second, because we expect that growth in immigrant populations might be associated with changes in segregation patterns (particularly via ethnic enclave formation and consolidation), we compute the *foreign-born population growth rate* for each metropolitan area between 1990 and 2000, since. Third, we compute the *group-specific income ratio change* as the change from 1990 to 2000 in the ratio of each group's per capita income to that of non-Hispanic whites. Positive changes indicate increasing income parity between a given group and non-Hispanic whites during the 1990s; negative changes indicate increasing between-group income inequality. Finally, we construct a measure of *group-specific relative suburbanization change* for each group. We define suburbanization as the percentage of a group that lives outside a metropolitan area's principal cities (i.e., those appearing in the official metropolitan area title). We compute the change from 1990 to 2000 in the ratio of a given group's suburbanization level to that of non-Hispanic whites. Positive changes indicate that the minority group is experiencing more rapid increases in suburbanization than non-Hispanic whites during the 1990s; negative changes indicate increasing city-suburban differentiation between the given group and non-Hispanic whites.

Table 1 provides descriptive statistics for the metropolitan area covariates we use in the analysis. The 100 metropolitan areas, on average, experienced rapid growth of their Hispanic, Asian, and foreign-born populations, compared to much more modest growth rates of their Black populations. On average, there were slight increases in black-white and Asian-white income ratios during the 1990s in these 100 metropolitan areas, but a substantial decrease (-13 percentage points) in the Hispanic-white income ratio over the same period. Finally, black suburbanization increased faster than white suburbanization, on average, during the 1990s, but Hispanic and Asian suburbanization growth were, on average, very similar to white suburbanization.

Table 1 about here

3. Results

Changes in segregation levels, 1990-2000

We begin by describing the average trends in segregation from 1990 to 2000 in the 100 largest metropolitan areas. Table 2 reports the average level of segregation from non-Hispanic whites, at each scale, for each of the three racial/ethnic groups (see also Figure 1). As expected, the downward slopes of the segregation profiles reveal that segregation is more acute at the micro level than the macro level. Likewise, consistent with prior research, we observe that average segregation levels are highest between blacks and whites, and lowest between Asians and whites, regardless of the spatial scale considered.

Table 2 & Figure 1 about here

The trends in segregation from 1990 to 2000, however, differ substantially among the three race groups. Black-white segregation, for example, declined on average at the most micro scales, but remained stable at the 4000m scale. Hispanic-white and Asian-white segregation, in contrast, increased at both the micro- and macro-scales. The average changes in segregation were relatively small in size in absolute terms,[6] but sizeable in comparison to the standard deviation of segregation levels in 1990. For example, the decline in black-white segregation at the 500m scale (-.036) is equal to about one-quarter of the standard deviation

[6] Reardon and Yun (2001) suggest that a change in the information theory index of .05 should be considered a sizeable change.

of segregation levels in 1990 (s.d.=.15); the increases in Hispanic-white segregation at 500m and 4000m are each equal to roughly three-eighths of a standard deviation; and the increases in Asian-white segregation at 500m and 4000m are equal to roughly one-third and three-fifths of a standard deviation, respectively.

For all three groups, the average granularity ratio increased substantially from 1990 to 2000. In the case of black-white segregation, the granularity ratio increased by an average of .043 (s.e.=.005) points, from .567 to .611. The average increases in Hispanic-White and Asian-White segregation were roughly constant in size across the range of scales, which means that the increase in segregation of these groups was driven largely or entirely by increases in macro-segregation. This pattern is evident in the increase in the granularity ratio for Hispanic-white segregation—which increased by .057 (s.e.=.006), from .469 to .526—and for Asian-White segregation—which increased by 0.071 (s.e.=.007), from .405 to .476. For all three groups, a larger proportion of micro-scale segregation was due to macro-scale patterns of segregation in 2000 than in 1990.

Correlates of Changes in Segregation, 1990-2000

We next investigate the metropolitan correlates of segregation change. Tables 3-5 present mean changes in micro- (500m) and macro-level (4000m) segregation and the granularity ratio (H_{4000m}/H_{500m}) by selected metropolitan characteristics (Reardon et al., 2006). These results are presented separately for black-white, Hispanic-white and Asian-white segregation.

Correlates of Changes in Black-White Segregation, 1990-2000

Table 3 explores the metropolitan correlates of changing black-white segregation.

There are notable regional distinctions in the trajectories of segregation, especially in the Northeast and West. Northeastern metros in particular illustrate the utility of our approach. While micro-segregation was declining in the Northeast—albeit at a modest pace—the segregation experienced in broader local environments increased by 6.5 percent. In other words, a black or white resident's experience of changing segregation in an average northeastern metro during the 1990s depends on how that resident's local environment is defined. The divergent macro-micro trends together contributed to an 11.5 percent increase in the granularity ratio, an indication that the northeastern segregation profile became flatter over the course of the decade. Segregation trends in western metros are also noteworthy in that they experienced the largest relative decreases in segregation at both small and large spatial scales. For this reason the mean western granularity ratio increased only incrementally (2.4 percent) during the 1990s.

Table 3 about here

The two cross-sectional metropolitan characteristics—population size and black population share in 1990—are not so clearly associated with segregation change at different scales. Each metropolitan area size group experienced similar average declines in micro-segregation and either stability or small declines in macro segregation. This is also the case for black population share, though metros with black populations of 10-20 percent in 1990 experienced the largest declines in segregation at both the 500m and 4000m bandwidths.

A number of interesting patterns emerge when we take into account metropolitan change in the 1990s. For example, the growth in foreign-born populations is more clearly related to spatial shifts in black-white segregation than is black population growth (relative to whites). Metropolitan areas in which foreign-born populations doubled experienced larger relative declines in micro-segregation among blacks and whites (-11.5 percent) than any other subset of metros in Table 3. These metros were also outliers at the larger spatial scale; the only mean declines in black-white macro-segregation occurred in the metros with the highest rates of foreign-born population growth.

As for our measures of the financial and residential progress of blacks vis-à-vis whites, changes in black-white income ratios are associated with the changing scale of segregation while black suburbanization is not. Metros in which the black-white income ratio has declined by more than five percent (i.e., those metros in which blacks are losing ground to whites) experienced remarkable increases in macro-segregation (15.7 percent) but virtually no change in micro-segregation (0.5 percent). This led to a double-digit increase (17.4 percent) in their granularity ratios. As a consequence, black and white residents in these areas experienced little racial change in their proximal spatial environments even as they became much more distant from one another across the broader metropolitan landscape. The effects of changing relative income are less extreme but also evident across spatial scales. As blacks approach income parity with whites they are becoming more likely to share small and, to some extent, large local environments with one another.

Correlates of Changes in Hispanic-White Segregation, 1990-2000

Hispanic and white metropolitan residents became more segregated from one another during the 1990s, and the pace and spatial dynamics of those increases are associated with a number of metropolitan characteristics (see Table 4). Segregation shifts are again contingent on regional location. Southern metros experienced the most rapid increases in micro and macro-segregation and northeastern metros are again experiencing the most spatially divergent changes. Metros in the Northeast are not marked by countervailing micro-macro shifts as they are for black-white segregation, but the overall trend is similar. Micro-segregation has increased only marginally in the highly segregated Northeast (3.4 percent) while macro-segregation increased at a rate five times that of the smaller scale (17.7 percent). Thus, relative increases in the granularity ratios were largest for metropolitan areas in the Northeast.

Table 4 about here

Metropolitan population size in 1990 was not a clear predictor of Hispanic-white segregation change over the decade, though smaller metros (<1 million) did experience the smallest relative increases in small-scale segregation while simultaneously experiencing the largest relative increases in large-scale segregation. Metros with modest Hispanic 1990 populations (<10 percent) also experienced a trend toward macro-scale segregation as their granularity ratios approached or exceeded .500, an indication that large-scale distinctions account for half of those occurring at the smaller scale.

Population dynamics are clearly related to Hispanic-white segregation changes. Metros in which Hispanics are increasing rapidly (relative to whites) have lower mean levels of segregation than lower growth metros, but they are making up ground quickly. For example, metros in which Hispanic growth rates outstrip those of whites by 100 percentage points or more experienced an average micro-segregation increase of 36.4 percent and an average macro-segregation increase of 63.6 percent. The results are virtually identical when we take into account foreign-born population growth, suggesting that Hispanic immigration is fueling the creation of segregated neighborhoods and, to an even greater extent, the consolidation of larger-scale enclaves.

Changes in Hispanic income and suburbanization (relative to whites) have clear consequences for segregation at small and large scales. Unlike the trends in black-white segregation, increasing economic inequality between Hispanics and whites is associated with substantial increases in *both* small-scale and large-scale segregation; only large-scale segregation was affected in the black-white case. However, the net result regarding the structure or profile of Hispanic-white segregation is similar to that occurring between blacks and whites: widening income disparities result in increasingly macro-centric segregation patterns (i.e., larger granularity ratios). An exception to this trend occurs in the few highly segregated metros (N=7) in which Hispanic incomes are actually increasing relative to whites. There are no such exceptions when considering Hispanic suburbanization trends. Increasing Hispanic suburbanization (relative to whites) results in smaller increases in segregation across the board.

Correlates of Changes in Asian-White Segregation, 1990-2000

The 1990s were a decade of increasing segregation between Asians and whites and certain metropolitan characteristics played a role in these changes (see Table 5). The largest increases in Asian-white micro-segregation (10.7 percent) occurred in southern metros, which now exhibit the highest levels of small-scale segregation of all the regions. These relative increases at the smaller scale were trebled at the larger scale; macro-segregation between southern metropolitan Asians and whites increased by 36.3 percent, leading to the largest regional increases (24.3 percent) in the granularity ratio.

Table 5 about here

Larger metropolitan areas not only have the highest overall levels of Asian-white segregation but they also experienced the largest segregation increases during the 1990s. For example, an average metropolitan area of more than two million residents in 1990 had a 16.0 percent increase in Asian-white micro-segregation and a 33.2 percent increase in macro-segregation; the corresponding increases for an area of less than one million were 4.6 percent and 21.9 percent, respectively. Changes in Asian-white segregation did not have such a linear relationship to the relative size of the metropolitan Asian population in 1990. Rather, metropolitan areas with a moderate Asian presence (1-5 percent) experienced the largest relative increases in micro-segregation, macro-segregation and the granularity ratios.

As was the case with Hispanic-white segregation, trends in Asian-white segregation are sensitive to group-specific population growth and to the growth in the foreign-born population. Asian-white segregation at the 500m bandwidth barely changed in low-growth metros and macro-scale increases hovered around 10 percent, the smallest such increases in all of Table 5. High-growth metros, however, experienced large relative increases in Asian-white segregation, especially at the 4000m bandwidth. Metros in which Asian growth rates were more than 10 percentage points greater than white growth rates saw their mean large-scale segregation indices increase by more than half (54.7 percent) and their granularity ratios increase at twice the magnitude (36.2 percent) of the changes occurring across all metros (17.5 percent). This same pattern applies to growth in foreign-born populations: higher growth rates result in larger relative increases in micro-segregation and much larger relative increases in macro-segregation. This in turn leads to flatter Asian-white segregation profiles (i.e., larger granularity ratios).

Changing income disparities have an uneven impact on changes in Asian-white segregation. On the one hand, metros in which Asian-white income ratios increased by more than 10 percent (i.e., metros in which Asian incomes were gaining ground) experienced the smallest increases in micro (2.7 percent) and macro-segregation (15.2 percent). On the other hand, metros in which the ratios declined by more than ten percent also experienced relatively modest segregation increases. Most of the larger increases in segregation occurred in metros falling between these extremes. For example, segregation at the larger scale increased by about one-third in metros experiencing modest Asian income gains *and* modest losses relative to whites. Asian suburbanization also did not emerge as an obvious predictor of segregation change. Metros in which Asians were becoming more suburbanized relative to whites had the smallest increases in segregation during the 1990s, but those metros in which the Asian-white suburbanization ratios were declining by more than five percent experienced the smallest relative increases in macro-segregation (22.1 percent).

4. Discussion

Our results point to three notable trends in segregation from 1990 to 2000: 1) Hispanic-white and Asian-white segregation levels increased at all scales; 2) black-white segregation declined at a micro-scale, but was unchanged at a macro-scale; and 3) for all three racial groups, the average segregation profile grew flatter during the 1990s. We discuss these three patterns in turn below.

Increases in Hispanic-White and Asian-White Segregation

As we noted above, prior research has generally found Hispanic-White and Asian-white segregation were stable or slowly increasing during the 1990s. We find that both Hispanic-White and Asian-white segregation have increased modestly, on average, over the range of scales we examine. The increases in segregation that we observe are slightly, larger, on average, than those reported by other studies, but these differences are likely due to differences between our sample and definitions of metropolitan areas and those used in prior research.[7] Several prior studies find that the largest metropolitan areas with significant populations of Hispanics or Asians tended to experience small increases in segregation during the 1990s, or smaller declines than other metropolitan areas, a finding that is consistent with our finding of average increases in segregation among our sample of 100 large metropolitan areas.

The increases in Hispanic-white and Asian-white segregation at both the micro- and macro-scales, coupled with the finding that the average increase in segregation levels is greatest in metropolitan areas with initially small but rapidly growing foreign-born and Hispanic or Asian populations, suggests that these increases may be driven by immigration and the growth of 'enclave' communities, particularly in urban areas. Moreover, the rapid growth of both micro- and macro-scale Hispanic-white segregation in metropolitan areas where Hispanic-white income disparities are growing rapidly suggests that income differences between the rapidly-growing immigrant populations and non-Hispanic white populations are a key mechanism producing both increases in segregation, particularly at the macro-scale.

Scale-Specific Changes in Black-White Segregation

We find that black-white segregation declined from 1990 to 2000 at small scales. Lee et al (2006) show that segregation at the census tract level corresponds roughly to

[7] In additional analyses (not shown), we estimated the average change in the *aspatial* (between-tract) Hispanic-White and Asian-white segregation from 1990 to 2000 for our sample of metropolitan areas, and found similar patterns of average modest increases in segregation to those we report using the spatial measure, regardless of whether we used the aspatial information theory index or the dissimilarity index. This suggests that the differences between our conclusion that Asian-white segregation is increasing slightly and the conclusion of some prior research indicating that Asian-white segregation has been relatively stable is not driven solely by our use of the spatial information theory index rather than the more commonly-used aspatial dissimilarity index.

segregation at a 1000m radius, so our results correspond to prior research showing a decline in tract-level black-white segregation. We also find, however, that black-white segregation at the 4000m macro-scale did not decline, on average, from 1990-2000. This indicates that the declines in black-white segregation observed in tract-level analyses are the result of local processes of residential integration (nearby neighborhoods became more racially similar to one another during the 1990s) rather than any large scale redistribution of black and white populations. This has potentially important implications for conclusions regarding the effects of reductions in residential segregation, since the well-documented decline in black-white segregation is likely only to affect social processes and outcomes that depend on highly localized residential contexts.

The strongest predictor of changes in black-white segregation in our bivariate descriptive analyses is the change in the black-white per capita income ratio. In metropolitan areas characterized by increasing black-white income parity, segregation declined most sharply at both the micro- and macro-scales. Likewise, in metropolitan areas where black-white income inequality increased substantially, micro-segregation remained unchanged and macro-segregation increased, resulting in segregation patterns increasingly dominated by macro-scale patterns, like those evident in places like Chicago, Detroit, and Atlanta. Our results confirm the existence of trends suggested in other research documenting the decline in black-white tract-level (micro-) segregation since the 1970s coupled with the persistence of larger-scale segregation (Fischer, Stockmayer, Stiles, & Hout, 2004; Massey & Hajnal, 1995). Our definitions of scale, however, are more precisely defined than in this prior work, since they do not depend on municipal or tract boundaries, and our sample of metropolitan areas is much larger.

The Increasing Importance of Macro-Scale Segregation

The one pattern that is most consistent across black-, Hispanic-, and Asian-white segregation is the trend toward the increasing importance of macro-scale segregation. For all three groups, granularity ratios increased substantially during the 1990s. Segregation patterns in these 100 largest metropolitan areas are becoming characterized more by large-scale racially-identified areas and less by patterns of variation in the racial composition over short distances. For Hispanic-white and Asian-white segregation, this trend is most pronounced in metropolitan areas experiencing rapid immigration and the concentration of immigrant Hispanic populations in urban areas. For black-white segregation, however, the trend is most evident where black-white income disparities are increasing. But more notable, perhaps, is the overall persistence of the trend across all types of metropolitan areas. In Tables 3-5, not a single category of metropolitan area shows an average decline in granularity ratios, for example, and almost all show significant increases. For all three groups, only 12% of the metropolitan areas in our sample had declining granularity ratios from 1990 to 2000.

The consistency of this trend toward the increasing dominance of segregation patterns by macro-segregation raises the question "why might the scale of segregation change over time?" In particular, why might we observe a trend toward the increasing importance of macro-scale segregation patterns in shaping local environments? While our primary goal in this paper is descriptive, we offer several suggestions for this trend.

Perhaps the most obvious possible explanation is that patterns of macro-scale racial segregation are harder to change than micro-segregation patterns, particularly in the absence of large-scale population changes. Given a stable population, segregation can only be changed by the movement of individuals within a metropolitan region. Because short-distance moves are both more common, particularly for low-income families, and more likely to affect micro-segregation more than macro-segregation, changes in micro-segregation are more easier to obtain. Processes such as changes in preferences, neighborhood gentrification, the dismantling of large housing projects and the like may create more integrated neighborhoods in transitional areas between regions with very different racial compositions (such as near city/suburban boundaries), but may have little or no effect on more macro-scale residential patterns. When a population changes rapidly (e.g., because of rapid immigration of Hispanics into a metropolitan area), however, segregation patterns may change not only because of internal residential moves, but because of where new residents settle. In this case, macro-segregation may be more susceptible to short-term change than when a population is stable. Evidence for this can be seen in the sharp increases in macro-scale Hispanic-white and Asian-white segregation in metropolitan areas where these groups are growing most rapidly (and where the foreign born population is growing rapidly as well).

A second possibility is that there have been changes over the 1990s in individuals' preferences regarding their most immediate neighbors, but less change in preferences regarding the racial composition of individuals' larger residential contexts. In other words, whites in 2000 may be more willing to live on a block where there is some racial heterogeneity than they were in 1990, but no more willing to live in a region of the metropolitan area that is predominantly non-white—and likewise for other groups' preferences for living with white neighbors. Farley and colleagues document such a change in preferences for one's immediate neighbors (micro-neighborhood preferences) in a study conducted in Detroit in 1976 and 1992, though it is not clear whether this decline is general to all race groups and all metropolitan areas; not is it clear whether the trend has continued through the 1990s (Farley, Steeh, Krysan, Jackson, & Reeves, 1994). Moreover, we are not aware of data that examine the stability or change in preferences regarding the racial composition of larger neighborhood contexts. Without better data on preferences at different scales and over time, it is not clear whether a change in micro-neighborhood preferences but not in macro-neighborhood preferences might explain the trend toward the increased dominance of macro-scale segregation patterns.

A third possibility is that the meaning of a given spatial distance has changed over the 1990s. This might happen if individuals, on average, tend to travel farther from their home in 2000 than in 1990. In this case, the contact that individuals have with others in their 4000m radius neighborhood in 2000 might correspond to the contact they would have had in 1990 in a smaller radius neighborhood, for example. It is unlikely that this accounts for the changes in granularity of segregation, for two reasons. First, the population density of metropolitan areas has grown over the 1990s (since we use constant metro area boundaries), so the number of people an individual might encounter, on average, within a given radius of his or her house is greater in 2000 than in 1990, which means that a the radius need to encompass a given number of neighbors is *smaller* in 2000 than in 1990, not larger. Second, even were this not the case, the change in distances traveled would have to be substantial, to account for the changes in granularity ratios—back-of-the-envelope calculations suggest that 4000m in 2000 would have to correspond to 3000-3500m in 1990 in order for a telescoping of distance alone to account for the change in the granularity ratios.[8] This is a rather large change, though not implausible: suburbanization patterns imply a shift of the population into low-density suburban and exurban areas where individuals must, in general, travel greater distances in the course of their day.

A final possibility is that there have been changes in institutional factors, such as

[8] This assumes that the meaning of a 500m distance was constant over the 1990s.

housing and lending markets. A study by HUD found that, although black and Hispanic applicants were treated differently, on average, by real estate agents than were white applicants, such discriminatory practices declined from 1989 to 2000 (Ross & Turner, 2005). This reduction in housing discrimination might differentially affect micro- and macro-segregation if, for example, it meant that real estate agents were more likely in 2000 than in 1990 to show homes to their clients (of any race) in transitional or border neighborhoods, but were no more likely to show homes whose surrounding macro-environments were racially dissimilar from their clients. As with the other potential explanations for the increasing salience of macro-segregation patterns, additional data and analysis would be needed to empirically test this hypothesis.

The Implications of Changes in Segregation for Social Outcomes

Our goal in this paper has been to describe the patterns of change in segregation at a range of spatial scales. Issues of scale are important not merely in describing patterns of segregation, however, but in understanding both the causes and consequences of segregation. The causes of large-scale segregation may be quite different from those of small-scale segregation. For example, factors such as the spatial location of public amenities that draw primarily on pedestrian traffic and local residents (e.g., elementary schools, playgrounds, storefront shopping areas, etc.), the nature of street networks (Grannis, 1998), and families' residential preferences may play a role in shaping small-scale segregation patterns. In contrast, large-scale segregation patterns, such as those observed in cities like Chicago, Detroit, and Atlanta, might be caused more by labor markets and other economic features of regions, jurisdictional structures (e.g., municipalities, school districts, service districts), racial income inequality, housing segregation (Yinger, 1995), and residual historical settlement patterns (Massey & Denton, 1993). One goal of future research should be to better understand these scale-specific causes of segregation patterns.

Likewise, the consequences of segregation may depend on the scale of segregation patterns. Local segregation is likely to affect pedestrian contact patterns, for example. Large-scale segregation, however, may be more likely to affect the spatial distribution of economic, institutional, and political resources. In addition, the consequences of segregation may depend differently on scale for different populations. For young children, who might stay relatively close to home in the course of a day (attending local child care, preschool, or elementary schools), patterns of local segregation are likely to be most influential. For adults, in contrast, who are more mobile, large-scale segregation patterns linked to employment opportunities and social and institutional resources may be more relevant. Again, future research should examine the relationship between segregation patterns and multiple scales and a range of social outcomes.

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Table 1. Descriptive Statistics for Selected Metropolitan Covariates, 100 Largest Metropolitan Areas, 1990-2000

	Mean	SD	Median	Min.	Max.
Population, 1990 (thousands)	1,517	1,506	1,052	384	10,378
Percent black, 1990	11.7	9.0	9.6	0.2	41.0
Percent Hispanic, 1990	9.7	14.2	4.1	0.4	85.2
Percent Asian, 1990	3.3	6.6	1.5	0.2	60.0
Black-white growth rate difference	19.7	23.0	15.4	-20.6	194.2
Hispanic-white growth rate difference	114.6	117.0	75.6	16.5	664.3
Asian-white growth rate difference	69.3	32.8	66.8	17.0	232.4
Percentage change in foreign-born Population	82.5	68.4	65.3	-14.4	341.4
Percentage change in black-white per capita income ratio	2.9	9.5	4.3	-45.2	29.1
Percentage change in Hispanic-white per capita income ratio	-12.8	9.3	-11.9	-42.0	9.0
Percentage change in Asian-white per capita income ratio	1.2	10.9	1.4	-32.5	40.2
Percentage change in black-white suburbanization ratio	11.3	22.1	8.3	-28.4	108.5
Percentage change in Hispanic-white suburbanization ratio	-3.0	13.8	-1.2	-45.2	33.2
Percentage change in Asian-white suburbanization ratio	3.4	13.8	0.8	-27.0	83.7

Note: N=100

Table 2. Mean Segregation Levels by Local Radius and Racial Group Combination, 1990-2000

	1990[a]	2000[a]	Difference[b]	% change
Black-White H				
500m	.483	.447	-.036	-7.5
	(.151)	(.141)	(.004)	
1000m	.433	.403	-.030	-6.9
	(.148)	(.140)	(.004)	
2000m	.367	.349	-.017	-4.8
	(.138)	(.132)	(.004)	
4000m	.281	.279	-.002[ns]	-0.5
	(.121)	(.117)	(.004)	
4000m/500m	.567	.611	.043	7.6
	(.118)	(.100)	(.005)	
Hispanic-White H				
500m	.248	.282	.034	13.8
	(.094)	(.086)	(.005)	
1000m	.208	.242	.034	16.2
	(.093)	(.086)	(.004)	
2000m	.167	.200	.033	19.6
	(.086)	(.082)	(.004)	
4000m	.123	.154	.030	24.8
	(.074)	(.072)	(.003)	
4000m/500m	.469	.526	.057	12.1
	(.161)	(.148)	(.006)	
Asian-White H				
500m	.195	.212	.017	8.8
	(.052)	(.049)	(.002)	
1000m	.149	.168	.019	12.9
	(.048)	(.047)	(.002)	
2000m	.112	.133	.021	19.0
	(.043)	(.045)	(.002)	
4000m	.081	.103	.022	27.4
	(.038)	(.041)	(.002	
4000m/500m	.405	.476	.071	17.5
	(.123)	(.112)	(.007)	

[a] N = 100 metropolitan areas; standard deviations appear in parentheses.
[b] All mean differences are statistically significant ($p < .001$) unless otherwise noted (*ns* = not significant); standard errors appear in parentheses.

Table 3. Mean Black-White Spatial Segregation Change by Selected Metropolitan Characteristics, 1990-2000

	H500				H4000				H4000/H500			
	1990	2000	Diff.	% change	1990	2000	Diff.	% change	1990	2000	Diff.	% change
Overall (N=100)	.483	.447	-.036	-7.5	.281	.279	-.002ns	-0.5	.567	.611	.043	7.6
Region												
Northeast (N=23)	.477	.458	-.019	-4.0	.238	.253	.015	6.5	.473	.528	.054	11.5
Midwest (N=20)	.603	.563	-.040	-6.7	.397	.390	-.007ns	-1.7	.646	.681	.035	5.4
South (N=35)	.521	.475	-.046	-8.8	.291	.292	.001ns	0.4	.551	.610	.059	10.6
West (N=22)	.320	.286	-.034	-10.7	.205	.186	-.018	-9.0	.620	.635	.015ns	2.4
Metro population size, 1990												
<1 million (N=47)	.445	.412	-.034	-7.6	.243	.244	.001ns	0.4	.531	.580	.049	9.2
1-2 million (N=31)	.499	.459	-.040	-8.0	.290	.287	-.004ns	-1.3	.574	.612	.038	6.5
>2 million (N=22)	.541	.506	-.035	-6.5	.350	.346	-.004ns	-1.0	.635	.675	.040	6.2
Black population, 1990												
<5 percent (N=22)	.296	.280	-.016ns	-5.5	.153	.155	.002ns	1.4	.506	.547	.041ns	8.1
5-10 percent (N=32)	.470	.433	-.037	-7.9	.258	.258	.000ns	0.0	.554	.600	.046	8.4
10-20 percent (N=29)	.576	.529	-.047	-8.2	.367	.357	-.011	-2.9	.626	.663	.037	5.9
>20 percent (N=17)	.592	.551	-.041	-7.0	.344	.350	.006ns	1.8	.571	.623	.051	9.0
Black minus white growth rate												
<10 point difference (N=30)	.462	.425	-.037	-8.0	.272	.266	-.007ns	-2.5	.585	.616	.032	5.4
10-20 point difference (N=41)	.542	.506	-.036	-6.7	.325	.327	.002ns	0.7	.587	.634	.047	8.0
>20 point difference (N=29)	.422	.387	-.035	-8.3	.228	.227	-.001ns	-0.5	.522	.572	.051	9.7
Foreign-born population growth rate												
<25 percent growth (N=15)	.536	.506	-.031	-5.8	.302	.306	.005ns	1.5	.550	.592	.042	7.6
25-50 percent growth (N=27)	.453	.434	-.019	-4.2	.260	.266	.006ns	2.1	.542	.583	.041	7.6
50-100 percent (N=30)	.471	.437	-.034	-7.2	.274	.277	.003ns	1.0	.567	.619	.052	9.2
>100 percent growth (N=28)	.496	.439	-.057	-11.5	.297	.281	-.016	-5.4	.601	.638	.037	6.2

(continued)

Table 3. Mean Black-White Spatial Segregation Change by Selected Metropolitan Characteristics, 1990-2000 (*continued*)

	H500				H4000				H4000/H500			
	1990	2000	Diff.	% change	1990	2000	Diff.	% change	1990	2000	Diff.	% Change
% change in the ratio of black to white per capita income												
>5 percent decrease (N=17)	.387	.388	.002 ns	0.5	.192	.222	.030 ns	15.7	.467	.549	.081	17.4
0-5 percent decrease (N=14)	.490	.466	-.024	-5.0	.296	.300	.004 ns	1.3	.603	.642	.039	6.5
<5 percent increase (N=24)	.504	.459	-.045	-8.8	.290	.286	-.003 ns	-1.2	.567	.610	.043	7.6
>5 percent increase (N=45)	.507	.457	-.049	-9.8	.305	.291	-.014	-4.6	.594	.625	.030	5.1
% change in the ratio of black to white suburbanization												
Decrease (N=23)	.442	.400	-.042	-9.4	.237	.232	-.006 ns	-2.4	.528	.569	.041	7.8
<10 percent increase (N=30)	.492	.463	-.029	-5.9	.289	.293	.003 ns	1.2	.578	.624	.046	8.0
10-25 percent increase (N=30)	.490	.456	-.035	-7.1	.278	.279	.001 ns	0.3	.551	.592	.041	7.4
>25 percent increase (N=17)	.511	.468	-.043	-8.4	.331	.322	-.009 ns	-2.6	.631	.676	.046 ns	7.2

Note: ns = not significant (p>.05)

Table 4. Mean Hispanic-White Spatial Segregation Change by Selected Metropolitan Characteristics, 1990-2000

	H500				H4000				H4000/H500			
	1990	2000	Diff.	% change	1990	2000	Diff.	% change	1990	2000	Diff.	% Change
Overall (N=100)	.248	.282	.034	13.8	.123	.154	.030	24.8	.469	.526	.057	12.1
Region												
Northeast (N=23)	.332	.343	.011[ns]	3.4	.150	.177	.027	17.7	.423	.488	.064	15.2
Midwest (N=20)	.215	.256	.041	19.1	.114	.149	.034	29.8	.489	.544	.055	11.3
South (N=35)	.224	.270	.047	20.9	.100	.132	.032	32.3	.426	.484	.058	13.6
West (N=22)	.229	.261	.032	14.1	.139	.168	.028	20.3	.567	.615	.048	8.4
Metro population size, 1990												
<1 million (N=47)	.243	.272	.029	12.0	.107	.136	.029	26.8	.429	.491	.062	14.5
1-2 million (N=31)	.243	.281	.038	15.7	.127	.158	.030	23.7	.479	.535	.056	11.7
>2 million (N=22)	.265	.304	.039	14.9	.151	.186	.035	22.9	.541	.587	.045	8.4
Hispanic population, 1990												
<5 percent (N=53)	.213	.258	.045	21.3	.088	.122	.034	39.2	.389	.450	.061	15.6
5-10 percent (N=20)	.285	.311	.026	9.3	.140	.174	.033	23.9	.484	.557	.073	15.1
10-20 percent (N=10)	.253	.299	.046	18.0	.156	.191	.036	22.8	.597	.638	.041	6.9
>20 percent (N=17)	.310	.312	.002[ns]	0.6	.194	.206	.012[ns]	6.0	.625	.659	.034	5.4
Hispanic minus white growth rate												
<50 point difference (N=19)	.293	.296	.004[ns]	1.2	.173	.183	.010	5.6	.559	.590	.030	5.4
50-100 point difference (N=48)	.267	.288	.021	7.9	.137	.164	.027	19.8	.498	.552	.054	10.9
>100 point difference (N=33)	.195	.266	.071	36.4	.075	.122	.048	63.6	.375	.451	.076	20.2
Foreign-born population growth rate												
<25 percent growth (N=15)	.278	.286	.008[ns]	2.7	.130	.149	.019	14.6	.419	.473	.053	12.7
25-50 percent growth (N=27)	.298	.307	.010[ns]	3.2	.159	.178	.019	11.9	.525	.564	.039	7.5
50-100 percent growth (N=30)	.230	.259	.029	12.4	.118	.141	.023	19.5	.475	.521	.046	9.6
>100 percent growth (N=28)	.202	.281	.078	38.8	.091	.146	.056	61.5	.435	.522	.087	20.0

(*continued*)

Table 4. Mean Hispanic-White Spatial Segregation Change by Selected Metropolitan Characteristics, 1990-2000 (*continued*)

	H500				H4000				H4000/H500			
	1990	2000	Diff.	% change	1990	2000	Diff.	% change	1990	2000	Diff.	% Change
% change in the ratio of Hispanic to white per capita income												
>20 percent decrease (N=14)	.217	.284	.067	30.7	.082	.122	.041	49.9	.355	.429	.074	20.9
10-20 percent decrease (N=50)	.215	.259	.044	20.4	.102	.137	.035	34.6	.460	.513	.053	11.6
<10 percent decrease (N=29)	.293	.298	.006^{ns}	2.0	.169	.185	.016	9.6	.538	.588	.050	9.2
Increase (N=7)	.357	.376	.019^{ns}	5.2	.170	.205	.035	20.9	.477	.553	.076	15.8
% change in the ratio of Hispanic to white suburbanization												
>10 percent decrease (N=23)	.203	.251	.048	23.4	.088	.126	.037	42.0	.413	.476	.064	15.4
0-10 percent decrease (N=36)	.238	.285	.047	19.5	.113	.153	.040	35.4	.459	.528	.069	15.1
<10 percent increase (N=29)	.254	.277	.023	8.9	.132	.157	.025	18.6	.489	.542	.052	10.7
>10 percent increase (N=12)	.346	.346	-.001^{ns}	-0.2	.198	.202	.003^{ns}	1.8	.558	.574	.016^{ns}	2.9

Note: ns = not significant (p>.05)

Table 5. Mean Asian-White Spatial Segregation Change by Selected Metropolitan Characteristics, 1990-2000

	H500				H4000				H4000/H500			
	1990	2000	Diff.	% change	1990	2000	Diff.	% change	1990	2000	Diff.	% change
Overall (N=100)	.195	.212	.017	8.8	.081	.103	.022	27.4	.405	.476	.071	17.5
Region												
Northeast (N=23)	.198	.214	.016	8.3	.068	.087	.019	27.3	.340	.398	.058	17.0
Midwest (N=20)	.194	.207	.014	7.2	.082	.099	.017	20.9	.424	.475	.051	12.0
South (N=35)	.197	.218	.021	10.7	.077	.105	.028	36.3	.377	.468	.092	24.3
West (N=22)	.188	.203	.015	7.9	.099	.120	.021	21.4	.501	.571	.069	13.9
Metro population size, 1990												
<1 million (N=47)	.199	.208	.009	4.6	.073	.089	.016	21.9	.358	.421	.063	17.7
1-2 million (N=31)	.190	.210	.020	10.5	.083	.108	.025	30.1	.422	.504	.082	19.5
>2 million (N=22)	.192	.223	.031	16.0	.094	.125	.031	33.2	.482	.553	.071	14.7
Asian population, 1990												
<1 percent (N=28)	.214	.227	.013	5.9	.078	.096	.018	23.6	.364	.422	.058	16.0
1-5 percent (N=41)	.179	.197	.019	10.5	.073	.095	.023	31.3	.392	.471	.079	20.1
>5 percent (N=13)	.226	.246	.020^{ns}	9.0	.124	.152	.028	22.3	.552	.615	.062	11.3
Asian minus white growth rate												
<5 point difference (N=25)	.218	.220	.002^{ns}	0.9	.098	.108	.009	9.6	.440	.470	.030	6.7
5-10 point difference (N=38)	.186	.207	.021	11.4	.077	.101	.024	31.7	.404	.480	.076	18.9
>10 point difference (N=13)	.192	.219	.027	14.2	.066	.102	.036	54.7	.344	.469	.125	36.2
Foreign-born population growth rate												
<25 percent growth (N=15)	.227	.229	.002^{ns}	0.7	.092	.102	.011	11.4	.395	.433	.039	9.9
25-50 percent growth (N=27)	.190	.208	.018	9.5	.079	.098	.019	24.5	.401	.455	.054	13.4
50-100 percent growth (N=30)	.192	.216	.024	12.5	.086	.111	.025	28.9	.434	.501	.067	15.3
>100 percent growth (N=28)	.184	.201	.017	9.4	.071	.100	.028	39.5	.383	.492	.109	28.5

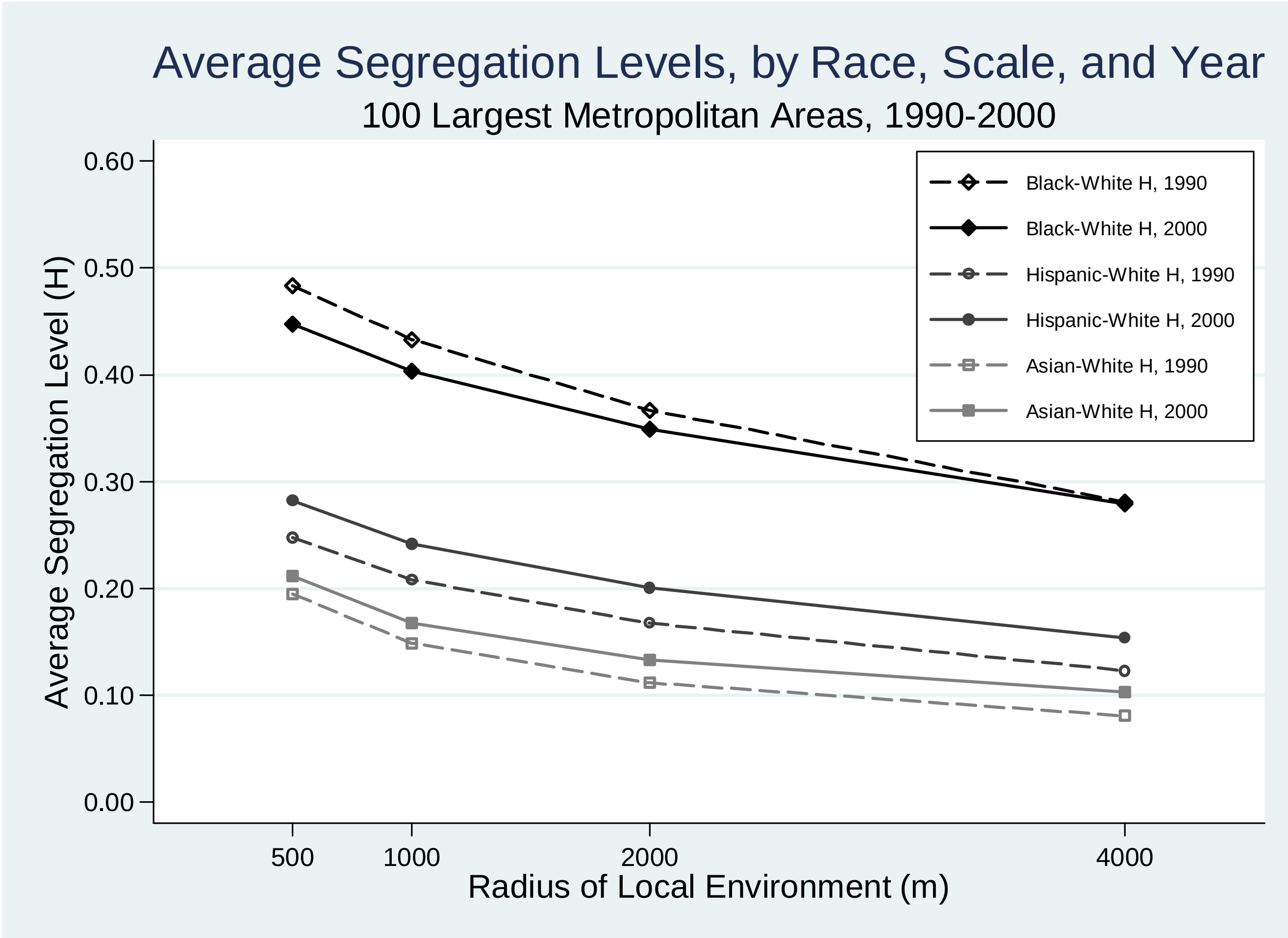
(*continued*)

Table 5. Mean Asian-White Spatial Segregation Change by Selected Metropolitan Characteristics, 1990-2000 (*continued*)

	H500				H4000				H4000/H500			
	1990	2000	Diff.	% change	1990	2000	Diff.	% change	1990	2000	Diff.	% change
% change in the ratio of Asian to white per capita income												
>10 percent decrease (N=16)	.189	.204	.015	7.8	.078	.093	.015	19.6	.388	.448	.060	15.4
<10 percent decrease (N=31)	.191	.214	.023	12.0	.080	.107	.027	33.9	.413	.489	.076	18.4
<10 percent increase (N=35)	.191	.210	.019	10.0	.076	.101	.025	32.8	.394	.473	.079	20.0
>10 percent increase (N=18)	.214	.220	.006[ns]	2.7	.094	.108	.014	15.2	.428	.484	.056	13.1
% change in the ratio of Asian to white suburbanization												
>5 percent decrease (N=18)	.190	.205	.015	8.0	.079	.096	.017	22.1	.399	.450	.051	12.8
0-5 percent decrease (N=27)	.180	.210	.030	16.7	.074	.105	.031	41.5	.406	.492	.086	21.1
<10 percent increase (N=33)	.199	.208	.010	4.9	.082	.100	.019	22.8	.397	.471	.075	18.8
>10 percent increase (N=22)	.211	.225	.014	6.7	.089	.109	.021	23.2	.420	.484	.063	15.0

Note: ns = not significant (p>.05)

Figure 1:



Average Segregation Levels, by Race, Scale, and Year
100 Largest Metropolitan Areas, 1990-2000
Average Segregation Level (H)
0.60
0.50
0.40
0.30
0.20
0.10
0.00
500
1000
2000
4000
Radius of Local Environment (m)
Black-White H, 1990
Black-White H, 2000
Hispanic-White H, 1990
Hispanic-White H, 2000
Asian-White H, 1990
Asian-White H, 2000

Appendix A. Covariates of Segregation Change for Largest 100 Metropolitan Areas

	2000 pop size (1000s)	1990 racial composition			Population growth rate				% change in per capita income ratio			% change in relative suburbanization		
		% black	% Hispanic	% Asian	Black-white	Hispanic-white	Asian-white	Foreign-born	Black/ white	Hispanic/ white	Asian/ white	Black/ white	Hispanic/ white	Asian/ white
Akron, OH	657	9.8	0.6	0.9	14.8	41.5	47.9	13.8	4.1	-10.8	3.5	20.4	-14.1	0.7
Albany-Schenectady-Troy, NY	809	4.7	1.5	1.3	33.0	74.0	52.3	13.3	-5.2	-19.9	-0.3	-5.6	-14.3	3.6
Albuquerque, NM	599	2.2	36.9	1.2	10.3	30.1	49.3	95.7	2.4	-3.7	1.9	14.2	-20.4	15.5
Allentown-Bethlehem-Easton, PA-NJ	687	1.9	4.1	1.0	40.2	88.8	66.3	47.8	5.9	-4.1	-1.0	10.0	-0.1	0.8
Atlanta-Sandy Springs-Marietta, GA	3,069	25.1	1.8	1.6	38.6	364.1	151.7	262.1	7.1	-33.2	-0.4	18.3	7.2	1.4
Austin-Round Rock, TX	846	9.1	20.6	2.1	-9.4	55.5	108.6	172.2	6.3	-5.1	23.2	3.5	-16.7	23.2
Bakersfield, CA	543	5.3	27.7	2.7	32.7	73.4	52.2	69.3	18.3	-6.4	-11.2	28.3	2.9	-20.6
Baltimore-Towson, MD	2,383	25.7	1.2	1.7	12.9	80.3	67.0	66.7	4.4	-16.9	-10.9	28.4	-1.5	-1.3
Baton Rouge, LA	624	32.2	1.4	0.9	10.9	34.0	68.6	67.1	11.5	-13.5	8.1	-7.5	1.5	22.5
Bethesda-Gaithersburg-Frederick, MD	912	10.9	6.2	6.9	41.7	86.7	61.4	65.7	-8.4	-17.0	1.9	-0.4	-3.1	0.2
Birmingham-Hoover, AL	957	26.3	0.4	0.5	9.7	373.8	63.4	133.3	10.0	-34.9	22.9	5.0	3.6	8.0
Boston-Quincy, MA	1,715	9.7	5.1	3.2	13.6	53.6	67.2	40.1	-8.5	-5.6	6.4	34.7	6.9	-4.9
Bridgeport-Stamford-Norwalk, CT	828	9.6	8.1	1.9	9.9	58.2	80.5	47.6	-9.5	-13.6	3.8	5.5	14.4	-13.9
Buffalo-Niagara Falls, NY	1,189	10.1	2.0	0.9	17.4	48.9	38.9	-1.6	4.9	0.8	-15.4	23.8	-1.9	-6.2
Cambridge-Newton-Framingham, MA	1,398	2.7	3.2	3.6	25.9	52.0	84.5	41.7	-9.1	-7.5	5.1	12.3	3.3	3.9
Camden, NJ	1,128	13.7	4.4	1.9	11.5	47.5	66.1	46.8	3.8	-6.0	-13.3	11.1	17.8	-1.9
Charlotte-Gastonia-Concord, NC-SC	1,024	21.5	0.8	1.0	14.3	664.3	131.0	305.7	4.7	-42.0	8.1	-16.5	-8.5	12.1
Chicago-Naperville-Joliet, IL	6,894	20.0	11.4	3.4	11.9	72.6	55.4	57.7	2.6	-5.8	-0.6	33.8	33.2	7.2
Cincinnati-Middletown, OH-KY-IN	1,845	11.0	0.5	0.7	7.7	121.2	72.5	61.1	9.6	-17.3	1.3	16.4	5.6	10.6
Cleveland-Elyria-Mentor, OH	2,102	17.8	2.3	1.0	11.7	53.0	50.9	14.9	1.8	-5.6	-10.2	4.6	-6.3	-2.8
Columbia, SC	548	31.8	1.1	0.8	9.8	155.0	68.9	90.1	8.2	-15.6	24.8	11.5	29.6	18.9
Columbus, OH	1,405	11.7	0.7	1.5	15.1	170.7	72.6	98.5	5.8	-18.8	14.6	14.0	-12.5	9.5
Dallas-Plano-Irving, TX	2,623	15.8	13.8	2.5	16.3	113.5	107.7	152.0	6.2	-12.8	5.6	31.0	-0.9	-6.5
Dayton, OH	844	13.4	0.7	0.9	11.2	56.8	46.8	30.0	9.3	-8.7	-11.7	22.3	-4.7	3.1
Denver-Aurora, CO	1,650	5.6	12.7	2.1	1.9	73.6	59.1	186.3	-2.7	-12.3	5.9	36.7	-9.1	7.5
Detroit-Livonia-Dearborn, MI	2,112	40.1	2.3	1.0	15.3	74.5	82.0	34.6	6.7	-13.7	3.7	15.6	-17.4	11.2
Edison, NJ	1,898	6.4	5.5	3.8	18.7	81.8	117.6	75.9	4.4	-14.5	4.9	-1.4	-0.7	-2.4
El Paso, TX	592	3.4	69.5	1.0	15.5	53.4	39.6	31.5	-19.7	-22.8	-7.2	-28.4	33.2	-27.0
Essex County, MA	670	1.4	7.1	1.4	42.4	68.0	85.0	44.6	-14.0	5.3	-3.6	0.0	0.0	0.0

(*continued*)

Appendix A. Covariates of Segregation Change for Largest 100 Metropolitan Areas (*continued*)

	2000 pop size (1000s)	1990 racial composition			Population growth rate				% change in per capita income ratio			% change in relative suburbanization		
		% black	% Hispanic	% Asian	Black-white	Hispanic-white	Asian-white	Foreign-born	Black/white	Hispanic/white	Asian/white	Black/white	Hispanic/white	Asian/white
Fort Lauderdale-Pompano Beach-Deerfield Beach, FL	1,255	14.9	8.4	1.3	72.1	157.2	130.7	107.0	2.6	-8.5	-13.7	19.0	5.0	0.8
Fort Worth-Arlington, TX	1,367	10.4	10.9	2.2	21.9	102.0	73.8	130.3	10.4	-9.7	-4.9	2.4	-1.4	-2.5
Fresno, CA	667	4.7	34.7	8.3	32.4	59.1	20.7	41.6	1.1	-4.5	2.4	67.1	-25.0	2.6
Gary, IN	643	18.1	7.4	0.5	6.6	42.0	55.4	35.5	9.0	-6.5	-24.4	51.8	5.5	-1.8
Grand Rapids-Wyoming, MI	646	6.7	2.5	0.8	17.6	170.8	94.9	132.9	11.3	0.4	14.3	24.5	-28.4	-1.2
Greensboro-High Point, NC	541	21.3	0.7	0.8	19.4	658.9	147.9	341.4	6.0	-33.0	-5.6	-16.5	-8.3	-16.8
Hartford-West Hartford-East Hartford, CT	1,124	8.1	6.6	1.5	19.9	49.7	66.8	19.1	-1.7	-3.0	-7.1	19.4	19.6	-1.9
Honolulu, HI	836	2.9	6.5	60.0	6.5	37.2	23.7	28.5	12.9	-18.5	-11.5	1.5	0.6	-1.4
Houston-Sugar Land-Baytown, TX	3,767	17.6	20.3	3.4	14.8	74.2	72.6	94.6	2.8	-7.8	-4.1	15.4	4.4	18.1
Indianapolis, IN	1,294	13.3	0.9	0.8	11.8	236.3	74.9	153.5	10.1	-20.9	2.6	64.9	-32.6	16.8
Jacksonville, FL	925	19.7	2.4	1.5	17.6	79.8	71.3	96.0	11.9	-7.1	-11.4	-22.3	-16.7	-12.0
Kansas City, MO-KS	1,637	12.2	2.8	0.9	5.1	96.8	83.5	126.2	9.3	-14.8	-1.2	4.7	2.1	-3.5
Knoxville, TN	535	6.5	0.6	0.8	-0.9	106.0	28.5	65.6	3.6	-26.9	13.8	-0.7	-17.6	11.1
Lake County-Kenosha County, IL-WI	645	6.1	6.6	2.0	16.8	135.2	100.9	117.9	3.7	-10.9	2.6	0.0	0.0	0.0
Las Vegas-Paradise, NV	741	9.3	10.9	3.4	25.8	226.2	155.0	252.3	7.6	-19.2	-1.5	-10.5	-5.6	7.6
Little Rock-North Little Rock, AR	535	19.1	0.9	0.6	17.5	149.6	75.3	93.2	11.7	-11.0	14.8	-21.7	-24.5	-24.3
Los Angeles-Long Beach-Glendale, CA	8,863	10.7	37.3	10.4	13.1	47.3	43.2	19.2	-5.8	-8.7	-9.1	7.5	2.3	9.1
Louisville, KY-IN	1,056	12.2	0.5	0.6	8.2	217.5	68.6	139.3	7.5	-29.2	-18.0	6.4	-1.1	1.4
McAllen-Edinburg-Mission, TX	384	0.2	85.2	0.2	194.2	45.3	232.4	77.6	-45.2	-21.3	-1.3	108.5	3.4	18.8
Memphis, TN-MS-AR	1,067	41.0	0.7	0.7	16.6	241.5	107.0	171.0	17.7	-11.3	-2.4	-22.0	-45.2	-9.7
Miami-Miami Beach-Kendall, FL	1,937	19.2	49.0	1.2	34.8	56.8	50.6	31.2	-19.8	-20.4	-16.9	13.8	11.4	5.9
Milwaukee-Waukesha-West Allis, WI	1,432	13.7	3.4	1.3	21.5	98.2	62.8	50.9	4.8	-3.2	10.8	52.9	5.2	8.0
Minneapolis-St. Paul-Bloomington, MN-WI	2,539	3.5	1.4	2.5	64.8	180.5	77.5	138.8	-2.5	-11.8	15.4	43.2	-9.4	3.7
Nashville-Davidson--Murfreesboro, TN	1,048	14.7	0.7	0.9	6.9	420.8	82.1	221.1	7.7	-39.5	4.4	-4.9	-31.8	37.0
Nassau-Suffolk, NY	2,609	7.1	6.0	2.3	24.4	84.2	65.4	45.1	-1.8	-17.0	-7.2	0.0	0.0	0.0
New Haven-Milford, CT	804	9.8	6.0	1.2	19.3	79.7	109.9	35.8	-0.2	-13.7	8.3	17.5	0.4	7.0

(*continued*)

Appendix A. Covariates of Segregation Change for Largest 100 Metropolitan Areas (*continued*)

	2000 pop size (1000s)	1990 racial composition			Population growth rate				% change in per capita income ratio			% change in relative suburbanization		
		% black	% Hispanic	% Asian	Black-white	Hispanic-white	Asian-white	Foreign-born	Black/white	Hispanic/white	Asian/white	Black/white	Hispanic/white	Asian/white
New Orleans-Metairie-Kenner, LA	1,264	34.3	4.1	1.7	16.2	16.5	38.7	21.1	10.3	-6.4	15.5	3.7	-5.3	2.7
New York-White Plains-Wayne, NY-NJ	10,378	21.0	20.9	6.2	15.2	40.5	68.8	38.4	-8.2	-6.6	-7.2	2.3	15.1	-1.7
Newark-Union, NJ-PA	1,960	21.1	9.4	2.7	10.0	51.0	63.5	44.8	-4.0	-7.2	3.9	5.4	10.6	-0.8
Oakland-Fremont-Hayward, CA	2,083	14.3	12.8	12.5	7.5	74.6	64.3	69.9	-0.5	-21.4	-3.0	9.2	-2.5	-5.5
Oklahoma City, OK	971	10.4	3.4	1.7	7.9	116.8	58.4	104.3	9.3	-10.2	-2.7	-5.2	-19.5	-13.9
Omaha-Council Bluffs, NE-IA	686	7.4	2.3	1.0	8.8	151.9	56.4	129.7	-0.1	-10.8	21.4	-16.5	-35.7	-23.7
Orlando-Kissimmee, FL	1,225	11.7	8.1	1.6	39.5	162.8	99.9	140.3	4.3	-10.3	9.1	10.9	-3.9	-2.9
Oxnard-Thousand Oaks-Ventura, CA	669	2.2	26.2	4.9	-9.1	47.2	26.6	36.8	-0.4	-10.2	3.6	11.9	-3.7	-4.9
Philadelphia, PA	3,729	20.5	3.1	2.1	11.6	62.1	74.2	40.4	-0.2	-1.2	0.5	11.3	1.6	2.2
Phoenix-Mesa-Scottsdale, AZ	2,238	3.4	16.7	1.5	22.1	93.2	77.4	182.7	8.2	-13.8	8.9	6.4	-28.1	-6.5
Pittsburgh, PA	2,468	7.3	0.5	0.6	8.5	50.1	68.5	7.8	5.2	-7.6	1.5	10.5	2.2	-1.5
Portland-Vancouver-Beaverton, OR-WA	1,524	2.6	3.2	3.3	2.1	172.9	68.3	136.3	10.3	-15.7	12.2	71.7	-3.5	18.2
Poughkeepsie-Newburgh-Middletown, NY	567	7.3	5.5	1.6	18.3	84.4	32.9	30.5	-5.9	-12.8	-1.0	10.7	-2.0	0.9
Providence-New Bedford-Fall River, RI-MA	1,510	2.7	3.7	1.4	26.9	97.9	50.7	16.2	-9.9	-15.5	5.8	12.1	-10.9	9.0
Raleigh-Cary, NC	541	21.2	1.1	1.6	-1.3	607.6	121.6	296.4	8.1	-40.8	19.4	-14.0	-6.2	83.7
Richmond, VA	949	29.7	1.0	1.2	8.0	155.9	67.8	100.1	6.4	-14.0	1.1	6.1	-6.3	-0.8
Riverside-San Bernardino-Ontario, CA	2,589	6.6	26.1	3.7	45.9	87.2	50.8	69.8	-7.3	-11.8	-2.0	3.2	-1.1	-1.2
Rochester, NY	1,002	9.1	2.9	1.3	18.0	59.3	53.3	19.3	1.1	0.1	5.8	5.1	6.2	0.5
Sacramento--Arden-Arcade--Roseville, CA	1,482	6.6	11.4	7.5	18.7	59.7	44.2	85.0	-3.6	-12.0	-1.2	2.7	-1.6	4.9
Salt Lake City, UT	768	0.7	6.0	2.5	43.3	129.2	58.7	183.5	13.7	-15.4	-3.0	11.2	0.3	10.7
San Antonio, TX	1,408	6.2	46.6	1.1	7.9	23.6	55.6	55.3	5.4	1.6	8.1	40.4	7.5	12.9
San Diego-Carlsbad-San Marcos, CA	2,498	6.0	20.0	7.5	6.9	56.4	42.9	41.4	2.7	-11.4	4.6	18.7	7.0	-0.1
San Francisco-San Mateo-Redwood City, CA	1,604	7.4	14.1	20.1	-20.6	33.2	29.5	25.7	-3.8	-16.1	-1.0	0.5	10.0	12.7
San Jose-Sunnyvale-Santa Clara, CA	1,534	3.5	21.1	16.6	-4.7	47.0	84.1	65.0	0.7	-18.7	2.0	-11.5	-1.2	-4.0
Santa Ana-Anaheim-Irvine, CA	2,411	1.6	23.1	10.1	10.0	63.9	66.8	47.7	0.2	-11.4	-5.7	0.3	-0.7	-2.5

(*continued*)

Appendix A. Covariates of Segregation Change for Largest 100 Metropolitan Areas (*continued*)

	2000 pop size (1000s)	1990 racial composition			Population growth rate				% change in per capita income ratio			% change in relative suburbanization		
		% black	% Hispanic	% Asian	Black-white	Hispanic-white	Asian-white	Foreign-born	Black/ white	Hispanic/ white	Asian/ white	Black/ white	Hispanic/ white	Asian/ white
Sarasota-Bradenton-Venice, FL	489	5.7	3.1	0.5	9.8	141.9	73.7	87.8	3.0	-11.1	-8.9	9.1	-5.5	-0.4
Scranton--Wilkes-Barre, PA	575	0.9	0.5	0.5	46.3	141.5	34.2	13.4	29.1	-15.3	-1.8	-22.6	-15.7	20.6
Seattle-Bellevue-Everett, WA	1,972	3.9	2.6	6.7	22.0	132.0	69.0	96.7	0.7	-28.9	-1.2	55.4	9.3	20.4
Springfield, MA	673	5.3	7.2	1.3	10.6	60.7	42.6	16.0	5.9	9.0	40.2	6.2	-8.9	-14.8
St. Louis, MO-IL	2,581	16.4	1.0	0.9	11.7	56.9	62.7	64.3	6.4	-15.5	3.2	9.7	0.0	-7.3
Stockton, CA	481	5.3	22.7	11.9	45.2	64.2	19.8	39.7	20.8	-11.3	13.1	47.5	7.5	29.4
Syracuse, NY	660	5.8	1.2	1.1	17.0	73.4	48.9	16.9	-10.1	-5.2	6.1	1.7	-13.3	2.3
Tacoma, WA	587	7.0	3.3	4.8	6.9	89.6	32.6	58.7	6.3	-15.1	12.6	0.7	-7.2	1.6
Tampa-St. Petersburg-Clearwater, FL	2,068	8.7	6.6	1.1	24.6	76.6	96.9	60.2	12.3	-13.2	5.0	24.1	1.5	7.9
Toledo, OH	654	10.6	3.1	0.9	16.1	46.5	17.0	15.8	8.2	-1.9	-11.3	1.7	-11.4	26.6
Tucson, AZ	667	2.9	24.2	1.7	3.8	40.5	39.3	66.9	-7.9	-8.3	6.7	-5.0	-3.1	-6.0
Tulsa, OK	761	8.1	2.0	0.9	18.7	159.9	49.3	130.1	16.3	-19.5	-17.8	-10.6	-30.7	25.0
Virginia Beach-Norfolk-Newport News, VA-NC	1,449	28.2	2.2	2.3	18.8	54.8	32.4	41.5	5.7	-12.9	11.3	-12.2	7.7	6.9
Warren-Farmington Hills-Troy, MI	2,137	4.3	1.4	1.6	52.5	65.0	95.2	49.9	3.6	-7.4	-5.7	-5.5	-1.9	-4.8
Washington-Arlington-Alexandria, DC-VA-MD-WV	3,211	29.6	5.1	4.3	15.8	95.4	62.3	71.6	-2.1	-18.4	-1.4	19.7	12.9	2.1
West Palm Beach-Boca Raton-Boynton Beach, FL	864	11.9	7.5	1.0	31.5	99.5	80.7	86.9	3.6	-15.9	-10.5	0.6	3.6	6.0
Wichita, KS	511	7.1	3.8	1.7	11.0	107.7	68.0	112.6	-0.6	-18.5	-6.9	35.3	-24.8	-5.6
Wilmington, DE-MD-NJ	579	14.6	2.2	1.3	29.3	128.9	94.3	83.6	10.0	-13.1	11.8	11.2	19.3	-1.2
Worcester, MA	710	1.9	4.6	1.5	39.0	56.6	77.1	38.3	-12.2	2.4	4.4	-21.6	-9.8	-5.6
Youngstown-Warren-Boardman, OH-PA	614	9.8	1.2	0.4	9.0	48.1	23.7	-14.4	12.5	-1.1	-32.5	15.6	7.4	4.9
Mean	1,518	11.7	9.7	3.3	19.7	114.6	69.3	82.5	2.9	-12.8	1.2	11.3	-3.0	3.4
Median	1,052	9.6	4.1	1.5	15.4	75.6	66.8	65.3	4.3	-11.9	1.4	8.3	-1.2	0.8