Patterns and Correlates of Racial Residential Segregation: A Spatially Refined Approach

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Over a two-decade span beginning in the 1960s, interest in the spatial manifestations of racial and ethnic inequality in American society inspired a series of major residential segregation studies (Lieberson 1963, 1980; Sorensen et al. 1975; Taeuber and Taeuber 1969; Van Valey et al. 1977). These studies, which documented the extent to which blacks and whites occupied separate metropolitan neighborhoods, established an important methodological precedent: capturing segregation with the index of dissimilarity (D) and exposure-type (P*) measures calculated across census geographic units such as blocks or tracts. Largely adhering to this precedent, recent analyses of data from the 1980-2000 period have confirmed many past findings but have also identified some emergent trends (Frey and Farley 1996; Iceland et al. 2002; Logan 2003; Massey and Denton 1993). Recent work has shown, for example, that blacks remain the most segregated minority group from whites despite nontrivial declines in black-white segregation across a substantial majority of metropolitan areas. Conversely, two groups ignored in earlier research–Hispanics and Asians–exhibit more moderate levels of segregation yet little change in those levels over time. If anything, they may be growing more residentially isolated.

The recent round of investigations diverges from its predecessors in seeking to explain as well as to describe patterns of racial residential segregation. Much attention has been devoted to the broad causes of segregation, including group-specific residential preferences and discriminatory practices in the real estate market (Charles 2000; Krysan and Farley 2002; U.S. Department of Housing and Urban Development 2003; Yinger 1995). However, because preference and discrimination data are available for only a handful of metropolitan contexts, the ability of these factors to account for inter-metropolitan variation in segregation is difficult to gauge. Farley and Frey (1994) offer a more testable, ecologically-oriented explanatory framework. Using 1980 and 1990 block group data for over 200 metro areas, they show how black-white segregation levels and trends (measured by D) covary with metro age, population size, regional location, functional specialization (whether an area is dominated by retirees, government workers, students, the military, etc.), new housing construction, and the ratio of minority-to-majority income. Variants of the Farley-Frey framework have been featured in several subsequent studies that examine the residential circumstances of Hispanics and Asians in addition to blacks (Farrell 2005; Frey and Farley 1996; Logan et al. 2004; Wilkes and Iceland 2004).

In this paper, we continue the descriptive and explanatory traditions of recent work while steering them in a new direction. We maintain that, despite its presumably spatial focus; the segregation literature tends to be aspatial in nature. With few exceptions (Grannis 1998; Morrill 1991; White 1983; Wong 1997, 1999), researchers have emphasized the racial composition of neighborhoods to the neglect of spatial proximity and scale. For instance, when D and P* are calculated for census tracts, they implicitly assume that (1) tracts constitute meaningful sociospatial entities, (2) all residents of a given tract have the same proximity to each other, and

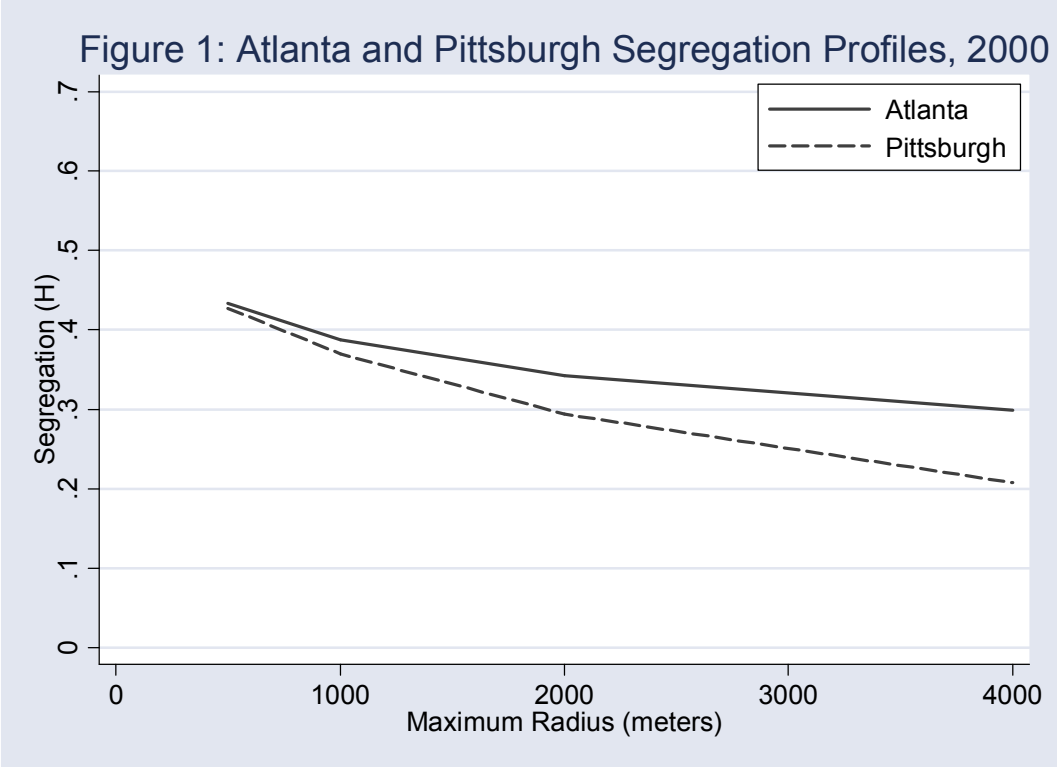
(3) all individuals living in separate tracts have no proximity to each other. These untenable assumptions are manifested in the well-known "checkerboard" and "modifiable areal unit" problems. Moreover, the common practice of computing segregation measures at only one level of census geography disregards the possibility that micro-segregation may be shaped by the street grid (Grannis 1998), with macro-segregation corresponding more closely to institutional domains (political jurisdictions, school districts, etc.). Put another way, this practice assumes that segregation is constant by scale. But different conclusions can be drawn depending upon how scale is operationalized, and the determinants and consequences of segregation may be similarly scale-sensitive. What is needed is an approach to studying segregation that handles scale in a more flexible manner and treats proximity more precisely.

Our purpose here is to illustrate one such spatially refined approach. Relying on GIS-based proximity calculations, we analyze newly developed measures that reflect the magnitude of segregation at a range of scales (for a fuller discussion, see Reardon and O'Sullivan 2004). The measures, which are spatially informed versions of the exposure (P*) and information theory (H) indexes, conceive of segregation as variation in the racial composition of the local environments (freed from census-imposed boundaries) inhabited by members of different racial groups. These measures allow us to compute, for a given metropolitan area, a spatial segregation profile, essentially a curve that describes the level of segregation by scale. (Each scale point in the profile represents a local environment defined by a distinct radius or "bandwidth.") The profile indicates both the magnitude of segregation at a particular scale (depicted by the height of the profile) and the extent to which segregation patterns change with scale (depicted by the slope of the profile). Example profiles are shown in Figure 1 for Atlanta and Pittsburgh. Although both metropolitan areas are equally segregated at the micro scale (500m radius), segregation in Pittsburgh is more localized, as its lower H values at the macro scale (4km radius) attest.

We apply this new approach to 2000 census data for the 40 largest U.S. metropolitan areas. Three sets of findings are presented that focus on black-white, Hispanic-white, and Asian-white segregation. In the first set, we report means and variances in segregation (measured by the spatially refined P* and H indexes) for the 40 metro areas at different bandwidths. We begin with a bandwidth that approximates the typical census block group, and from this baseline bandwidth we demonstrate how the measures of segregation change as scale increases.

A second set of findings pertains to the correlates of segregation across metro areas. Following previous studies, we examine the association of the segregation measures with the structural factors in the Farley-Frey framework. It should be pointed out, however, that these factors were originally intended to account for variation in the magnitude of segregation; little is known about what predicts the scale of segregation. To address the latter issue, two additional variables are incorporated in the analysis: school district fragmentation and topographic variation. We measure the former with a version of the Herfindahl index, the value of which can be interpreted as the probability that two students drawn at random from the same metro area are enrolled in different districts. A measure of the latter variable is still being formulated.

Because school quality often drives residents' locational decisions, our expectation is that metro areas with many small school districts (i.e., that score highly on fragmentation) will exhibit more



localized segregation while those with a few large districts will be segregated at a more macro scale. Likewise, topography could influence settlement and, ultimately, segregation patterns. On the one hand, metropolitan settings marked by many hills and valleys should have more localized segregation, mirroring topographical contours. On the other hand, macro-scale segregation should be common in flatter, undifferentiated areas (i.e., where topography is irrelevant to segregation).

Our last set of findings is based on an assessment of the correlates of change in segregation across bandwidths. We refer to this change as a metro area's "segregation gradient," which can be measured both in terms of the slope and in terms of percentage change in segregation. By examining the correlates of segregation gradients, we shed light on a central question about scale: namely, what structural characteristics of metro areas are associated with steeper declines in segregation as one moves from local environments that approximate block groups to those that are more spatially extensive?

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