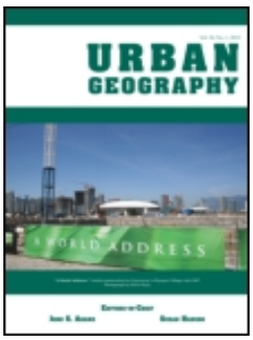

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# Poverty and Affluence: A Comparative Analysis of Economic Segregation in Metropolitan Cincinnati, Cleveland, and Columbus, Ohio, 1970-2000

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# POVERTY AND AFFLUENCE: A COMPARATIVE ANALYSIS OF ECONOMIC SEGREGATION IN METROPOLITAN CINCINNATI, CLEVELAND, AND COLUMBUS, OHIO, 1970–2000[1]

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*Abstract:* Our research examines the dynamics of economic segregation in metropolitan Cincinnati, Cleveland, and Columbus during the period 1970–2000 through comparison of (1) Dissimilarity Index and General Spatial Segregation Index values, (2) concentration patterns of the rich and poor, and (3) mapped class distributions. Our results corroborate other studies that observed rising economic segregation from 1970 to 1990, followed by a substantial decline in the 1990s to approximately 1970 levels. We find the rich and the poor moderately segregated from the nonrich and the nonpoor, while highly segregated from each other. The segregation manifests itself in growing concentrations of the poor in the central cities and emigration of the middle class and the wealthy to the suburbs and beyond. When the poor population is disaggregated by race, our results indicate the highest level of segregation continues to be experienced by poor Blacks. [Key words: segregation, poverty, affluence, metropolitan, Ohio.]

Metropolitan areas of the United States have experienced increasing economic segregation since World War II. And despite the overall reduction in the poverty level in the United States since the 1960s, poverty concentration in metropolitan areas has intensified. Based on this trend, several authors (e.g., Massey, 1996) made dire predictions of an ever more polarized society in the 21st century, in which the underclass would increasingly be isolated and concentrated, with society bearing ever greater consequences of class ghettoization.

Because of the well-documented negative effects of concentrated poverty, research to measure, explain, and confront its spatial dimensions has proliferated. In this article, we add to this body of research by examining trends in economic segregation from 1970 to 2000 with a comparative analysis of the distribution of poverty and affluence in the metropolitan regions of Cincinnati, Cleveland, and Columbus, Ohio (Fig. 1). Whereas the

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**Fig. 1.** Study Regions: Cincinnati PMSA, Cleveland PMSA, and Columbus MSA, 2000.



literature generally gives less emphasis to the concentration patterns of the rich compared to the poor, we consider the spatial concentration of affluence within these metropolitan regions as an integral element in economic segregation patterns.

Our analysis includes the measurement and visualization of economic segregation, interpreted through the changing socioeconomic context of the three leading metropolitan regions in Ohio. The larger context of metropolitan regions and regional processes—economic structure, housing market, and population movements—has been shown to condition the magnitude of economic segregation at the neighborhood scale (Holloway et al., 1999; Sanchez-Jankowski, 1999). Accordingly, our meso-scale, comparative research approach allows a fairly detailed consideration of the study regions, each subject to similar external forces but sufficiently differentiated to produce distinctive patterns of economic segregation.

## LITERATURE REVIEW

### *The Consequences of Economic Segregation*

Spatial segregation of the poor imposes significant costs on metropolitan residents and society as a whole. First, it produces a landscape of unequal opportunity and lower quality of life for inner city residents. Urban areas of concentrated poverty, characterized by a lack of social resources and adverse material conditions (e.g., employment shortages, poor education systems, exposure to environmental hazards, amplified social pathologies), compromise the ability of the poor who reside there to transcend their difficulties and realize a higher quality of life (see, for example, Coulton and Pandey, 1992; Massey, 1996; Marcuse, 1997; Kaplan and Holloway, 1998; Sanchez-Jankowski, 1999; Pulido, 2000; Swanstrom et al., 2002; Crowder and South, 2003; Massey and Fischer, 2003). Individual attributes notwithstanding, one's social and physical environment directly affects opportunities to achieve economic success, as Swanstrom et al. (2002, pp. 350–351) have noted: "neighborhood and community context have important impacts on life chances over and above individual characteristics and family background … life chances are significantly linked to place." In particular, the social network of residents isolated in areas of concentrated poverty provides limited access to information useful to improving their economic condition, for example, knowledge about living-wage employment opportunities or effective strategies for achieving economic success (Massey, 1996; Crowder and South, 2003).

Besides the negative effects of economic segregation on those who inhabit inner cities, the financial burden of concentrated poverty falls disproportionately on central cities, many of which have endured fiscal crises in recent decades. Central cities bear the direct costs of poverty through providing various mitigation services specifically aimed at the poor, as well as substantial indirect costs through increased expenditures for municipal services such as public safety (e.g., fire, police, emergency response), administrative services (e.g., courts), and public education. Disinvestment and the out-migration of the rich and middle-class residents exacerbate the dilemma of central cities: they must address poverty and provide adequate services for all their citizens while dealing with deepening fiscal constraints that impede these efforts (Pack, 1998; Swanstrom et al., 2002; Joassart-Marcelli et al., 2005).

Concentrated poverty engenders a high cost to society and central cities beyond the human cost for those directly afflicted. For example, metropolitan regions divided by wealth feature polarized political landscapes that lack meaningful political interaction and exhibit reduced civic participation (Oliver, 1999). And as a motivating factor in urban deconcentration, economic segregation contributes to the negative externalities of sprawl, including the inefficient use of land and infrastructure, increased air pollution, and heightened traffic congestion (Johnson, 2001; Swanstrom et al., 2002; Liberty, 2003). Moreover, the lack of quality education for inner-city children and the insufficient integration of able adults into the labor force represent a substantial loss of human resources.

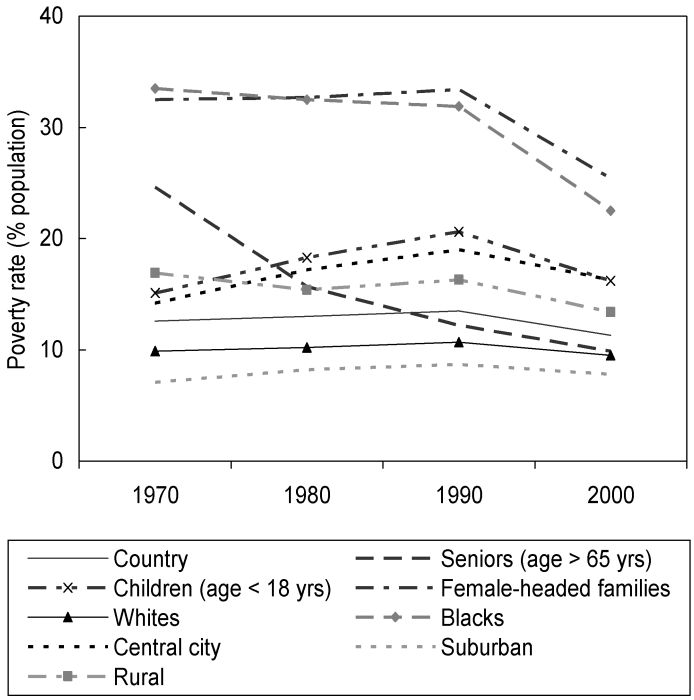


**Fig. 2.** Poverty rates in the United States from 1970 to 2000. Data represent individual rates by category except for female-headed families. *Source:* Historical Poverty Tables, Current Population Survey, Annual Social and Economic Supplements, 2004, U.S. Census Bureau.



*Poverty and Affluence in the United States*

Nationally, Whites and suburbanites have experienced the lowest rates of poverty since at least 1970 (Fig. 2). Female-headed families and Blacks, followed by children and central city residents, have experienced the highest rates of poverty. In addition to their high rate of poverty, Blacks are the most likely ethnic/racial group to live in areas of concentrated poverty—more than 45% of Blacks lived in census tracts where at least 20% of the population was poor in 1999 (Lamison-White, 1995; Bishaw, 2005). Although the hierarchy in poverty rates largely persisted among different population segments (e.g., lower rates for Whites vs. Blacks), many groups experienced slightly increasing poverty rates from 1970 to 1990 followed by a decline from 1990 to 2000. The two groups experiencing an overall increase in poverty during the study period are central city residents and children. In contrast, the elderly and Blacks experienced a consistent decline in poverty rates, decreasing from a rate of 25%–10% for seniors and 34%–23% for Blacks. The national poverty rate and those of Whites and suburbanites remained relatively stable during the study period.

Whereas poverty is defined by the Census Bureau based on monetary income, criteria for the identification of the rich as a distinct population group have not been delineated by

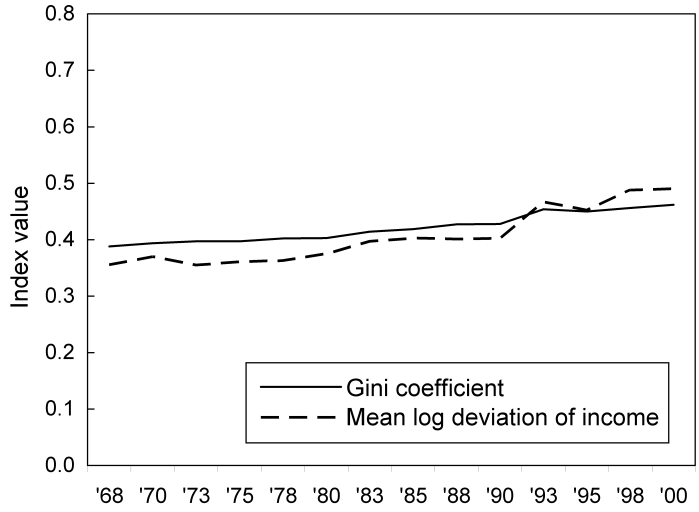


**Fig. 3.** Increasing income inequity in the United States as measured by the Gini coefficient and mean log deviation. *Source:* Historical Income Tables—Income Inequality, Current Population Survey, Annual Demographic Supplements, 2004, U.S. Census Bureau.



government agencies (hence the use of surrogate indicators to track trends in economic success). Using median income data, for instance, analyses have shown that income has risen in past decades, although inequitably. According to McNeil (1998), median income for all households increased by 6.3% (in constant dollars) from 1969 to 1996. However, incomes for households below the median did not rise significantly; rather, those households above the median income experienced a 30% increase. Other research supports these findings of increasing income inequity. Analyses by the Census Bureau using a number of statistical measurements, including the Gini coefficient and mean logarithmic deviation of income, indicate that income distribution by household has slowly become more inequitable since 1968, particularly since 1980 (Fig. 3).[3] In 2000, the top quintile of households received 49.8% of all U.S. household income in 2000 (Jones and Weinberg, 2000; U.S. Census Bureau, n.d.), and according to international data, the United States has the most inequitable distribution of income among its peer countries (Japan, Canada, Australia, and all of European except Russia; The World Bank, 2004).

### *Spatial Concentration of Poverty and Affluence*

The uneven distribution of income has its most vivid expression in metropolitan regions, where neighborhoods and municipalities exhibit wide ranges of poverty and

[3]Measurement of the distribution of wealth among a population is commonly calculated utilizing the Gini coefficient, a value ranging from 0 (every group receives an equal share of income—i.e., perfect equity) to 1 (one group receives all income—i.e., perfect inequity) expressing the equity of income distribution whereby the greater the coefficient, the greater the inequity. The mean logarithmic deviation of income is a generalized entropy measure able to measure inequality both within and between groups (Jones and Weinberg, 2000).

affluence. Previous studies focusing on the geography of income have tracked trends in economic segregation since 1970, finding the concentration of poverty in central cities and affluence in suburbs increasing substantially from 1970 to 1990, then decreasing from 1990 to 2000 (Massey, 1996; Massey and Fischer, 2003). In an investigation of income patterns, Madden (2003) found that the median income of suburban residents, especially those living in outlying suburbs, increased relative to the metropolitan median from 1970 to 1990; during the same time period, central city residents experienced an increase in the poverty rate, especially in the central cities of the Midwest and the Northeast. Importantly, the increase in economic segregation from 1970 to 1990 was not offset by the decline from 1990 to 2000. According to Massey and Fischer (2003), economic segregation in metropolitan areas of the United States, measured at the census tract level, increased 30% overall from 1970 to 2000.

Economic segregation in metropolitan areas largely results from two processes: (1) the gradual abandonment of decaying sections of the central city (i.e., the inner city) by the nonpoor (see Wilson, 1987); and (2) local practices to exclude the poor and minorities from affluent areas (Massey, 1994; Marcuse, 1997; Sanchez-Jankowski, 1999; Fischer et al., 2004). The decisions of nonpoor households to vacate the inner city are motivated by socioeconomic conditions of central cities in general and inner cities in particular. Explanations for emigration include declining public services and employment opportunities and/or fear of decreasing property values and heightening social pathologies that plague impoverished areas.

In contrast, distance from impoverished areas of the central city and the exclusion of poor people is positively associated with societal advantages including higher social status and improved quality of life. Residence in elite enclaves or communities distant from the inner city denotes economic success and confirms social status, an elevated position not infrequently accompanied by political autonomy (DeFrances, 1996; Massey, 1996; Swanstrom et al., 2002). Wealthy suburban residents realize a degree of political control that is difficult to achieve in diverse central cities responsible to a range of political stakeholders (Massey, 1996). Suburban municipalities can, and have, enacted discriminatory land use regulations to effectively exclude the poor and minorities; for example, low-density zoning enacted in affluent communities has been shown to decrease the supply and increase the cost of housing so that only those with high incomes can afford homes (Rolf, 2000; Liberty, 2003; Nelson et al., 2004). In his discussion of late–20th century developments in urban structure, Marcuse (1997) described the characteristics of emerging elite enclaves ("citadels of power") that served to preserve social privilege:

> A citadel is a spatially concentrated area in which members of a particular population group, defined by its position of superiority in power, wealth, or status in relation to its neighbors, congregate as a means of protecting or enhancing that position.… They are exclusionary, through the use of social and/or physical means of fortification … [to] protect established positions of superiority and power seen as secure, deserved, and permanent. (p. 315)

Located close to central cities, citadels feature totalizing, self-contained communities separated from surrounding [inferior] populations by physical and/or social boundaries.

Race and prejudice have historically played a significant, even primary, role in economic segregation (Massey, 1994; Massey and Fischer, 2000). According to Marcuse (1997), ghettoes of the poor and minorities have been spatially concentrated and excluded from the mainstream economy by external forces largely motivated by fear and discrimination. And while Black segregation has moderately declined throughout the last half of the 20th century, poor Blacks remain more isolated and concentrated than any other ethnic/racial group, including poor Whites (Massey, 1996; Fischer, 2003). Whites as a group continue to associate the increasing presence of minorities in their residential space with decreasing privilege, and they continue to demonstrate a distinct preference for largely White residential neighborhoods (Boro and Zubrinsky, 1996; Charles, 2000; Krysan and Farley, 2002). Accordingly, the highest concentration of poverty and affluence has been found in older industrial cities with large poor minority populations, while metropolitan areas with low concentrations feature economically strong central cities without high racial/ethnic segregation and income inequity (Coulton et al., 1996).

To the extent that most affluent and middle-class Americans are White and possess the means to pursue their residential preferences, segregation can be attributed to the cumulative result of individual residential choices of Whites. These individual choices are not the intentional hostile acts of individuals normally identified as racist, instead, they represent a form of racism called "White privilege" described by Pulido (2000) as "the hegemonic structures, practices, and ideologies that reproduce Whites' privileged status.… Whites do not necessarily *intend* to hurt people of color, but because they are unaware of their white-skin privilege, and because they accrue social and economic benefits by maintaining the status quo, they inevitably do" (p. 15). Because Whites as a group enjoy disproportionate influence over public discourse, cultural norms and public policy serve to protect and preserve White privilege (Kobayashi and Peake, 2000; Wright et al., 2005). Hence incontrovertible acts of overt racism by individuals receive public condemnation whereas the social system that maintains the inequitable status quo fails to receive meaningful scrutiny beyond that of concerned activists and academics.

### *Study Regions: Metropolitan Cincinnati, Cleveland, and Columbus*[4]

The three metropolitan regions of Cincinnati, Cleveland and Columbus display socioeconomic structures typical of large metropolitan regions across the country: higher concentrations of minorities and the poor are found in the core counties and central cities while greater job growth and higher incomes mark the suburbs and adjacent counties. The three regions, however, exhibit substantial differences in the magnitude of these demographic and economic characteristics. For instance, socioeconomic conditions in the Cleveland region are the worst among the three regions. Metropolitan Cleveland remains the largest in population size but exhibits decreasing numbers in recent decades due to substantial population losses within its core county (Cuyahoga). It also contains the highest proportion of Blacks (19%), largely concentrated Cuyahoga County and the central

[4]In this section of the paper, all data referring to trends since 1960 or 1970 are aggregated by 2000 metropolitan definitions (Cincinnati PMSA, Cleveland PMSA, and Columbus MSA) and obtained from decennial census data 1960–2000.

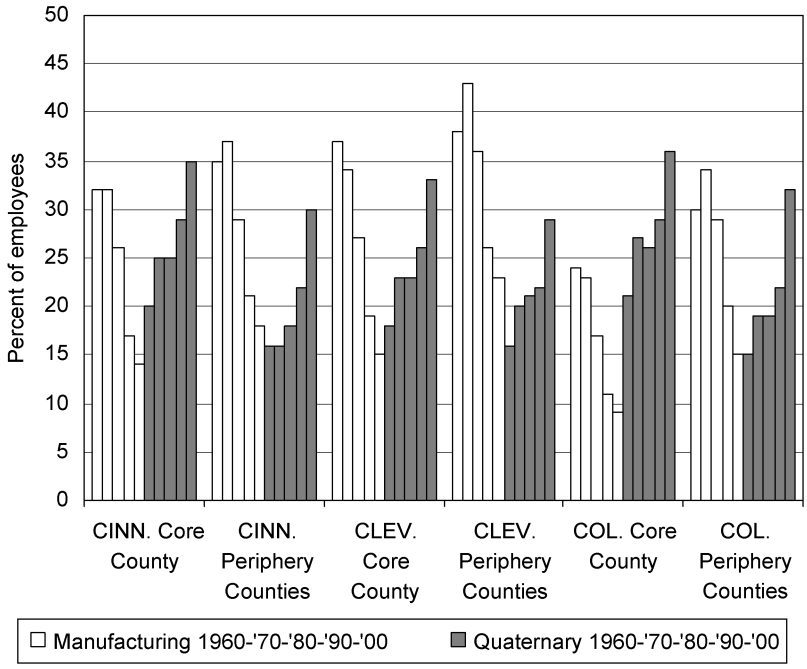


**Fig. 4.** Decline in the share of manufacturing employment and an increase in quaternary services from 1960 to 2000 depict the process of economic restructuring in study regions; aggregated by 2000 metropolitan definitions. *Source:* Decennial Census data 1960–2000, sample file data in 1990 and 2000, U.S. Census Bureau.



city (Cleveland) so that this region ranks among the country's highest in racial segregation (Iceland et al., 2002). In addition, the economic welfare of Cuyahoga County's residents is the worst among the three regions; they experience the highest rate of poverty—more than one-fourth of Cleveland's residents live in poverty—and the lowest median household income. Moreover, the lowest employment growth occurred in the Cleveland region (Cuyahoga County contained fewer jobs in 2000 than in 1960). An industrial power of the late 19th and early 20th century, Cleveland has lost 42% of its manufacturing jobs, from a high of 350,000 jobs in 1970 to 200,000 in 2000, with virtually all of the loss occurring in Cuyahoga County.

The Columbus metropolitan region fared much better during the second half of the 20th century. It experienced the greatest increase in population and employment of the three metropolitan regions, and strong job growth in the quaternary sector has diminished the negative effects of economic restructuring felt elsewhere. Columbus's core county, Franklin, where the share of quaternary employment almost equaled that of manufacturing in 1960, contained the highest proportion of quaternary employment among the three regions in 2000 (Fig. 4). In the metropolis overall, quaternary employment expanded by 75%, a gain of 220,000 jobs with the majority (73%) located within the Franklin County (home of the state capital and Ohio's largest public university). In 2000, the Columbus

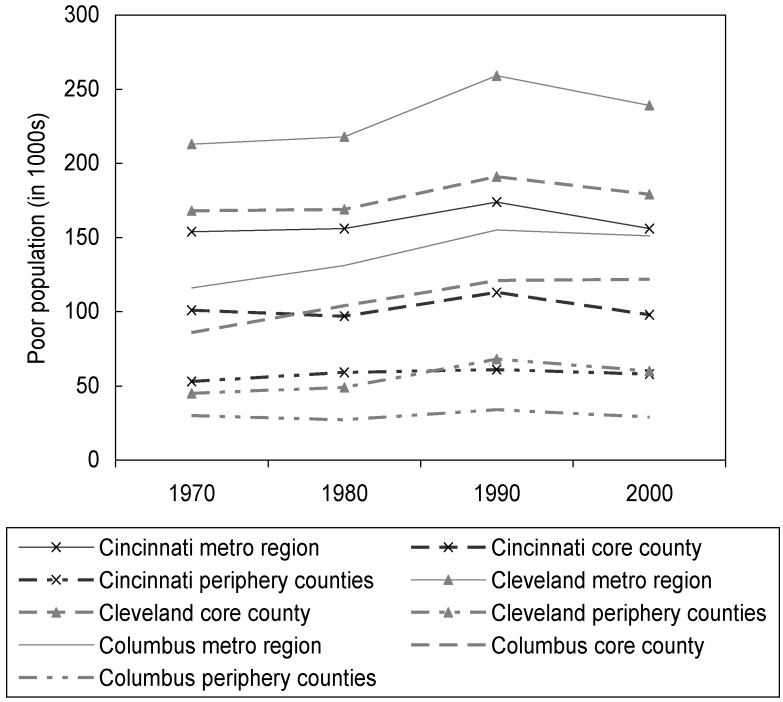


**Fig. 5.** Size of poor population in study regions aggregated by 2000 metropolitan definitions, 1970 to 2000. *Source:* Decennial Census data 1970–2000, sample file data in 1990 and 2000, U.S. Census Bureau.

region registered the highest median household income and also the lowest income disparity between the central city and metropolitan region. In general, poverty rates ranked the lowest among the three regions; nonetheless, Franklin County contained the vast majority of the poor, and unlike the other metropolitan regions, a decline in their number did not occur between 1990 and 2000 (Fig. 5).

For most socioeconomic variables, metropolitan Cincinnati ranks between the conditions described for the Cleveland and Columbus regions. The Cincinnati metropolis exhibits similar demographic patterns to those of the Cleveland region in terms of population losses in the core county (Hamilton) and a highly segregated Black population; but unlike the Cleveland and Columbus regions, the population share of Blacks did not expand during the past half century (Blacks comprised 13% of the population in both the Columbus and Cincinnati regions in 2000). Job growth was almost as high as that of metropolitan Columbus, but manufacturing losses occurred in Hamilton County similar to those experienced in Cleveland's Cuyahoga County, and the growth in the quaternary sector occurred primarily in the peripheral counties. Perhaps the defining characteristic of the Cincinnati region is the gradual economic and demographic ascendancy of its peripheral counties. Nonetheless, Hamilton County contained the lowest proportion of the poor among the three regions despite its job losses.

## RESEARCH METHOD: ANALYSIS OF SEGREGATION PATTERNS

The research here examines the dynamics of economic segregation in metropolitan Cincinnati, Cleveland, and Columbus through comparisons of (1) segregation index values, (2) concentration patterns of the rich and poor, and (3) map analysis. We employ a comparative approach to provide a comprehensive understanding of the segregation process, more so than would be possible in a large-sample study. But unlike a qualitative approach, we also allow for generalized observations that may be extended to the greater region (e.g., the Rustbelt).

We analyze segregation patterns from 1970 to 2000 with decennial census data for each metropolitan region. However, the use of census data is complicated by the progressive modification of Census Bureau geographies (boundaries of census-defined spatial units) necessitated by population changes in size and distribution over time. Although the definition of metropolitan regions has remained fairly consistent—a central city of certain size, the county in which it is located, and functionally connected adjacent counties—the boundaries and names of metropolitan regions have been subject to change from census to census.[5] In addition, it is important to note that census data limitations involving reporting error and variability in annual income have the potential to significantly understate economic segregation, perhaps by as much as 20%–30% reported by Dickens (2003).

For the calculation of segregation indices, we adopt the Census Bureau's metropolitan boundary definition for each decade because boundary adjustments, albeit broadly based on county boundaries, reflect the cohesiveness and growth of metropolitan regions during the previous decade. Employing a static metropolitan definition or adopting only a consistent set of census tracts from 1970 to 2000 would provide spatial consistency but reduce the integrity of the study areas by unnecessarily limiting the analysis to a potentially biased subset of the true functional region.[6] For example, a static definition of metropolitan regions based on 1980 boundaries would include largely rural counties in



[5]Originally identified in 1949 and named Standard Metropolitan Areas (SMA), the regions became known as Standard Metropolitan Statistical Areas (SMSA) in 1959, then Metropolitan Statistical Areas (MSA) in 1983. The general term of Metropolitan Area (MA) and two agglomerations of MSAs were defined in 1990 (PMSA and CMSA). Following the 2000 census, the term "Core-Based Statistical Area" (CBSA) was defined for reference to Metropolitan Statistical Areas and the new category of Micropolitan Statistical Areas.

[6]We believe that using a consistent set of tracts for our analysis is not feasible given the rapid expansion of the three regions during the study period. In defense of our approach, we would point out that tracts are split when population growth warrants the division, and theoretically, they remain roughly similar in population size each decade. It is not the size of the area that affects the value of $D$ but the proportional size of the subgroups in the spatial units—that is, more tracts (as a consequence of population growth and splitting) with equal proportions of rich and poor would result in the same values of $D$. In addition to split tracts in suburban areas, many central city tracts lost population over the study period, but were not consolidated. To investigate the impact of these changes in the number and size of units and population, we performed a limited test to determine whether similar research results could be obtained using a spatially consistent dataset. Our test results showed that for the core county of Cuyahoga, containing the City of Cleveland, the same trends in $D$ (and roughly similar values) were found as in the entire metropolitan region. In particular, the decline in economic segregation from 1990 to 2000 is evident, while the county's population remained approximately the same at 1.4 million, and the number of tracts increased minimally from 499 to 502. The number of tracts increased significantly from 1980 to 1990, so we selected the unchanged tracts from both datasets ($n$ = 273) and calculated $D$. Here we found the increasing trend in economic segregation was still occurring, but in these results, based on two-thirds (1980) and one-half (1990) of the total number of tracts in the county, the levels of $D$ were higher than all reported figures.

the segregation measurements for 1970 and exclude counties added to the functional region during succeeding decades. In addition, values of *GD*, which depend on neighborhood composition, would not be valid if anchored to a static set of census tracts.

Measurement of economic segregation is undertaken here with two indices: the widely applied Index of Dissimilarity (*D*; Massey and Denton, 1988; Kaplan and Holloway, 1998; Glasmeier, 2005) and the newer General Spatial Segregation Index (*GD*; Wong, 2005). We use these two indices to better capture the multiple dimensions of segregation and mitigate the spatial limitations of the Index of Dissimilarity (*D*). As contended by Wong (2005), the advantages of *GD* are that it: (1) provides for interaction among residents of one census unit and its neighbors; (2) uses flexible neighborhood definitions; and (3) distinguishes between various regional patterns of segregation that *D* cannot (e.g., the checkerboard pattern).

The Index of Dissimilarity (*D*) measures the evenness of a subgroup's distribution among another subgroup. It provides us with a summary of how concentrated the poor or the rich are within a metropolitan area using census tracts as subareas. The following formula is used to calculate *D*:

$$D = \frac{1}{2}\sum_{i}\left|\frac{x_i}{X} - \frac{y_i}{Y}\right| \quad (1)$$

where $x_i$ = population of group X in subarea $i$; $y_i$ = population of group Y in subarea $i$; $X$ = population total of group X for all subareas; and $Y$ = population total of group Y for all subareas.

Index values range from 0 to 1, with a value of zero indicating perfect integration of subgroup X among subgroup Y, and a value of 1 indicating perfect segregation of the two subgroups. Like Glasmeier (2005) and Massey and Fischer (2003), we consider values of *D* greater than .60 as indicative of high segregation, .30 to .60 as moderate, and values below .30 as indicative of low segregation. The Index of Dissimilarity does have drawbacks, including sensitivity to the size of spatial units: the larger the units analyzed for a given population, the smaller the index value. For example, the value of *D* at the census tract level measuring the segregation of the poor (vs. the nonpoor) in Cincinnati (2000) is considerably less than the value of *D* measured at the census block-group level ($D$ = 0.394, $D$ = 0.457, respectively).[7]

In the study regions, population change from 1970 to 1990 necessitated the division, addition, and deletion of census tracts by the Census Bureau as the functional regions evolved. It is important to note that more spatial units mean greater values for *D*, but only when precisely the same area and population is under consideration. Population and tract changes do not change the value of *D* if the size of the population and proportion of the groups under consideration remains similar in each of the tracts. Thus, as we calculated *D* for each decade, we captured actual changes in segregation within the three metropolitan regions.

[7]The level of aggregation employed in this longitudinal analysis is necessarily the census tract, because census block geography did not extend to all parts of the United States until the 1990 census.

Wong's (2005) General Spatial Segregation Index (*GD*) differs from *D* in that it assumes human interaction occurs across the unit boundaries by which data are aggregated; that is, it attempts to capture human spatial interaction by "treat[ing] different population groups in neighboring units as if they are in the same unit" (Wong, 2005, p. 288). Conceptually, this makes sense, because interaction occurs across unit boundaries as nearby residents share the same public (parks, transportation, schools, government services) and private facilities (grocery stores, restaurants, hospitals).

The *GD* model incorporates the interaction concept through calculation of composite population counts for each areal unit (*i*):

$$cx_i = \sum_r d(x_r) \text{ and } cy_i = \sum_r d(y_r) \tag{2}$$

where $cx_i$ = a composite population count for subgroup *x*; $cy_i$ = a composite population count for subgroup *y*; *d*(.) = a distance function defining the locale or neighborhood of *i*; *r* = a subarea of the locale defined by *d*; *r* can be *i*.

Using census tract data in our study, we operationalized the distance function *d*(.) to select all adjacent census tracts (*r*) to census tract *i*, thereby forming a locale or neighborhood for potential human interaction. After calculating the composite $cx_i$ and $cy_i$ for each census tract *i*, the General Spatial Segregation Index (*GD*) can be computed as:

$$GD = \frac{1}{2}\sum_i \left| \frac{cx_i}{\sum_i cx_i} - \frac{cy_i}{\sum_i cy_i} \right| \tag{3}$$

Like *D*, *GD* values range from 0 to 1 with greater values indicating higher levels of segregation. But because *GD* is new, there is no accepted standard of high, moderate, or low measures of segregation as with *D*.

Generally, *GD* values are lower than *D* values because segregation in a neighborhood or cluster of neighborhoods is diluted by the creation of composite population units. The magnitude of the dilution is a consequence of the value of *d*(.), the distance function defining the size of composite units. According to Wong (2005), values for *GD* differ the most from *D* when small clusters of homogeneous neighborhoods are located adjacent to heterogeneous neighborhoods, whereas values for *GD* differ the least from *D* where large clusters of homogeneous neighborhoods are present:

> Large clusters preclude more people within the clusters interacting with other groups outside the clusters, while small clusters with a relatively high concentration of one group may not create a highly segregated situation if neighbors of the clusters are heavily populated by the other groups such that intergroup interaction across units is feasible. (Wong, 2005, p. 290)

In our longitudinal analysis of economic segregation, we calculated *D* and *GD* at the census tract level for three group pairings from 1970 to 2000: poor versus nonpoor, rich versus nonrich, and rich versus poor. The poor are defined as those individuals designated below the official poverty threshold, the nonpoor as everyone else. As mentioned

previously, the rich have not been defined nor enumerated by the Census Bureau; instead, census data provide the number of households falling into different income categories, with some infinite upper category for the highest income (e.g., for the 2000 Census, the highest income category is for households with an annual income exceeding $150,000).[8] We defined the rich as those households falling into the upper income ranges representing the most affluent 4%–6% of households within the metropolitan region; all households not within the specified high-income brackets are designated nonrich.[9] It is important to note the tendency of household income to be much more equitably distributed among the U.S. population than wealth (a household's net worth; Diaz-Gimenez and Quadrini, 1997)—thus, to the extent that the concentration of wealth may be spatially expressed, our results might be conservative estimates of economic segregation in the study regions.

Because Blacks experience a high level of poverty and racial segregation in the three regions, segregation indices are also calculated to distinguish segregation patterns of poor Blacks vis-à-vis the remaining poor population (mostly Anglo-Whites). Four group pairings are considered: poor Blacks versus nonpoor; all-other-poor versus nonpoor; the rich versus poor Blacks; and the rich versus all-other-poor. These calculations were restricted to 1990 and 2000 because census data for 1970 and 1980 did not include the number of poor Blacks for each census tract, only for those containing more than 400 Blacks.

The Index of Dissimilarity does not allow for the visualization of the spatial distribution of poverty and affluence; in particular, the index cannot account for the contiguity or propinquity of affluent and impoverished census tracts nor changes in these relationships over time. The General Spatial Segregation Index distinguishes between large-cluster and small-cluster segregation, but likewise requires maps for proper interpretation (Wong, 2005). We illustrate this principle by comparing the *D* and *GD* index results with maps of segregation patterns, as well as area and density measurements for each decade.[10]

The maps display only impoverished and high-income tracts in order to highlight areas of poverty and affluence consistently. Generally accepted cutoffs for high poverty (poverty rate 20%–39%) and extreme poverty (poverty rate 40% or more) are adopted as data breakpoints to identify impoverished areas for each region and decade (Greene, 1991). High-income tracts are identified using the same cutoffs for each region and decade. For parsimony and to emphasize the overall change in residential patterns of the poor and rich, only the 1970 and 2000 maps for each metropolitan area are included in this study (Figs. 6–8).



[8]The Census Bureau defines household income as periodic income derived from employment (earnings), wealth (e.g., interest payments, rental income), social welfare programs (e.g., social security, unemployment compensation), private transfers such as child support, and the like. It excludes income in the form of lump sum payments such as capital gains, property sales, bank withdrawals, loans, etc. See Sample File 3 Documentation (2000 data set), U.S. Census Bureau, for a more detailed discussion.

[9]Rich households include those with annual income greater than $150,000 in 2000; greater than $100,000 in 1990; greater than $50,000 in 1980; and greater than $25,000 in 1970. Adjusting for inflation—using the Consumer Price Index provided by the Bureau of Labor Statistics, U.S. Department of Labor—these income thresholds equal $150,000 (2000), $131,752 (1990), $104,490 (1980), $110,954 (1970) in 2000 dollars.

[10]A series of maps for each decade and metropolitan region were produced with census tract data and Census Bureau Geographic Information System (GIS) shapefiles for 1990 and 2000. Manual editing of the 1990 shapefiles based on 1980 Census paper maps permitted the creation of the 1980 Ohio tracts, which themselves were edited based on the 1970 Census paper maps to create the 1970 tracts.

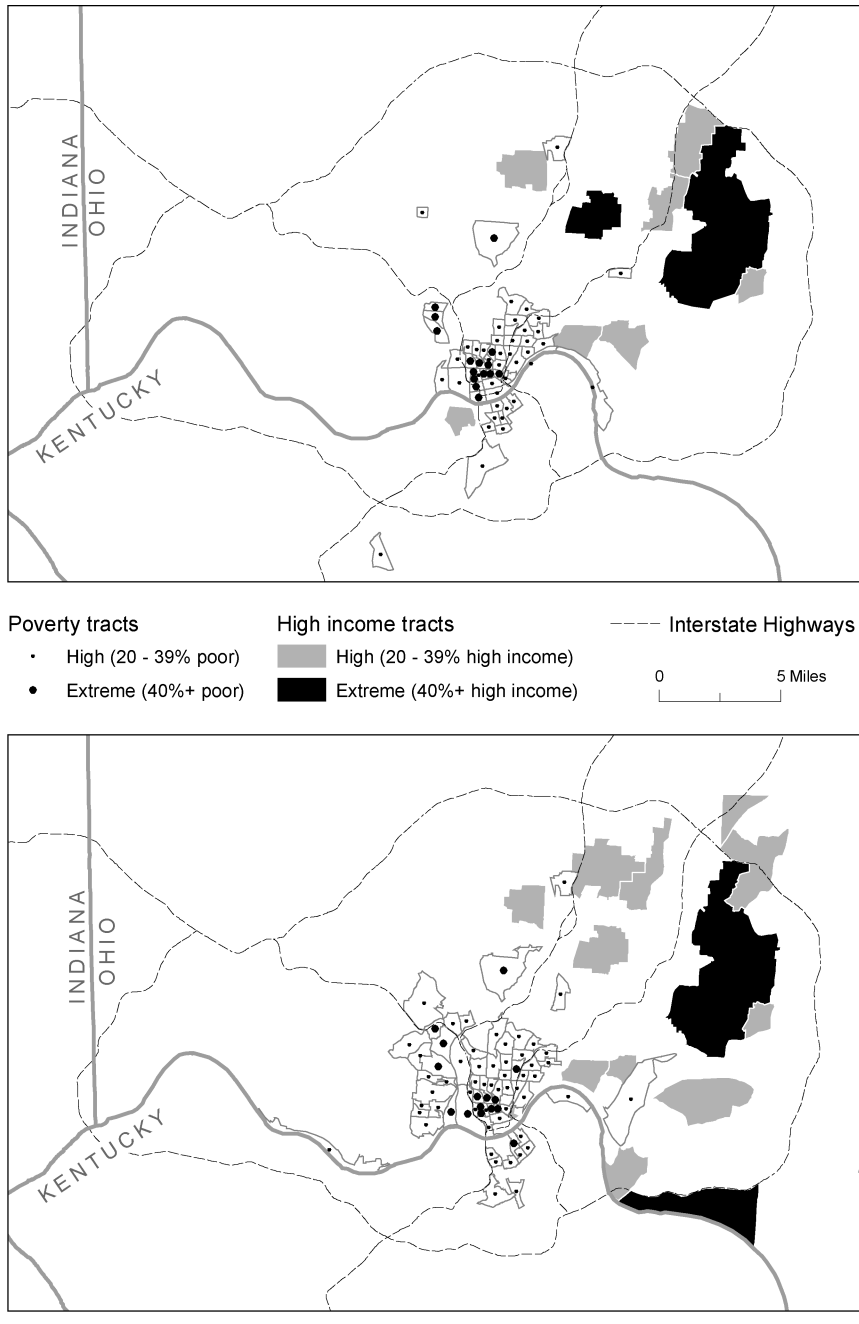


**Fig. 6.** Cincinnati metropolitan area 1970 (top) and 2000.

The cartographic analysis focused on the core county and immediate vicinity for each region because these areas include most tracts of interest and heighten the juxtaposition of the poverty and high-income tracts. Preliminary analysis revealed, as expected, that nearly all of the poverty and extreme-poverty tracts fell within the core county of each metropolis: in 2000, 301 of the 329 total impoverished tracts for all three regions were found in their core counties. This trend persisted to a lesser degree for affluent and extremely affluent tracts; in 2000, there were 63 affluent tracts, of which 49 were located in the core counties.

## RESEARCH RESULTS



Results of the statistical analyses revealed a distinctive pattern of economic segregation from 1970 to 2000 as well as notable differences in the degree of segregation among the rich and the poor (Table 1). In general, segregation indices increased from 1970 to peak in 1990, followed by a decline in 2000.[11] Economic segregation decreased significantly in the last decade across all groupings, in many cases falling nearly to the segregation level recorded for 1970. Furthermore, the segregation indices suggested that the level of economic segregation of the rich and poor from the general population is not severe; for example, the dissimilarity index (*D*) for the poor versus nonpoor, indicated moderate segregation levels in all cases and years. Similarly, the index values for the rich versus the nonrich were in the moderate range if slightly greater than the segregation of the poor and nonpoor measured by *D*.

The segregation of the rich from the poor was considerably higher than their segregation from the general population as measured by *D* (in every case $D > 0.63$), indicating high levels of segregation between the two groups in each metropolis. The widest gaps in values of *D* and *GD*, however, occurred when the rich constituted one of the comparison groups. Because *GD* distinguishes between "regional" (a tract and its neighbors) and "local" (within a single tract) effects, whereas the Dissimilarity Index (*D*) cannot, the greater disparities between *D* and *GD* for groupings including the rich suggest more dispersion (and presumably more interaction) of rich tracts among the nonrich and poverty tracts than indicated by *D* alone. Note, however, that the highest values of *GD* were also for rich versus poor, notwithstanding the overall lower values of *GD* compared to *D*.

When the poor were disaggregated by race, the segregation indices clearly showed the greatest extent of segregation was experienced by poor Blacks. Extremely high segregation levels were found for poor Blacks versus the rich in 1990 and 2000 ($D > 0.83$ in every case and $GD > 0.72$). In addition, poor Blacks exhibited a high level of segregation from the general population (the nonpoor), returning segregation values around twice as high as the all-other-poor versus the nonpoor.

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[11]The exception to the trend involved the rich versus nonrich grouping for which increases in the number of rich households correlates with a decrease in the segregation of the rich. Whether the change in segregation level resulted from economic conditions or data limitations cannot be ascertained here; the income thresholds used for definition of the rich lend themselves more readily to cross-sectional comparisons rather than longitudinal.

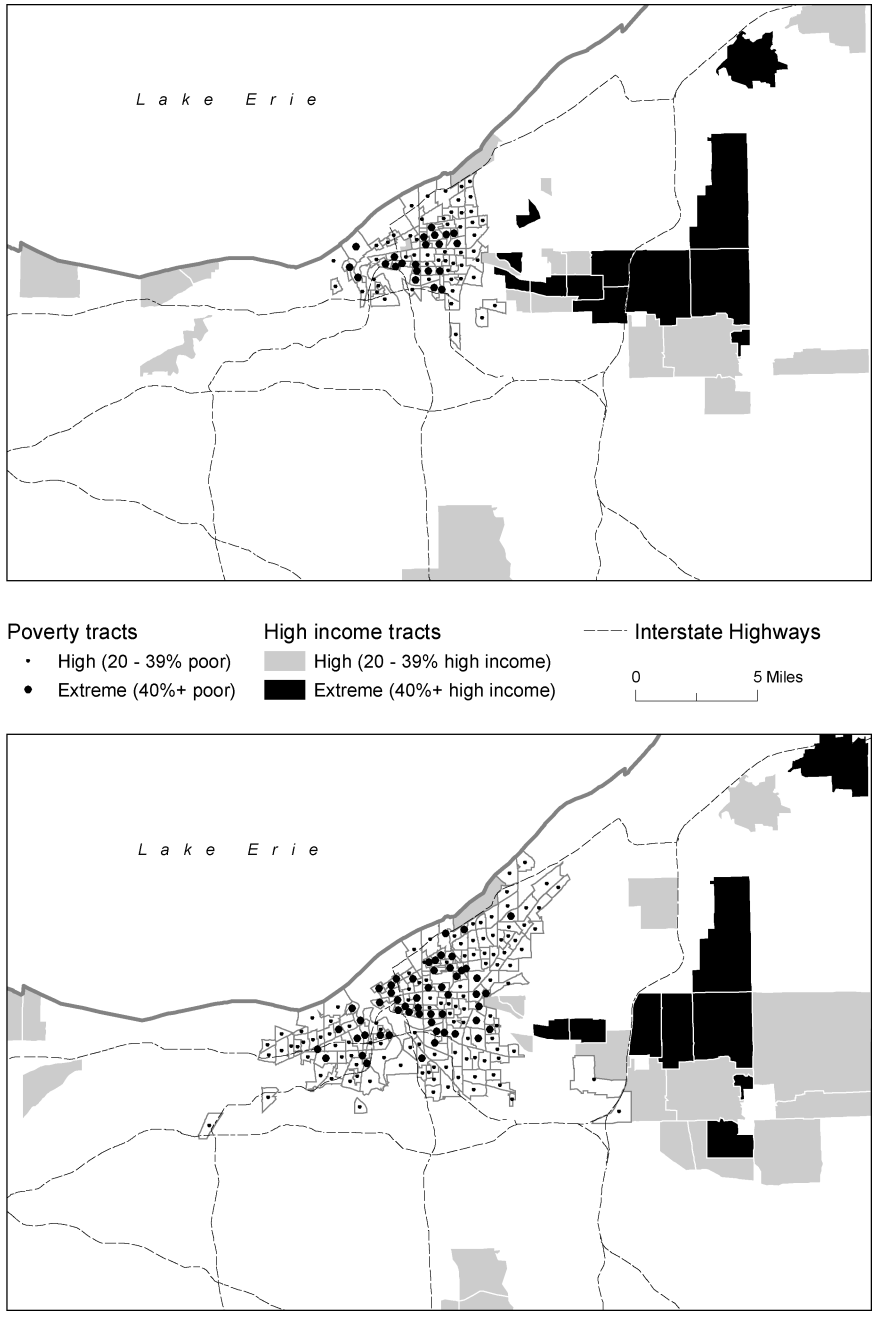


**Fig. 7.** Cleveland metropolitan area 1970 (top) and 2000.

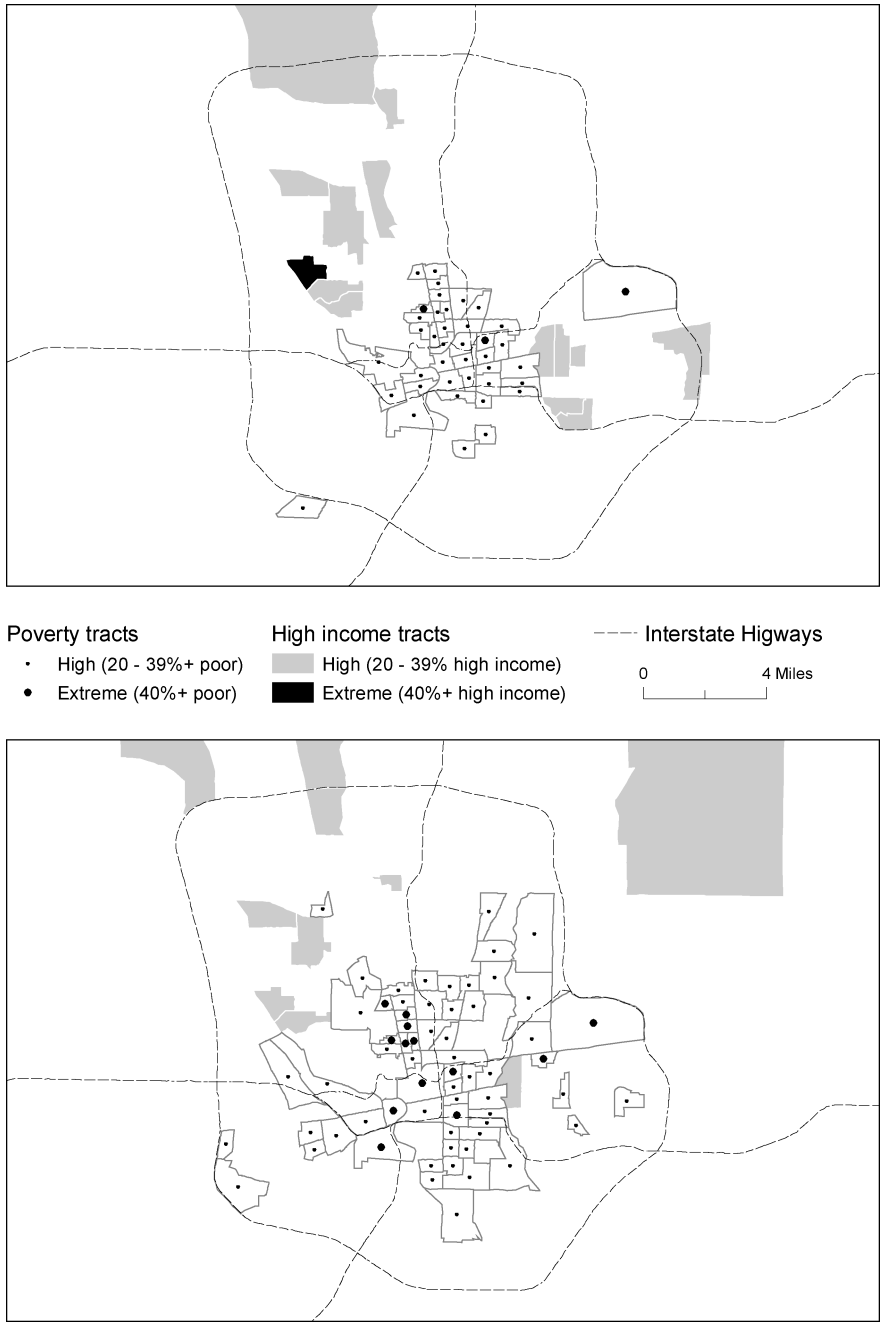


**Fig. 8.** Columbus metropolitan area 1970 (top) and 2000.

**TABLE 1.** DISSIMILARITY INDEX VALUES (*D*) AND GENERAL SPATIAL SEGREGATION INDEX VALUES (*GD*) FOR THE METROPOLITAN REGIONS OF CINCINNATI, CLEVELAND, COLUMBUS 1970–2000

| | Cincinnati | | Cleveland | | Columbus | |
|---|---|---|---|---|---|---|
| Group pairings | D | GD | D | GD | D | GD |
| Poor vs. nonpoor | | | | | | |
| 2000 | .39 | .34 | .45 | .41 | .41 | .33 |
| 1990 | .44 | .36 | .52 | .49 | .44 | .36 |
| 1980 | .40 | .34 | .48 | .46 | .43 | .35 |
| 1970 | .38 | .32 | .43 | .37 | .40 | .33 |
| Poor Blacks vs. nonpoor | | | | | | |
| 2000 | .75 | .65 | .74 | .68 | .69 | .59 |
| 1990 | .77 | .65 | .79 | .74 | .76 | .67 |
| All-other-poor vs. nonpoor | | | | | | |
| 2000 | .33 | .23 | .38 | .31 | .36 | .27 |
| 1990 | .37 | .27 | .52 | .41 | .38 | .30 |
| Rich vs. nonrich | | | | | | |
| 2000 | .44 | .32 | .48 | .41 | .48 | .36 |
| 1990 | .48 | .35 | .55 | .46 | .52 | .38 |
| 1980 | .43 | .32 | .42 | .35 | .49 | .36 |
| 1970 | .46 | .33 | .45 | .32 | .50 | .39 |
| Rich vs. poor | | | | | | |
| 2000 | .64 | .50 | .70 | .62 | .69 | .55 |
| 1990 | .69 | .53 | .78 | .70 | .73 | .59 |
| 1980 | .63 | .49 | .68 | .63 | .69 | .54 |
| 1970 | .63 | .51 | .67 | .55 | .69 | .57 |
| Rich vs. poor Blacks | | | | | | |
| 2000 | .84 | .73 | .88 | .81 | .86 | .74 |
| 1990 | .87 | .72 | .94 | .87 | .91 | .79 |
| Rich vs. all-other-poor | | | | | | |
| 2000 | .59 | .44 | .64 | .54 | .65 | .51 |
| 1990 | .66 | .49 | .69 | .64 | .70 | .56 |

Considering the three metropolitan regions individually, the statistical results indicated significant variation in economic segregation. Cleveland yielded the highest values for both *D* and *GD* over time. While significant segregation of individual tracts by income produced high values of *D*, high values for *GD* connoted concentration of poor tracts in Cleveland's core with few high-income tracts near the center with which the poor could interact (Fig. 7). Indeed, most of the 186 poverty tracts in Cleveland in 2000 are

**TABLE 2.** CONCENTRATION OF POVERTY IN THE METROPOLITAN REGIONS OF CINCINNATI, CLEVELAND, AND COLUMBUS[a]

| | Poor pop. (in 1000s) | No. high poverty tracts[b] | Pop. density in high poverty tracts (per $km^2$) | Percent of all poor in high poverty tracts | Percent of all poor Blacks in high poverty tracts | Percent of all-other-poor in high poverty tracts |
|---|---|---|---|---|---|---|
| Cincinnati | | | | | | |
| 2000 | 156 | 66 | 1,626 | 36 | 69 | 18 |
| 1990 | 161 | 81 | 2,043 | 49 | 76 | 32 |
| 1980 | 141 | 63 | 1,995 | 43 | – | – |
| 1970 | 144 | 56 | 2,246 | 40 | – | – |
| Cleveland | | | | | | |
| 2000 | 239 | 186 | 1,920 | 53 | 79 | 31 |
| 1990 | 200 | 169 | 2,543 | 63 | 87 | 34 |
| 1980 | 187 | 128 | 2,731 | 55 | – | – |
| 1970 | 184 | 73 | 4,131 | 39 | – | – |
| Columbus | | | | | | |
| 2000 | 151 | 66 | 1,310 | 43 | 65 | 34 |
| 1990 | 157 | 65 | 1,538 | 49 | 78 | 38 |
| 1980 | 121 | 64 | 1,498 | 51 | – | – |
| 1970 | 94 | 44 | 473 | 49 | – | – |

[a]Figures based on decennial metropolitan boundary definitions: SMSA for all regions 1970–1980, MSA for Columbus 1990–2000, PMSA for Cincinnati and Cleveland 1990–2000.
[b]Tracts more than 20% poor population.



contiguous, clustered in the center of the city. The concentration of poverty in 2000 was greater than in 1970 and more than half of the poor population resided in high-poverty census tracts (poverty rate 20%–39%; Table 2). In contrast to Cleveland, the values of *GD* for Cincinnati tended to be much lower than values of *D*; as Figure 6 shows, Cincinnati's 66 impoverished tracts in 2000 were more dispersed in the metropolis, and therefore bordered more nonpoor or even high-income tracts. Columbus fell between Cincinnati and Cleveland in this regard.

The lowest level of economic segregation occurred in metropolitan Cincinnati during the study period, yet that region exhibited the greatest disparity in segregation levels when disaggregated by race. In every metropolis, the disaggregated results revealed poor Blacks experiencing a much higher rate of segregation than all-other-poor but especially in Cincinnati, where the segregation index for poor Blacks was more than double that of all-other-poor when calculated against the nonpoor population (in 2000, $D = 0.75$ for Blacks and $D = 0.33$ for all-other-poor). While most *D* values were higher for Cleveland when disaggregated by race, the decline in the segregation of poor Blacks in Cincinnati from 1990 to 2000 was the lowest among the three regions according to *D*. In addition,

the Cincinnati region had the highest proportion of its poor Black population, 33%, residing in extreme-poverty tracts in 2000 (poverty rate > 40%), and the greatest disparity between the proportion of poor Blacks (69%) and all-other-poor (18%) in high-poverty tracts (poverty rate 20%–39%). Interestingly, Cincinnati experienced an inverse relationship between *D* and *GD* for the grouping of poor Blacks versus nonpoor and rich versus poor Blacks, hinting at a racial component to that city's slightly higher *GD* results over the study period 1990–2000. Where *GD* increases or remains constant at the same time that *D* decreases, we can infer that although a number of individual tracts may have become more integrated (resulting in declining *D* values), the overall concentration of homogenous tracts remained steady or increased, thus diminishing the dilution effect of *GD*.

The segregation indices for metropolitan Columbus position it between the values for the Cleveland and Cincinnati regions in most group pairings. Deviation from this pattern occurred in the segregation of poor Blacks versus the nonpoor in 1990 and 2000 (lowest values for *D* in 1990 and 2000 and *GD* in 2000), and the segregation of the rich in 1970 and 1980 (highest values for *D* and *GD* in aggregated groupings with only one exception). The region exhibited the greatest concentration of the rich in every decade: the proportion of the wealthy in upper-income tracts of Columbus exceeded that found in metropolitan Cincinnati and Cleveland by an average of 6.5% (Table 3). Although race clearly represented an important element of economic segregation in the Columbus region, the impact was less than in the other two regions. The lowest percentage of poor Blacks in high-poverty tracts and the greatest percentage of all-other-poor in high-poverty tracts were found in metropolitan Columbus.

The metropolitan maps corroborate the segregation indices by illuminating the spatial variation of the level of segregation between the rich and poor in the study regions from 1970 to 2000 (Figs. 6–8). As expected, poverty tracts are concentrated in the central city and wealthy tracts in the periphery, with most poor tracts separated by some distance from rich tracts. The distribution of poverty appears fairly stable during the study period, with expansion generally occurring outward from preexisting tracts. Many high-income tracts were also stable during the study period, but there was a discernible tendency for rich tracts to disappear with the approach of poverty.

The overall number of poor residents increased in each region from 1970 to 2000, and the spaces in which they were concentrated expanded as well (here the data were aggregated by the metropolitan boundaries designated for each decade by the Census Bureau; Table 2). The expansion involved a greater number of impoverished tracts (which could partly be due to tract splitting) and total land area: Cincinnati's poverty area increased 42% from 1970 to 2000, Cleveland's 378%, and Columbus's 37%. Despite the overall growth, there is evidence that the extent of impoverished areas responded to positive economic trends. For example, the Cincinnati and Columbus regions witnessed an expansion of poverty tracts from 1970 to 1990, but a slight reduction occurred during the economic growth of the 1990s. The economically troubled Cleveland region, however, experienced continuous expansion in the number and extent of poor tracts during the study period. This expansion resulted in a significant decline in population density within the impoverished area even though the poor population increased in metropolitan Cleveland and a greater proportion was concentrated in poor tracts in 2000 than in 1970 (Table 2).

**TABLE 3.** CONCENTRATION OF WEALTH IN THE METROPOLITAN REGIONS OF CINCINNATI, CLEVELAND, AND COLUMBUS[a]

| | No. rich households (in 1000s) | No. wealthy tracts | Pop. density in wealthy tracts (per km$^2$) | Percent all rich in wealthy tracts |
|---|---|---|---|---|
| Cincinnati | | | | |
| 2000 | 31 | 15 | 395 | 21 |
| 1990 | 22 | 11 | 389 | 25 |
| 1980 | 22 | 10 | 228 | 20 |
| 1970 | 17 | 9 | 525 | 26 |
| Cleveland | | | | |
| 2000 | 36 | 24 | 286 | 21 |
| 1990 | 29 | 27 | 277 | 27 |
| 1980 | 37 | 24 | 292 | 22 |
| 1970 | 33 | 27 | 483 | 30 |
| Columbus | | | | |
| 2000 | 26 | 18 | 390 | 25 |
| 1990 | 18 | 12 | 313 | 32 |
| 1980 | 15 | 14 | 112 | 29 |
| 1970 | 10 | 14 | 721 | 36 |

[a]Figures based on decennial metropolitan boundary definitions: SMSA for all regions 1970–1980, MSA for Columbus 1990–000, PMSA for Cincinnati and Cleveland 1990–2000.
[b]Tracts more than 20% rich households.

The metropolitan maps (Figs. 6–8) also reveal that the greatest growth in poverty tracts occurred adjacent to preexisting poor inner-city tracts in a compact pattern (thus accounting for the lower discrepancy in *D* and *GD* values for the poor vs. the nonpoor). This concentrated growth pattern is especially evident in the case of the Cleveland region where the tremendous increase in poverty tracts from 1970 to 2000 occurred steadily outward in multiple directions from the preexisting core. In comparison, the Columbus region experienced growth in poverty tracts in all directions but in a less dense pattern than the other two regions. Each of the regions also experienced some degree of suburban poverty growth, wherein poverty tracts emerged a significant distance from the central core of poverty. In a few cases, these tracts were contiguous to rich tracts but they never adjoined extremely rich tracts (rich households > 40%) and they did not contain large numbers of poor Blacks.

Frequently, the emergence of poverty tracts coincided with the decline or disappearance of rich tracts in the vicinity. For instance, the number of rich tracts to the east of the impoverished core of the Columbus region decreased while the number of poor tracts increased from 1970 to 2000. Here, only one of the three contiguous rich tracts remained wealthy while poverty spread along the tract's borders and pockets of poverty emerged

beyond. A form of White flight is indicated in one formerly wealthy tract located close to the urban core, which steadily gained middle-income Blacks as the number of wealthy declined precipitously. One tract remaining wealthy through the study period encompassed Bexley City, an inner suburb physically separated from the core by the Scioto River. Other tracts farther from the core but still inside the circumferential freeway seemed to be experiencing the downward filtering housing or aging in place (permanent tenants with static incomes), because the population remained predominantly White and fairly stable in size while the percentage and/or number of wealthy households declined.

Similarly in the Cleveland region, one tract along Lake Erie remained rich despite becoming encircled by impoverished tracts during the study period; this tract encompassed the incorporated Village of Bratenahl bordered on the northwest by the lake and on the southwest by multi-laned Interstate 90. Most other affluent tracts declined or disappeared with the incursion of poverty in the inner suburbs of metropolitan Cleveland. For example, several tracts extending eastward to the circumferential expressway from Cleveland's impoverished core declined in affluence. In general, these tracts experienced significant population decline, increasing numbers of poor residents, and a significant loss of affluent households that were not replaced by the middle class. The affluent tracts remaining within the circumferential expressway also experienced significant decline in population, but the percentage of poor remained fairly stable (a small population segment composed almost exclusively of poor Whites) and the decline in affluent households not as severe.

Overall, the number and area of rich tracts in the study regions increased during the study period, their growth occurring primarily on the urban periphery in the vicinity of preexisting wealthy areas. In terms of land area, rich tracts in the Cincinnati region increased by 61%, 29% in Cleveland, and 480% in Columbus. Although the size of peripheral tracts may have inflated the land values for rich tracts, the numbers indicate that the Columbus region experienced the widest growth in area for the rich, the greatest increase in the number of wealthy households, and the highest concentration of the rich (Table 3). In fact, metropolitan Columbus provided a good example of the suburbanization and exurbanization of the rich from 1970 to 2000 (Fig. 8). In 1970, 13 of Columbus's 14 rich tracts were located inside or partially inside the circumferential highway, but by 2000 only 5 of 18 high-income tracts were located there.

The decentralization of the rich to the (often literal) corners of the core counties and adjacent tracts outside the core county is evident in all three metropolitan regions. Exceptions to these general trends occurred primarily in the Cincinnati region where only a few high-income tracts declined inside the circumferential freeway, some growth of high-income tracts occurred near poverty tracts, and one rich tract emerged in the impoverished core as an apparent case of gentrification.

## CONCLUSION

The research presented in this article explored the nature and extent of economic segregation in metropolitan Cincinnati, Cleveland, and Columbus from 1970 to 2000. Comparing the results for these three regions, metropolitan Cleveland—experiencing economic decline most severely in the central city and core county—exhibited the greatest overall degree of economic segregation and poverty concentration. The Columbus

region fared better economically than the other two regions as impressive quaternary employment growth occurred in both the core and peripheral counties during the study period. Yet the segregation indices calculated for Columbus were greater than those for metropolitan Cincinnati in virtually all groupings, and greater than those of the Cleveland metropolis in some cases. These contextual findings suggest that although economic distress may aggravate economic segregation as in the case of the Cleveland region, healthier economic conditions at the metropolitan level do not necessarily lead to comparatively lower economic segregation as in the case of the Columbus region.

The map analyses revealed that all three central cities exhibited a widening area of concentrated poverty from 1970 to 2000 but at lower population densities, thereby suggesting that those able to do so had escaped the inner-city neighborhoods. The result has been an expansion of poor neighborhoods in the central cities, whose ability to cope with poverty and provide adequate public services has been hampered by negative economic changes (with the possible exception of Columbus). At the same time, we have demonstrated that high-income neighborhoods, many of which appear to have been established before 1970, clustered in favored urban or suburban areas, expanding generally outward toward the exurban fringe while declining near the urban core.

Our longitudinal results corroborate the findings of earlier studies that measured general trends in economic segregation, because our tri-metropolitan statistical analysis revealed a slight overall growth in economic segregation for both the poor and the rich from 1970 to 2000. This change in economic segregation was uneven over the 30-year period: segregation levels increased steadily from 1970 to 1990 and then decreased substantially from 1990 to 2000. The decline in economic segregation in our study regions coincided with an improving national economy during the last decade, suggesting that economic changes at the macro level affected the degree of economic segregation experienced at the metropolitan level. However, we cannot ascertain here if the greater economic integration in the study regions from 1990 to 2000 is a result of migration behavior (including gentrification) or rising incomes of fixed residents. Further research is required at both the micro- and macrolevels to explicate the factors responsible for the unexpected reversal in economic segregation during the 1990s, with a view to predicting whether the recent positive trend will continue.

In terms of the segregation levels of different population groups, we found the segregation of the poor and the rich from the general population to be moderate, while segregation between the poor and the rich has persisted at high levels. Economic segregation appears to be largely accomplished by the rich distancing themselves from the poor by settling in the urban periphery. Only a few pockets of affluence remained near the urban cores over the three-decade study period, especially in the cases of the Cleveland and Columbus regions where segregation levels were highest. The isolated pockets of affluence corresponded to the boundaries of inner suburbs politically and physically separated from surrounding areas and thus consistent with the citadels described by Marcuse (1997).

Our results underscore the primary role of race in the severity of economic segregation: in every study region, poor Blacks experienced a profoundly unequal level of economic segregation and concentration in poverty-dominated tracts compared to the rest of the poor population. Particularly in metropolitan Cincinnati and Cleveland, race compounded economic segregation and the majority of the population in poor tracts was

Black. And while Blacks comprised a large proportion of the Cleveland region's population and were highly concentrated there, economic segregation of poor Blacks has been and remains most severe in the Cincinnati region—an interesting finding in light of the race riots that occurred in the city of Cincinnati in 2001.

Although we were not able to discern the intentions of those who moved away from the concentrated poverty of the inner city, we can surmise that physical separation of the rich from the poor reduced understanding of the experience and challenges of poverty and abetted apathy toward the negative conditions of poor inner-city neighborhoods.

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