

School District Fragmentation and Racial Residential Segregation: How do Boundaries Matter?

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ABSTRACT

Fragmentation, or the proliferation of independent jurisdictions, is a key feature of the political structure in many metropolitan areas in the United States. This paper engages sorting theories to investigate racial segregation as one potential negative consequence of school district fragmentation in metropolitan areas. The main results suggest that fragmentation does increase multiracial segregation between districts. Using a decomposable segregation measure, I also find that fragmentation has a negative impact on segregation within districts and no significant effect on tract-level segregation. Additionally, the results suggest that the causes of segregation may differ for various race/ethnic groups. I argue here that segregation between political units may in fact be more appropriate than segregation between smaller units, such as census tracts, if one believes that the negative consequences of segregation stem from access to public goods.

SCHOOL DISTRICT FRAGMENTATION AND RACIAL RESIDENTIAL SEGREGATION: HOW DO BOUNDARIES MATTER?

Fragmentation is a key feature of the political structure in many metropolitan areas. Political fragmentation refers to the proliferation of autonomous jurisdictions and is evident across the United States—in 2002 there were 87,849 local governments and 13,522 school districts (U.S. Census Bureau 2002). Although jurisdictional decentralization underscores the American ethos of local independence and home rule, it is a significant concern because there are costs and benefits associated with jurisdictional size. It affects land-use control, tax policies, economies of scale in public resources and services, and the diversity of human interaction. New Jersey epitomizes a fragmented political system with 616 school districts for just 8.5 million residents. In contrast, Florida has only 67 (county-based) school districts for 16 million people. Figure 1 compares maps of school district boundaries in the Northern New Jersey/New York metropolitan areas with the boundaries in southern Florida. These maps highlight the sharp contrast in jurisdictional size and structure across states and metropolitan areas. It is clear that hundreds of tiny school districts abound in the Newark and New York areas whereas only one school district encompasses the Miami area.

[Figure 1 about here]

New Jersey residents and politicians are intensely debating what to do about the costs of fragmentation that have produced the country's highest local property tax rates and highly segregated schools. As stated by policy analyst Jon Shure, "It's the reality that while this is one of the nation's most diverse states, it's also one where minority public school students are less likely than in almost any other state to go to a well-integrated school—a consequence of having

so many small, homogeneous districts” (Shure 2007). This anecdote clearly shows that political fragmentation has real consequences for citizens.

I argue that the social construction of political boundaries profoundly affects the demographic composition of these constructed units. And neighborhood composition has serious consequences for the well-being of the communities within these units. Many metropolitan areas in the United States are politically fragmented and have diverse populations, but what are the effects of fragmentation on residential choice, and racial segregation? Focusing on school districts, how does their number in a metropolitan area affect racial segregation between these districts? Does fragmentation simply affect the between-unit segregation or does it also impact the residential patterns within these units? Finally, how do these effects differ for segregation among various race/ethnic groups?

Racial segregation is a key component in the perpetuation of unequal opportunities, a particularly important issue in the context of public education. Racial segregation is a manifestation of personal preferences, restrictive housing policies, discrimination, and differential resources; all of which can become more pronounced in smaller, more controllable political units. Heterogeneous areas that are broken into smaller, less diverse entities often have large discrepancies in school quality. These disparities are due to differential school funding, parental involvement, teacher quality, student behavior, class size, facilities, or some combination of these factors. Despite the fact that many legal and institutional barriers to integration in education have been removed, residential and school segregation persists. This study extends a long line of research that examines where segregation is likely to occur and explores one mechanism that is a likely cause of segregation.

BACKGROUND

Theories of Sorting

The manifestation of political fragmentation, its causes and consequences, has been examined mostly through theoretical lenses. This literature conceptualizes the problem as the historical expansion of central cities and the ensuing autonomy of suburban and exurban fragments. Several explanations for this problem have been put forth by political scientists, economists, and urban historians. Sociologists, however, have largely ignored this phenomenon despite the fact that they are often interested in the causes and consequences of racial segregation and residential choice.

The Tiebout model is one of the original theories of residential selection. It connects individual preferences with local expenditures on public goods. From this economic perspective, people choose to live in a municipality that most closely matches their ideal set of government services with their ability-to-pay. This public choice model proposes that fragmentation creates a market structure for public goods (Tiebout 1956). Solely focusing on economic behavior leads to the conclusion that smaller municipalities optimally serve their select, well-suited residents.

The “politics of exclusion” is a second framework that maintains that political boundaries regulate housing, tax, and other resource policies in a way that protects and isolates its residents (Danielson 1976). Small municipalities allow simpler self-governance of their often demographically homogenous residents because they can focus on the narrowly-defined needs of their constituents. By the same means, towns maintain exclusivity through relatively closed democratic processes, and control over local ordinances.

Finally, political boundaries are a source of information. Boundaries make residential sorting decisions more efficient because they convey demographic and socioeconomic differences that may otherwise be hard to discern. Most importantly, they represent educational

opportunities. The meaning of place provides a low-cost prepackaged bundle of information. Although spatial proximity to high-income, high-resource areas may seem advantageous, official political boundaries exclusively dictate access and entitlement to resources (Weiher 1991).

The connection between political fragmentation and racial residential segregation is indirect. Racial segregation can be produced by either race-specific or race-neutral processes. Race-specific processes include legislation that enforces racial segregation, such as Jim Crow laws, or policies that explicitly encourage racial segregation, such as the Federal Housing Administration's former practice of "redlining." The FHA's institutional practices clearly targeted race as a distinguishing factor in real estate sales and mortgage attainment. This occurred at a time when suburbs were expanding and housing construction was rapidly growing. It had the direct effect of solidifying the residential segregation that exists today.

Race-neutral processes do not overtly produce segregation, but instead, they interact with differences in racial groups' preferences or ability-to-pay to generate the same effect. These indirect processes predominate now that government-sponsored discrimination has been abolished and attitudes supporting equality and integration have become more prevalent over the past 50 years. Political fragmentation can be considered race-neutral. Boundaries are not strictly based on the racial composition of the area and residents are not required by law to live in certain jurisdictions as a function of their race. Therefore the connection between fragmentation and segregation is interactive; fragmentation activates, or enables, racial differences in preferences or resources to dictate residential location.

The Tiebout and the politics of exclusion models suggest two mechanisms that connect political fragmentation to racial residential segregation. First, consumers match their preferences and ability-to-pay with the characteristics of a political jurisdiction. This can be thought of as a

demand side process. Well-defined boundaries enable those with specific residential preferences to make more precise decisions. This interactive mechanism may lead to racial segregation for three reasons: 1) People may have a “taste” for segregation and political boundaries help them to realize this goal; 2) People choose their residence based on socioeconomic, or class-based factors, such as the quality of public goods, appearance of housing units, transportation infrastructure, or availability of commercial establishments. Minorities’ ability-to-pay is generally lower than that of whites, leading to racial segregation; and 3) People use demographic composition as a proxy for quality of public goods within a jurisdiction. This item suggests that people statistically discriminate to make decisions based on observed correlations, such as the proportion of minorities in a school district and the quality of those public schools. When more units are available to select from, a finer matching process takes place. This more pronounced sorting produces higher levels of racial segregation.

Second, political boundaries are an interactive mechanism that link political fragmentation to racial segregation. Political boundaries provide a sense of identity, a foundation for common goals, and allow citizens to exercise power through democracy. Most importantly, these boundaries represent local authority over land use. Land use regulations translate into a supply side mechanism whereby local political elites and community groups heavily influence the housing stock. Local action may be funneled into efforts to maintain a certain demographic composition or quality of public goods within the jurisdiction, perhaps through zoning laws, tax policies, or school board decisions. For example, a jurisdiction could effectively bar entry of low-income and minority families by restricting the development of multifamily housing or establishing large minimum lot sizes for single-family homes. Although these policies have the effect of increasing racial segregation, there are generally two more direct goals. First,

commercial real estate and large, expensive homes generate more tax revenue than multifamily dwellings. And second, jurisdictions want to minimize the need for public services.

Commercial real estate adds revenue without adding residents and high-end homes generally attract residents that are less likely to require government assistance. Greater municipal fragmentation generates more competition among the municipalities to attract high revenue-generating development. This mechanism increases the incentives for jurisdictions to exclude dwellings and amenities for low-income residents, which in effect increases segregation.

Whereas I argue that institutional boundaries shape residential demography, it is plausible that residential demography also has impacted the creation of institutional boundaries. As is frequently the case in social science research, causal order is difficult, if not impossible, to determine definitively. Questions regarding political fragmentation pose an especially challenging circumstance in which to determine causal order. Political fragmentation changes so slowly that in order to conduct a temporal analysis, one would need comparable data over a long period of time. Even then, our socially constructed definitions of race and ethnicity, and the ways in which this information is collected, have changed over the course of the century in a way that makes comparisons to the present problematic. Although it is feasible that demographic patterns affect boundary decisions, it would mean that the demographic patterns that existed when school and municipal boundaries were created determined the boundaries that in many cases still exist today. If it is true that segregation remains along these boundaries today, then it would imply that residential demography has not changed much over the course of many years. This seems unlikely considering the shifts in minority concentration and the large influx of immigrants that have occurred in metropolitan areas.

Previous Fragmentation Literature

Although claims have been made in the past regarding the relationship between metropolitan fragmentation and racial residential segregation, few studies have systematically assessed the issue using national-level data. Those who have explored this question have mainly used theory and socio-historical analyses to assess the connection between fragmentation and metropolitan characteristics, including racial segregation (Danielson 1976; Mogulof 1971; Orfield 1997, 2002; Rusk 1995; Teaford 1979; Tobin 1987).

Although these descriptive works vet the historical structures and political institutions that create fragmentation, they do not provide an answer to the question posed here. Namely, what is the relationship between political fragmentation and racial segregation? Other studies have approached this problem by examining the empirical relationship between municipal fragmentation and divisive social outcomes such as racial residential segregation or unequal governmental resources among municipalities. Hill (1974) finds support for the argument that municipal fragmentation is related to differential fiscal resources among municipalities. Others find limited support for a positive relationship between fragmentation and racial residential segregation (Frank 2001; Morgan and Mareschal 1999).

In the economics literature, Clotfelder argues that fragmentation, as measured by the number of school districts in a metropolitan area, aids residential segregation. However, he does not formally test this idea. His paper shows that larger districts have lower white/black segregation levels and heavily-minority districts have higher white/black segregation levels (1999). Hoxby (2000) tests the consequences of Tiebout choice on student outcomes and finds that school district fragmentation has no effect on the segregation of children between schools. Urquiola, using data from school-age children, finds that within metropolitan areas, larger

numbers of districts affect the racial composition of the district as well as the individual schools within that district (2005).

This work provides evidence that a relationship is indeed expected between more choices and demographic sorting among school-age children. But it says little about the way in which these boundaries may affect the broader population. In a paper that reverses the causal direction of this relationship, Alesina et al. (2004) demonstrate that racial and economic heterogeneity impact the number of jurisdictions within U.S. counties, and use an instrumental variable technique to bolster their argument. Despite their attempt to determine the causal order, the authors admit that it is impossible to determine whether demographics impact institutions or vice versa. Although there has been some recent interest in this topic, there has been relatively little empirical evidence produced. The evidence that has been produced does not address how fragmentation affects segregation for different groups or at different geographic levels.

Boundary Choices

Although past fragmentation research has focused on municipalities, this study uses the school district as the political unit of interest. School district boundaries, like municipal boundaries, signal access to a slate of public goods. However, they precisely signal access to one particularly salient public good—public education. These boundaries give access to one of the nation’s most valued services, and they signal other community characteristics, such as property values, that may be associated with school district quality (Brasington and Haurin 2006; Haurin 1996). Schelling’s bounded neighborhood model hypothesizes that population sorting is dependent on the existence of “a common definition of the neighborhood and its boundaries—a person is either inside or outside” (Schelling 1978, 155). The quality and reputation of a school

district play a large role in formulating this common definition of a residential area.

Consequently, these characteristics are heavily weighted in residential decisions. The same cannot be said for census-defined “neighborhoods” because people are rarely cognizant of their boundaries.

Given that boundary choice is essential to the implications of this study, it is important to clearly delineate the empirical and theoretical differences between segregation at various geographic levels. There are many choices of units between which segregation measures can be based, such as census block-groups, census tracts, school districts, political subunits, such as council wards in Washington, DC, or even larger areas, such as suburbs and central cities. The trend in segregation research has been to use the smallest available units because it is thought that these units most accurately represent real residential neighborhoods (see, for example, Frey and Myers 2005; Iceland and Steinmetz 2003). However, all of these non-political, census-defined units lack social meaning.

Conceptually, one might think of the difference between segregation measures at the census tract and school district level as micro vs. macro segregation. Micro segregation matters more for pedestrian-level interactions whereas macro segregation, in this case, matters more for access to public goods. Indeed, both levels of segregation matter for social outcomes. However, the opportunities afforded through public schools, both educationally and socially, are intended to be the foundation of a democratic and equal society. Segregation between these units speaks most clearly to the ways in which racial segregation can be so detrimental to long-term social outcomes.

This paper focuses on three types of residential segregation: 1) between-district; 2) within-district; and 3) total tract-level segregation. Between-district segregation is the amount of

the total tract-level segregation that is attributable to segregation between school districts. As noted above, segregation at this level best approximates differential access to jurisdiction-based resources, such as public schools, community centers, recreational facilities, or transportation infrastructure. Similarly, within-district segregation is the amount of total tract-level segregation that is attributable to residential within-district segregation. Total tract-level segregation is a small-unit calculation of segregation for a metropolitan area. This measure best estimates neighborhood level segregation, which is important for everyday communal activities, such as interactions at grocery stores, local parks, and post offices, or for neighborhood gatherings, such as a block party. Summing residential within- and between-district segregation yields total tract-level segregation.

There are three reasons to focus on between-district segregation instead of within-district segregation in the context of residential sorting. First, segregation between districts is representative of broader social and economic forces that impact residential choice, such as housing markets and access to broader public goods. In contrast, residential segregation within districts represents district policies about student assignment to specific schools (Reardon, Yun and Eitle 2000; Rivkin 1994) and smaller-scale residential choice, such as which neighborhood and street to select within a political jurisdiction. Second, political fragmentation refers to political units, which school districts are and neighborhoods are not. And third, some urban districts allow within-district school choice, making a specific point of residence within the district irrelevant.

This is not to say that within-district forces do not affect segregation. However, fragmentation, as a mechanism that facilitates segregation, may have a positive effect on segregation between districts, but may or may not affect residential segregation patterns within

districts. To address this issue I use the Theil index (H), a decomposable measure of segregation. This measure allows for comparisons of the effect of fragmentation on segregation between various geographic units (Theil 1972).¹

Multiracial Segregation

The Theil index (H) also allows for the study of segregation among multiple race/ethnic groups. Now more than ever, the United States is characterized by an incredibly diverse populace consisting of significant numbers of white, black, Hispanic, and Asian individuals. In 2006, the U.S. population was 66% non-Hispanic white, 15% Hispanic, 12% non-Hispanic black, and 4% non-Hispanic Asian (U.S Census Bureau 2008). The school-age population was even more diverse. In 2006, the elementary and secondary school population was 57% non-Hispanic white, 20% Hispanic, 17% non-Hispanic black, and 5% non-Hispanic Asian (National Center for Education Statistics 2006). These statistics show a clear departure from past decades when the primary groups of interest were whites and blacks. Today it is of theoretical and empirical interest to explore the interactive relationship among the multiple race/ethnic groups that are prevalent in American society. This is especially true of urban areas, which have been and continue to be focal points of minority settlement.

The traditional dichotomous measures of segregation lose important information regarding the interaction of multiple race/ethnic groups. White/black segregation is still more pronounced than white/Hispanic or white/Asian segregation (see, for example, Frey and Myers 2005; Logan et al. 2004), and these pair-wise measures provide us with important insights into the relationship between white/minority interaction. However, the computation of these measures ignores the presence of other groups in the geographic unit and do not provide any

information about how race/ethnic groups simultaneously coexist. This study sheds light on the multiracial dimension of segregation as well as providing dichotomous measures to examine the differential effect of fragmentation on segregation between specific race/ethnic groups.

HYPOTHESES

The main hypothesis guiding this research posits a positive relationship between school district fragmentation and racial residential segregation between school districts in metropolitan areas. It is expected that a proliferation of independent school districts within a metropolitan area causes higher levels of homogeneity, and therefore racial segregation.

The matching, or demand-side, process associated with school district boundaries may be more sensitive to families that directly utilize this public resource as opposed to families who are simply affected by other externalities, such as property values. This is tested by treating the presence of school-age children in families as a moderator variable. For families who intend to use the public education system, the sorting mechanism into fragmented school districts should be stronger. Thus, in metropolitan areas with a higher proportion of families with children, I predict a higher level of racial segregation.

Another test of this hypothesis includes private school enrollment as a moderator variable. Families whose children attend private school should be less concerned with school district boundaries than those whose children attend public school. Thus, this sorting mechanism should be weaker for metropolitan areas with higher proportions of children in private school, implying a lower level of racial segregation.

The supply-side mechanism of housing availability tests whether the actions of local political elites and community groups create constraints that lead to increased segregation. Municipal fragmentation generates fierce inter-municipality competition for tax revenue. This in

turn reduces options for low-income and minority residents as jurisdictions fight for high-end and commercial development. Thus, municipal fragmentation should increase racial residential segregation; although it is unclear if there is an impact net of school district fragmentation.

Political boundaries matter by providing information to the residential consumer and by providing a venue in which members can organize to control local policies and resources. School districts, however, usually include several different neighborhoods, that may or may not possess local governmental authority. Segregation at various geographic levels can have different social consequences and fragmentation may affect micro, tract-level segregation differently than macro, district-level segregation.

The Theil index makes it possible to explore how fragmentation differentially affects between-district, within-district, and total, tract-level segregation. Although theory does not lead to any obvious predictions, two scenarios are plausible. First, if there is a significant positive relationship between fragmentation and all three levels of segregation, this indicates that fractured political systems unambiguously impact residential sorting, between the boundaries that define the fragmentation as well as between smaller, more informal neighborhood boundaries. This would mean that the effects of fragmentation are not simply reflected as between-district or within-district segregation. Instead, this would suggest that these various levels of aggregation are not important for the interpretation of fragmentation as a mechanism leading to segregation. Second, if fragmentation is significant and related to segregation for some levels of geography but not others, then it would imply that fragmentation only impacts racial sorting in certain contexts.

Whereas the main analysis focuses on the Theil index as a multiple group segregation measure, it is also interesting to consider the variation in effects for white/black, white/Hispanic,

and white/Asian segregation. Previous research has shown that the causes and consequences of segregation differ for various race/ethnic groups. Thus, it is worthwhile to investigate the potentially different effects of fragmentation on the segregation of blacks, Hispanics, and Asians from whites. It is unknown how political boundaries might affect segregation among race/ethnic groups differently.

METHODS

This analysis uses metropolitan-level data from the 2000 U.S. Census that are obtained from the School Districts Demographic System using the School District Tabulation File (STP2) and the School District Public Law File (PL2 and SF1). This project was developed by the National Center for Education Statistics (NCES) and provides Census 2000 data using the school district as the unit of geography. Metropolitan segregation measures at the tract-level are obtained from the U.S. Census Bureau's website.² Metropolitan statistical areas (MSA) include both central cities as well as their economically integrated outlying areas and usually contain many autonomous jurisdictions. MSAs serve as the unit of analysis.

There were 331 census-defined MSAs in 2000, but this analysis is restricted in two ways.³ First, cases are deleted where fragmentation is equal to zero. This occurs in the 22 MSAs that consist of only one school district.⁴ Second, four cases are deleted because they are missing from the Census Bureau's multiracial H-index calculations or they are irreconcilable with the district-level segregation calculations. One additional case is lost because there was no place-level data available from which to construct municipal fragmentation. The final population of MSAs contains 304 cases.

Political fragmentation can be operationalized in a number of ways. Previous studies have used the number of municipalities per capita in a metropolitan area or variations on this

measure, such as the number of municipalities of more than 10,000 per 1,000,000 residents in the metropolitan area, or a blunt measure of the number of school districts in a county (Alesina et al. 2004; Frank 2001; Hill 1974; Morgan and Mareschal 1999).

In this study, district fragmentation is operationalized with a probability measure that represents the likelihood of two students in the same metropolitan area attending different districts. This measure is defined as:

$$Fragmentation = \sum_{d=1}^k P_d(1 - P_d),$$

where P is the proportion of children in the metropolitan area enrolled in district d . The primary independent variable is derived from total school district population counts within each metropolitan area. This measure captures the underlying concept of fragmentation—there is complete fragmentation if every child attended his/her own district and complete incorporation if every child attended one school district. It varies from 0.00 (no fragmentation) to 1.00 (complete fragmentation) and controls for metropolitan population size. Municipal fragmentation is calculated in the same way, but represents the probability that two individuals in a metropolitan area live in different Census-defined *places*. A *place* is either a legally incorporated entity or an entity that has been labeled as a Census Designated Place. For municipal fragmentation then, P is the proportion of individuals in the metropolitan area that live in place d .⁵

Metropolitan racial segregation is the dependent variable and is measured using Theil's entropy index (H). This index is defined to be the evenness with which racial groups are distributed among given units (school districts). In other words, this index compares the diversity of districts to the diversity of the entire metropolitan area. It is calculated using residential race counts from metropolitan school districts and can represent either segregation between two

groups or mutual segregation among a number of groups.⁶ A key component of the entropy index is the diversity, or entropy measure (E) of the population. E is defined as:

$$E = \sum_{r=1}^n Q_r \ln \frac{1}{Q_r},$$

where Q_r is the proportion of the population made up of racial group r . E varies from $\ln(n)$ when each racial group is equally represented in the population to zero when only one racial group is present. Theil's entropy index (H) can then be defined as:

$$H = \frac{\sum_{i=1}^k \frac{t_i}{T} (E - E_i)}{E},$$

where T is the population of the metropolitan area as a whole and t_i is the population of district i . E and E_i are the entropy, or diversity, of the metropolitan area and each district, respectively. The measure ranges from 0.0 to 1.0. The minimum value indicates that the diversity of each school district is equal to the diversity of the entire metropolitan area. The maximum value indicates that each district contains only one race/ethnic group. Five race/ethnic groups are used in this study: non-Hispanic white, black, Asian and Pacific Islander, and American Indian, as well as Hispanic; Hispanics can be of any race.⁷ Given the growing population diversity in many large cities, this more realistic measure of segregation improves upon commonly used dichotomous measures of segregation, such as the dissimilarity index. Dichotomous white-minority segregation patterns are still important because non-Hispanic whites accounted for approximately 70% of the U.S. population in 2000 and are still the largest group in most metropolitan areas. However, as many urban areas continue to experience growth in their minority populations, one also cares how segregation has developed among these minority

groups. This analysis compares the effects of fragmentation on multiracial segregation to the effects on traditional segregation between two groups.

The Theil index's decomposition property also makes it possible to determine the proportion of total segregation that is due to segregation at various geographic levels (Reardon and Firebaugh 2002; Reardon, Yun, and Eitle 2000; Theil 1972). H can be rewritten as follows to make the decomposition clear:

$$H = H_D + \sum_{d=1}^k \frac{T_d E_d}{TE} H_d,$$

where H is the total metropolitan entropy index calculated using census tracts; H_D is the entropy index calculated between districts; H_d is the entropy index calculated within district d ; and E_d , E , T_d , and T are respectively the diversities and the total populations of district d and the metropolitan area.⁸ For a more complete discussion of the properties of the Theil index, refer to Appendix A.

All segregation measures rely on the subunits between which they are calculated. Typically, these clusters of data have no social meaning and are vulnerable to the modifiable areal unit problem (MAUP). This flaw in “aspatial” segregation measures arises because the assumption is that households located in different data clusters are always less proximate to each other than households within the same data cluster. However, all of the households on the perimeter of the census tracts, for example, are closer to the households in the neighboring tract than they are to most of the households within their own tract. As discussed in Reardon and O'Sullivan (2004), this issue is less of a concern when the unit boundaries have social meaning.

In the case of the school district, this data aggregation problem actually highlights why calculating segregation between political units provides important insights—proximity alone has no consequences for access to resources. A household must be within the defined political

boundaries to gain the right to use the resources; being close is not enough. School districts can be thought of as discrete, socially meaningful units and thus between-district segregation measures are less arbitrary than between-tract measures.

The moderating variables are presented as the percentage of families in a metropolitan area with children and the percentage of families who send their children to private school. Both are metropolitan-level rates.⁹ The regression models control for the following metropolitan characteristics: metropolitan population size, region, percentage black, and percentage with a college education degree or higher. Average per capital income and percentage foreign-born were originally included as control variables but had no effect and were dropped from the models for parsimony.

ANALYSES AND RESULTS

The analysis consists of two sections. First, I establish a strong relationship between political fragmentation and racial residential segregation. Second, I explore the differential effects of fragmentation on the geographic components of metropolitan segregation and how this varies for multiracial and dichotomous segregation. Table 1 provides a summary of descriptive statistics for key variables.

[Table 1 about here]

The multiracial between-district H-index has an average value of .09, which can be interpreted to mean that the average school district is 9% less diverse than the metropolitan area as a whole. In this sample of metropolitan areas, the minimum value was .0003 (Daytona Beach, FL) and the maximum was .4352 (Detroit, MI). As one might expect, the value for white/black segregation is three percentage points higher whereas the values for white/Hispanic and

white/Asian are 2 and 4 percentage points lower, respectively. These results follow a large body of segregation research that shows blacks to be the most segregated group from whites, followed by Hispanics and Asians (see, for example, Frey and Myers 2005; Iceland, Weinberg, and Steinmetz 2002; Logan et al. 2004) The average value of the census-tabulated tract-level H-index is .18. These data show that within- and between-district segregation nearly equally account for total tract-level segregation (because tract-level segregation is the sum of these components).

This result differs from previous findings that report between-district segregation to account for a larger proportion of the total metropolitan segregation (Clotfelder 1999; Reardon, Yun, and Eitle 2000). These studies, however, use 1994-1995 district-level data from the NCES Common Core of Data, which only includes children enrolled in school. This implies that either segregation patterns changed from 1995-2000, or that patterns for children and the total population differ. The results presented here show that segregation patterns of children are in fact somewhat different from those of the total population.

It is important to realize that segregation index values vary inversely with the size of geographic unit between which the measure is calculated. Therefore, measures of tract-level segregation are higher than district-level measures.¹⁰ The average school district fragmentation across metropolitan areas is .72, meaning that in areas where there is any possibility of choosing among more than one school district, there is a .72 probability that two randomly selected children will live in different districts. The smallest fragmentation value was .016 for Reno, NV and the largest was .986 for Nassau-Suffolk, NY. The average value of municipal fragmentation is slightly lower at .69. On average, 33% of households have children and 12% of these

households report that their children attend private school, although interestingly, both of these characteristics have little variation.

Regional differences in segregation patterns are presented in Table 2. Many metropolitan characteristics, such as demographics, government structures, and labor force characteristics, systematically differ by region, making a metropolitan area's region strongly related to its segregation levels. According to the census definitions, the South contains the most MSAs (35%), followed by the Midwest (26%), the West (20%), and the Northeast (19%). The Northeast has the highest fragmentation levels followed by the Midwest, the West, and the South. This is expected because older cities generally have more political jurisdictions, and in areas such as the Northeast, there has been a long tradition of decentralized local government. The multiracial H-index levels shadow the fragmentation levels, demonstrating at least a superficial relationship between the structure of political jurisdictions and segregation patterns. There is almost no difference in the percentage of households with children by region and only small differences in private school attendance rates. The small differences in private school rates may be a function of differential preferences, availability, or religiosity across regions.

[Table 2 about here]

Fragmentation and Between-District Segregation

The first analysis uses ordinary least squares to estimate five linear regression models examining the effect of fragmentation on multiracial between-district segregation. Robust regression techniques are used to correct for non-constant variation of the error terms. Table 3 reports the results for all five models.

The baseline model contains only the control variables, which are all highly significant. Metropolitan areas with larger populations, with a greater proportion of African-Americans, and all regions compared to the South are more segregated, whereas those with better educated residents are less segregated. The second model adds fragmentation, the key independent variable, which is positive and highly significant. The addition of this variable significantly improves the fit of the model, providing evidence in support of the main hypothesis that fragmentation increases residential racial segregation. Although this model does not contribute an explanation for why this relationship exists, it does lend support to residential sorting models based on public goods.

[Table 3 about here]

Model 3 adds two moderators, the percentage of families with children and the private school attendance rate. Neither one of these metropolitan characteristics is significant, but the negative coefficient for private school rate is consistent with the hypothesis that higher private school rates are related to less residential segregation. There is no support for the hypotheses regarding the sorting process in which fragmentation leads to segregation. However, these two moderators are by no means the only indicators of residential sorting into school districts and further investigation is needed.¹¹ Municipal fragmentation is added in Model 4, but the coefficient is not significant. This suggests that supply-side factors, such as housing stock availability created by municipal competition, are not significant determinants of between-district segregation net of school district fragmentation. In analyses not presented here, municipal fragmentation is a positive and significant predictor of between-district segregation before adding district fragmentation to the model. The fact that district fragmentation absorbs

the effect of municipal fragmentation is not altogether surprising given that the boundaries relating to school access are expected to have the strongest impact on residential sorting.

Model 5 includes a quadratic term to test for a non-linear relationship between district fragmentation and segregation. Preliminary diagnostic plots suggested the non-linear relationship. The inclusion of the quadratic term modestly but significantly improves the model, suggesting that as fragmentation increases segregation grows at an increasing rate. Referring back to the basic sorting models, this finding suggests that as people have more bounded communities to choose from, sorting occurs at an increasing rate. The non-linear model highlights the fact that fragmentation does not substantially affect racial segregation until fragmentation reaches a fairly high level. This implies that some degree of metropolitan decentralization is not problematic regarding residential segregation and indeed, is most likely necessary for other factors affected by fragmentation, such as the management and delivery of public services. Appendix B displays a plot of the linear and non-linear relationships.¹²

This analysis is primarily concerned with how school districts affect general sorting trends. I also explore the effects for children though since they are arguably more likely to encounter the direct social consequences of segregation due to their requisite school attendance. Although general segregation leads to differential public goods and opportunities, which affects all segments of the population, children are less likely than adults to have social ties and interactions outside their immediate community. Adults are not forced to work in specific workplaces based on residential location and they may or may not have direct and regular contact with those in their neighborhood or school district. The OLS estimates for segregation among the population 18 years of age and under are nearly identical to the results for the total population, but the effects are somewhat stronger and the model explains slightly more of the

variation in segregation. These results are presented in Appendix C. These findings can be interpreted as a stronger test of the hypothesis that households with children care more about school district boundaries and therefore, segregation is more acute for children than for the general population.

How Does Boundary and Group Choice Matter?

The second analysis addresses whether the effect of fragmentation on residential segregation between districts differs from the effect on residential segregation within districts and total tract-level segregation. Between-district segregation represents sorting based on jurisdictional boundaries, and so it captures segregation on a scale that matters for access to public goods and resources, but it does not capture segregation at smaller scales, such as what some may think of as local neighborhoods. Table 4 reports results for this comparative analysis, displaying both the linear and non-linear full models for each geographic component.

[Table 4 about here]

Models 1 and 2 represent the between-district analysis and are simply replicated from Table 3. Models 3 and 4 represent the effect of fragmentation on the residential within-district component of the total metropolitan segregation. There is a significant negative relationship between political fragmentation and residential within-district multiracial segregation. As a metropolitan area becomes more politically disjointed, people sort into boundaries that matter for access to goods, but segregate less within these meaningful boundaries.

This finding suggests two possibilities. One, people are more concerned about access to resources than specific residential location, for instance making residence within a neighborhood less important than residence within a school district. It may be the case that small

neighborhoods have declined in importance as a means of social support and interaction. As it has become increasingly normal for people to drive or travel long distances on public transportation, it is no longer necessary for children or adults to live within walking distance of their friends. As long as the family has access to the public good conferred by their jurisdiction of residence, they are then able to interact with others from that jurisdiction, even if they do not live in the same microenvironment. The second possibility is that jurisdictional boundaries convey more information than vague, local neighborhood boundaries. As opposed to more unstructured information regarding local neighborhood quality, people are able to accurately select into their optimal school district because more concrete information about the quality of that discrete unit is available. This finding supports the argument that fragmentation increases between-district segregation, highlighting the importance of information-laden boundaries. Municipal fragmentation remains insignificant in each of the models.

Although the moderating variables, percentage of households with children and private school attendance rate were inconsequential in the previous models, they are highly significant in these models. A higher percentage of households with children is related to less within-district segregation and a higher private school rate is related to more within-district segregation. The original hypotheses made no predictions about how these potential moderators might affect within-district sorting, but these results suggest that different processes take place within and between jurisdictions.

Finally, Models 5 and 6 represent results from the estimated effects of fragmentation on total, or tract-level, segregation. It is apparent that there is a positive, but non-significant effect of political fragmentation on tract-level multiracial segregation. An abundance of political jurisdictions has no substantial effect on the sorting of individuals into small geographic areas.

This may lead some to conclude that fragmentation has no real effect on segregation.

Researchers often focus on these administrative units even though they are usually poor proxies for neighborhoods. Institutional boundaries, on the other hand, are delineated by laws, tax policies, public works, quality of public schools, and many other factors that are particularly consequential for equality of opportunity. Tract-level segregation measures better approximate the street-to-street living patterns of individuals, but they do not capture access to the resources that ultimately make segregation harmful to individuals and society over time.

Repeating the analysis for white/black, white/Hispanic, and white/Asian segregation, the results show that white/black segregation mimics the multiracial segregation results.

Appendices D-F present these results. However, the models explain more of the overall variance in segregation for the between-district and total segregation and less of the variance in within-district segregation than the multiracial models. The fragmentation effects are stronger for white/black segregation than they are for multiracial segregation, which dilutes the white/black effect to some extent with the inclusion of other, less segregated groups. There is also a strong negative effect of percentage of households with children on white/black tract-level segregation. This finding might be related to class-specific fertility differentials. Low-income families, both black and white, have higher fertility levels than higher-income families. Thus, the percentage of households with children may attenuate the effect of fragmentation on white/black segregation as families with more children may be less segregated than families with fewer children.

The results for white/Hispanic segregation are also similar, but the explained variation in segregation declines considerably in these models. The quadratic term in the between-district model is not significant here, but the moderating variable measuring the percentage of households with children is positive and significant, indicating that opposite the case for

multiracial and white/black segregation, white/Hispanic segregation increases with an increase in households with children. Few of the control variables are significant, suggesting that the models for predicting segregation may be better suited for explaining white/black segregation than for white segregation from other minorities. Finally, the results for white/Asian segregation show an even larger decrease in the percent of variation explained by the model. Again, few of the predictors in the models are significant, although the effect of fragmentation remains highly significant and the valence follows the same basic patterns as the Hispanic models.

The results regarding differences in predicted segregation levels for various race/ethnic groups to some degree reflects the overarching trend in segregation levels—blacks remain the most segregated group from whites, followed by Hispanics and then Asians. The estimates presented here reflect this general pattern, but represent not just descriptive segregation levels, but predicted levels based on metropolitan fragmentation. Thus, although the trends seem familiar, they represent new information. Fragmentation contributes to racial residential segregation, but it accounts for more of the variation in white/black segregation than it does for white segregation from other groups.¹³

DISCUSSION

The finding that high levels of fragmentation are related to high levels of between-district racial segregation represents a form of macro segregation. Segregation among these units reflects sorting patterns that involve a potentially different kind of decision-making process from micro segregation involving smaller geographic units such as census tracts or neighborhoods. The macro level decision-making process reflects Tiebout choice as it is the manifestation of residential preferences based on jurisdictional resources. Tiebout choice is certainly not the only decision process that creates these patterns. The Tiebout model has been invoked in a wealth of

research for its intuitive nature and simplicity. As some have recently noted, however, the Tiebout model is, in fact, too simple. Although the influence of local public goods is indeed apparent, it may not dominate the residential decision process (Rhode and Strumpf 2003). But, in a situation where the political boundaries represent access to one specific public good, it is perhaps more likely that Tiebout choice plays a greater role than if the boundaries represented access to a vague set of public goods. Although the intent of these residential decisions may not be race-specific, the product often is.

This analysis shows that political fragmentation, as one potential mechanism for residential segregation, does not in fact affect total, micro level segregation in a metropolitan area. Indeed, it actually decreases within-district segregation. This lends support to the ideas put forth by Weiher (1991); residents use information regarding variation across political boundaries but are not as aware of or concerned with their exact locale once inside these meaningful units. Although neighborhood-level segregation is also a cause for concern, sorting into these units does not necessarily mean that individuals are receiving differential access to resources. This macro, institutional-boundary based segregation may be more pertinent for assessing the negative consequences associated with segregation, which very often stem from unequal access to quality schooling.

The results presented here also demonstrate that metropolitan decentralization affects segregation among various race/ethnic groups differently. The primary analysis assesses the impacts on segregation among five race/ethnic groups, which improves upon dichotomous measures by more accurately portraying the demographic reality of the United States in the 21st century. However, examining the effects of fragmentation on segregation between specific

race/ethnic groups is helpful in understanding that patterns differ and the causes of segregation may not always be uniform.

Segregation between whites and blacks has been most frequently studied for obvious socio-historical reasons and indeed, segregation between these groups remains the most egregious. However, with growing populations of Hispanics and Asians, these groups are ever more at-risk of becoming increasingly segregated. Boosts in population totals and concentration are related to increases in segregation, even though the overall levels of segregation for these groups remains far below that for blacks (Frey and Myers 2005; Logan et al. 2004). Thus, the results of this analysis to some extent reflect what would be expected in terms of absolute levels of segregation (black>Hispanic>Asian), but they also present evidence that the causes of segregation are not the same for all minority groups.

Political fragmentation can be operationalized as the proliferation of a wide variety of political units. The American political system allows for many divisions in jurisdictions, both vertically and horizontally. Vertically, one might think of political hierarchy, such as federal vs. state vs. municipal government. Horizontally, one might think of jurisdictions that govern the same area, but are responsible for different public goods. For instance, a school district is horizontal to the municipal governments from which it draws students. These jurisdictions overlap but they do not provide the same services. Instead, they work in tandem to provide a complete set of public goods. Segregation that develops out of sorting processes likely results from a combination of municipal and school district effects. Whereas school district fragmentation represents a demand-side process whereby people select into a certain quality of public goods, municipal fragmentation may operate in a supply-side framework whereby inter-municipality competition creates scarce housing for low-income and minority residents. The

results presented here confirm that municipal fragmentation has no significant effect on district segregation net of school district fragmentation. This could be interpreted to mean that supply-side forces are weaker predictors of segregation than demand-side forces, including individual preferences and ability-to-pay. Alternatively, this could be a signal that favors the main argument in this paper—people are acutely aware of boundaries that define highly valued public goods.

Tiebout and other sorting theorists argue that institutional boundaries are the salient social dividers. In the Tiebout framework as well as in Weiher's information theory, jurisdictional boundaries serve as signals for residential consumers. The research findings presented here lend support to this idea that people use the information conveyed by these boundaries to select into certain areas based on public goods. However, better evidence is needed on the sociological mechanisms inherent in this theory. I do not argue that micro, tract-level segregation is devoid of social implications, but it is the goal here to push forward the idea that segregation, and its long-term consequences for social stratification, is a phenomenon that in part is affected by socially-constructed institutions.

CONCLUSIONS

Much extant research seeks to answer aspects of larger questions surrounding the issue of segregation as a social fact. This research contributes to the understanding of one cause of segregation—political fragmentation. It highlights one of the negative social consequences of fragmentation, although others have been noted. Fragmentation makes it difficult to accomplish regional planning as individual municipalities have competing interests and suburbs become

disconnected from their urban cores. However, it is not to say that some degree of decentralization is unnecessary and inefficient.

In large metropolitan areas, certain social services and public goods need to be managed separately because the geographic areas are large and needs vastly differ in inner cities and suburbs. There is also evidence that fragmentation produces certain beneficial outcomes, namely school productivity, as measured by student achievement accounting for per-pupil spending (Hoxby 2000). Thus, the consequences of metropolitan fragmentation are not clear. Although it appears to be harmful for the racial stratification of society, it may be necessary and indeed helpful for other social outcomes. However, even if the average district in a fragmented metropolitan area gains some benefits from the small, controlled environment, winners and losers will still emerge. Certain districts may benefit from fragmentation while others are harmed.

Perhaps most importantly, the results of this paper have implications for public policy. Since the landmark Brown decision in 1954, urban areas have been under pressure to desegregate schools, usually by court order, but also sometimes voluntarily. Not surprisingly, the last 50 years have been fraught with struggle regarding the constitutionality of these reassignment policies. Desegregation efforts began in earnest during the Civil Rights Era, and it was immediately apparent that school segregation was a product of residential segregation. Effective efforts to integrate schools needed to transcend residential isolation, and busing became the policy of choice. However, since the 1974 Milliken v. Bradley decision that ruled inter-district busing unconstitutional, school desegregation plans have almost exclusively focused on within-district transfers. This ruling effectively made it impossible to combat the effects of “white flight” on school segregation because suburban districts were independent of

the inner cities. Clotfelder (2004) presents an excellent account of the direct and indirect effects of school desegregation policies since 1954 on racial segregation in schools and districts. Most recently, in 2007 the Supreme Court struck down voluntary integration in Seattle and Louisville. Reversing nearly four decades of progress toward integration, it was said that these districts could not explicitly use race as a factor for school reassignment (*Parents Involved In Community Schools V. Seattle School District No. 1 Et Al. June 28, 2007*). Gary Orfield, among others, has shown that school resegregation has been on the rise since the early 1990s when desegregation plans began to lose their legal traction (Orfield and Lee 2007).

The results of this paper bear on education policies in several ways. First, given the strong positive relationship between fragmentation and between-district segregation, inter-district transfers would likely be the most effective way to desegregate schools. However, this is the least plausible solution given the Milliken decision. Second, although perhaps not as powerful as between-district plans, within-district reassignment plans may be more effective in less fragmented metropolitan areas. Less fragmented areas have larger and often more diverse districts with more within-district, residential segregation. This implies that intra-district efforts to reassign children would be more effective in these areas. One mechanism that may be driving higher levels of within-district residential segregation in less-fragmented areas is school attendance zones. Just as classroom tracking has been noted as a within-school mechanism that reproduces inequality in diverse schools, perhaps school catchment boundaries are a within-district mechanism that reproduces inequality in diverse districts. Although data analysis for a national-level study of school catchment areas would be burdensome, it would be useful to test whether attendance boundaries in less fragmented areas replicate the function of jurisdictional boundaries in more fragmented areas. And finally, the results suggest that school district

consolidation would diminish segregation between districts by decreasing fragmentation.

Returning to the New Jersey example, however, makes the prospects for this large-scale policy shift bleak. In areas where home rule reigns supreme, fragmentation is rampant because people believe in their right to local autonomy. And school districts are often the most fiercely protected of jurisdictional boundaries. In northern New Jersey's Bergen County, part of the New York metropolitan area, 74 school districts encompass an average of less than four square miles each. Despite the enormous costs associated with duplicate services across small areas of land, destabilizing this entrenched system has proven to be a formidable task (Bruck 2008).

Although this study adds to what is known about political fragmentation, two limitations must be noted. First, the analysis is based on cross-sectional data and makes no attempt to determine the causal direction of the relationship between fragmentation and segregation. In reality, it is a relationship that may best be explained as interactive. Second, the use of secondary data for the tract-level metropolitan segregation measures compromises to a small degree the geographic consistency of the analysis. Because school districts do not precisely overlap with metropolitan areas the calculations for the decomposition are not exact. However, because the population differences are on average less than 1%, I have no reason to believe that this discrepancy affected my results.

The results presented here help to confirm that racial sorting is impacted by the degree of jurisdictional choice, as predicted by the Tiebout model. This sorting may occur due to individual agency and optimization, but it may also occur as a result of actions taken by local political elites or as a reflection of the availability of information regarding the jurisdiction. Even though evidence lends support to the theoretical prediction that more political units cause those units to become more homogenous, it does not address why that homogeneity occurs along

racial lines. Perhaps people prefer racial segregation or use racial composition as a signal for the quality of public goods. Racial segregation may at some level be a proxy for income segregation. Or in a more sociological framework, perhaps race-based sorting emerges out of collective identities formed via jurisdictional boundaries. The mechanisms that drive the sorting process are difficult to disentangle, mainly due to the endogeneity of factors that determine residential choice and the limited supply of behavioral data. However, future work on the mechanisms that drive race-based choice could help us to further understand the dynamics of the sorting process and the ways in which society can counteract its detrimental effects.

NOTES

¹ Although one-district metropolitan areas are out of the scope of this project, it is important to note that theoretically, these metropolitan areas should have lower levels of racial segregation. Areas that have more unified political structures generally have larger jurisdictions and have less variation in public goods. Although residential sorting can certainly occur along other dimensions, a lack of formal boundaries decreases the extent of the sorting process. It is possible that different sorting mechanisms operate depending on the type and scale of available political boundaries.

² The tract-level H-index measures allow for the decomposition of H into its component parts.

³ Large MSAs with more than one labor market are broken up into PMSAs (primary metropolitan statistical areas). I use PMSAs where available.

⁴ Of the 22 metropolitan areas with a fragmentation score of zero, 21 were located in the South. In general, the South has larger, more consolidated school districts. Of the 21 located in the South, 12 were located in Florida.

⁵ To calculate this measure I used the Census Bureau's county-based lists of places and place populations to aggregate to the metropolitan level. In cases where places straddled metropolitan boundaries, I use the partial population that falls within the metropolitan area. Some metropolitan areas have some unincorporated land. The results in the analyses were not affected depending on whether I included or excluded these unincorporated population counts.

⁶ Some states have separate elementary and secondary school districts that cover the same geographic area. To avoid double-counting populations in areas without unified school districts, I exclude districts that only serve secondary schools.

⁷ I include American Indian/Alaska Native and Native Hawaiian/Pacific Islander in this analysis, however their numbers are small in most metropolitan areas and the inclusions of these groups does not affect the results in a significant way. Multiracial individuals are excluded from this analysis.

⁸ In this study, the within-district component is the Census Bureau's calculation of between-tract (or total) segregation minus my calculation of the between-district segregation. Because school district boundaries do not always perfectly map onto metropolitan area boundaries, there are some slight discrepancies in the population totals used to calculate these measures; however, the average difference is less than 1%.

⁹ A family with children is defined by the Census Bureau to be a family in which there are children in the household related by birth, marriage, or adoption. Private school attendance is simply the percentage of families who indicated that their child attends a private school.

¹⁰ As readers may be more familiar with the dichotomous dissimilarity index, the comparable measure for average district-level white/black segregation is .36 for this sample of MSAs.

¹¹ Additionally, both moderators have low variance which may have contributed to the lack of significant findings.

¹² The inflection point of the non-linear model ($x = -\beta_1 / 2\beta_2$) indicates that there is a turning point in the relationship when $X \approx .35$. This means that there is a slight negative or neutral relationship between fragmentation and segregation until metropolitan fragmentation is greater than .35, after which the relationship accelerates.

¹³ I test for robustness by using the dissimilarity index as the dependent variable for between-district segregation and total tract-level segregation. These analyses produce similar substantive results, but larger R^2 values. The correlations between dichotomous Theil index values and the corresponding dissimilarity index values range from .86 to .96.

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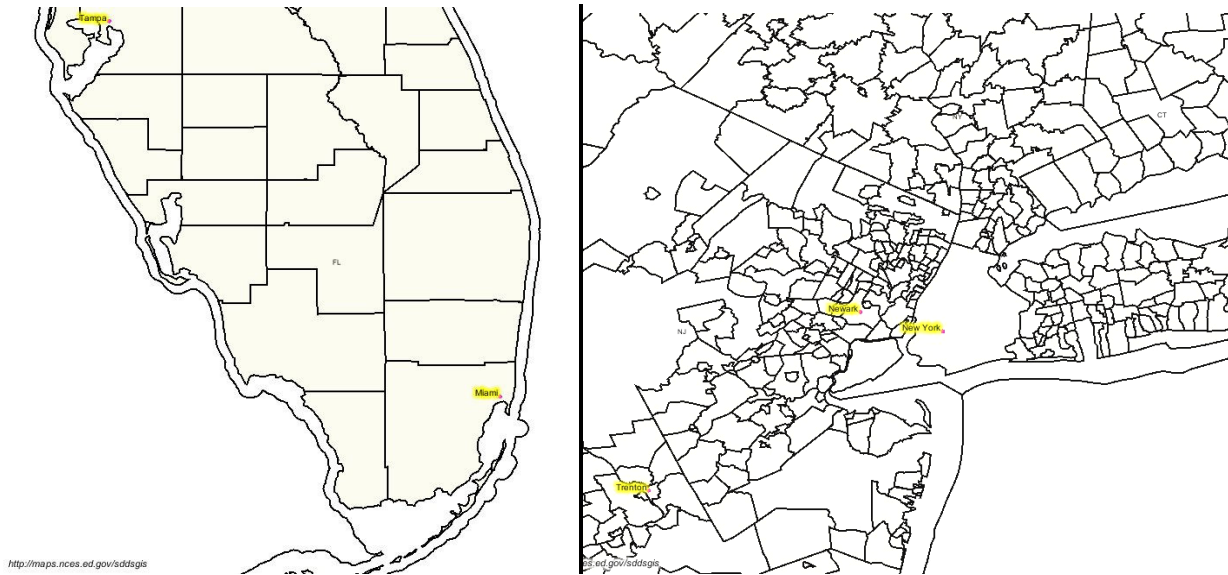
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TABLES AND FIGURES

Figure 1. School District Boundaries in Southern Florida and in the Northern New Jersey/New York Metropolitan Areas



Source: National Center for Education Statistics 2007

Table 1. Summary Statistics

Variables		
<i>Dependent Variable</i>		
H (between-district segregation)		
Multiple Race H	.09	(.08)
White-black H	.12	(.11)
White-Hispanic H	.07	(.07)
White-Asian H	.05	(.04)
<i>Explanatory Variables</i>		
School District Fragmentation	.72	(.20)
Municipal Fragmentation	.69	(.17)
Private School Rate	.12	(.04)
HH with Children (%)	.33	(.04)
Total Metro Population	710,229	(1,183,541)
Log (Total Metro Population)	12.81	(1.05)
% Black	.10	(.11)
Midwest	.26	
Northeast	.19	
South	.35	
West	.20	
At least college degree (%)	.24	(.08)

N=304
(Standard Deviation)

Table 2. Means of Variables by Region

Region	Fragmentation		Black (%)		HH with Children (%)		Private School Rate		Multiple Race H	
Midwest	.744	(.19)	.072	(.06)	.320	(.02)	.142	(.04)	.113	(.09)
Northeast	.862	(.12)	.063	(.06)	.319	(.03)	.129	(.04)	.142	(.08)
South	.650	(.18)	.185	(.13)	.332	(.05)	.121	(.04)	.065	(.05)
West	.691	(.25)	.029	(.03)	.348	(.05)	.097	(.03)	.063	(.05)

N=304
(Standard Deviation)

Table 3. OLS Estimated Effects from the Linear Regression of Between-District Multiracial Segregation on Metropolitan Characteristics

	Model 1	Model 2	Model 3	Model 4	Model 5 (Non-Linear)
Fragmentation		.135***	.132***	.139***	-.203***
Fragmentation ²					.304***
Municipal Fragmentation				-.017	-.025
Private School Rate			-.078	-.078	-.020
Households with Children (%)			-.042	-.060	-.049
Log (Metro Population)	.032***	.019***	.020***	.021***	.014**
Black (%)	.196***	.221***	.227***	.228***	.235***
Midwest	.080***	.066***	.068***	.068***	.058***
Northeast	.104***	.077***	.079***	.077***	.058***
West	.031**	.029**	.028**	.028**	.020*
At least college degree (%)	-.193***	-.124**	-.120**	-.126**	-.107**
Intercept	-.342	-.274	-.266	-.264	-.102
R ²	.46	.54	.54	.55	.57
N	304	304	304	304	304
Incremental F-Statistic		51.4***	.58	.66	30.6***

*p<.05, **p<.01, ***p<.001

Table 4. OLS Estimated Effects from the Linear Regression of Multiracial Metro Segregation on Metropolitan Characteristics

Dependent Variable	Between-District H			Within-District H			Total Tract-Level H		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6			
Fragmentation	.139***	-.203***	-.108***	.177***	.030	-.027			
Fragmentation ²		.304***		-.253***		.051			
Municipal Fragmentation	-.017	-.025	.005	.011	-.013	-.014			
Private School Rate	-.078	-.020	.252***	.204**	.174	.183*			
Households with Children (%)	-.060	-.049	-.134*	-.143**	-.194*	-.192*			
Log (Metro Population)	.021***	.014**	.023***	.028***	.043***	.042***			
Black (%)	.228***	.235***	.207***	.201***	.435***	.436***			
Midwest	.068***	.058***	-.024***	-.015*	.044***	.043***			
Northeast	.077***	.058***	-.031***	-.015*	.046***	.043***			
West	.028**	.020*	-.034***	-.027***	-.005	-.007			
At least college degree (%)	-.126**	-.107**	-.127***	-.142***	-.252***	-.249***			
Intercept	-.264	-.102	-.081	-.216	-.345	-.318			
R ²	.55	.57	.68	.71	.61	.61			
N	304	304	304	304	304	304			
Incremental F-Statistic		30.6***		39.0***		.59			

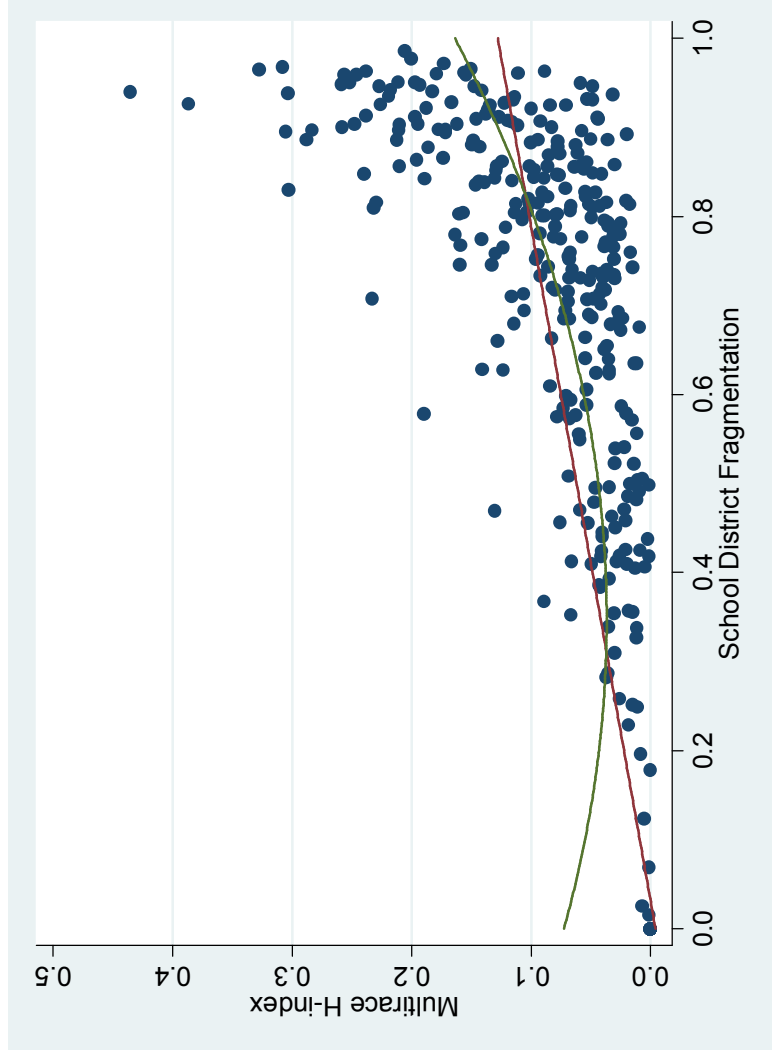
*p<.05, **p<.01, ***p<.001

APPENDIX

Appendix A. Further Description of the Theil Index

The Theil index has become more popular with segregation researchers in recent years. Although it essentially captures the same underlying construct as other measures of evenness, such as the dissimilarity index, it has fewer disadvantages. First, and as noted in the text, it allows for the measure of mutual segregation between more than two groups. This advances segregation research beyond simple dichotomies, which rarely give an accurate representation of population processes in diverse areas. In the past, researchers have used the average of pair-wise indices to measure multiracial segregation, although that technique does not capture simultaneous segregation. Second, the Theil index is decomposable into between- and within-unit components. This property allows researchers to determine the proportion of total segregation that is attributable to different geographic dimensions. And third, as noted in Reardon and Firebaugh (2002), the Theil index is superior to other multiple group indices because it is the only one that adheres to the principle of transfers. A measure obeys the principle of transfers if it is impossible to increase segregation when an individual of group m from unit i moves to unit j , where the proportion of persons in group m is greater in unit i than in j . For example, if you had two units, one that was fully white and one that was fully black, the Theil index ensures a decrease in segregation when a white person moves from the all-white unit into the all-black unit. For excellent, in-depth descriptions of the Theil index, please see Reardon, Yun, and Eitle (2000), Reardon and Firebaugh (2002) and Fischer (2003).

Appendix B. Plot of School District Fragmentation vs. Between-District Segregation



Appendix C. OLS Estimated Effects from the Linear Regression of Between-District Multiracial Segregation Among Children Metropolitan Characteristics

	Model 1	Model 2	Model 3	Model 4	Model 5 (Non-Linear)
Fragmentation		.212***	.215***	.231***	-.290***
Fragmentation ²					.462***
Municipal Fragmentation				-.040	-.052
Private School Rate		.010	.011	.011	.099
Households with Children (%)		-.134	-.175	-.175	-.159
Log (Metro Population)	.040***	.018***	.019**	.021***	.011
Black (%)	.340***	.379***	.379***	.382***	.392***
Midwest	.111***	.090***	.088***	.088***	.073***
Northeast	.152***	.111***	.109***	.104***	.075***
West	.034**	.031*	.034**	.034**	.021
At least college degree (%)	-.194***	-.087	-.108*	-.122*	-.094
Intercept	-.421	-.316	-.276	-.273	-.026
R-squared	.47	.57	.57	.58	.61
N	304	304	304	304	304
Incremental F-Statistic		68.1***	1.2	2.2	38.8***

*p<.05, **p<.01, ***p<.001

Appendix D. OLS Estimated Effects from the Linear Regression of White-Black Metro Segregation on Metropolitan Characteristics

Dependent Variable	Between-District H			Within-District H			Total Tract-Level H		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6			
Fragmentation	.172***	-.416***	-.137***	.246***	.036	-.170			
Fragmentation ²		.522***		-.340***		.182			
Municipal Fragmentation	-.022	-.036	-.012	-.003	-.034	-.039			
Private School Rate	-.156	-.057	.347**	.282**	.191	.226			
Households with Children (%)	-.209*	-.191*	-.377***	-.389***	-.586***	-.580***			
Log (Metro Population)	.038***	.026***	.046***	.054***	.084***	.080***			
Black (%)	.344***	.354***	.224***	.217***	.567***	.571***			
Midwest	.106***	.088***	-.030*	-.019	.076***	.070***			
Northeast	.109***	.076***	-.050***	-.029*	.059***	.048**			
West	.022	.008	-.071***	-.062***	-.049**	-.054***			
At least college degree (%)	-.175**	-.144*	-.262***	-.282***	-.437***	-.426***			
Intercept	-.432	-.153	-.199	-.381	-.631	-.534			
R ²	.58	.62	.64	.66	.67	.67			
N	304	304	304	304	304	304			
Incremental F-Statistic		41.7***		24.6***		3.4			

*p<.05, **p<.01, ***p<.001

Appendix E. OLS Estimated Effects from the Linear Regression of White-Hispanic Metro Segregation on Metropolitan Characteristics

Dependent Variable	Between-District H			Within-District H			Total Tract-Level H		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6			
Fragmentation	.079***	-.018	-.083***	.176*	-.004	.158			
Fragmentation ²	.086			-.230***		-.144			
Municipal Fragmentation	-.028	-.030	-.034	-.028	-.062	-.058			
Private School Rate	-.010	.007	.097	.053	.087	.060			
Households with Children (%)	.271**	.274**	.086	.079	.358*	.353*			
Log (Metro Population)	.021***	.019***	.031***	.037***	.053***	.056***			
Black (%)	.004	.006	-.039	-.043	-.035	-.037			
Midwest	.020*	.017*	-.021*	-.013	-.001	.004			
Northeast	.090***	.085***	-.002	.013	.089***	.098***			
West	.026**	.023*	-.013	-.007	.013	.017			
At least college degree (%)	-.002	.003	-.019	-.033	-.021	-.029			
Intercept	-.360	-.314	-.269	-.392	-.628	-.705			
R ²	.48	.48	.35	.39	.44	.45			
N	304	304	304	304	304	304			
Incremental F-Statistic		2.0		13.5***		2.4			

*p<.05, **p<.01, ***p<.001

Appendix F. OLS Estimated Effects from the Linear Regression of White-Asian Metro Segregation on Metropolitan Characteristics

Dependent Variable	Between-District H			Within-District H			Total Tract-Level H		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6			
Fragmentation	.069***	-.010	-.049**	.086*	.020	.076			
Fragmentation ²		.070*		-.120***		-.050			
Municipal Fragmentation	.008	.006	-.002	.001	.005	.007			
Private School Rate	-.104*	-.090	.024	.001	-.079	-.089			
Households with Children (%)	.079	.081	.021	.017	.10	.098			
Log (Metro Population)	.007**	.005*	.014***	.016***	.021***	.022***			
Black (%)	.039*	.040*	.008	.005	.047	.046			
Midwest	.013**	.010*	-.002	.002	.010	.012			
Northeast	.015*	.011	-.009	-.002	.006	.009			
West	.004	.002	-.011	-.008	-.006	-.005			
At least college degree (%)	.070**	.074**	.018	.010	.088*	.085*			
Intercept	-.135	-.098	-.105	-.169	-.240	-.267			
R ²	.40	.41	.23	.25	.27	.28			
N	304	304	304	304	304	304			
Incremental F-Statistic		4.7*		12.3***		.99			

*p<.05, **p<.01, ***p<.001