MUNICIPAL FRAGMENTATION AND RACIAL RESIDENTIAL SEGREGATION: MOVING BEYOND AGGREGATE ANALYSES BY EXPLORING IMPACTS OF MUNICIPAL BOUNDARIES WITHIN METROPOLITAN AREAS

A Dissertation

by

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ABSTRACT

This dissertation study tested the hypothesis that greater political fragmentation in a metropolitan area increases the degree of residential segregation between non-Hispanic whites and non-Hispanic blacks. The questions posed in this study is: (1) Do boundaries capture segregation because they are drawn and redrawn over time to reflect shifts in population distribution or do boundaries capture segregation because they represent social and physical barriers that prevent groups from entering? (2) Do administrative and political boundaries capture segregation better than similarly sized arbitrarily aggregated areas?

I begin examining the relationship between political fragmentation and residential segregation at the aggregate level across U.S. metropolitan areas by calculating measures of fragmentation and segregation for each city and then examining their covariation across metropolitan areas. I follow this with fractional logit regression analyses comparing the results using alternative measures of fragmentation and segregation.

I contribute to and extend the literature on this topic by examining the relationship more closely using methods of decomposition. First, I decompose segregation over multiple nested spatial levels - specifically, census blocks within block groups, block groups within census tracts, and census tracts within places and examine their between and within component variation. Utilizing the contribution to the segregation score at each level, I regress the results with measures of fragmentation to determine whether the

geographic unit used in assessing segregation affects the extent to which the two are related.

Lastly, I compare segregation scores captured using arbitrarily drawn places with segregation scores captured using observed places. I conclude that a relationship does exist between political fragmentation and residential segregation. I also find that political fragmentation's impact is greatest at the largest and most meaningful cities in the U.S. The multiple analyses implemented in this dissertation allow the findings to be deemed robust and to conclude with confidence that this relationship is real.

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The work conducted for the dissertation was completed by the student independently. Chapter VI was developed with the help of Dr. Mark Fossett utilizing his clarification work on decomposing segregation. Work on decomposing segregation was developed during 'Segregation Group' meetings held by Dr. Mark Fossett between Spring 2014 and Summer 2016 in the Department of Sociology at Texas A&M University - College Station. Segregation Group meetings are an opportunity to discuss issues in residential segregation and segregation measurement not covered in currently available scientific research.

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CHAPTER I

INTRODUCTION

This dissertation investigates the relationship between the fragmenting of populations across various political, governmental, and social boundaries and racial and ethnic residential segregation within metropolitan areas the United States. Using Census 2000 data, I perform three related analyses to better understand the relationship political fragmentation has on residential segregation of U.S. minority groups. In the first set of analyses I document the relationship between political fragmentation and residential segregation in a national aggregate level analysis of cities. I assess the relationship by examining the covariation among measures of fragmentation and segregation across the U.S. In addition, using the measures of fragmentation I conduct fractional logit regression analyses predicting segregation including controls for a set of population characteristics commonly used in segregation research.

Second, I quantitatively examine how population distributions align with political boundaries and how these distributions contribute to segregation. I accomplish this by decomposing segregation across nested spatial units into within- and between-area components reflecting micro-segregation, meso-segregation, and macro-segregation. I conclude with an analysis that examines the covariation between segregation scores calculated using observed units and arbitrarily drawn units.

Chapter 2 reviews relevant literature on residential segregation within the U.S. I review the history of residential segregation in the U.S. and how it has evolved to how we see segregation today. I review relevant literature that argues discrimination has persisted in the post-Civil Rights Era and continues to shape communities in the U.S. (Ellen 2000; Glaeser Vigdor 2001; Massey and Denton 1993; Turner, Ross, Galster, Yinger, Godfrey, Bednarz, Herbig, Lee, Hossain, and Zhao 2002)

In Chapter 3, I review relevant literature pertaining to political fragmentation and review the role it may have in creating opportunities for discrimination. In this section, I review research that has been conducted and note its limitations. Here is where I review the inability of past research to conclude whether any relationship found between political fragmentation and residential segregation is real or spurious (Bischoff 2008; Byun and Esparza 2005; Weiher 1991). In this section, I adopt the definition of municipal fragmentation, sometimes referred to as fragmentation, political fragmentation, or jurisdictions, as boundaries that have regulatory authority over land use, land development, and social and political processes of areas within its boundary (Bischoff 2008:182; Byun and Esparza 2005:253). I also review measures of fragmentation used by past researchers in an attempt to identify which measures are best able to capture the degree to which an area is fragmented (Morgan and Mareschal 1999; Weiher 1991). I conclude this chapter with a detailed review of the hypotheses and research questions of the dissertation.

Chapter 4 reviews the data, measures, and methods used in this dissertation. The data, measures, and methods are similar to each other in the national aggregate level of analysis of cities and the decomposition analyses, so I review them together instead of reintroducing the same information in each separate analysis. In this chapter, I also include an in depth discussion of commonly used measures of segregation as well as touch upon a discussion on aspatial and spatial methods in segregation research.

Chapter 5 covers the national aggregate level analysis of cities. I measure the effect political fragmentation has on residential segregation using methods more commonly used in previous research. Previous research studies have used OLS regression analyses where I implement a fractional logit regression analysis due to the bounded nature of the dependent variable.

Chapter 6 is a more thorough discussion of methods of decomposing segregation by spatial level. Here I review methods of decomposing segregation that I term 'formal' which were developed and popularized by Reardon and Firebaugh (2002). I also review an alternative method for decomposing segregation by spatial level noted by Fossett (2016b) that I term 'simple'. I draw on the simple decomposition approach to measure the extent to which population distributions align with larger spatial units and political boundaries.

Chapter 7 covers the quantitative examination of how population distributions align with political boundaries and how these distributions contribute to segregation. Here I review the decomposition analysis of segregation from a variety of observed nested spatial units such as census blocks and tracts. In addition to decomposing segregation into nested within- and between-area components, I also decompose segregation within larger areas such as places to assess micro-segregation, meso-segregation, and macro-segregation.

Chapter 8 presents analyses in which I assess whether segregation coalesces more around areas coinciding with observed boundaries in comparison with areas of similar population size created by arbitrary aggregations of smaller units. Here I calculate segregation using larger units constructed from arbitrary aggregations of smaller units. I then compare the segregation scores with segregation scores calculated for larger units based on observed boundaries.

In Chapter 9, I review and combine the discussion from each of the analyses in the dissertation. I revisit why researchers should opt to use census blocks instead of the more commonly used Census tract. I discuss the consistent relationship political fragmentation has with residential segregation and the increasing importance place boundaries have on the residential segregation between non-Hispanic whites and non-Hispanic blacks in larger metropolitan areas. I then conclude with a discussion on the importance of political fragmentation on residential segregation in the U.S.

CHAPTER II

SEGREGATION RESEARCH - HISTORICAL REVIEW

Residential segregation within the U.S. has been well-documented utilizing various methods and measures available to researchers (Fossett 2016a; Iceland, Weinberg, and Steinmetz 2002; Massey and Denton 1993; Reardon, Farrell, Matthews, O'Sullivan, Bischoff, and Firebaugh 2009; Wong 1997). Because segregation has proven to be a complex social phenomenon it has required both quantitative and qualitative analyses, as well as historical investigations, in order to understand its development and persistence in contemporary society. These investigations have found contemporary residential segregation to have a deep rooted history that is the result of social, economic, and discriminatory practices (Hershberg, Burstein, Ericksen, Greenberg, and Yancey 1979; Massey and Denton 1993; Lieberson 1981). In this chapter, I briefly review the history of residential segregation from 1850 to the present focusing on four historical time periods over this span of time.

1850 - 1899 - Segregation before the Formation of Urban Ghettos

Around 1870, five years after slavery was abolished in the U.S., blacks were highly concentrated in rural areas of the South while newly arriving European immigrants were concentrating in urban parts of the North (Lieberson 1981:38). At this time the relatively small portion of the U.S. black population that resided in large urban areas resided in wards where "well over 90 percent of the population was not black" resulting in low segregation scores at the city level (Lieberson (1981:258). By 1890, the proportion of blacks residing in large cities, while growing, remained small at approximately three percent with segregation increasing only slightly (Lieberson 1981:258).

In this era, white-black segregation in large urban areas was not characterized by large ghetto formations that would emerge in later eras. The black population often was dispersed widely across wards and segregation often involved patterns of differential group distribution across avenues and primary streets versus side streets and alleyways. The black population also lived in patterns of "carriage-house" segregation where blacks lived in close proximity to whites in quarters for domestic service workers, yard workers, and other household laborers.

1900 - 1939 - Emerging Discrimination and Formation of Ghettos

In the early 1900s, industrialization in the North created several changes in the way of life that it promoted segregation all the while millions of European immigrants and black migrants from the South continued to flow into urban metropolitan areas in search of work (Massey and Denton 1993:26-30). During this time, Charles (2003:167) notes that the color line separating black and white neighborhoods developed and took contemporary form with the result that the two groups increasingly saw the worst in the other.

Lieberson (1981:258) notes that from 1900 to 1930, segregation between blacks and whites rose steadily with black isolation rising rapidly and beyond levels that could be attributed to the increases in black population size and proportion in major cities. Hershberg et al. (1979:72) note that, by 1930, blacks increasingly came to be located in highly concentrated black communities, usually the urban core, and new black migrants from the South increasingly were directed into neighborhoods with a high concentration of blacks.

During this era, high levels of segregation of blacks, and other minorities, emerged, produced primarily by the combination of informal discrimination frequently involving intimidation, extra-legal violence, and widespread practices of formal discrimination such as local segregation ordinances or federally sanctioned practices such as “redlining” (Massey and Denton 1993:51). Redlining restricted housing loans to white neighborhoods while those deemed black or minority neighborhoods were redlined and denied home loans (Massey and Denton 1993:51). Collectively these efforts were aimed at restricting blacks to certain regions within the city and it worked. In Philadelphia, for example, white-black segregation as measured by the dissimilarity index rose markedly from 47 in 1850 to 68 in 1940 (Hershberg et al. 1979:60-63).

1940 - 1967 - Stabilizing Segregation and Consolidation of the Ghetto

The 1940s, and the post-World War II era saw further increases in, and consolidation and maintenance of, white-black segregation. Resources were diverted towards winning the war and, thus housing construction had stopped, leaving the supply of housing limited (Massey and Denton 1993:43). New housing was available to whites who could afford them while blacks, with the economic means to afford a new home, were restricted to older housing stock in the urban core. By the mid- to late-1960s, unrest in urban ghettos brought this entrenched racial inequality to the public’s attention highlighting the enduring consequences of “separate and unequal” (Charles 2003:168).

As the culmination of many decades of incrementally successful legal challenges and increasing social resistance and political protest born out of built-up frustration, the Civil Rights Act was passed in 1964 and then the subsequent Fair Housing Act (FHA) in 1968. The Fair Housing Act of 1968 outlawed the refusal to rent or sell a property to someone because of their race, color, sex, national origin, or religion. Communities across the U.S. were characterized by very well-established, high levels of white-black segregation by the time of the passage of the FHA. Although discrimination in housing was formally outlawed, segregation remained at high levels as communities initially resisted integration both in overt and formal ways and also in a variety of informal ways. Accordingly, Glaeser and Vigdor (2001-14) reported that the degree of segregation in communities has fallen only slowly, and remained at levels much higher than if the FHA had truly removed barriers to housing access.

1968 - Present - Resistant Decline of Segregation

Post-FHA, researchers have found that several factors may exist which continue to perpetuate and maintain segregated communities across the U.S. (Charles 2003; Ellen 2000; Glaeser and Vigdor 2001; Massey and Denton 1993; Rothwell and Massey 2010; Silver 1997). Massey and Denton (1993:96) note that "discrimination with a smile", that is discrimination not legally sanctioned or on paper, became more pervasive post-FHA. It was during this time that discrimination increasingly became less overt and more informal because formal, overt discrimination had been outlawed formally by the Civil Rights Act.

At the local level, differential treatment of people of color contributed to neighborhood disrepair and decline at a faster rate for minorities than whites. Silver

(1997:61) found that federal funding made available for urban development was distributed disproportionately across American neighborhoods. Local communities in charge of distributing funds allocated funding to areas not deemed black or immigrant neighborhoods. Turner, Ross, Galster, Yinger, Godfrey, Bednarz, Herbig, Lee, Hossain, and Zhao (2002) found that the real estate industry had been practicing racial "steering" - a process where real estate agents steer potential buyers to different areas of the city based on the race or ethnicity of the buyer. Steering and related practices maintained existing segregation and adversely affected home values in minority neighborhoods.

Blacks and other minorities increasingly faced "discrimination with a smile". "Instead of being greeted with a derisive rejection" minorities were greeted by hiring managers, realtors, and mortgage consultants with smiling faces, who, "through a series of ruses, lies, and deceptions," made it harder for them to gain employment, earn respectable wages, and purchase or rent housing units (Massey and Denton 1993:97).

Researchers also find that population groups differ on household and locational preferences (Alesina, Baqir, and Easterly 1999; Charles 2003; Clark 1986; Ellen 2000; Massey and Denton 1993). Charles (2003:191) argues that "active racial prejudice is a critical component of preferences for integration and the persistence of racially segregated communities. In a study examining the extent and causes of residential segregation, Clark (1986:108-110) notes that whites have a neighborhood composition preference of 0-30% black and 70-100% white while blacks have a neighborhood composition preference of 50% white 50% black. In a study examining neighborhood composition turnover, Ellen (2000:124) finds that if the black population increases in a neighborhood by ten percentage points the probability of a white homeowner relocating out of the neighborhood increases by 2.75 percentage points. On the other hand, Alesina et al. (1999:1260) find that the type and number of public services offered by a community entice certain groups more than others. Racial and ethnic minorities were found to be likelier to move to an area that spent greater amounts of funding in healthcare, welfare, and education (Alesina et al. 1999:1260-1263).

Another factor studied in segregation research is the proliferation of fragmented population groups by government, social, and political boundaries which this dissertation is most concerned with (Amaro 2013; Baird and Landon 1972; Bischoff 2008; Byun and Esparza 2005; Rothwell and Massey 2010). The factor in discussion, sometimes referred to as political fragmentation or municipal fragmentation, is conceptualized as legal and administrative boundaries associated with regulatory authority over land use, land development, and social and political processes of areas within said boundary (Bischoff 2008:182; Byun and Esparza 2005:253).

Researchers have found that "political boundaries support the recruitment that is the complement to exclusion in urban sorting" (Weiher 1991:166). Morgan and Mareschal (1999:579) argue that a proliferation of government, social, and political boundaries contribute to urban problems such as residential segregation. In their study, Morgan and Mareschal (1999:589) find that a single suburb increase in a metropolitan area was associated with an average increase of 2.01 units, on a scale of 100, in black racial isolation. Alesina, Baqir, and Hoxby (2004:391) find that increases in white ethnic heterogeneity leads to an increase in the number of political fragments within an area.

Utilizing various measures of fragmentation, Amaro (2013:126-127) finds that as the number of fragments within a metropolitan area increase so does the degree of residential segregation between non-Hispanic whites and non-Hispanic blacks.

Research has also studied the effects of zoning ordinances on the distribution of population groups in an area (Burgess 1996; Orfield 1999; Weiher 1991). Zoning is defined as “the separation of land use according to each area’s impact and neighborhood relevance” (Maltz 2006:49). Some researchers have argued that zoning regulations and jurisdictional fragments work together in excluding certain population groups from entering specific areas (Burgess 1996; Orfield 1999; Weiher 1991). As communities and fragments develop on the outskirts of a metropolitan area they use their jurisdictional power to enact low-density and restrictive zoning regulations that would prevent minority populations in the urban core from moving in (Bassett 1936; Orfield 1999:34-36; Papke 2009:14). Researchers argue that zoning regulations perpetuate segregated communities by utilizing legal exclusionary practices that limit housing supply, monopolize public goods and services, and encouraging land speculation (Plotkin 1987:20-23; Popper 1981:11; Silver 1997).

However, while acknowledging the statistical association of fragmentation and zoning with residential segregation, some researchers suggest that these relationships can be spurious (Bischoff 2008; Rothwell and Massey 2010; Weiher 1991). Rothwell and Massey (2010:1131) note that the various types of fragments in an area may have been drawn after neighborhood patterns were already well-established and thus the association reflects pre-existing patterns of segregation rather than a causal role of fragmentation in creating residential segregation. In addition, researchers note that, although their correspondence with segregation is clear, these various fragments sometimes may need to exist because local neighborhoods require specialized monitoring for social services (Bischoff 2008:207). In regards to zoning, Weiher (1991:87 & 162) also points out that the association with segregation can be observed but we usually are unable to fully know the intentions of officials when enacting zoning ordinances that are found to be disproportionately exclusionary of certain population groups.

CHAPTER III

THE ROLE OF POLITICAL FRAGMENTATION - REVIEW AND OPPORTUNITIES FOR DISCRIMINATION

Many researchers have advanced the hypothesis that political fragments cause and/or maintain segregation in neighborhoods across the U.S. (Alesina et al. 2004; Amaro 2013; Baird and Landon 1972; Bischoff 2008; Byun and Esparza 2005; Morgan and Mareschal 1999; Rothwell and Massey 2010; Weiher 1991). The mere existence of boundaries formally creating a quilt of separate and distinct areas makes it more feasible for people to choose a "suitable location" that is satisfying by race and class (Weiher 1991:xi). Weiher (1991:166) argues that a proliferation of political boundaries complement exclusion in urban sorting under the guise of a lower tax base and public services tailored to its citizens. The result is that rather than becoming a mechanism that efficiently governs with a lower tax base, political boundaries and fragments become social fractures in society (Weiher 1991).

Researchers also argue that a proliferation of government, social, and political boundaries foster and exacerbate urban problems such as residential segregation (Morgan and Mareschal 1999:579). In their study, Morgan and Mareschal (1999:589) find that a larger number of suburbs in an area is associated with higher levels of black racial isolation. Alesina et al. (2004:394) find that not only do political fragments increase in the presence of racial heterogeneity, they increase while sacrificing economies of scale meaning that populations are willing to create less efficient local economies in order to avoid racial heterogeneity. Finally, in a precursor for this dissertation, I undertook research analyzing political fragmentation and residential segregation and found that as the number of fragments increased in an area so did the degree of segregation (Amaro 2013:126-127).

Although researchers have hypothesized that political fragments contribute to segregation the arguments that political fragmentation contributes to segregation is countered by concerns that it is difficult to establish whether an observed empirical relationship is causal or spurious. This section discusses several hypothesized mechanisms through which political fragments may contribute to residential segregation in a metropolitan area as well as concerns regarding the possibility that associations between fragmentation and segregation could be spurious rather than causal. I first review, cities, school districts, and the process of taxation. The second part of this section discusses issues and processes related to political fragmentation. In the second part of this section, I discuss the processes of zoning and land use regulations, the dynamics of areal units, and then conclude by summarizing the limitations of previous research.

Cities and Municipalities

Cities are local municipal governments with the power to define who is a citizen and which has a complex system to govern those within its boundary by regulating such things as utilities, housing, and transportation (Marsh, Parnell, and Joyner 2010; Galster 2001). Cities vary greatly in population size and spatial size. Marsh et al. (2001:692) argue that cities use obscure processes to discriminate against minorities by utilizing the power afforded to them to exercise annexations and the implementation of restrictive zoning and land use regulations. The following section will review city processes, such as annexation, neighborhoods, underbounding, and public services and resources, all of which can shape its population composition.

Annexation

Annexation is the "altering of an urban settlement's boundary" which would define local citizenship (Marsh et al. 2010:693). As the population density of a city increases, or sprawls outward, the city boundary line may be redrawn in an effort to govern those who would reside within. Marsh et al. (2010:693) find that annexing or refusing to annex neighborhoods can "significantly affect the political power" of population groups in an area. The researchers argue that today municipalities segregate minority neighborhoods through "subtle acts of omission" as opposed to the more obvious instances such as the Tuskegee, Alabama case in 1960 where the city attempted to remove almost all of the black voters by redrawing the municipal boundaries (Marsh et al. 2010:693).

Neighborhoods

The concept of a neighborhood is more complicated than it may seem on first consideration (Galster 2001). Galster (2001:2112) defines a neighborhood as a bundle of spatially based attributes associated with clusters of residences, sometimes in conjunction with other land uses. These spatially based attributes includes structural characteristics of the buildings, infrastructural characteristics, demographic characteristics, taxing characteristics, environmental characteristics, proximity to employment and entertainment characteristics, political characteristics, social-interactive characteristics, and sentimental characteristics (Galster 2001:2112).

Galster (2001:2116) argues that neighborhoods come to exist because of a complex process of interaction between consumers and producers where "consumers" of a neighborhood are also the "producers" of the neighborhood. Galster (2001:2116) notes that "households consume a neighborhood by choosing to occupy it, thereby producing an attribute of that location related to that household's demographic characteristics, status, civil behaviors, participation in local association, and social networks".

It is through these spatial processes that neighborhoods change. Demand by households looking to relocate are influenced by the availability of the supply of housing in a sub-market nearest their own (Galster 2001:2117). The least competitive neighborhoods are then subject to an in-migration of "lower means" households than neighborhoods whose households have the ability to relocate (Galster 2001:2117). Another way neighborhoods can change, or in this case resist change, is via a collective socialization. In these situations, "decision-makers live in a community where some of their neighbors exhibit non-normative behaviors, they will be more likely to adopt these behaviors themselves" (Galster 2001:2119). Galster (2001:2121) notes that this can sometimes lead to an artificially inflated or deflated home value which in turn would enable the in-migration of less financially capable households or restrict them.

Underbounding

Underbounding is a form of racial exclusion by a municipal government in avoiding annexation of minority areas. Marsh et al. (2010:692) define underbounding as the "delimitation of municipal boundaries to keep minority neighborhoods outside" of the city limits effectively reducing their political influence in city governance. In a case study of North Carolina, Marsh et al. (2010:694) found that 8 out of 10 cities had only annexed majority white neighborhoods which had effectively "neutralized" the natural growth of minority populations already existing within the city limits.

Marsh et al. (2010:706) note that attention has been paid to voting districts to prevent gerrymandering but little has been paid to municipalities excluding minority neighborhoods. Minority neighborhoods kept outside as a result of underbounding are without a "political voice" leaving them unable to have their interests considered during political processes such as rezoning and redevelopment (Marsh et al 2010:706). Lichter, Parisi, Grice, and Taquino (2007:67) find that underbounding is an issue that plagues communities across the U.S. although it is less widespread than one would think. Underbounding is still a persistent issue for certain areas and not all. Lichter et al. (2007:65) find that underbounding is likelier to occur in areas on the fringe or ETJ where the proportion of blacks is greater than the proportion of blacks within the City. In addition, cities with a large proportion of whites were least likely to annex predominantly black neighborhoods regardless of the neighborhood size relative to the City (Lichter et al. 2007:67).

Public Services and Resources

Researchers also note that small-town, rural, communities are more likely to lack public services, such as water and sewer services, that a city would need to start providing in the event of an annexation (Lichter et al. 2007). Although excluded communities, such as those affected by underbounding, will find it difficult to obtain public services such as water and sewer, Marsh et al. (2010:706) find that the greatest complaint these residents have is a lack of voice in the political spectrum. In many cases, these communities on the fringe of annexation are still within an extraterritorial jurisdiction of the city, which can be under municipal control for zoning regulations, but without political representation. Residents can watch their neighborhood be rezoned commercial and industrial without any clout (Marsh et al. 2010:706).

School Districts

School districts are an administrative component of the American educational system that is shaped by pressures from parents, community groups, state governments, and the federal government (Meyer, Scott, and Strang 1987:186). School districts have experienced significant changes throughout the years. Over the past century, school district funding has gone from mostly local sources to mostly state and federal funding (Meyer, Scott, and Strang 1987:86). As part of the Great Society reforms in the early 1960s, school districts went from being shielded from federal oversight to becoming directly involved with support and management by the federal government (Meyer, Scott, and Strang 1987:190-191). Since the 1940s, school districts have increased in overall student enrollment even as the number of school districts is declining based the consolidation of many adjacent, usually smaller, districts (Meyer, Scott, and Strang 1987:189).

School district choice has been thought to be a matter of access to quality public goods and services (Bischoff 2008:188). School district boundaries play a unique role in segregation because, unlike Census boundaries such as blocks, block groups, and tracts, people pay attention to whether they are inside or outside of a school district boundary

(Bischoff 2008:189). School district characteristics are thus "heavily weighted" in residential locational decisions as opposed to residential locational decisions being decided on which Census block or Census tract a household will reside in (Bischoff 2008:189).

Between-School Districts

Bischoff (2008:205) notes that metropolitan fragmentation may play a role in between-school district segregation. In a study analyzing the social construction of political boundaries, Bischoff (2008:205) finds that greater amounts of fragmentation increases between-school district segregation supporting the idea that households use information of variation across fragments and districts "but are not as concerned with their exact locale once inside." It should be noted that Bischoff (2008) utilized segregation measures that were calculated using tracts which have been found to have a limited ability of capturing segregation in less densely populated areas as opposed to using Census blocks (Lee, Reardon, Firebaugh, Farrell, Matthews, and O'Sullivan 2008:779). Similarly, Clotfelter (1998:14) finds that in the larger school districts, a majority of observed segregation is due to between-school district segregation.

Within-School Districts

School districts may also have within-district segregation which can be perpetuated by local school officials (Clotfelter 1998:19). Using 1994-1995 data from the National Center for Education Statistics, Clotfelter (1998:19) found that as school districts increased in size so did the district's degree of segregation. In addition, as the school district's share of MSA population increased so did the district's degree of segregation

(Clotfelter 1998:19). On the other hand, Bischoff (2008:205) finds that greater amounts of fragmentation decrease within-school district segregation.

Although the within-school district findings are informative and important, both Clotfelter (1998) and Bischoff (2008) note that segregation within-districts is not as high as segregation between-districts. It can be argued that between-district segregation is more important because desegregation orders usually are limited to a single school district (Clotfelter 1998:21). Thus, regions with greater degrees of segregation, between-school district segregation is more important due to the inability of court-ordered school desegregation to address it. Desegregation orders are therefore "limited" in potential since it can only address within-school district segregation (Clotfelter 1998:21).

Private and Charter Schools

Enrollment in private, charter, and magnet schools has been debated as a potential factor in the racial and ethnic segregation of students in public schools within-school districts (Saporito and Sohoni 2006). With the rise in availability of school vouchers, Saporito and Sohoni (2006) researched whether students' enrollment in private schools alters the degree of segregation within the school district. The researchers find that school segregation is higher relative to the neighborhood composition of the attendance zone catchment area when there are greater numbers of private, charter, and magnet schools in the district (Saporito and Sohoni 2006:94). On the other hand, when school districts have specialty schools that enroll students outside of the catchment area, schools are likelier to have lower racial and ethnic segregation relative to the neighborhood composition of the attendance zone (Saporito and Sohoni 2006:94).

Taxation

A discussion of taxes applies to cities and school districts since these two boundaries are the most common local taxing jurisdictions. Researchers argue that residential locational decisions can be influenced by the appearance, or assumption, that communities furthest away from the urban core, or those less densely populated, may have lower tax bases (Orfield 1999; Baird and Landon 1972). Common belief among the public is that local municipalities can ensure that tax expenditures are efficiently spent on social and public goods that would directly affect the interest of those residing within, effectively offering lower tax rates. Baird and Landon (1972:182) investigate this relationship and find that the greater the degree to which an area is fragmented, the higher its total taxes, educational expenditures, and police expenditures (Baird and Landon 1972:183).

Political fragments create the possibility for households with the available resources to exercise choice in their residential location. Orfield (1999:40) argues that this allows a population to take their tax base along with them to lesser populated municipalities. Greater degrees of fragmentation create a double impact on urban problems in that not only is the total tax higher in municipalities with smaller populations, or in the municipalities in the outer ring of a metropolitan, they also take much needed tax resources from the inner-city, or the municipalities with higher population densities, which demonstrate a greater need for public goods (Orfield 1999:40).

Lastly, communities and neighborhoods in the U.S. have the ability to enable segregation by implementing special district taxes (Le Goix 2005). Neighborhoods across the U.S. accomplish this by adopting special district, community facility district, or Mello

Roos District status which enables them to levy taxes only applicable to residents within the district. For example, a special district may form when a municipality transfers the responsibility to construct infrastructure to the developer, or homebuilder, instead of the local government having to develop the infrastructure. The developer will then transfer those costs to the potential new residents by increasing the housing costs or adopting a special district (Le Groix 2005:330). These communities may also have special district status to pay for school bonds which were used to construct schools in the neighborhood. Instances like these result in the neighborhood remaining unaffordable and out-of-reach to minorities since it is solely the district residents who incur costs that the general population would normally cover.

Zoning Regulation and Land Use

To reiterate, a political fragment is the "autonomous regulatory authority that every jurisdiction has over land use and land development decisions" (Byun and Esparza 2005:253). Given this autonomy, municipalities have the power and legal authority to set local tax rates, determine areas to be annexed, as well as define the local land use and development code known as zoning. Burgess (1996:216) finds that "several municipalities within the same region, and metropolitan area, practiced zoning independently of one another and for their own purposes." Researchers argue that zoning regulations perpetuate segregated communities by utilizing legal exclusionary practices that limit housing supply, monopolize public goods and services, and encouraging land speculation (Plotkin 1987:20-23; Popper 1981:11; Silver 1997). Papke (2009:4) argues that suburbanites have used zoning regulations to outlaw housing developments that keep out undesirable population groups from entering their cities and communities.

In this dissertation I do not directly assess the role of zoning regulations in contributing to residential segregation. Instead, I argue that zoning and land use regulations can be seen as an underlying mechanism through which the effects of political fragmentation are realized. Thus the questions posed later in this research will emphasize the importance of segregation as a result of places as opposed to segregation as a direct result of zoning and land use regulations. The following section will review some zoning and land use regulations that cities will practice and which may contribute to residential segregation. Some zoning and land use regulations include requiring minimum size lots or floor space, the controlling of sprawl, and environmental protection to name a few.

Minimum Lot Size and Minimum Square Footage

One of the legal authorities that local municipalities have is to enact minimum-lot size and minimum square footage size zoning regulations. Requiring homes to maintain large lots such as a minimum of 1 acre or for homes to maintain a minimum of 2,000 square feet greatly decreases the number of available units for purchase and rent (Frieden 1979:25-26). These restrictions would then lead to an increase in the cost of living since the supply cannot meet the demand (Elliott 2003:116). Since minorities tend to have lower incomes than whites they will less likely be able to move into these types of large lot and large home areas.

Growth Management and Smart Growth

Growth management and 'smart growth' are initiatives and policies adopted by cities and local communities to manage the development, residential or commercial, within their boundaries. Growth management focuses on land use and development on the fringe of governmental boundaries (Pendall, Nelson, Dawkins, Knaap 2005:219). Pendall (2000:125-126) defines smart growth as collaborative efforts by governmental and non-governmental organizations to contain the spread of low density communities on the fringe and focus on streamlining the development process for the local and urban core communities. Smart growth has a goal of preserving open space and rehabilitating already developed communities to allow higher density housing (Pendall 2000:126). Both initiatives seem to focus on the quality of life within the jurisdictional boundary but take opposing measures: one by focusing on the fringe; and the other by focusing on the urban core.

Both initiatives also require the implementation of zoning and land use regulations. Zoning regulations can make housing unaffordable for low-income households but they can also increase the number of affordable units within an area. These types of zoning regulations can require new developments to have inclusionary housing. Inclusionary housing, sometimes referred to as inclusionary zoning, is the "citywide or countywide mandatory requirement or voluntary objective that assigns a percentage of housing units in all new residential developments with more than a specified minimum of units, to be sold or rented to lower- or moderate-income households at affordable rates" (Calavita and Grimes 1998:151).

Lastly, growth management initiatives can also have policies that pay greater mind to the fringe and relegate higher density developments and commercial and industrial developments to areas where low-income households may be located. Evenson and Wheaton (2003:223) find that these low-income households are at greater risk of having their home values and quality of life decrease with the proliferation of zoning regulations such as these.

Environmental Protection

Researchers argue that zoning regulations enacted under the guise of protecting the environment are done by: special interest politicians and groups who are seeking restrictions for selfish reasons; or politicians and groups interested in the greater good of the public (Bates and Santerre 1994:253; Pendall et al 2005:219). Environmental protection comes in forms such as sewage system requirements, wetland protections, and fresh water requirements, all of which limit housing supply, density of development, and increase the cost of living (Frieden 1979:19; Glaeser and Ward 2009:272). These restrictions may be enacted in the best interest of the public as a whole but also may be supported by special interests. It is difficult to ascertain whether a restrictive covenant was enacted for selfish reasons or for the greater public good. Popper (1981:50) does find that in some cases the local governing board was made up of the local elite, or special interest groups, whose goals were to make money or who could afford the increase costs of living that restrictive covenants create.

Restrictive covenants usually lead one to believe that inequality increases among population groups in the area when a regulation limits the number of new housing developments. Cheshire and Sheppard (2002:267) find that when special interest groups argued for restrictive zoning regulations which pushed for public open access to restricted land it led to a decrease in the amount of inequality in the area. Cheshire and Sheppard (2002:267) also find that in the event that special interests groups argued for zoning regulations which prohibited public access to restricted land the amount of inequality within the area would increase.

Zoning regulations have led spatial partitioning to be influenced by factors such as the distribution of wealth and power, pandering or influence of politicians, racism, religion, ideology, and demographic changes (Marcuse and Kempen 2002:258). Zoning and land use regulations can also aid in the integration of population groups by implementing requirements such as inclusionary housing practices. Zoning may not be entirely detrimental but previous research is correct in that zoning is practiced independently by each municipality. Generally, municipalities are likelier to opt for zoning and land use regulations that are restrictive rather than inclusive.

Case Study

To date the research literature has not undertaken comprehensive quantitative analyses to establish the relationship between zoning and land use regulations and residential segregation. There are many reasons for this. First among them is that a comprehensive zoning and land use dataset for the U.S. does not exist. Thus researchers investigating this question have necessarily resorted to constructing specialized, study-specific data sets for a small number of cities (Pendall, R., Robert Puentes, and Jonathan Martin, J. 2006).

The original proposal for this dissertation included the goal of conducting an intensive quantitative case study to examine how the segregation of racial groups in Houston and West University Place and in Boston and Cambridge align with land use and zoning regulations. Unfortunately, the challenges associated with conducting a study of this type made the analysis infeasible within the scope of this dissertation. The central, and insurmountable, obstacle was the problem of creating a data set with the essential qualities needed to conduct the desired quantitative analysis. For these two areas, the analysis would have required successfully collating data from Central Appraisal Districts, Planning and Zoning Departments, Redevelopment Authority Departments, and Census summary files.

The major problem I encountered and could not overcome was that each municipality and department has records and data that differ on variables covered, variables operationalization and coding schemes, reliability, and years of availability. For example, Harris County Appraisal District could provide parcel data, which is parcel polygon boundary data, but nothing earlier than 2011. Boston Redevelopment Authority could provide parcel, zoning, and land use regulation data but for 2004. The Cambridge Central Appraisal District could provide parcel and land use regulation data but nothing earlier than 2013.

In addition to these problems, the data reflected contemporary parcel boundaries and land use designations which are not necessarily those that were in place at the time the residential patterns were created. Altogether, these problems undermined the feasibility of conducting analysis for this dissertation. I note however that it might be feasible to undertake a project like this in the future where a full dissertation would undertake the task of developing a longitudinal database for two or more cities to sustain a viable quantitative analysis of the impact of fragmentation in land use regulations and segregation.

Dynamics of Areal Units

Political fragments have been found to encourage people to selectively reside in one municipality over the other (i.e. school district preference) as well as sort people out by making housing unaffordable for low-income families and minorities via restrictive zoning regulations (Fischer, Stockmayer, Stiles, and Hout 2004:40). The measurement of fragmentation and segregation incorporates municipal boundaries, which are the result of local political and social processes, as well as census boundaries such as tracts and blocks, which are drawn according to census guidelines and criteria that emphasize capturing social homogeneity while also respecting natural and built feature of the environment. This section will discuss two measurement dynamics of the arbitrary boundary units such as blocks and tracts: the modifiable areal unit problem and the meaningfulness of random versus arbitrarily generated boundaries. In addition, this section will discuss two other concepts unrelated to the arbitrariness of the geographic boundaries rather more related to the spatial distribution of population groups: the scale effect and proximity.

Modifiable Areal Unit Problem (MAUP)

Demographers and geographers have noted that geographic boundaries for constructs such as blocks and tracts are arbitrarily drawn (i.e., do not reflect legal or administrative domains) and thus are modifiable. Modifiable areal units are artificially drawn boundaries that can be, and/or are subject to being, changed from the point of view of the research question being addressed (Wong 2004:571). The modifiable areal unit problem (MAUP) arises when the boundary can be changed thus changing its contents which, in this case, are population groups. If Census place boundary data was taken at one point in time, only to have the place boundaries redrawn, the result would be two completely different datasets even though the population groups never altered their spatial locations. Researchers note that this is a problem because it can impact even basic descriptive statistics (Wong 2004:571; Kramer, Cooper, Drews-Botsch, Waller, and Hogue 2010:2).

Further statistical analysis of the same place area but with the two datasets from the modifiable boundaries can potentially return inconsistent results. This type of problem is sometimes termed the "zoning effect" (Wong 2004:571; Taylor, Gorard, and Fitz 2003:42). The zoning effect occurs when the spatial units of an area are arbitrarily redrawn, all while remaining constant in size and number, potentially leading to "inconsistent analytical results" (Wong 2004:571).

A second problem, known as the "scale effect", is attempting to develop larger units from spatially insufficient smaller units (i.e. blocks to tracts) or smaller units from larger units (i.e. tracts to blocks) (Wong 2004:571; Taylor et al. 2003:42). Theoretically, blocks can aggregate to tracts but there may be cases where the data may be missing at such a low level thus making the tract unreliable. The scale effect can also occur in areas where low level units are reliable thus generating reliable higher level units, or nested geographies. The issue with utilizing higher level units is that any variation in population groups at the block level is "smoothed" out and lost when aggregated to the tract level (Wong 2004:573).

Researchers have undertaken several approaches to address the MAUP but no single approach is universally accepted (Wong 2004:575). Ultimately, when conducting statistical analyses where the MAUP may be a potential issue, the researcher must acknowledge that the problem is relevant and take into account the possibility that results obtained using one dataset are one instance of many possible results that could be obtained from other alternative datasets (Wong 2004:575).

I take account of the MAUP in this dissertation by performing analyses where I reconstitute boundaries to aid in testing the relationship between political fragmentation and residential segregation. More specifically, I reconstitute city boundaries based on arbitrary aggregation of lower-level spatial units and recalculate segregation scores to compare with scores calculated using the observed socially meaningful city boundaries. If I find that redrawn fragments consistently results in lower segregation levels it will suggest that the fragments drawn by political and government agencies are clearly associated with the separation of minorities from the majority.

Scale Effect

The measurement of unevenness in segregation research comes with several dimensions that researchers need to be aware of, one of which is the scale effect. Scale effect occurs when the extent of segregation captured is affected by the scale of the measurement chosen (Reardon et al. 2009:56). Lee et al. (2008:767) note that a majority of studies assume that a Census tract "constitutes an appropriately-sized spatial unit for capturing segregation." Researchers also note that utilizing too low of a level of analyses in segregation, such as blocks, can result in a more homogenous area, whereas too large of a level of analyses in segregation, such as tracts, can obscure segregation patterns resulting in a heterogeneous population (Lee et al. 2008:779; Wong 1997:131). Ultimately, since residential segregation is inherently spatial, "a complete understanding of segregation must be attentive to its scale in addition to its magnitude" (Lee et al. 2008:767).

This dissertation will implement a decomposition analysis which will directly account for scale effect issues. I will decompose segregation at various spatial units in order to determine the contribution that each spatial level has towards the segregation score. I also calculate segregation at the first-order contiguity unit which records all of the neighbor units of an areal unit to form a new unit. The first-order contiguity unit will utilized blocks, thus making them larger than a block, which will address concerns that blocks are too small for segregation measurement, and smaller than a tract, which will address concerns that tracts smooth out variation in population distribution.

Proximity

The most commonly used measures of segregation in empirical studies are aspatial in nature and are most commonly calculated at the spatial scale of the census tract. Although commonly used, it is a matter of convenience for computation and analysis as using an aspatial measure to investigate an "inherently spatial" research topic can produce misleading results as to the degree of segregation between groups within an area (Lee et al. 2008:767-770). Lee et al. (2008:770) note that an aspatial measure is incapable of taking into account proximity to one another. That is, aspatial measures of segregation are unable to distinguish the proximity one spatial unit, such as tracts, has to another. In segregation research, this is much noticeable in areas that have a population distribution in the shape of a checkerboard while another area will have a population distribution in the shape of clusters, yet their segregation scores would be identical.

The issue of proximity also arises with the assumption that all people or households within the aspatial unit are equally distant from one another. Lee et al. (2008:770) note that common segregation measures are incapable of distinguishing proximity among residents when it is possible that whites and people of color are occupying distinct pockets within the areal unit. In addition, it is also assumed that these people, or households, are closer to those within the units, as opposed to populations in adjacent units. People on opposite ends of the areal unit may be spatially distant from one another within the areal unit but are spatially near people on the periphery of the adjacent areal unit (Lee et al. 2008:770). As Lee et al. (2008:770) point out, "people may literally live across the street from one another yet they are judged to be more distant than are individuals who live relatively far apart but within the same tract".

Egocentric Neighborhood

Researchers address the proximity issue by developing a spatially relevant neighborhood in the form of various radii. This is known as the "egocentric neighborhood". In an egocentric neighborhood, "every person is assumed to live at the center of a local environment whose population reflects the proximity-weighted average composition of each surrounding point in some larger geographic region of interest" (Lee et al. 2008:770). The egocentric neighborhood is beneficial in that it allows the scale to not only be representative of an individuals' local environment but to be uniquely defined by the researcher so as not to be constrained by the scale of Census geography (Kramer et al. 2010:3). Blocks, being the lowest level of geography available, can then be treated as individual homogeneous units in the construction of the egocentric neighborhood unit. Nearby populations, or blocks, can then be ruled to "contribute more to the local environment" than would a distant block thus allowing the researcher to delineate them as having greater weight than those at a greater distance (Lee et al. 2008:770).

Nested Geographies and Decomposition

Some of the units in the analysis here involve nested geographies. A nested geography is a geographical unit that can completely aggregate up into a larger geographic unit (Lichter et al. 2007:2). A perfect example of nested geographies are Census blocks which can aggregate up into block groups. Block groups can then aggregate up into Census tracts. Census tracts can aggregate up into county boundaries. Although tracts are designed to follow larger boundaries such as place boundaries they may not always completely fall within city limits (U.S. Census Geographic Terms and Concepts 2010). But nesting can be achieved in these cases by subdividing tracts into tract-place parts for tracts that are split by place boundaries.

Nested geographies are greatly beneficial for this dissertation since nested geographies can be used in decomposition analyses. Decomposing segregation allows researchers to "identify the specific source of residential segregation between racial and ethnic minorities and non-Hispanic whites" (Lichter, Parisi, and Taquino 2015:844).

While residential segregation has been generally declining at the metropolitan level researchers have taken notice to the importance of the spatial partitioning of racial and ethnic groups at the community and place level as a result of decomposing segregation (Fischer et al. 2004; Lichter et al 2015).

Issues and Motivation for Research

This chapter covered topics related to the measurement of political fragmentation and segregation, as well as previous research analyzing the relationship between political fragments and residential segregation. Although political boundaries have been hypothesized and found to have statistical associations with segregation, the nature of the relationship is yet to be fully understood. The relationship between political fragmentation and residential segregation is greatly affected by the creation process and dynamics of the administrative and political boundaries being analyzed. Administrative and statistical boundaries such as blocks, block groups, and tracts are a few boundaries developed by the Census. These administrative and statistical boundaries are delineated by geographic characteristics such as streams or rivers, infrastructure such as streets and roads, and population and economic characteristics. Census procedures develop tracts and block groups with the goal of capturing homogeneity, when it's present, in contrast to arbitrary or grid drawn boundaries. Political boundaries delineate school districts, city boundaries, and voting districts, to name a few. These boundaries are shaped by political and social processes affected by local population manipulation.

Previous research that has analyzed political fragments and their relationship with residential segregation have utilized qualitative as well as quantitative statistical procedures such as OLS and other various types of linear regressions (Amaro 2013; Weiher 1991; Morgan and Mareschal 1999; Alesina et al. 2004). Although these previous studies have found that a relationship may exist between political fragments and residential segregation they have several limitations.

The nature of political fragments make them difficult candidates when testing their relationship with residential segregation because many of these fragments are subject to change over time due to a variety of political and population changes. Previous studies are incapable of determining whether the political fragments represent social and physical barriers that prevent minorities from entering or whether the fragments are simply a reflection of capturing pre-existing population distribution.

Previous research findings are also limited because the results cannot attest to whether political fragments capture segregation better than a similarly sized arbitrarily constituted boundaries. Metropolitan areas with greater fragmentation will have boundaries that are smaller in scale and will thus capture segregation better than areas with less fragmentation which would have boundaries that are larger in scale. Previous research also is limited in its ability to establish whether higher degrees of fragmentation is sociologically meaningful because they have not compared results obtained using observed boundaries with results obtained using units with arbitrarily constituted boundaries of similar number and scale. For these limitations, researchers have been unable to conclude if the relationship between political fragmentation and residential segregation is real or spurious.

Research Hypotheses

Given the historical backdrop of residential segregation and the causal dynamics of political fragmentation, it is plausible to hypothesize that residential segregation in the U.S. has persisted because of factors already accounted for, as well as for reasons we do not yet fully understand. In an effort to contribute to the study of residential segregation and to determine whether any relationship is causal or spurious, this research study will examine the effect political fragments have on the residential segregation of minority groups within the U.S.

Research Questions

Both administrative and political boundaries are drawn and redrawn over time to reflect changes in the population. For example, as the population in an area increases, town boundaries may grow and become incorporated. Other boundaries, such as cities, grow and annex communities. Because boundaries are created at a point in time, and may be subject to change, the question arises do boundaries capture segregation because they are drawn and redrawn to reflect shifts in population distribution or do boundaries capture segregation because they represent social and physical barriers that prevent groups from entering?

The question also arises whether administrative and political boundaries capture segregation better than similarly sized arbitrarily drawn boundaries in space? Similar to the scale effect and modifiable areal unit problem in segregation measurement, arbitrarily drawn boundaries will capture some degree of segregation as do political or administrative boundaries. As an area is more fragmented, the smaller the scale is, and thus the greater the chance of the boundary capturing more segregation. This study will test the hypothesis that administrative and political boundaries have a greater sociological impact because of their ability to restrict population movement by various means such as enacting restrictive zoning regulations than would an arbitrary boundary.

CHAPTER IV

DATA, MEASURES, AND METHODS

This chapter reviews the data, measures, and methods used in metropolitan level analysis and the analysis of the relationship between and within macro and micro components of segregation.

Data and Methods

First, I calculate measures of segregation and fragmentation and examine their covariation using Census 2000 Decennial Summary File 1 data and 2010 Topologically Integrated Geographic Encoding and Referencing (TIGER) 2000 Line Files. Decennial Summary File 1 tabulations are based on 100 percent, or "complete coverage", of the U.S. population.

Second, I conduct a fractional logit regression analyses using Census 2000 Decennial Summary File 1 and Summary File 3 Data. Decennial Summary File 3 tabulations are based on a 1 in 6 sample which gathers social, economic, and household data in the U.S.

Although Census 2010 decennial data is available, I use Census 2000 decennial data because of its larger sample for establishing social, economic, and household characteristics that are used in developing independent and control variables implemented in aggregate level regression analyses reported in later chapters. In 2010, these characteristics are available in the American Community Survey which is about a 1%

sample for annual data releases. But measures based on the ACS will be less reliable than measures based on the larger sample available in 2000.

Although Census 2000 is not the most current, this is not a major concern for hypothesis testing because past research documents great stability in segregation index scores for metropolitan areas over time with trends of declining segregation being limited to small changes (approximately 2-4 points per decade in recent decades). Previous research also documents that factors predicting variation in segregation across metropolitan areas have similar effects from decade to decade. Accordingly, Census 2000 decennial data are appropriate for testing the relationship between residential segregation and political fragmentation. Levels of segregation and patterns of effects found using data for 2000 are valid in their own right and in addition will also be highly correlated with patterns found in 2010.

Using cartographic Census 2010 TIGER Line 2000 shapefiles I develop first order contiguity units. TIGER Line files are spatial extracts of legal and statistical geographic areas within the U.S. This study uses 2010 TIGER shapefiles of 2000 boundaries. The U.S. Census releases data as near its respective year as possible. For example, year 2000 files are released near year 2000. Through the years, errors are found and updates are made. The Census has rereleased 2000 TIGER boundary files several times with each release more accurate than the previous. Census 2010 TIGER/Line file release of 2000 boundaries are the most spatially accurate.

The U.S. Census releases Summary File data and TIGER/Line shapefiles directly to the public. This study incorporates data and shapefiles released by the National

Historical Geographic Information System (NHGIS) operated by the Minnesota Population Center. The NHGIS is highly regarded in academia and is also referenced by the Census Bureau in several of their TIGER/Line file releases. The shapefiles available from the NHGIS are identical to those released by the U.S. Census Bureau with the exception that the NHGIS erases all coastal water areas from the boundaries. Retaining the coastal water areas can potentially cause the centroid (center) of a polygon to lie out in the ocean where populations do not exist.

Sample and Units of Analysis

The analysis sample consists of Metropolitan Statistical Areas (MSA) in the U.S. with a minimum 1,000 non-Hispanic black population. The population of interest are non-Hispanic blacks and non-Hispanic whites. The U.S. Census classifies non-Hispanic whites as persons having "origins in any of the original peoples of Europe, the Middle East, or North Africa" (SF1 Technical Documentation 2000:B-12). Non-Hispanic blacks are persons "having origins in any of the black racial groups of Africa (SF1 Technical Documentation 2000:B-12).

Previous segregation research has most commonly drawn on census tracts as the unit of analysis. I use Census blocks as the unit of analysis. I calculate segregation at the Census block level for reasons more apparent in the chapter on decomposition analyses. Blocks are utilized in these analyses for several reasons: (1) blocks can aggregate to calculate segregation at the block group, tract, and county unit; (2) blocks can also aggregate to place, school district, and congressional district units; (3) blocks can be used to create first-order contiguity units; (4) and blocks have better capabilities to capture segregation within and across areas. Capturing segregation within and across areas is part of the decomposition analysis which analyzes the covariance of segregation scores calculated at various nested and non-nested levels in addition to determining the contribution to the segregation score at each of the nested geographies.

In segregation research, utilizing Census blocks to measure segregation has some potential drawbacks. One is that index calculations based on block data tend to be higher due to upward bias in scores obtained using units with small population counts, especially when the minority group is small in relative size (Winship 1977). Blocks also can be criticized on conceptual grounds as failing to capture the notion of a neighborhoods. For example, blocks follow certain geographic markings such as roads which could result in the neighbor directly across your street not being considered in your neighborhood.

This study will also utilize a higher-order contiguity unit in response to these critiques. The first-order spatial contiguity is a neighbor defined unit where a block unit's shared boundary with other blocks are compiled to form a new unit. This neighbor defined unit can potentially be a better representation of a neighborhood because it will capture household characteristics across one's street. If results obtained using blocks and first-order contiguity neighborhoods are the same, it will demonstrate that the possible concerns mentioned above do not have practical consequences for the analyses reported here.

Geographic Definitions of Units

The following section will cover the geographic definitions for the units used in the study. The definitions are derived from the U.S. Census SF1 Technical Documentation 2000 section A-1.

Census blocks are statistical areas bounded by features such as roads, streams, property lines, and municipal lines like city, school district, and county boundaries. In urban areas, Census blocks tend to correspond to individual city blocks that are bounded by streets. As the area becomes less dense with populations, such as in rural areas, blocks become larger and can comprise up to several square miles.

Census block groups are larger than a block and are subdivisions of a census tract. Block groups have between 600 and 3,000 people and 240 and 1,200 housing units. Most block groups are delineated by local officials. Block group boundaries do not cross state, county, or tract boundaries.

Census tracts are subdivisions within counties and generally have between 1,200 and 8,000 people and about 4,000 people or 1,600 housing units. Most tracts are comprised of multiple block groups. Tract boundaries will follow county and state boundaries and also often follow place or other municipal boundaries but not always.

Spatial contiguity unit is a form of spatial relationship developed using polygon shapefiles in GIS. I use first-order contiguity units which is a neighbor unit derived from existing smaller units. The process will take Census blocks as a central point and model a new unit comprised of the central block's contiguous neighbors. As noted above, researchers sometimes criticize blocks as not representing true neighborhoods. A first-order spatial contiguity neighborhood addresses this concern by generating a new unit that is larger than a block and smaller than a block group.

A Census place is a concentration of a population meeting certain definitions of urban density and/or legal standing. As used here, places are limited to incorporated places, such as a city, which is legally recognized by the state that the place is located within. Census data also include the concept of "census designated place" to refer to population concentrations that have urban characteristics, but are not incorporated. I do not include designated places in fragmentation calculations because the logic of fragmentation theory is that the distribution of population is shaped by the policies and regulations of the area and unincorporated cities are incapable of enforcing policy and regulation. Also, not all cities are legally incorporated because either the state considers them towns, boroughs, or villages. For example, the State of Hawaii considers their cities as counties and, in the case of Honolulu, county-city.

Counties are considered "the primary legal subdivision in most states." There can be some ambiguity among the interpretation and understanding of counties in the U.S. As mentioned previously, some states do not recognize incorporated places rather they consider them counties. In addition, the Census also considers boroughs and municipalities as counties. For example, in the public eye, Anchorage, AK may be a city. To the State of Alaska, Anchorage is a municipality. Because it is recognized as a municipality by the State, the U.S. Census considers it a County.

Metropolitan Statistical Areas (MSA) are county-based entities with an urban core of at least 50,000 in population. MSAs are comprised of the primary urban core county as well as any adjacent counties that have a high degree of social and economic integration as determined by commuting patterns and related census criteria. MSAs have been widely used in previous segregation research. MSAs are appropriate units of analysis in comparison to cities because they include the full population that has a high degree of social and economic integration with the central urban center for the metropolitan region. This is especially important for analyses here which assess the extent to which segregation takes place between places including the urban core, or central city, and suburban places.

Measures of Segregation

An important component of this study is the measure of residential segregation. Some of the most common measures of segregation are the dissimilarity index, Gini index, Theil index, and separation index, all of which are measures of evenness and in the vast majority of cases are used in an aspatial manner (White 1986; Massey and Denton 1988; Reardon and Firebaugh 2002). Of these, the dissimilarity index (D) has been used most widely in empirical studies (Massey and Denton 1988:284).

Researchers have classified five dimensions of spatial variation in residential segregation: evenness, exposure, concentrated, centralized, and clustered (Massey and Denton 1988). Evenness is the "differential distribution of two social groups among areal units in a city" (Massey and Denton 1988:284). Segregation measures of evenness are affected when the unit's two-group proportion varies from the city as a whole. Exposure is the "degree of potential contact between minority and majority group members within geographic areas of a city" (Massey and Denton 1988:288). Segregation measures of exposure measure the experience of segregation felt by the average minority or majority member to determine the likelihood of their sharing the same neighborhood. Concentration is the "relative amount of physical space occupied by a minority group in the urban environment" (Massey and Denton 1988:290).

Cities where minority groups occupy a small share of the total area are said to be concentrated. Centralization is "the degree to which a group is spatially located near the center of an urban area" (Massey and Denton 1988:291). The difference between centralization and concentration is that groups can be concentrated on the outskirts of the city whereas their concentration in the center of the city would be considered centralization. Lastly, clustering is the "extent to which areal units inhabited by minority members adjoin one another in space" (Massey and Denton 1988:293). Clustering is distinct from the other dimensions because it focuses more on the distribution of minority areas with respect to each other as opposed to the distribution of minority areas with respect to majority areas.

This dissertation study uses measures of segregation that capture evenness of the spatial distribution of a population. The following section discusses the measures of evenness that this dissertation study incorporates: *dissimilarity, Theil, separation*, and *Hutchens square root index*. The Gini index is another measure of evenness that is commonly discussed in reviews of segregation measurement. I exclude it from the analyses in this dissertation because it has close conceptual and empirical relationships with D (Duncan and Duncan 1955; Massey and Denton 1988) and so little is gained by examining both D and G in the same analysis.

Separation Index

The following formula highlights that S is the person-weighted average of squared area deviations of local racial composition from the racial composition of the city as a whole. It is given by:

$$S = \frac{\sum_{i=1}^{n}[t_i|p_i - P|]^2}{[2TP(1-P)]}$$

The correlation ratio, also known as the separation index, is also measured on a scale of 0 to 1. The separation index (*S*) measures the extent to which minorities, group one, are exposed to majority members, group two. Stearns and Logan (1986:127) note that the separation index "measures the difference in racial composition of various neighborhoods" by assessing the "variance in racial composition between neighborhoods to the total variance in racial composition."

This dissertation study will use the difference of means approach to calculating *separation*. The difference of means approach is a mathematical equivalent formula of *S* above that reveals the correspondence between segregation and group differences in residential outcomes (Fossett 2016a). Fossett (2016a) notes that *S* can be understood as the white-minority difference of means on contact with whites.

$$S = Y_W - Y_m = \left(\frac{1}{W}\right) * \sum w_i\, y_i - \left(\frac{1}{M}\right) * \sum m_i\, y_i$$

The formula looks identical to the difference of means formula for *D* with the sole difference being that residential outcomes (y_i) are scored from area proportion white (p_i) according to the simple identity function $y_i = p_i$" (Fossett 2016a).

Dissimilarity Index

The value of D can be obtained from a variety of mathematically equivalent computing formulas. The following formula highlights that D is the person-weighted average of area deviations of racial composition from the racial composition of the city as a whole. It is given by:

$$D = \frac{\sum_{i=1}^{n}[t_i\,|(p_i - P)|]}{[2TP(1-P)]}$$

where n is equal to the number of areas in the metropolitan; t_i is equal to the total population of area i, p_i is equal to the proportion of area i's population that is minority; P is equal to the proportion of the metropolitan area's population that is minority; T is equal to the sum of all t_i, and t_i is equal to the total population of area j.

D also is related to the segregation curve (Duncan and Duncan 1955) and registers "the maximum vertical distance between the Lorenz curve and the diagonal line of evenness" (Massey and Denton 1988:284). *D* "captures the degree to which blacks and whites are evenly spread among neighborhoods in a city" and can be interpreted as the minimum proportion of one group that would need to change neighborhoods to bring about an even distribution (Massey and Denton 1988:284; Massey and Denton 1993:20; Iceland et al. 2002:8; Fossett 2016a; White 1986:202-203). *D* varies on a scale of 0 to 1 with 1 being complete segregation and 0 being complete integration.

I also use an alternative "difference of means" approach to calculating *dissimilarity* introduced by Fossett (2016a). The difference of means approach is mathematically equivalent to the formula for *D* given above and - thus yields the exact same value for D - and is useful for two reasons. One is that it reveals the "correspondence between segregation and group differences in residential outcomes" and in doing so makes it clear that D registers white-black differences in the residential outcome of attaining parity-level contact with whites (Fossett 2016a). The other reason the difference of means formula is useful is that it is convenient to use in programming to obtain index scores. The difference of means formula for D is given as follows:

$$D = Y_W - Y_m = \left(\frac{1}{W}\right) * \sum w_i\, y_i - \left(\frac{1}{M}\right) * \sum m_i\, y_i$$

where Y_w is the white group mean and Y_m is the minority group mean on segregation-relevant residential outcomes (y_i) scored on the basis of area proportion white (p_i). Residential outcomes are determined where $y_i = 1\ if\ p_i \geq P$ and $y_i = 0\ if\ p_i < P$ (Fossett 2016a). Fossett (2016a) notes that the difference of means D can be understood as the white-minority difference in attaining parity on residential contact with whites. The formula looks identical to the difference of means formula for S - as will be the case for all difference of means formulas.

Theil Index

The following familiar formula from Massey and Denton (1988) highlights H as the person-weighted average of area deviations of the "entropy" score for the racial composition in the local area (E_i) from the entropy score for the racial composition of the city as a whole (E). It is given by:

$$H = \sum_{i=1}^{n} \left[\frac{t_i(E - E_i)}{ET}\right]$$

$$where\ E_i = p_i ln\left(\frac{1}{p_i}\right) + (1 - p_i) ln\left(\frac{1}{1 - p_i}\right)$$

$$and\ E = P ln\left(\frac{1}{P}\right) + (1 - P) ln\left(\frac{1}{1 - P}\right)$$

Similarly to *D*, the Theil index (*H*) also varies on a scale of 0 to 1 like. *H* measures a departure from evenness by assessing each unit's departure from the racial, or ethnic, entropy of the whole city (Massey and Denton 1988:285). A Theil index value can be thought of as a measure of the average difference between a unit's group proportions and that of the system as a whole (Iceland et al. 2002).

The difference of means formula for computing Theil is as follows:

$$H = Y_W - Y_m = \left(\frac{1}{W}\right) * \sum w_i \, y_i - \left(\frac{1}{M}\right) * \sum m_i \, y_i$$

The sole difference with this difference of means formula being that residential outcomes (y_i) are scored from area proportion white (y_i) on the basis of:

$$y_i = Q + 1/[p_i/P - q_i/Q] * (E - e_i)/E$$

Hutchens Square Root Index

The following formula for R is given in Hutchens (2001):

$$R = O(x) = 1 - \sum_{i=1}^{T} \sqrt{(x_{1i}/N_1)(x_{2i}/N_2)}$$

One of the features of Hutchens square root index is that it is similar to D and G in terms of ranking segregation comparisons in a manner that is consistent with segregation curve analysis but also additively decomposable, a quality that does not apply to D and G (Hutchens 2001; Hutchens 2004). In this regard, it is similar to the *Theil* index and the *separation* index which are also additively decomposable (Reardon and Firebaugh 2002:53). In addition, Hutchens (2001:24) notes that the square root index is superior to D on technical grounds because it registers relevant segregation altering residential transfers and exchanges between groups while D does not.

The difference of means formula for Hutchens square root is as follows:

$$R = Y_W - Y_B = \frac{1}{W}\sum w_i y_i - \frac{1}{B}\sum b_i y_i$$

$$y_i = Q + (1 - \sqrt{p_i q_i / PQ} / [(p_i/P) - (q_i/Q)]$$

This dissertation utilizes all of the previously discussed measures of segregation, with the exception of the Gini index, in an effort to ensure that the findings are consistent. Although the dissimilarity index is used more widely than other indices of uneven distribution no single measure of segregation is correct for all purposes (Lieberson 1981:253). Using multiple measures here thus addresses the question of whether results may vary depending on the choice of the index used to measure uneven distribution.

Aspatial vs Spatial

Researchers note that the dissimilarity index, Theil index, and separation index are typically implemented as aspatial measures for a topic that some may view as inherently spatial (Fossett 2016a; Lee, Reardon, Firebaugh, Farrell, Matthews, and O'Sullivan 2008:768; Reardon et al. 2009:58). Indices are aspatial when they assess segregation using bounded units (e.g. tracts) without regard for their spatial location in relation to other units. This makes them susceptible to the criticism that they do not fully account for the spatial distribution of population groups by race and ethnicity especially with regard to the size and spatial scale of enclaves, ghettos, barrios, and other large spatial clusters within a city. Aspatial implementation is not all together detrimental but it can come with drawbacks if the researcher is not already familiar with the population distribution of the area being studied (Wong 1997:131). A common problem with aspatial measures is their inability to capture segregation occurring at different geographic scales (Reardon et al. 2009:58).

Spatial measures of segregation register "neighborhood outcomes for households," in terms of their "proximity to particular spatial locations" so that when an area differs in racial proportion, the variation in the spatial arrangement of neighborhoods can affect the index (Fossett: 2008:2-3). Previously, I calculated segregation at a small spatial scale - specifically, using census blocks - and implemented the calculations both in conventional aspatial calculations and in spatial calculations using first-order contiguity neighborhoods (i.e., the block and the surrounding blocks). I then compared the results to determine whether results obtained using aspatial calculations differ from the results obtained using spatial calculations at a similar spatial scale. I found that the results were virtually indistinguishable. Accordingly, I used the aspatial calculations for the analyses because they are much easier to implement.

CHAPTER V

METROPOLITAN LEVEL ANALYSIS

In this chapter, I investigate the empirical relationship between residential segregation and political fragmentation at the aggregate level across U.S. metropolitan areas by first calculating measures of fragmentation and segregation for each city and then examining their covariation across metropolitan areas. Standard conceptions of fragmentation focus on the number of municipality units in the metropolitan area taking account of their population size and relative density. I develop a variety of fragmentation scores using both traditional approaches from previous research on fragmentation, and also new alternatives, and compare the results obtained to gain a better understanding of the association between fragmentation and segregation across metropolitan areas.

The segregation scores that serve as dependent variables in the metropolitan level regression reported in this chapter vary within the bounded range of 0 to 1. Using OLS regression is inappropriate because standard assumptions regarding the error term (e.g., that it is normally distributed with equal variance) are not met and because model-based predictions can be misleading and potentially outside of the range of 0-1 since effects are estimated as linear and additive when they inherently must be nonlinear and non-additive. Accordingly, I use the more statistically appropriate method of fractional logit regression to estimate effects (Papke and Wooldridge 1996).

Table 1 includes summary statistics for all variables included in the aggregate level analyses where MSAs have a minimum 1,000 non-Hispanic Black population.

Table 1. Descriptive Statistics: Segregation, Political Fragmentation, and Control Variables - MSAs w/Minimum 1k NH Black Population

	Variable	N	Mean	Standard Deviation	Minimum	Maximum
Segregation Measures	Dissimilarity (D)	311	0.71	0.08	0.41	0.90
	Separation (V)	311	0.39	0.19	0.04	0.82
	Hutchens (R)	311	0.70	0.07	0.45	0.88
	Theil (H)	311	0.46	0.13	0.20	0.80
Fragmentation Measures	# of Cities per 1M MSA Population	311	50.30	42.38	1.14	266.97
	# of Cities 2,500+ per 1M MSA Population	311	20.63	11.55	1.14	60.82
	# of Cities 10,000+ per 1M MSA Population	310	10.08	4.97	1.14	28.89
	MSA Pop. Share Residing Outside Largest City	311	66.05	19.04	0.00	97.95
	Gini Place Concentration	311	91.28	8.14	50.28	100.00
	Likelihood Two Students Attend Different Districts	311	0.08	0.07	0.00	0.25
	# of School Districts per 1M MSA Population	311	1373.91	279.63	550.80	2141.81
	Share of Pop. Residing Outside Largest District	311	53.23	24.97	0.00	95.76
Control Variables	% White	311	87.30	11.39	47.72	99.70
	% Vacant	311	8.27	4.64	2.17	35.03
	% of Labor Force in Armed Forces	311	1.34	3.83	0.01	38.07
	% Housing Units Built Post-FHA	311	52.97	14.87	19.00	90.18
	% Suburbanization	311	38.81	20.88	0.00	87.78
	Total Population (Log)	311	12.66	1.00	10.81	15.66
	Age of the MSA 1900 & Earlier*	311	0.22	0.42	0.00	1.00
	Age of the MSA 1910 to 1940*	311	0.26	0.44	0.00	1.00
	Age of the MSA 1950 to 1960*	311	0.12	0.33	0.00	1.00
	Age of the MSA 1970 & Later*	311	0.24	0.43	0.00	1.00
	% Foreign Born	311	7.47	7.41	0.85	50.94
	% of Labor Force in Public Administration	311	5.00	2.54	1.70	19.37
	% of Population with a Bachelor's Degree	311	23.71	7.42	11.05	52.38
	% of Population Enrolled in College	311	20.46	7.88	9.71	55.10
	% of School-Aged Children in Private School	311	10.33	3.76	2.48	24.82

*Dummy Variable - Year Central City Reached 50k Population. Central cities that did not reach 50k is the reference category

Aggregate Level Measures: Uneven Distribution

The dependent variables in the analyses are the scores for the *dissimilarity index (D), separation index (S), Hutchens square root index (R),* and *Theil index (H).* I report results for the dissimilarity index because it is the most commonly used measure of segregation. Dissimilarity has a mean of .71, a minimum of .41 (Jacksonville, NC), and a maximum of .90 (Gary, IN). I also report results for analyses that use alternative measures to ensure that my findings are robust to the choice of which index is used.

The first alternative to dissimilarity is the *separation index (S)* which is sometimes known as the correlation ratio, the variance ratio, and eta squared. The separation index measures the extent to which whites and blacks differ in their average contact with whites. An alternative interpretation is that the separation index "measures the difference in racial composition of various neighborhoods" by assessing the "variance in racial composition between neighborhoods to the total variance in racial composition" (Stearns and Logan 1986:127). Separation has a mean of .39, a minimum of .04 (Provo Orem, UT), and a maximum of .82 (Gary, IN).

The separation index is a good choice to ensure the findings are robust. One reason for this is that the dissimilarity and separation indices have both been widely used in previous segregation research. Another reason is that Fossett (2016a) notes that D and S differ in how they respond to deviations from parity that are quantitatively small. D responds equally to small and large deviations from parity; S responds minimal to small deviations from parity and strongly to large deviations from parity. Other measures such as the Hutchens index (R) and the Theil index (H) fall in between D and S on this continuum with R responding to small and large deviations from parity in a manner similar to D, and H responding in a manner more similar to S. As a result, if results are the same for D and S, results will be similar for the other indices as well.

I also examine results for the *Hutchens (R)* square root index because it has a close conceptual and empirical correlation with D (Hutchens 2004). In addition, unlike D, the *Hutchens* square root index (R) is additively decomposable (Hutchens 2004) and can be used and compared with results for the *Theil* and *separation* indices both of which are also additively decomposable (Reardon and Firebaugh 2002:53). Results for R are generally similar to D. R has a mean of .70, a minimum of .45 (Jacksonville, NC), and a maximum of .88 (Gary, IN).

I also report results for the *Theil index (H)* because it is used widely in segregation studies that perform decomposition analyses of segregation. Scores for H are typically between scores for D and S. Accordingly, Theil has a mean of .46, a minimum of .20 (Lawrence, KS), and a maximum of .80 (Gary, IN). The Theil index findings, as with the other measures of segregation in this chapter, will set the stage for the next chapter on decomposition analyses where the results between the two analyses will hopefully remain consistent, enabling a more robust conclusion.

Aggregate Level Measures: Political Fragmentation

Political fragments are conceptualized as boundaries that have regulatory authority over land use, land development, and social and political processes of areas within its boundary. The independent variables used to capture political fragmentation are:

The total number of places per 1 million MSA residents. Total number of places per 1 million MSA residents is a variation of more commonly used measures of fragmentation listed below. Although used in the analyses, this measure of fragmentation may not be considered conceptually fruitful due to its inclusion of very small cities. For example, it will include cities such as Belleair Shore, FL and New Amsterdam, IN who populations were very small and did not exceed 1000 in the Census 2000. Cities of such small size are unlikely to play a meaningful role in the residential segregation patterns of an MSA. Total number of cities per 1 million MSA residents has a mean of 50.30, a minimum of 1.14 (Honolulu, HI), and a maximum of 266.97 (Joplin, MO).

The total number of places with a minimum 2,500 population per 1 million MSA residents. Total number of places with a minimum 2,500 population per 1 million MSA residents improves on the previous measure by placing a lower bound on the population size of places to help assure they will be potentially relevant for segregation patterns in the MSA. Even so, some might view it as including cities with populations that may be too small to have important effects on residential segregation patterns in metropolitan areas. Total number of places with a minimum 2,500 population per 1 million MSA residents has a mean of 20.63, a minimum of 1.14 (Honolulu, HI), and a maximum of 60.82 (Scranton-Wilkes Barre-Hazleton, PA).

The total number of places with a minimum 10,000 population per 1 million MSA residents. This measure is one of the more common measures of fragmentation and has the quality of excluding areas that have small populations. Total number of places with a minimum 10,000 population per 1 million MSA residents is also a potentially attractive measure of fragmentation because it may serve as a proxy for other fragments in the form of special districts, such as school and utility districts since they are likelier to occur in larger populations. Total number of places with a minimum 10,000 population per 1 million MSA residents has a mean of 10.08, a minimum of 1.14 (Honolulu, HI), and a maximum of 28.89 (Abilene, TX).

The MSA population share residing outside the largest city. This measure of fragmentation is also one of the more widely used measures because it can be seen as capturing decentralization of population. The presumption is that, when a greater share of the population resides outside of the primary urban core, special districts are needed to regulate utilities, schools, and land use. The MSA population share residing outside the largest city has a mean of 66.05, a minimum of 0 (Anchorage, AK), and a maximum of 97.95 (Nassau-Suffolk, NY).

Place concentration. This measure of fragmentation captures the degree to which the population is concentrated in places in the MSA. Place concentration is measured using the Gini concentration index. Place concentration has a mean of 91.28, a minimum of 50.28 (Odessa-Midland, TX), and several cities with a maximum of 100.00.

The total number of school districts per 1 million MSA students enrolled. This measure follows a similar construction and logic as previous measures of place fragmentation. Total number of school districts relative to MSA enrollment has a mean of 1,374, a minimum of 551 (McAllen-Edinburg-Mission, TX), and a maximum of 2,142 (Duluth-Superior, MN).

The total share of population residing outside the central school district. This measure follows a similar construction and logic as a previous measure of place fragmentation. The total share of population residing outside the central school district has a mean of 53.23, a minimum of 0 (Hagerstown, MD), and a maximum of 95.76 (Nassau-Suffolk, NY).

The likelihood of two students in an MSA attending different districts. The likelihood of two students in an MSA attending different districts is a popular measure of fragmentation. The likelihood of two students in an MSA attending different districts varies from 0, meaning no fragmentation, to 1, meaning complete fragmentation. There would be complete fragmentation if every child attended their own district and complete incorporation if every child attended one school district. 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. The likelihood of two students in the MSA attending different districts has a mean of .08, a minimum of 0 (Hagerstown, PA), and a maximum of 0.25 (Sarasota-Bradenton, FL).

As discussed, the total number of places with a minimum 10,000 population per 1 million MSA residents is one of the more common measures of fragmentation. Total number of places with a minimum 10,000 population per 1 million, total share of the population residing outside the largest city, and the likelihood of two students in an MSA attending different districts are the most the fruitful measures of fragmentation since they each may capture decentralization and are focused on more heavily in this analysis.

Measures of fragmentation that utilized places were calculated using data for incorporated places only. The U.S. Census dataset includes incorporated places, unincorporated places, and the remainder as rural populations. The presumption of the fragmentation hypothesis is that cities enact land use regulations that may restrict the movement of population groups. Regulatory authority over land use applies only to incorporated cities and does not generally apply to unincorporated places and rural areas.

Control Variables

This study incorporates several control variables to account for any spurious effects that political fragmentation may have on residential segregation. The data for the control variables listed come from Census 2000 Summary File 1 and Summary File 3 data releases. The control variables are:

The percentage of housing units built after the Fair Housing Act in 1968. According to previous research, housing built 1980+ should affect segregation outcomes because they are under “new housing rules” enacted in 1968 and 1974 (Denton 1999). The percentage of housing units built after the Fair Housing Act in 1968 has a mean of 52.97, a minimum of 19 (New York, NY), and a maximum of 90.18 (Naples, FL).

The percentage of housing units vacant. Previous research has found relationships with residential segregation and the number of vacant housing units in an area (Stearns and Logan 1986; South and Crowder 1998). It is argued that a greater surplus of housing has an effect on the ability for residents to relocate in the first place. Stearns and Logan

(1986) find that a higher amount of vacant housing units relates to lower amounts of black-white segregation. Lastly, Berry (1976) found that neighborhood price levels affected the movement of blacks into white and integrated neighborhoods. The percentage of housing units vacant has a mean of 8.27, a minimum of 2.17 (Nashua, NH), and a maximum of 35.03 (Barnstable-Yarmouth, MA).

The percentage of the civilian labor force employed in public administration. Previous research has used the percentage employed in public administration to analyze black-white segregation in metropolitan areas with a strong economic base in the government. Iceland and Wilkes (2006) in their study analyzing socioeconomic status and its effect on residential segregation used several variations of occupational categories similar to that as public administration. Percentage of the labor force in public administration has a mean of 5, a minimum of 1.70 (Elkhart-Goshen, IN), and a maximum of 19.37 (Springfield, IL).

The percentage of the total labor force in the armed forces. Farley (1991:281) found that black-white segregation may be influenced in a metropolitan that has strong economic ties to a military base. Metropolitan areas with strong military ties are associated with decreased amounts of segregation between non-Hispanic whites and non-Hispanic blacks (Logan, Stultz, and Farley 2004:14). The percentage of the labor force in the armed forces has a mean of 1.34, a minimum of .01 (Santa Cruz-Watsonville, CA), and a maximum of 38.07 (Jacksonville, NC).

The percentage of the total population enrolled in undergraduate college. The percentage of the population that is enrolled in college has also been considered a characteristic that may have an effect on the degree of residential segregation (Logan et al. 2004:14). This control, along with the percentage of the total labor force in the armed forces, the percentage of the total labor force in public administration, and the percentage of the total population retired are considered a part of a broader control, the functional or economic specialization of the metropolitan (Farley and Frey 1994; Logan et al. 2004). The percentage of the population enrolled in college has a mean of 20.46, a minimum of 9.71 (Yakima, WA), and a maximum of 55.10 (Bryan-College Station, TX).

Age of the MSA. Previous segregation research has suggested that older metropolitan areas have higher levels of segregation between blacks and whites (Logan et al. 2004). Older metropolitans contain neighborhoods that were likelier to have been developed during times of overt racist policies, as well as have developed through historical population patterns and economic hardships. The *Age of the MSA* is determined by the decade (decennial Census) that the central city of the Metropolitan area reached a population of 50,000. *Age of the MSA* is then operationalized as a dummy variable and broken into four time periods:

1900 and earlier (N = 69)

1910-1940 (N = 82)

1950-1960 (N = 38)

1970 and later (N = 76)

Age of the MSA is a multi-category variable represented by dummy variables. MSAs with a central city that never reached 50k remains as the reference group. Since the choice of the reference category is arbitrary, one cannot definitively ascertain the strength and significance of the individual dummy variables because their coefficients and t-ratios will vary depending on the arbitrary choice of the reference category. Thus, Age of the MSA should be tested as a set since the dummy variables are being used to assess the effect of a single conceptual variable (Kerlinger and Pedhazur 1973; Smith and Sasaki 1979). For this reason, a Global F test was utilized to ascertain the statistical significance of Age of the MSA and to determine whether the variable improves the model predictions.

The percentage white for the MSA. Previous literature suggests a large population percentage of whites will have an effect on the in-migration of blacks into white communities (South and Crowder 1998). Previous research studies have used different variations of measuring population size and have ultimately found that population and group size is linked to residential segregation (Logan et al. 2004; South and Crowder 1998). Percent white has a mean of 87.3, a minimum of 47.72 (Albany, GA), and a maximum of 99.70 (Provo-Orem, UT).

Minority educational attainment. Previous research has found non-Hispanic blacks with a higher education degree are less segregated than those without a college degree (Logan et al. 2004:3). Educational attainment has a mean of 23.71, a minimum of 11.05 (Merced, CA), and a maximum of 52.38 (Boulder-Longmont, CO).

Nativity. Nativity represents the percentage of the population that is foreign born for the year 2000. Logan et al. (2004:16) note that rapid growth in immigration amongst certain minority groups may contribute to an increase in residential segregation. Nativity has a mean of 7.47, a minimum of 0.85 (Huntington-Ashland, WV-KY-OH), and a maximum of 50.94 (Miami, FL).

Percent of school-aged population in private school. Researchers note that in neighborhoods with a similar aged population, and less of a need for private schools, residential segregation will be reflected in the demographic make-up of the schools (Denton 1996:813). Areas with a larger number of private schools affords the opportunity for households of various ethnicities to live alongside each other while attending separate schools. The percentage of school-aged children enrolled in private school has a mean of 10.33, a minimum of 2.48 (McAllen-Edinburg-Mission, TX), and a maximum of 24.82 (New Orleans, LA).

Suburbanization. Researchers note that suburbanization is capable of reducing black-white segregation but there is no consensus whether desegregation occurs or if suburbanization affords the opportunity for minorities to cluster outside the central city instead of clustering inside the central city (Logan et al. 2004:13). Suburbanization is measured as the percentage of non-Hispanic blacks living within the metropolitan area but not in the central city. Suburbanization has a mean of 38.81, a minimum of 0 (Anchorage, AK), and a maximum of 87.78 (Riverside-San Bernardino, CA).

Natural log of the total MSA population. The size of the population within the MSA has been found to be positively related to the amount of residential segregation (Logan et al. 2004:13). This research study measures size by the natural log of the total population. The natural log transformation is used to capture non-linearity in the effect of city size wherein increases in the absolute size (e.g. 100,000) take in less importance at higher levels of overall size. The natural log of the population has a mean of 12.66, a minimum of 10.81 (Victoria, TX), and a maximum of 15.66 (Chicago, IL).

Aggregate Level Analyses

I first begin by examining covariation amongst the measures of fragmentation and measures of segregation. Figure 1 presents a scatterplot matrix depicting associations between measures of fragmentation based on data for places with measures of segregation. The associated correlation matrix is present in Table 2. Figure 2 presents a similar scatterplot matrix depicting associations between measures of fragmentation based on data for school districts and measures of segregation. The associated correlation matrix is presented in Table 3. Both figures show that the alternative measures of fragmentation are correlated but only at modest levels (|r| ranges from 0.05 to 0.62) thus indicating that there are substantial differences between the alternative measures of fragmentation. The figures similarly show that there is substantial variation in the nature of the relationship between different measures of fragmentation and different measures of residential segregation (|r| ranges from 0.02 to 0.42).

The figures also show that there are similarities and differences among the segregation indices. As expected, the correlation between the dissimilarity index (D) and the Hutchens index (R) is very strong (r=0.99) and the relationship between the Theil index (H) and the Separation index (S) also is strong (r=0.94) albeit not quite at the level observed between D and R. Also as anticipated, the relationship between D and S is only moderate (r=0.49) because D can take high scores when scores for S are low since D responds equally to small and large departures from parity while S responds primarily to large departures from parity.

Figure 1. Covariation Matrix: Place Fragmentation and Residential Segregation for MSAs with a Minimum 1,000 non-Hispanic Black Population

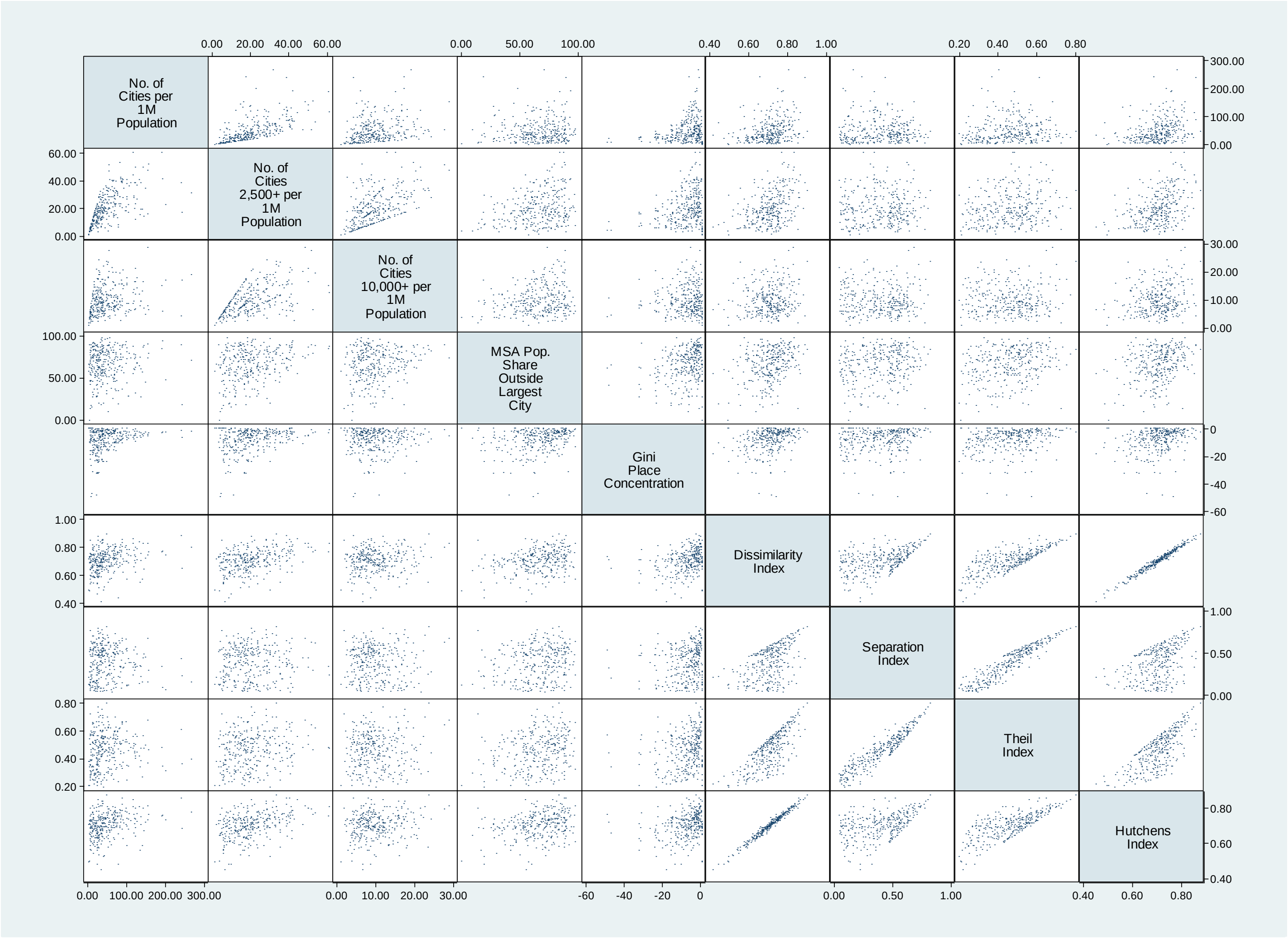
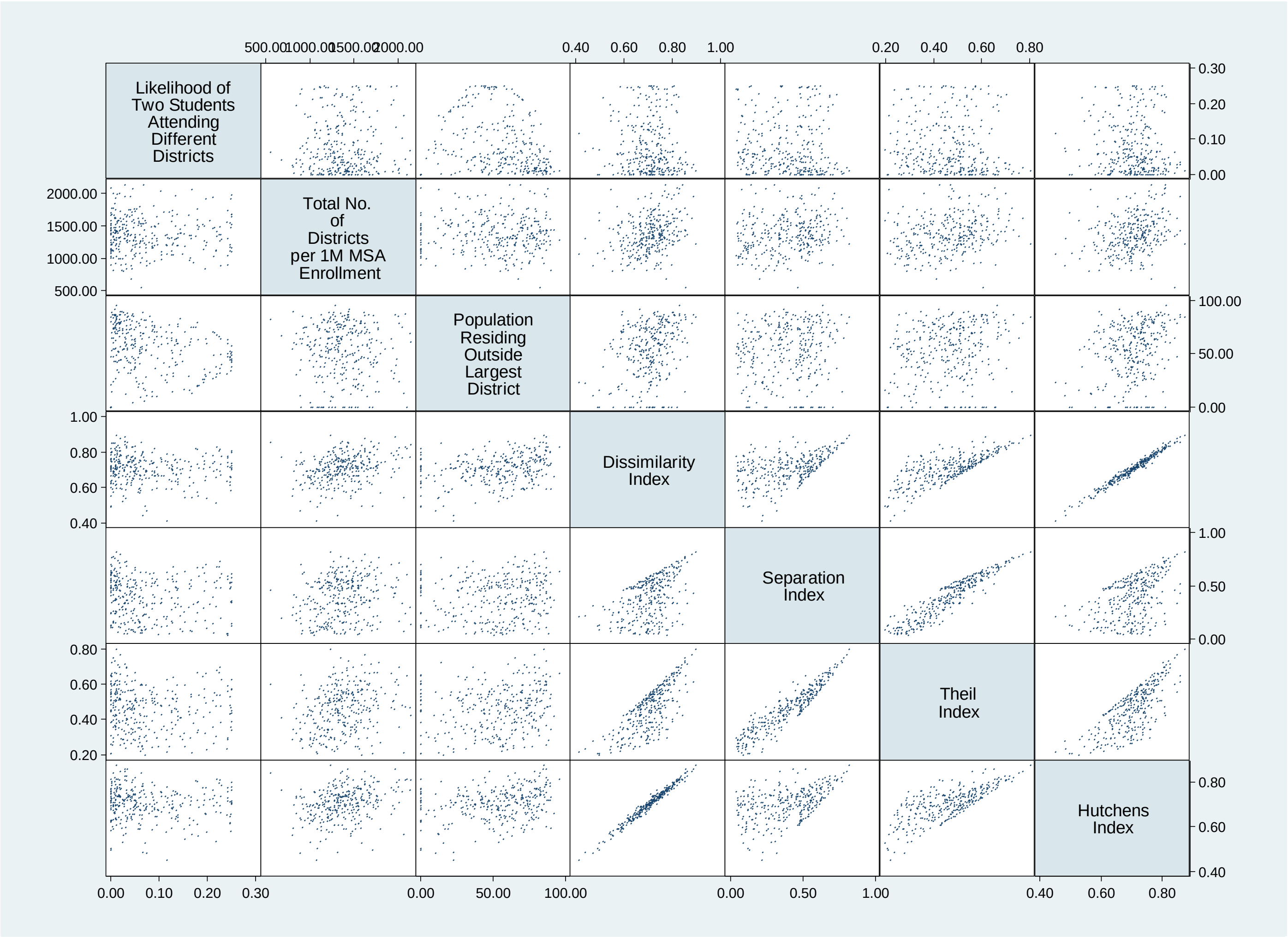


Figure 2. Covariation Matrix: School District Fragmentation and Residential Segregation for MSAs with a Minimum 1,000 non-Hispanic Black Population



Review of the correlations reported in Tables 2 and 3 shows that most relationships differ from zero by an amount that is substantively interesting (i.e., $|r| > 0.12$) are in the expected direction and are statistically significant. In most cases the expected correlation is positive. The exceptions are the correlations involving the Gini concentration measure of fragmentation in Table 2 and correlations involving the likelihood of two students in an MSA attending different districts in Table 3. These are explained by the fact that the values of these two measures of fragmentation inherently correlate inversely with the values of the other measures of fragmentation. After allowing for this, the zero-order associations between measures of fragmentation and segregation are in the expected direction when they depart from zero, but $|r|$ never exceeds 0.42 in Table 2 or 0.31 in Table 3.

Table 2. Place Fragmentation and Residential Segregation Covariation

	Frag1	Frag2	Frag3	Frag4	Frag Gini	(D)	(S)	(H)	(R)
Frag1	1.00								
Frag2	0.62	1.00							
Frag3	0.25	0.55	1.00						
Frag4	0.05	0.30	0.19	1.00					
Frag Gini	0.27	0.29	0.05	0.25	1.00				
(D)	0.27	0.40	0.14	0.32	0.28	1.00			
(S)	-0.04	0.04	-0.02	0.18	0.16	0.49	1.00		
(H)	0.09	0.20	0.05	0.26	0.23	0.76	0.94	1.00	
(R)	0.29	0.42	0.16	0.31	0.27	0.99	0.47	0.75	1.00

N = 310; Correlations with absolute values above 0.12 are statistically significant at $p < 0.05$. Frag1 is Total Number of Cities per 1 Million MSA Residents. Frag2 is the Total Number of Cities with a minimum 2,500 population per 1 Million MSA Residents. Frag3 is Total Number of Cities with a minimum 10,000 population per 1 Million MSA Residents. Frag4 is the Total Share of the Population Residing Outside the Largest City. Frag Gini is the Place Concentration measure using the Gini Index.

Table 3. School District Fragmentation and Residential Segregation Covariation

	SDFrag1	SDFrag2	SDFrag3	(D)	(S)	(H)	(R)
SD Frag1	1.00						
SD Frag2	0.00	1.00					
SD Frag3	-0.11	-0.02	1.00				
(D)	-0.08	0.28	0.31	1.00			
(S)	-0.06	0.18	0.09	0.49	1.00		
(H)	-0.09	0.25	0.19	0.76	0.94	1.00	
(R)	-0.07	0.28	0.29	0.99	0.47	0.75	1.00

N = 311; Correlations with absolute values above 0.12 are statistically significant at $p < 0.05$. SD Frag1 is the Likelihood of Two Students in an MSA Attending Different Districts. SD Frag2 is the Total Number of School Districts per 1 Million MSA Enrollment. SD Frag3 is the Total Share of the Population Residing Outside the Largest School District.

I next turn to review fractional logit regression analyses that assess the strength and direction the effects of measures of fragmentation and relevant control variables have on the measures of segregation. Following Papke and Wooldridge (1996), I use fractional logit regression analysis because it will ensure that model predictions fall between 0 and 1 without requiring additional statistical procedures such as quadratic equations and special model constraints (Kumlin 2010:422).

A fractional logit regression is modeled as follows:

$$\mathrm{E}(\gamma_\iota|\chi_\iota) = G(\chi_\iota\beta)$$

where $G(.)$ is the logistic cumulative distribution function (c.d.f.), χ is the values of the independent variables of individual ι , and β is the parameters that indicate the effect of a given χ on the dependent variable, which in this case is residential segregation (Kumlin 2010:422). The model is implemented in Stata by using the "fracreg" procedure or the generalized linear model (glm) routine with link function set to "logit" and the distribution family set to "binomial". Additionally, the robust estimation option is specified and under this specification the assumptions for statistical hypothesis testing are satisfied. In contrast, OLS estimation of the same model would inappropriately yield linear, additive effects that are potentially nonsensical because effects of any given independent variable on a bounded dependent variable cannot remain constant when settings of other independent variables change and thus OLS can yield inaccurate and misleading predictions including predictions outside the logical 0-1 range of the dependent variable (Papke and Wooldridge 1996:619).

Results

I report results for a series of fractional logit regression models designed to examine the impact political fragmentation has on residential segregation. The regression models vary by including alternative measures of segregation and alternative measures of fragmentation to come to a more robust conclusion about the relationship between the two. In addition, the models also include several control variables that previous research has found as being a factor on residential segregation.

The analyses I report here extend and enhance a previous study I conducted investigating this topic (Amaro 2013). In my earlier study, I found an inconsistent and weak positive relationship between residential segregation and political fragmentation. Some measures of fragmentation I considered did not have consistent, significant effects. Two measures - namely, *Total Number of Cities with a minimum 10,000 population per 1 Million MSA Population* and *Share of the MSA Residing outside the Largest City* - did yield suggestive results consistent with the fragmentation hypothesis. Here I extend my earlier analysis by developing more refined measures of fragmentation. In particular, I distinguish more carefully between the kinds of places identified by census geographic place codes and limit my focus to incorporated places (i.e. cities and equivalent units) since the legal standing of these entities coincides more appropriately with city limits and municipal boundaries that are most relevant to the fragmentation hypothesis.

Lastly, the discussion that follows will summarize the findings of the aggregate analyses by each measure of segregation. Detailed equation tables that include all measures of fragmentation and control variables for each measure of segregation can be found in Appendix A of this dissertation.[1]

Separation Index

Tables 35 thru 42 present the results for a sequence of equations where various measures of fragmentation are modeled with residential segregation which is measured using the separation index. As anticipated, the relationship between fragmentation and residential segregation varies between the differing measures of fragmentation. For example, when modeled with the total number of cities per 1 million MSA residents, models 10-12 have the only statistically significant relationships with residential segregation with coefficients that vary between 0.157 and 0.246 (Table 35). These three models include the full set of control variables with the exception of excluding, in sequence, percentage of the housing units vacant, percentage of the population in the armed forces, and percentage of the housing built post-FHA.

The relationship between fragmentation and residential segregation becomes stronger and more often statistically significant as the measures of fragmentation capture only places that have a minimum 2,500 or a minimum 10,000 population (Table 36 and Table 37). Many of these statistically significant relationships appear in equations where the relationship is modeled along with several control variables. For example, the total number of cities with a minimum 10,000 population per 1 million MSA residents has a

[1] Regression models with all of the control variables are not entirely included in this discussion. Several of the control variables, when included in the regression model with other controls, exhibited small and insignificant relationships with residential segregation and were excluded from the discussion when other factors may have displayed more statistically meaningful relationships with residential segregation.

statistically significant relationship in models 11, 12, 14, 15, and 16 with a coefficient that varies between 1.336 and 2.034.

The relationship is statistically significant in almost all of the models when fragmentation is measured by the total MSA population share residing outside the largest city (Table 38). In model 15, which includes all control variables except for Age of the MSA, fragmentation has an effect of 1.251. The estimated effect is minimally larger in models where other control variables are excluded from the analysis. So the effect observed in model 15 is robust to changes in the model specification. The range for this measure of fragmentation is from a low of 0.274 to a high of 1.570. Based on the first derivative calculation p(1-p)b where p is the initial level of segregation and b is the logit coefficient for the independent variable, the maximum slope for the effect of fragmentation on segregation in its natural metric is 0.313 (from 0.5(0.5)1.251). The actual change of moving from low to high on fragmentation would depend on the expected level of segregation based on the values of the other independent variables. Assessed purely in quantitative terms, this is not a large effect compared to the effects of some other variables in the model such as population size and MSA percent white but it is similar in magnitude to the effects of variables like suburbanization and post-FHA housing.

The remaining analyses that implement Gini place concentration, the likelihood of two students in an MSA attending different school districts, the number of school districts per 1 million students enrolled, and the share of the population residing outside the largest school district tend to be much weaker and statistically insignificant than the previous place measures of fragmentation. When modeled with larger sets of control of variables (models 10 thru 16), Gini place concentration is statistically insignificant. Of the school district measures of fragmentation, the total number of school districts per 1 million MSA students enrolled is the only fragmentation measure statistically significant in 9 out of 16 models. Its relationship with residential segregation is weak and never greater than 0.068, although this may be due to the measure of fragmentation having a large range (550.80 to 2,141.81).

Control Variables

In general, the control variables have consistent, statistically significant effects in the expected direction across models. Several control variables have effects on residential segregation that are clearly stronger than the effects of political fragmentation. The effects of MSA percent white, Armed Forces presence, new housing, and suburbanization have negative effects on segregation. City size and vacancy have positive effects. The set of dummy variables for age of the MSA suggest that older cities tend to have higher degrees of segregation but its relationship is statistically insignificant in the global F-test. Since older cities tend to be larger, age of the MSA is not important net of its association with city size.

Best Model and Diagnostic Models

Since the control variables generally have effects that are consistent, statistically significant, and in the directions expected, I view model 15 as perhaps the "best single model" to examine for an overall assessment of the effect of fragmentation. This model includes all of the control variables except age of the MSA. I view models 1 through 14 as useful for diagnostic purposes to provide information about whether the effect of fragmentation is robust across a range of model specifications involving different combinations of control variables.

Overall the analyses assessing effects of the various measures of fragmentation on residential segregation measured by the separation index, produced mixed results. Three measures of place fragmentation had positive, statistically significant effects on segregation in model 15 which includes the primary control variables. The three measures were the total number of cities with a minimum 2,500 population per 1 million MSA residents (Table 36), the total number of cities with a minimum of 10,000 population per 1 million MSA residents (Table 37), and total population share residing outside of the primary central city (Table 38). The effect of total population share comes through most clearly and consistently. It is statistically significant in the expected direction across most models including model 15 which includes a full complement of controls. It attains statistical significance more consistently and more clearly (i.e. at lower p values) than other measures of place fragmentation. As noted earlier the effect is not as large as the effect of city size and MSA percent white, but it is similar in size to the effect of suburbanization and post-FHA housing. Finally, the finding that the effect is present and robust provides support for the guiding hypothesis that fragmentation may have consequences for segregation.

The results from analyses using measures of school district fragmentation produced few supportive results. Measures of school district fragmentation mostly had weak and statistically insignificant effects on segregation.

Dissimilarity Index

Tables 43 thru 50 present the results for a sequence of equations where various measures of fragmentation are modeled with residential segregation which is measured using the dissimilarity index. The relationship between fragmentation and residential segregation also varies between the differing measures of fragmentation. The total number of cities per 1 million MSA residents exhibited a weak and statistically significant relationship that ranged between 0.163 and 0.349 (Table 43). This relationship continues to be statistically significant as the measures of fragmentation capture only places that have a minimum 2,500 or a minimum 10,000 population but becomes stronger with coefficients that ranged between 0.873 and 1.719 (Table 44 and Table 45). The relationship mostly becomes weaker when modeled with total share of the MSA population residing outside the largest city and statistically insignificant when modeled with place concentration.

The fragmentation measures using school districts continue to display patterns seen in the analysis with the separation index. The total number of school districts relative to MSA student enrollment is the only fragmentation measure that has statistical significance in most models (Table 49). The statistically significant models are weak although the relationship is similar in strength to that of other fragmentation measures due to total number of school districts per 1 million MSA students enrolled having a much wider range than other fragmentation measures.

Control Variables

With the exception of age of the MSA and suburbanization, the control variables consistently have statistically significant effects in the expected direction across models. Age of the MSA is statistically insignificant in the global F-test when modeled with all measures of fragmentation. MSA percent white, percent in the Armed Forces, and percentage of housing units built post-FHA have negative effects on residential segregation. City size and percentage of the housing units vacant have positive effects across all models. In model 15 and across the different measures of fragmentation, city size has the highest coefficient that ranges between 0.067 and 0.113 and statistically significant.

Overall, the analyses assessing effects of the various measures fragmentation on residential segregation measured by the dissimilarity index, produced mixed results although much more stable than the results utilizing the separation index. Five measures of fragmentation had positive, statistically significant effects on segregation in model 15 which includes the primary control variables. The measures were the total number of cities per 1 million MSA residents (Table 43), the total number of cities with a minimum 2,500 population per 1 million MSA residents (Table 44), the total number of cities with a minimum 10,000 population per 1 million MSA residents (Table 45), the total share of MSA population residing outside the largest city (Table 46), and the total share of the MSA population residing outside the largest school district (Table 50). The clearest and strongest relationship occurs with the total number of cities with a minimum 10,000 population per 1 million MSA residents which has a 1.307 coefficient that is statistically significant at the 0.01 level. These findings continue to display an effect that is present which supports the guiding hypothesis that fragmentation may have consequences for segregation.

Theil

Tables 51 thru 58 present the results for a sequence of equations where various measures of fragmentation are modeled with residential segregation which is measured using the Theil index. The relationship between fragmentation and residential segregation using the Theil index is similar the findings using previous measures of segregation. Fragmentations relationship becomes stronger as fragmentation begins to capture only places that have a minimum 2,500 or a minimum 10,000 population. In model 15, fragmentation is statistically significant except when measured as place concentration and except when measured using any of the school district fragmentation measures.

Control Variables

The control variables have consistent statistically significant effects in the expected direction across models. As in previous analyses, the effects control variables have on residential segregation measured using the Theil index is stronger than the effect of fragmentation but the effects are similar in size to the effect of suburbanization and post-FHA housing. In model 15, city size has the strongest relationship with residential segregation with a 0.182 coefficient that is statistically significant when modeled with the total number of cities with a minimum 10,000 population per 1 million MSA residents (Table 53). Percentage of housing units vacant also has statistically significant effects across all models.

Overall, the analyses assessing effects of the various measures of fragmentation on residential segregation, measured by the Theil index, also produced mixed results. Four measures of place fragmentation had positive and statistically significant effects on residential segregation in model 15. The four measures were the total number of cities per 1 million MSA residents (Table 51), the total number of cities with a minimum 2,500 population per 1 million MSA residents (Table 52), the total number of cities with a minimum 10,000 population per 1 million MSA residents (Table 53), and the total share of the MSA population residing outside the largest city (Table 54). The total number of cities with a minimum 10,000 population had the greatest strength (1.354) statistically significant at the 0.001 level although the four fragmentation measures were generally consistent with each other ranging from 0.159 to 1.354 in model 15. Although not displaying the greatest strength in model 15, total share of the MSA population residing outside the largest city has statistically significant effects at lower p values than other measures of fragmentation.

Hutchens Square Root Index

Tables 59 thru 66 present the results for a sequence of equations where various measures of fragmentation are modeled with residential segregation which is measured using the Hutchens index. I do not discuss the findings in as depth as I have for the previous measures of segregation because the relationship between fragmentation and residential segregation using the Hutchens index are very similar.

In sum, the analyses assessing the effects of the various measures of fragmentation on residential segregation, measured by the Hutchens index, produced encouraging results. Four measures of fragmentation had positive and statistically significant effects on segregation in model 15. The four measures were the total number of cities per 1 million MSA residents (Table 59), the total number of cities with a minimum 2,500 population per 1 million MSA residents (Table 60), the total number of cities with a minimum 10,000 population per 1 million MSA residents (Table 61), and the total share of the MSA population residing outside the largest city (Table 62). When modeled with the four fragmentation measures of fragmentation, Hutchens displayed a consistent statistically significant and positive effect with residential segregation but its greatest effect was with the total number of cities with a minimum 10,000 population per 1 million MSA residents.

Discussion

The aggregate level analyses was modeled using several alternative measures of segregation and several alternative measures of fragmentation. These models all aimed to measure the extent to which fragmentation affects residential segregation and come to a more robust conclusion the relationship between the two. I determine that model 15, which includes all control variables except for age of the MSA, was the best model to assess the relationship between residential segregation and fragmentation while the accompanying models were helpful for diagnostic purposes.

When modeled with the separation index, place measures of fragmentation were mostly significant in model 15 although not as strong in significance when modeled with other measures of segregation. Looking past significance, the separation index would move between a negative relationship with fragmentation and a positive relationship with fragmentation. This may be due to the separation index's behavior of responding "strongly to displacement from even distribution only in situations when it produces group separation and area ethnic polarization" (Fossett 2016a). Thus, the separation index for an MSA may be low when dissimilarity and Hutchens index values are high. In the "best model", total number of cities with a minimum 2,500 population per 1 million MSA residents, total number of cities with a minimum 10,000 population, and the total share of the MSA population residing outside the largest city had statistically significant effects with the total number of cities with a minimum 10,000 population having the greatest fragmentation effect on residential segregation.

When modeled with the dissimilarity index, measures of fragmentation increase in significance over the separation index and continue to have positive and statistically significant effects with five measures of fragmentation - the total number of cities per 1 million MSA residents, the total number of cities with a minimum 2,500 population per 1 million MSA residents, the total number of cities with a minimum 10,000 population per 1 million MSA residents, the total share of the MSA population residing outside the largest city, and the total share of the MSA population residing outside the largest school district. The total number of cities with a minimum 10,000 population per 1 million MSA residents had the strongest fragmentation effect on residential segregation.

Analyses using the Theil and Hutchens models repeat the behavior of previous analyses although Hutchens seems to have had a few more models reach statistical significance over the previous measures of segregation. These two measures of segregation also had the best empirical performance with four place measures of fragmentation - the total number of cities per 1 million MSA residents, the total number of cities with a minimum 2,500 population per 1 million MSA residents, the total number of cities with a minimum 10,000 population per 1 million MSA residents, the total share of the MSA population residing outside the largest city, and the total share of the MSA population residing outside the largest school district. The total number of cities with a minimum 10,000 population per 1 million MSA residents had the strongest fragmentation effect on residential segregation for both measures of segregation.

Place concentration, the likelihood of two students in an MSA attending different school districts, the total number of school districts per 1 million MSA students enrolled, and total share of the MSA population residing outside the largest school district did not have consistent relationships with residential segregation and were statistically insignificant most of the time.

I assess the total number of cities with a minimum 10,000 population per 1 million MSA residents as being the best measure fragmentation in this analysis. Conceptually, total number of cities with a minimum 10,000 population per 1 million MSA residents is the more fruitful measure of fragmentation because it may serve as a proxy for other fragments in the form of special districts, utility districts, and school districts since all are likely to occur in larger populations. This measure of fragmentation excludes cities with too small of a population to have any sociological meaningful impact on residential segregation. Empirically, this measure of fragmentation has the strongest and statistically significant effect on residential segregation of all measures of fragmentation on all measures of segregation.

Table 4 summarizes the model 15 regression results for total number of cities with a minimum 10,000 population per 1 million MSA residents and residential segregation which included all control variables except for age of the MSA. Fractional logit regression results can be difficult to interpret. Generally, in Table 4 summarizing the model 15 results, fragmentation is positively associated with residential segregation and statistically significant. To ease the interpretation of the effect fragmentation has on residential segregation, I transform the logit coefficients to instantaneous slope effects. Table 5 presents the results for the transformed fractional logit regression effects using fragmentation measures in their natural metric (i.e. not multiplied by 100). These effects calculate the maximum slope effect at the middle point where ((p)*(1-p))*b evaluated at y = 0.50. Table 6 presents the results for the transformed fractional logit regression effects by calculating minimal slope effect, near the bounded area of the slope evaluated at y = 0.80.

Across all measures of segregation, the maximum slope for the effect of fragmentation on segregation in its natural metric is 0.003. The maximum slope for the effect of MSA percentage white, percentage vacant, and suburbanization have consistent direction but vary in strength depending the measure of segregation. The maximum slope for the effect of city size on segregation was greater than all other variables in the model with a range between 0.02 and 0.07. Although not having the strongest effect on residential segregation, the strength of fragmentation is similar to other control variables such as the percentage of housing units built post-FHA. These patterns remain true when analyzing the minimal slope effect evaluated at y = 0.80.

Table 4. Residential Segregation and Total Number of Cities with a Minimum 10,000+ Population per 1 Million MSA Residents - Summary Findings

	Separation Index	Dissimilarity Index	Theil Index	Hutchens Index
Number of Cities 10,000+ per 1 Million MSA Residents	1.336*	1.307***	1.354***	1.278***
	(0.624)	(0.343)	(0.399)	(0.307)
% White	-0.053***	-0.004**	-0.025***	-0.002
	(0.003)	(0.001)	(0.002)	(0.001)
% Housing Units Vacant	0.055***	0.031***	0.042***	0.029***
	(0.010)	(0.005)	(0.007)	(0.005)
% of Population in Armed Forces	-0.052***	-0.041***	-0.048***	-0.036***
	(0.009)	(0.005)	(0.006)	(0.004)
% of Housing Built Post-FHA	-0.015***	-0.012***	-0.013***	-0.010***
	(0.002)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.005***	-0.003**	-0.004***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Total Population (log)	0.281***	0.106***	0.182***	0.087***
	(0.029)	(0.017)	(0.020)	(0.015)
Constant	1.124	0.274	0.105	0.206
	(0.587)	(0.291)	(0.377)	(0.267)
Observations	310	310	310	310

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.
*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 5. Residential Segregation and Total Number of Cities 10,000+ per 1 Million MSA Residents - Summary of Effects - Instantaneous Slope - Evaluated at y = 0.50

	Separation Index	Dissimilarity Index	Theil Index	Hutchens Index
Fragmentation	0.00325	0.00325	0.00350	0.00325
% White	-0.01325	-0.00100	-0.00625	-0.00050
% Housing Units Vacant	0.01375	0.00775	0.01050	0.00725
% of Population in Armed Forces	-0.01300	-0.01025	-0.01200	-0.00900
% of Housing Built Post-FHA	-0.00375	-0.00300	-0.00325	-0.00250
Suburbanization	-0.00125	-0.00075	-0.00100	-0.00050
Total Population (log)	0.07025	0.02650	0.04550	0.02175
Constant	0.28100	0.06850	0.02625	0.05150
Observations	310	310	310	310

Note: All effect coefficients are statistically significant by at least the 0.05 level. First derivatives are calculated at the point in the slope with the greatest effect on residential segregation where p=0.50

Table 6. Residential Segregation and Total Number of Cities 10,000+ per 1 Million MSA Residents - Summary of Effects - Instantaneous Slope - Evaluated at y = 0.80

	Separation Index	**Dissimilarity Index**	**Theil Index**	**Hutchens Index**
Fragmentation	0.00208	0.00208	0.00224	0.00208
% White	-0.00848	-0.00064	-0.00400	-0.00032
% Housing Units Vacant	0.00880	0.00496	0.00672	0.00464
% of Population in Armed Forces	-0.00832	-0.00656	-0.00768	-0.00576
% of Housing Built Post-FHA	-0.00240	-0.00192	-0.00208	-0.00160
Suburbanization	-0.00080	-0.00048	-0.00064	-0.00032
Total Population (log)	0.04496	0.01696	0.02912	0.01392
Constant	0.17984	0.04384	0.01680	0.03296
Observations	310	310	310	310

Note: All effect coefficients are statistically significant by at least the 0.05 level. First derivatives are calculated at the point in the slope near the bounded area and thus a low effect on residential segregation where p=0.80

The final examination of the aggregate level analysis results is where I investigate the impact fragmentation has on residential segregation at varying profiles of fragmentation (Table 7). The assessment examines the impact fragmentation has on residential segregation if fragmentation were set to low scores, observed scores, and high scores. The total number of cities with a minimum 10,000 population per 1 million MSA residents ranges between 1.14 and 28.89. I categorize the low fragmentation profile as 2.00. The observed profile scores are equivalent to the mean score of fragmentation of 10.08. Finally, the high fragmentation profile scores are set to 28.00.

The assessment using the fragmentation profiles is promising because it shows that cities with higher fragmentation have greater impacts on the segregation score relative to cities with lower fragmentation. Across all measures of segregation, fragmentation has a difference between 0.06 and 0.09 going from low to high fragmentation profiles. Thus the findings are robust that higher fragmentation has stronger impacts on residential segregation.

Table 7. Residential Segregation and Total Number of Cities 10,000+ per 1 Million MSA Residents - Predictions Based on High, Observed, and Low Profiles

		Fragmentation	Separation Index	Dissimilarity Index	Theil Index	Hutchens Index
Fragmentation	**Low**	2.00	0.36080	0.68834	0.43418	0.68474
	Observed	10.08	0.38605	0.71054	0.46121	0.70660
	High	28.00	0.44409	0.75626	0.52176	0.75176

In this Chapter, I investigated the empirical relationship between residential segregation and political fragmentation at the aggregate level across U.S. metropolitan areas. All models taken as a whole, fragmentation has a weak, and mostly positive, relationship with residential segregation. The results of the aggregate level analyses, although modeled with the intent to come to a more robust conclusion about whether segregation crystallizes along fragment boundaries, do not allow for the definitive conclusion regarding the relationship between the two. According to the results, the relationship between fragmentation and residential segregation, when there, is weak. In addition, the aggregate level analysis alone cannot attest to that fact the finding are not the result of any spurious effects which leads us to the next chapter which further partitions residential segregation as it relates to cities and fragments in an MSA.

CHAPTER VI

FORMAL AND SIMPLE METHODS FOR DECOMPOSING SEGREGATION

In this chapter I perform decomposition analyses to determine how segregation at different spatial levels, such as cities, tracts, and block determines overall segregation in the city. I first review methods for decomposing segregation across nested geographic levels to establish how the overall level of segregation can be quantitatively partitioned into contributions that originate at different spatial levels. Specifically, I review the decomposition methods developed by Reardon and Firebaugh (2002) and then outline how the components of their decomposition for segregation across nested geographies can be obtained by simpler calculations as clarified by Fossett (2016b)[2] .

Methodological Decomposable Properties

Methods for performing decomposition analysis of segregation to assess how segregation at different spatial levels contributes to the overall segregation score for the city is set forth in Reardon and Firebaugh (2002). Reardon and Firebaugh (2002:38) identify two decomposability properties which are desirable for segregation indices: additive organizational decomposability and additive group decomposability. The property of interest for this dissertation is the additive organizational decomposability property. Additive organizational decomposability refers to the capability of a segregation

[2] A significant amount of the discussion in this chapter was developed during 'Segregation Group' meetings held by Dr. Mark Fossett. The group meetings are held semiregularly between Spring 2014 and Summer 2016 in the Department of Sociology at Texas A&M University - College Station. The Segregation Group meetings are used as an opportunity to discuss issues in residential segregation and segregation measurement not covered in currently available scientific research.

measure to decompose "into a sum of independent within- and between- cluster components" (Reardon and Firebaugh 2002:38). Reardon and Firebaugh (2002:52) conclude that a measure of segregation has additive organizational decomposable capabilities if:

Total segregation can be partitioned into $K + 1$ independent additive components, which is a between-cluster component and K within-cluster components. The portion of total segregation due to segregation within cluster k should be the amount by which total segregation would be reduced if segregation within cluster k were eliminated by rearranging individuals among its units while leaving all other units unchanged.

In empirical analyses, decomposable measures are commonly used to measure segregation across nested levels such as block, block group, and tract levels. These measures also have the capabilities to measure segregation at other nested relationships such as macro and micro levels which can reveal the importance of within-city, within-suburb, within-fringe, between-city-suburb-fringe, and between-suburb-to-suburb components in a metropolitan area (Lichter et al. 2015:853).

Decomposable Measures of Segregation - The Detailed Formal Calculations

Reardon and Firebaugh (2002:56) identify four measures of segregation that satisfy the additive organizational decomposability properties: the Theil index, the squared coefficient of variation, the relative diversity index, and the normalized exposure index which is equivalent to the separation index. In the following section I review Theil index (H) and the separation index (S), which is the mathematical equivalent of the normalized exposure index as discussed in Reardon and Firebaugh (2002). I also discuss the Hutchens square root index (R) which was not included in Reardon and Firebaugh's (2002) discussion - due to being relatively newer than other segregation measures - but also has the property of being additively organizational decomposable (Hutchens 2004). Reardon and Firebaugh's (2002) article discusses the decomposition in the context of investigating multi-group segregation. Multi-group segregation measures are constructed from complex weightings of two-group segregation measures. This additional complexity is not relevant to the discussion here. So I review decomposition methods as applied in the less complicated context of a two-group segregation comparison.

Reardon and Firebaugh's (2002) formula for a decomposable two-group Theil index is as follows:

$$H = H_k + \sum (t_k/T) * (e_k/E) * h_k$$

where T is the city-level total for the combined population of group 1 and group 2, E is the entropy value for the city as a whole, t_k is the total for the combined population of group 1 and group 2 in the higher level unit, such as tracts, e_k is the entropy value for area i, such as tracts, H is segregation computed using the lowest level spatial unit, such as block groups, H_k is segregation computed using k-level, such as tracts, and h_k is segregation computed using lower-level units within a single higher j-level unit, such as block groups.

Reardon and Firebaugh's (2002) formula for a decomposable separation is as follows:

$$V = V_k + \sum (t_k/T) * (I_k/I) * v_k$$

where V is segregation computed using the lowest j-level spatial unit, such as block groups, V_k is segregation computed at k-level, such as tracts, v_k is segregation computed at the lower j-level, such as block groups, I is the Simpson Interaction index for the city as a whole, and I_k is the Simpson Interaction index for the k-level units.

A comparable formula for the Hutchens index (Hutchens 2004) can be given as follows:

$$R = R_k + \sum \sqrt{S_{1k} * S_{2k}} * r_k$$

where R is segregation calculated at the j-level for the city overall, R_k is the value of R computed using k-level data, such as tracts, r_k is the value of R computed using block group j-level data for k-level data such as tracts.

Decomposable Measures of Segregation - A Simpler Option for Calculation

The above formulas generate values of components based on complex calculations wherein over nested j-level and k-levels one computes segregation at the j-level within k-levels units and then aggregates these results using weights calculated separately for each k-level unit, and combine the result with the segregation score obtained using k-level data to obtain the segregation score based on j-level data for the entire city. The procedure is repeated over each successive nested spatial level until the full decomposition is obtained.

Review of these procedures in Fossett (2016b) shows that the same decomposition results can be obtained by computing the difference of city-level segregation scores based on j-level and k-level. Thus, in an empirical decomposition analysis of the Theil index (H) where j-level refers to block groups and k-level refers to tracts, the overall segregation at level j (H_J) is decomposed into a contribution from overall segregation at level k (H_K)

and contribution from within area segregation (H_W) given by the weighted sum of j-level segregation within each k unit. That is,

$$total\ seg.\left(H_J\right) = between\ component\ (H_K) + within\ component\ (H_W)$$

$$\left(H_J\right) = \ (H_K) - (H_W)$$

In the Reardon and Firebaugh (2002) formulation the within area contribution (H_W) is calculated from the complex expression

$$\sum (t_k/T) * (e_k/E) * h_k$$

Fossett (2016b) outlines a simpler computational approach for obtaining the value of the within area contribution (H_W). It is based on rearranging the earlier expression to the form

$$(H_W) = \ \left(H_J\right) - (H_K)$$

where

$$H_J = \ (1/T) * \sum t_j(E - e_j)/E = block\ group\ seg.$$

$$H_k = \ (1/T) * \sum t_k(E - e_k)/E = tract\ seg.$$

That is, the within component of segregation (H_W) can be obtained by subtracting segregation calculated at the block group level $\left(H_J\right)$ from segregation calculated at the tract level (H_K).

Similarly, the same decomposition result can be obtained for the Separation index (S) and the Hutchens square root index (R) based on

$$(S_W) = \left(S_J\right) - (S_K)$$

$$(R_W) = \left(R_J\right) - (R_K)$$

Recognizing that these computationally less demanding strategies can be used to obtain the value of the within-area component of segregation has great practical value. It allows one to perform complex decompositions over multiple nested spatial levels based on the results of computing overall segregation at each spatial level and then performing the relevant calculations to obtain within area segregation at each step in the progression from higher to lower spatial levels.

The Reardon and Firebaugh (2002) decomposition formulation makes the crucial methodological contribution of formally establishing how j-level segregation within k-level areas aggregates up to determine overall j-level segregation when combined with k-level segregation. Surprisingly, however, their article does not specifically note the useful point of information that the within k-level component can be obtained by simpler calculations.[3] I review an empirical example to illustrate this point that the simpler approach to calculating the quantitative contribution of within-area segregation components will yield correct results only for measures that are established to be additively decomposable. For example, the Gini index (G) and the Dissimilarity index

[3] It may be that Reardon and Firebaugh (2002) viewed this as obvious and not warranting mention. Fossett speculates the fact is not widely appreciated because, if it were, the decomposition approach would be used often instead of only occasionally, as is currently the case.

(D) are not additively decomposable. Consequently, while the calculation $G_J - G_K$ will yield a numeric result, the result cannot be interpreted as a within-area contribution to overall segregation.

Formal versus Simple Calculation of Decomposition Components - Working Example

In this section I present a hypothetical case to illustrate how two different approaches can be used to obtain the values of a spatial decomposition of segregation. The hypothetical case study compares patterns across tracts, block groups, and blocks. The preceding review of the formal decomposition denotes j for block groups and k for tracts. In the working example, Census blocks are denoted by i. The working example draws on the following terms:

$$P = Group\ 1\ proportion\ in\ the\ city\ population$$

$$Q = Group\ 2\ proportion\ in\ the\ city\ population$$

$$E = Entropy\ value\ for\ the\ city\ as\ a\ whole$$

$$e_k = entropy\ value\ for\ area\ i$$

$$i = is\ an\ index\ or\ spatial\ unit\ areas$$

$$t_i = is\ the\ total\ combined\ population\ of\ group\ 1\ \&\ 2\ in\ area\ i$$

$$p_i = Group\ 1\ proportion\ in\ area\ i$$

$$q_i = Group\ 2\ proportion\ in\ area\ i$$

The case study example begins with 3 tracts, 6 block groups, and 12 blocks. Each unit is then given a hypothetical group 1 (W) and group 2 (B) composition that corresponds to the composition of a nested relationship (Table 8 and Table 9). Table 10 breaks down the segregation index scores at each of the unit levels. Hutchens has a .0135, .0463, and .0638 at the tract, block group, and block level, respectively. Theil has a .0194, .0653, and .0882 at the tract, block group, and block level, respectively. Separation has a .0267, .0867, and .1133 at the tract, block group, and block level, respectively. The following sections begin by reviewing the computing steps for the within component according to Reardon and Firebaugh (2002)

Table 8. Formal vs Simple Decomposition Case Study Illustration I

Area Notation

TR [k]	1				2				3			
BG [j]	1.1		1.2		2.1		2.2		3.1		3.2	
BK [i]	1.1.1	1.1.2	1.2.1	1.2.2	2.1.1	2.1.2	2.2.1	2.2.2	3.1.1	3.1.2	3.2.1	3.2.2

Table 9. Formal vs Simple Decomposition Case Study Illustration II

Unit	Tract 1				Tract 2				Tract 3				Total	
TR W				240				200				160	600	= W
TR B				160				200				240	600	= B
TR T				400				400				400	1200	= T
TR p				0.60				0.50				0.40	0.50	= P
TR q				0.40				0.50				0.60	0.50	= Q
BG W		150		90		100		100		50		110	600	= W
BG B		50		110		100		100		150		90	600	= B
BG T		200		200		200		200		200		200	1200	= T
BG p		0.75		0.45		0.50		0.50		0.25		0.55	0.50	= P
BG q		0.25		0.55		0.50		0.50		0.75		0.45	0.50	= Q
BK W	85	65	55	35	50	50	50	50	35	15	65	45	600	= W
BK B	15	35	45	65	50	50	50	50	65	85	35	55	600	= B
BK T	100	100	100	100	100	100	100	100	100	100	100	100	1200	= T
BK p	0.85	0.65	0.55	0.35	0.50	0.50	0.50	0.50	0.35	0.15	0.65	0.45	0.50	= P
BK q	0.15	0.35	0.45	0.65	0.50	0.50	0.50	0.50	0.65	0.85	0.35	0.55	0.50	= Q

Table 10. Formal vs Simple Decomposition Case Study Illustration - Segregation Scores

Unit	Tract 1				Tract 2				Tract 3				Index Score	
Tract				0.3266				0.3333				0.3266	0.0135	**= (R)**
Tract				0.0097				0.0000				0.0097	0.0194	**= (H)**
Tract				0.0033				0.0000				0.0033	0.0267	**= (V)**
Blk Grp.		0.1443		0.1658		0.1667		0.1667		0.1443		0.1658	0.0463	**= (R)**
Blk Grp.		0.0315		0.0012		0.0000		0.0000		0.0315		0.0012	0.0653	**= (H)**
Blk Grp.		0.0104		0.0004		0.0000		0.0000		0.0104		0.0004	0.0867	**= (V)**
Block	0.0595	0.0795	0.0829	0.0795	0.0833	0.0833	0.0833	0.0833	0.0795	0.0595	0.0795	0.0829	0.0638	**= (R)**
Block	0.0325	0.0055	0.0006	0.0055	0.0000	0.0000	0.0000	0.0000	0.0055	0.0325	0.0055	0.0006	0.0882	**= (H)**
Block	0.0102	0.0019	0.0002	0.0019	0.0000	0.0000	0.0000	0.0000	0.0019	0.0102	0.0019	0.0002	0.1133	**= (V)**

Table 11 begins the computing process to calculate the weighted sum of block level segregation within block group clusters, also known as block level contribution to the overall segregation score. Table 12 continues the computing process by taking the decomposition 'parts' in Table 11 and calculating the weighted sum of block level segregation within block group clusters. Table 41 computes $\sum h\,[j]$, $\sum v\,[j]$, and $\sum r\,[j]$ which are terms for block level segregation within block group units. The values are .0229, .0267, and .0175 for Theil, separation, and Hutchens indices, respectively.

Table 11. Formal vs Simple Decomposition Case Study Illustration - Block within Block Group Segregation - Parts

	Block Group (j-level) Terms				Block (i-level) Terms									
	t[j]	p[j]	q[j]	e[j]	t[i]	p[i]	q[i]	e[i]	t[i]/t[j]	t[i]/(tpq)[j]	(e[j]-e[i])/e[j]	h[j] parts	v[j] parts	r[j] parts
BG j=1.1	200	0.7500	0.2500	0.5623								0.0485	0.0533	0.0369
BK[1.1.1]					100	0.8500	0.1500	0.4227	0.5000	2.6667	0.2483	0.1241	0.0267	0.4123
BK[1.1.2]					100	0.6500	0.3500	0.6474	0.5000	2.6667	-0.1514	-0.0757	0.0267	0.5508
BG j=1.2	200	0.4500	0.5500	0.6881								0.0296	0.0404	0.0206
BK[1.2.1]					100	0.5500	0.4500	0.6881	0.5000	2.0202	0.0000	0.0000	0.0202	0.5000
BK[1.2.2]					100	0.3500	0.6500	0.6474	0.5000	2.0202	0.0591	0.0296	0.0202	0.4794
BG j=2.1	200	0.5000	0.5000	0.6931								0.0000	0.0000	0.0000
BK[2.1.1]					100	0.5000	0.5000	0.6931	0.5000	2.0000	0.0000	0.0000	0.0000	0.5000
BK[2.1.2]					100	0.5000	0.5000	0.6931	0.5000	2.0000	0.0000	0.0000	0.0000	0.5000
BG j=2.2	200	0.5000	0.5000	0.6931								0.0000	0.0000	0.0000
BK[2.2.1]					100	0.5000	0.5000	0.6931	0.5000	2.0000	0.0000	0.0000	0.0000	0.5000
BK[2.2.2]					100	0.5000	0.5000	0.6931	0.5000	2.0000	0.0000	0.0000	0.0000	0.5000
BG j=3.1	200	0.2500	0.7500	0.5623								0.0485	0.0533	0.0369
BK[3.1.1]					100	0.3500	0.6500	0.6474	0.5000	2.6667	-0.1514	-0.0757	0.0267	0.5508
BK[3.1.2]					100	0.1500	0.8500	0.4227	0.5000	2.6667	0.2483	0.1241	0.0267	0.4123
BG j=3.2	200	0.5500	0.4500	0.6881								0.0296	0.0404	0.0206
BK[3.2.1]					100	0.6500	0.3500	0.6474	0.5000	2.0202	0.0591	0.0296	0.0202	0.4794
BK[3.2.2]					100	0.4500	0.5500	0.6881	0.5000	2.0202	0.0000	0.0000	0.0202	0.5000

Table 12. Formal vs Simple Decomposition Case Study Illustration - within Block Group Segregation - Calculated Weighted Sum of Block Level Segregation within Block Group Clusters

	H = H[I] = H[J] + Σ w[j]*h[j]					V = V[I] = V[J] + Σ w[j]*v[j]				R = R[I] = R[J] + Σ w[j]*r[j]			
Blk. Grp.	**e[j]**	**e[j]/E**	**h[j]**	**w[j]*h[j]**		**pq/PQ**	**v[j]**	**w[j]*v[j]**		**w[j]**	**r[j]**	**w[j]*r[j]**	
BG 1.1	0.5623	0.8113	0.0485	0.0066		0.7500	0.0533	0.0067			0.0369	0.0053	
BG 1.2	0.6881	0.9928	0.0296	0.0049		0.9900	0.0404	0.0067			0.0206	0.0034	
BG 2.1	0.6931	1.0000	0.0000	0.0000		1.0000	0.0000	0.0000			0.0000	0.0000	
BG 2.2	0.6931	1.0000	0.0000	0.0000		1.0000	0.0000	0.0000			0.0000	0.0000	
BG 3.1	0.5623	0.8113	0.0485	0.0066		0.7500	0.0533	0.0067			0.0369	0.0053	
BG 3.2	0.6881	0.9928	0.0296	0.0049		0.9900	0.0404	0.0067			0.0206	0.0034	
				0.0229	**= Σh[j]**			0.0267	**= Σv[j]**			0.0175	**= Σr[j]**

Table 13 begins the computing process to calculate the weighted sum of block group segregation within tracts, also known as block group contribution to the overall segregation score. Table 14 continues the computing process to calculate the weighted sum of block group segregation within tract clusters. Table 43 computes $\sum h\,[k]$, $\sum v\,[k]$, and $\sum r\,[k]$ which are block group segregation within tract segregation. The values are .0459, .0600, and .0329 for Theil, separation, and Hutchens indices, respectively.

Table 13. Formal vs. Simple Decomposition Case Study Illustration - within Tract Segregation

		Tract (k) Level) Terms				Block Group (j) Level) Terms							h[k]	v[k]	r[j]
		t[k]	p[k]	q[k]	e[k]	t[j]	p[j]	q[j]	e[j]	t[j]/t[k]	t[j]/(tpq)[k]	(e[k]-e[j])/e[k]	parts	parts	parts
TR[1]		400	0.60	0.40	0.6730								0.0710	0.0938	0.0503
	BG[1.1]					200	0.75	0.25	0.5623	0.50	2.0833	0.1644	0.0822	0.0469	0.4419
	BG[1.2]					200	0.45	0.55	0.6881	0.50	2.0833	-0.0225	-0.0112	0.0469	0.5078
TR[2]		400	0.50	0.50	0.6931								0.0000	0.0000	0.0000
	BG[2.1]					200	0.50	0.50	0.6931	0.50	2.0000	0.0000	0.0000	0.0000	0.5000
	BG[2.2]					200	0.50	0.50	0.6931	0.50	2.0000	0.0000	0.0000	0.0000	0.5000
TR[3]		400	0.40	0.60	0.6730								0.0710	0.0938	0.0503
	BG[3.1]					200	0.25	0.75	0.5623	0.50	2.0833	0.1644	0.0822	0.0469	0.4419
	BG[3.2]					200	0.55	0.45	0.6881	0.50	2.0833	-0.0225	-0.0112	0.0469	0.5078

Table 14. Formal vs Simple Decomposition Case Study Illustration - within Tract Segregation - Calculated Weighted Sum of Block Group Segregation within Tract Clusters

	H = H[J] = H[K] + Σ w[k]*h[k]					V = V[J] = V[K] + Σ w[k]*v[k]				R = R[J] = R[K] + Σ w[k]*r[k]			
Area	**e[k]**	**e[k]/E**	**h[k]**	**w[k]*h[k]**		**pq/PQ**	**v[k]**	**w[k]*v[k]**		**w[k]**	**r[k]**	**w[k]*r[k]**	
Tract 1	0.6730	0.9710	0.0710	0.0230		0.9600	0.0938	0.0300		0.3266	0.0503	0.0164	
Tract 2	0.6931	1.0000	0.0000	0.0000		1.0000	0.0000	0.0000		0.3333	0.0000	0.0000	
Tract 3	0.6730	0.9710	0.0710	0.0230		0.9600	0.0938	0.0300		0.3266	0.0503	0.0164	
				0.0459	**= Σh[k]**			0.0600	**= Σv[k]**			0.0329	**= Σr[k]**

I now review the steps necessary to compute the within component from the simple calculation method. Recall that the computations to obtain the within the component for Theil, separation, and Hutchens are simply:

$$(H_W) = (H_J) - (H_K)$$

$$(S_W) = (S_J) - (S_K)$$

$$(R_W) = (R_J) - (R_K)$$

To compute the within components for Theil we switch the terms with the segregation scores already computed for the between component:

$$(H_{within\,block\,groups}) = (.0882) - (.0653) = .0229$$

$$(H_{within\,tracts}) = (.0653) - (.0194) = .0459$$

To compute the within components for the separation index we switch the terms with the segregation scores already computed for the between component:

$$(V_{within\,block\,groups}) = (.1133) - (.0867) = .0266$$

$$(V_{within\,tracts}) = (.0867) - (.0267) = .06$$

To compute the within components for the Hutchens index we switch the terms with the segregation scores already computed for the between component:

$$(R_{within\,block\,groups}) = (.0638) - (.0463) = .0175$$

$$(R_{within\,tracts}) = (.0463) - (.0135) = .0328$$

The results produced from the simple method are identical to the more complex method developed by Reardon and Firebaugh (2002) with the exception of a few differences due to rounding error at the ten thousandth decimal place.

The value of this exercise is that it provides a clear demonstration that the simpler method of obtaining component values in fact works as described. This is useful for the present analysis as the Reardon and Firebaugh approach to obtaining values of the components of the decomposition is computationally demanding. Instead, I adopt the simpler approach for calculating the values of the components so I can conduct spatial decomposition analyses for a large number of metropolitan areas. I report the results of these analyses in the next chapter.

CHAPTER VII

ANALYSIS OF THE RELATIONSHIP BETWEEN FRAGMENTATION AND SEGREGATION WITHIN INDIVIDUAL METROPOLITAN AREAS

In this chapter, I investigate the empirical relationship between residential segregation and political fragmentation more closely by decomposing segregation to examine whether segregation in cities aligns with fragmentation. Decomposition analyses can reveal the extent to which segregation varies within boundaries and between boundaries at different spatial levels. If a large contribution to overall segregation originates in segregation between place-level fragments it will lend support to the hypothesis that fragmentation matters. Accordingly, decomposing segregation into components reflecting segregation originating within and between fragment units can help test which aspect of fragmentation has its greatest effect on segregation. High segregation and greater differences between fragments may suggest that segregation crystallizes along fragmentation boundaries. Low or no differences may suggest that a spurious relationship exist between fragmentation and residential segregation and that further analyses need to be considered.

Decomposition Analyses Measures

I calculate segregation using the *dissimilarity index (D), separation index (S), Hutchens square root index (R),* and *Theil index (H).* Dissimilarity does not satisfy the additive organization decomposability property that Reardon and Firebaugh (2002) have set forth as a requirement. Thus, in this chapter, comparisons involving dissimilarity is used in more of a descriptive capacity rather than a decomposable capacity. The values of D can be compared to the values of Hutchens square root index (R, discussed below) which, among indices that are additively decomposable, is closest to D in terms of conceptual underpinnings and empirical performance. For descriptive purposes, I calculate segregation using the dissimilarity index to assess the degree to which blacks and whites are segregated at the block, block group, tract, place, and county level and examine the values and differences for D at each spatial level, and the covariation of the terms. As noted, already, D does not have the particular formal property of being additively decomposable. Nevertheless, one can gain insight into the relative importance of segregation at different spatial scales by performing a descriptive analysis of D measured using units at different spatial scales. It is, of course, necessarily the case that the value of D will increase monotonically when one calculates D using nested spatial units starting with larger units and moving to smaller units. This is not unique to D. It applies to all measures of uneven distribution.

I also perform analyses using the separation index to ensure the findings are robust. In addition to being additively decomposable, S has been widely used in previous research and S tends to track D for samples of very large metropolitan areas with substantial minority populations (Duncan and Duncan 1955; Massey and Denton 1988; Fossett 2016a).

I also report decomposition results for the *Theil Index*. H has been used less widely than D and S in empirical studies of segregation generally. Because it is additively decomposable, it has been more widely used in studies that involve decompositions, including decompositions of segregation across nested geographies (Fischer et al. 2004:40).

Finally, as noted above, I also review results for the *Hutchens* square root index (R). Like S and H, R has the property of being additively decomposable (Hutchens 2001; 2004). In addition, R is conceptually similar to D because it ranks segregation comparisons in accord with the principle of segregation curve dominance (James and Taeuber 1985). This principle holds for two segregation comparisons, a segregation index should take a lower value for one comparison if the segregation curve for that comparison is somewhere inside and nowhere outside the segregation curve for the comparison. The principle is controversial and is not widely accepted (White 1986; Fossett 2016a). However, the principle is relevant here because measures that conform to the principle have similar conceptual underpinnings. D and G conform to this principle and R also conforms to this principle. H and S do not conform to this property. Thus, Hutchens (R) is useful because among all indices that are additively decomposable it is most similar to D in how it measures segregation (as documented in Chapter 4).

Decomposition Analyses - Close Analysis of Selected Cases

In this section I present detailed quantitative decomposition analyses of a set of 30 metropolitan areas. Of the Metropolitan Statistical Areas (MSA) with a minimum of 1,000 non-Hispanic black population, I selected ten MSAs with the smallest total population, ten moderately sized MSAs, and ten areas with the largest total population (Table 15). Using these 30 MSAs, I decompose segregation into nested within- and between-area components (Lichter et al. 2015:846).

Table 15. Selected Areas for Decomposition Analyses

Small	Cheyenne, WY MSA	**Moderate**	Allentown, PA MSA	**Large**	Atlanta, GA MSA
	Enid, OK MSA		Ann Arbor, MI PMSA		Boston, MA PMSA
	Flagstaff, AZ--UT MSA		Charleston, SC MSA		Chicago, IL PMSA
	Jonesboro, AR MSA		Gary, IN PMSA		Detroit, MI PMSA
	Las Cruces, NM MSA		Little Rock, AR MSA		Houston, TX PMSA
	McAllen, TX MSA		Mobile, AL MSA		Los Angeles, CA PMSA
	Pittsfield, MA MSA		Sarasota, FL MSA		Minneapolis, MN MSA
	San Angelo, TX MSA		Toledo, OH MSA		New York, NY PMSA
	Victoria, TX MSA		Tucson, AZ MSA		Philadelphia, PA PMSA
	Yuma, AZ MSA		Wilmington, DE PMSA		Washington, DC PMSA

Although not strictly and officially nested boundaries, I calculate segregation at the place boundary and at intermediate boundaries progressing down to blocks. Blocks do not strictly and formally nest under places but as a practical matter blocks can be treated as nesting under places within metropolitan areas due to their small spatial size (Lichter et al. 2015:852). I opted to perform this type of between and within level decomposition analysis at each of the nested and non-nested fragment geographies because population patterns can potentially align with boundaries outside of administratively nested geographies. Lichter et al. (2015:843) argue that segregation is increasingly a part of social processes at larger units such as place boundaries. I attempt to capture these changes in segregation patterns by breaking down the components in measurement for nested geographies, as well as non-nested geographies which I discuss in greater detail below.

The only non-nested geographies in this study are Census places. As noted above, blocks can be treated as "nesting" within cities because blocks are so small, errors have no practical consequences. Block groups and tracts are large enough that the issue of nesting cannot be set aside. It can be overcome by using the place-tract and place-block group combinations when computing segregation at the tract and block group levels. This has a small practical consequence of yielding higher scores at the tract and block group level - because, for example, segregation scores can only go higher when tracts are split into place-tract subunits.

Thus, I will use the smallest available geographical unit, blocks, to examine the variation in racial distribution in space and then calculate components to determine the extent to which each spatial level in the decomposition analysis contributes to overall segregation. By adopting this approach, I follow previous research which has reported that this is a fruitful approach (Lichter et al. 2007:4; Lichter et al. 2015:852).

A Brief Aside Discussing Blocks and First-Order Contiguity Neighborhoods

The spatial decomposition I implement assesses overall segregation using census blocks. These are the smallest spatial units for which census tabulations of population by race area systematically available. Blocks typically have 8-15 households and 25-40 persons and are treated by many researchers as useful approximations of small-scale residential neighborhoods (Lichter et al. 2015). One criticism of blocks is that they often are delimited by roads and as a result sometimes assign "across the street neighbors" as being on different blocks when household-level conceptions of neighbors might include across the street neighbors in small-scale spatial neighborhoods.

In my dissertation proposal I had outlined a plan of analysis to address this concern by calculating segregation using first-order spatial contiguity neighborhoods instead of blocks to delimit small-scale neighborhoods. Ultimately, I did not implement this approach. The reason for this was that my preliminary methodological investigation of the issue revealed that it would not have added value to the analysis. Two factors were central to my decisions. First and foremost, I found no practical difference between segregation scores computed using blocks and using first-order spatial contiguity areas. This was true even in the smallest metropolitan areas where one would expect to see a difference if one existed. Second, the implementation of a first-order contiguity unit would have presented complications for the analysis in terms of computation burdens and dealing with nesting of small areas within block groups and tracts. In light of the fact that the first-order contiguity unit did not display meaningful differences in measured segregation, I concluded census blocks were satisfactory for the needs of the present analysis.

Analyses of Nested Units

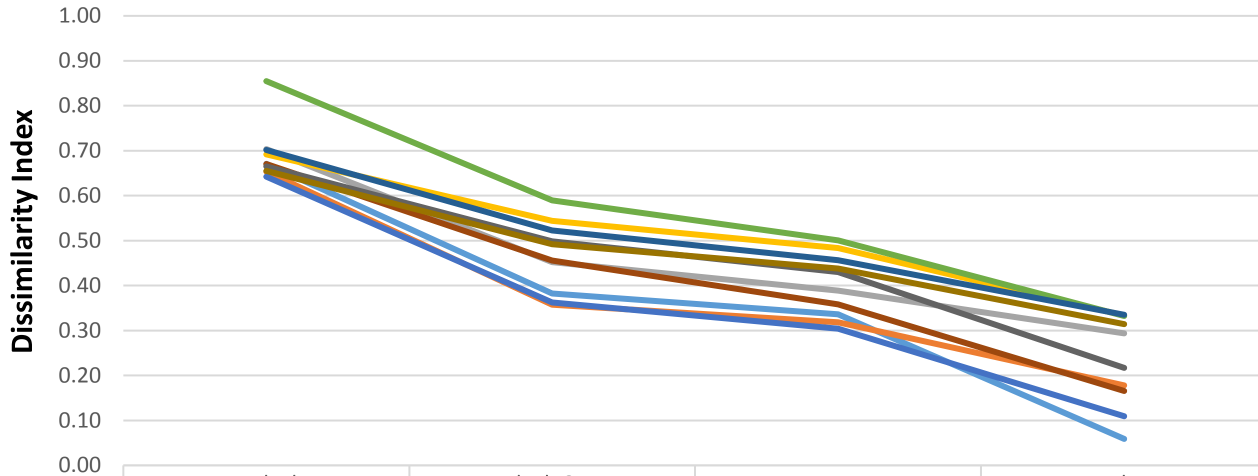
I first begin by examining covariation among segregation by decomposing each measure of segregation into between and within components at each of the newly nested Census geographies: blocks, block groups, tracts, and places. The first set of figures depicts segregation scores calculated using data for each of the several levels of spatially nested units.

Figures 3 thru 14 are organized by measure of segregation - dissimilarity, separation, Theil, and Hutchens - and size of the MSA - small, moderate, and large. All of the figures confirm the expected behavior of segregation indices which is that the scores monotonically decrease as spatial scale increases; that is, index scores are never higher and usually are lower when moving from smaller to larger spatial units. Thus, as the chart moves from block to place, the level of measured segregation between whites and blacks steadily moves to lower scores.

The most important substantive finding in this part of the analysis is that the extent to which segregation is captured by units at different spatial levels varies systematically by size of the MSA. Census tracts are the most widely used spatial unit in segregation analyses based on the assumption that they can sufficiently capture segregation for metropolitan areas (Lee et al. 2008:767). The data reviewed here indicate this assumption may be reasonable for large metropolitan areas, but not for smaller metropolitan areas. The figures for the moderate and large MSAs show that the difference in the level of segregation measured using blocks and tracts is relatively similar and might perhaps support the conclusion that the differences are not substantively important for the purposes of many kinds of studies. For example, a large MSA such as Detroit, MI has a Hutchens .8484 score at the block level and a .7751 score at the tract level (Figure 11). A moderate MSA such as Gary, IN has a Hutchens .8757 score at the block level and a .7857 score at the tract level (Figure 10). Each MSA has a about a .08 to .09 difference between segregation calculated at the block and tract level.

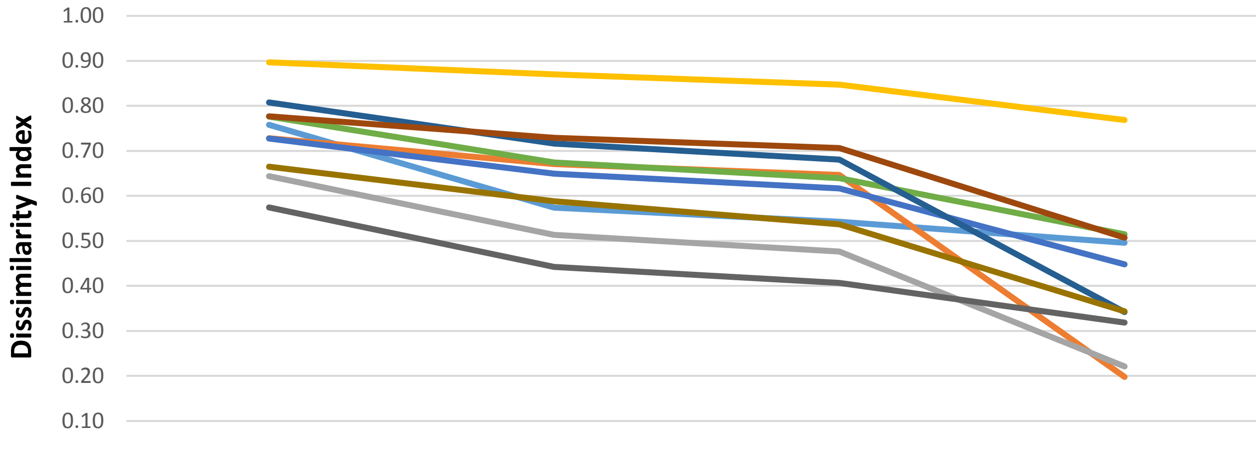
On the other hand, the differences between levels of segregation measured using different spatial units are large and dramatic for Small MSAs. In all cases, the block level segregation scores are much higher than segregation scores captured at the tract level. For example, a small MSA such as McAllen, TX has a Hutchens .8412 score at the block level and a .5266 score at the tract level (Figure 9). Another small MSA such as Cheyenne, WY has a Hutchens .673 score at the block level and a .3151 score at the tract level (Figure 9).

Figure 3. Residential Segregation Between Nested Units in Small MSAs - Dissimilarity



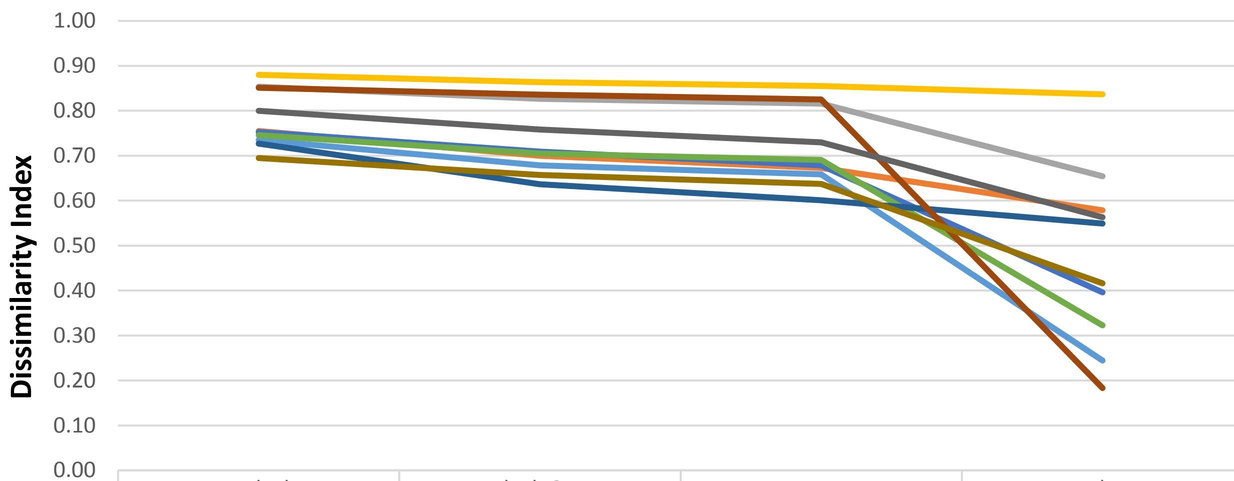
	D Block	D Block Group	D Tract	D Place
Cheyenne, WY	0.6708	0.3826	0.3362	0.0589
Enid, OK	0.6534	0.3572	0.3182	0.1779
Flagstaff, AZ	0.7036	0.4523	0.3888	0.2937
Jonesboro, AR	0.6918	0.5443	0.4835	0.3334
Las Cruces, NM	0.6422	0.3624	0.3042	0.1093
McAllen, TX	0.8548	0.5893	0.5004	0.3324
Pittsfield, MA	0.7016	0.5226	0.4564	0.3350
San Angelo, TX	0.6704	0.4555	0.3580	0.1655
Victoria, TX	0.6650	0.4987	0.4298	0.2169
Yuma, AZ	0.6551	0.4923	0.4379	0.3142

Figure 4. Residential Segregation Between Nested Units in Moderate MSAs - Dissimilarity



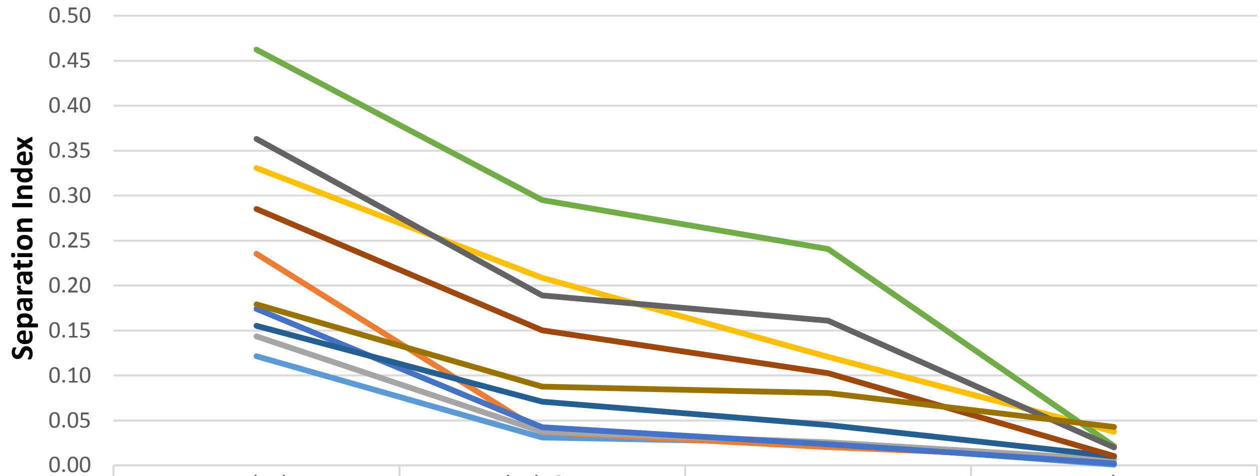
	D Block	D Block Group	D Tract	D Place
Allentown, PA	0.7579	0.5735	0.5427	0.4958
Ann Arbor, MI	0.7282	0.6709	0.6464	0.1977
Charleston, SC	0.6437	0.5134	0.4766	0.2209
Gary, IN	0.8968	0.8699	0.8475	0.7686
Little Rock, AR	0.7274	0.6495	0.6165	0.4479
Mobile, AL	0.7762	0.6742	0.6396	0.5147
Sarasota, FL	0.8077	0.7166	0.6808	0.3418
Toledo, OH	0.7768	0.7288	0.7063	0.5071
Tucson, AZ	0.5743	0.4419	0.4066	0.3184
Wilmington, DE	0.6648	0.5884	0.5367	0.3434

Figure 5. Residential Segregation Between Nested Units in Large MSAs - Dissimilarity



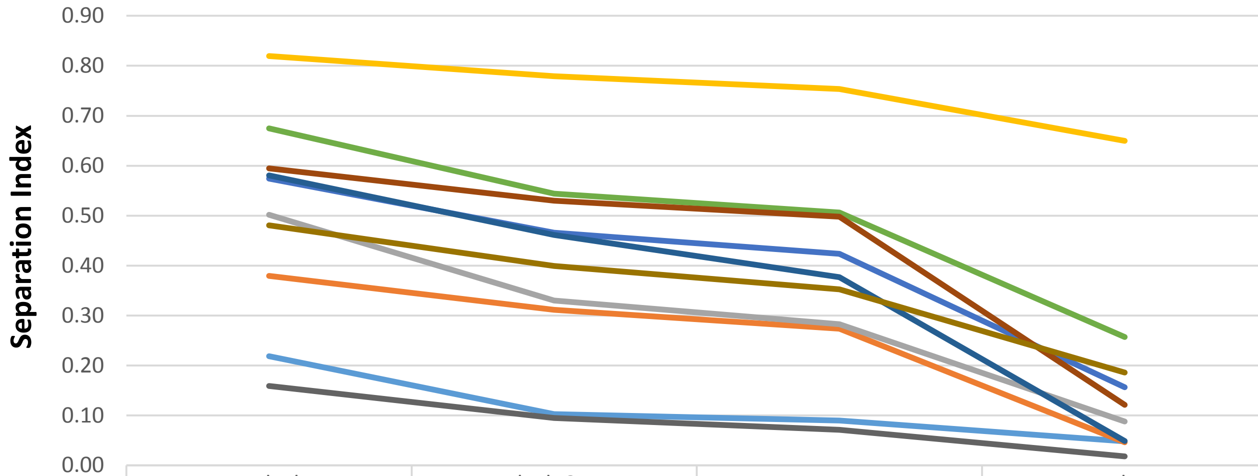
	D Block	D Block Group	D Tract	D Place
Atlanta, GA	0.7350	0.6787	0.6589	0.2444
Boston, MA	0.7550	0.7000	0.6730	0.5785
Chicago, IL	0.8536	0.8266	0.8157	0.6543
Detroit, MI	0.8800	0.8635	0.8552	0.8366
Houston, TX	0.7525	0.7089	0.6786	0.3960
Los Angeles, CA	0.7457	0.7049	0.6908	0.3226
Minneapolis, MN	0.7269	0.6362	0.6011	0.5491
New York, NY	0.8512	0.8356	0.8250	0.1831
Philadelphia, PA	0.7999	0.7584	0.7297	0.5631
Washington, DC	0.6948	0.6571	0.6374	0.4161

Figure 6. Residential Segregation Between Nested Units in Small MSAs - Separation



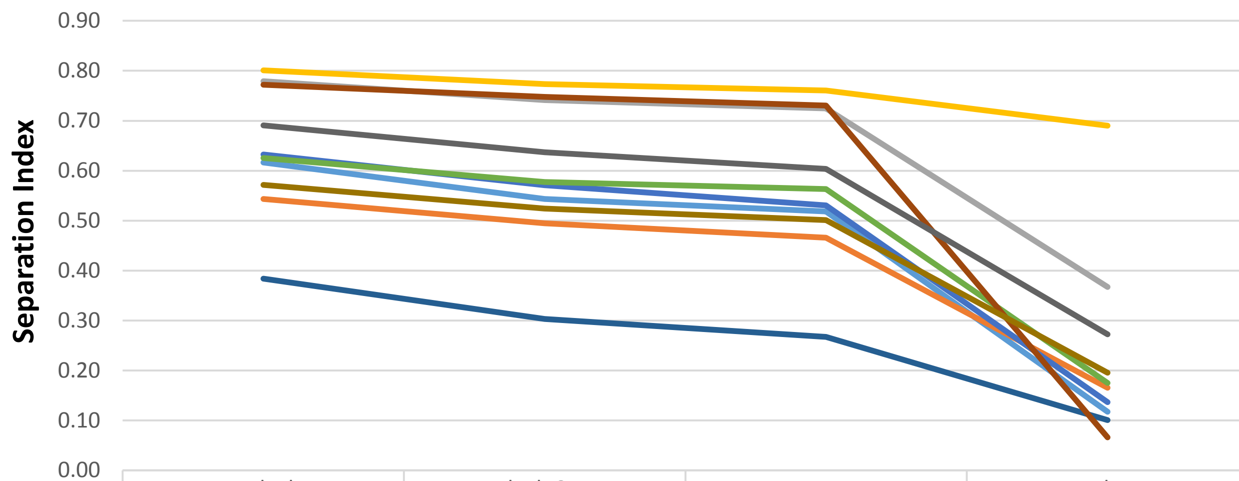
	V Block	V Block Group	V Tract	V Place
Cheyenne, WY	0.1213	0.0311	0.0248	0.0008
Enid, OK	0.2353	0.0371	0.0203	0.0070
Flagstaff, AZ	0.1435	0.0372	0.0255	0.0063
Jonesboro, AR	0.3309	0.2087	0.1209	0.0375
Las Cruces, NM	0.1740	0.0425	0.0236	0.0023
McAllen, TX	0.4624	0.2950	0.2405	0.0213
Pittsfield, MA	0.1554	0.0708	0.0448	0.0100
San Angelo, TX	0.2853	0.1502	0.1026	0.0102
Victoria, TX	0.3632	0.1891	0.1608	0.0198
Yuma, AZ	0.1790	0.0876	0.0804	0.0428

Figure 7. Residential Segregation Between Nested Units in Moderate MSAs - Separation



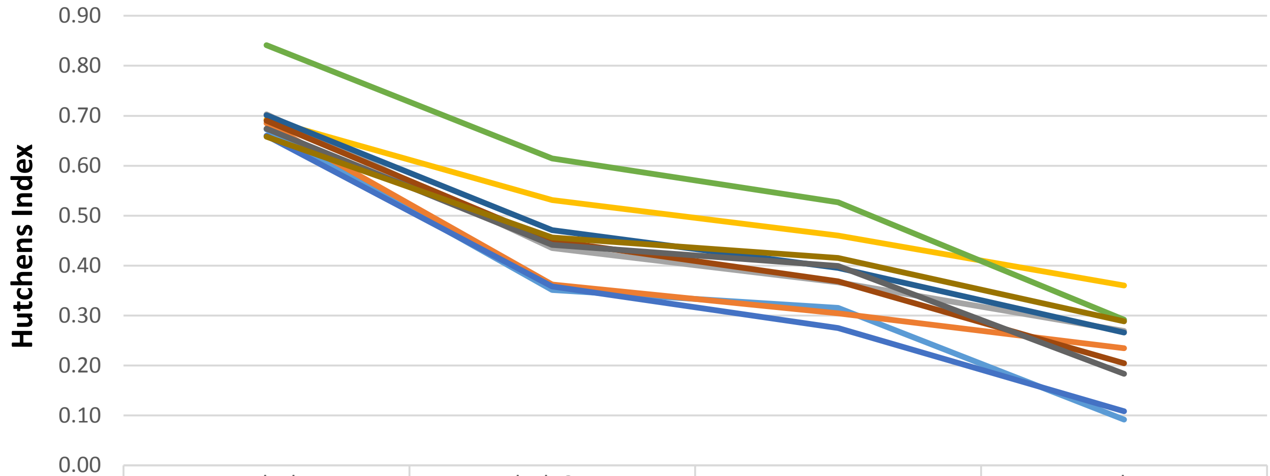
	V Block	V Block Group	V Tract	V Place
Allentown, PA	0.2187	0.1029	0.0899	0.0481
Ann Arbor, MI	0.3794	0.3117	0.2737	0.0459
Charleston, SC	0.5019	0.3301	0.2825	0.0876
Gary, IN	0.8193	0.7794	0.7537	0.6496
Little Rock, AR	0.5742	0.4661	0.4238	0.1562
Mobile, AL	0.6747	0.5442	0.5059	0.2573
Sarasota, FL	0.5808	0.4614	0.3770	0.0488
Toledo, OH	0.5946	0.5301	0.4980	0.1214
Tucson, AZ	0.1589	0.0948	0.0715	0.0178
Wilmington, DE	0.4807	0.3992	0.3527	0.1858

Figure 8. Residential Segregation Between Nested Units in Large MSAs - Separation



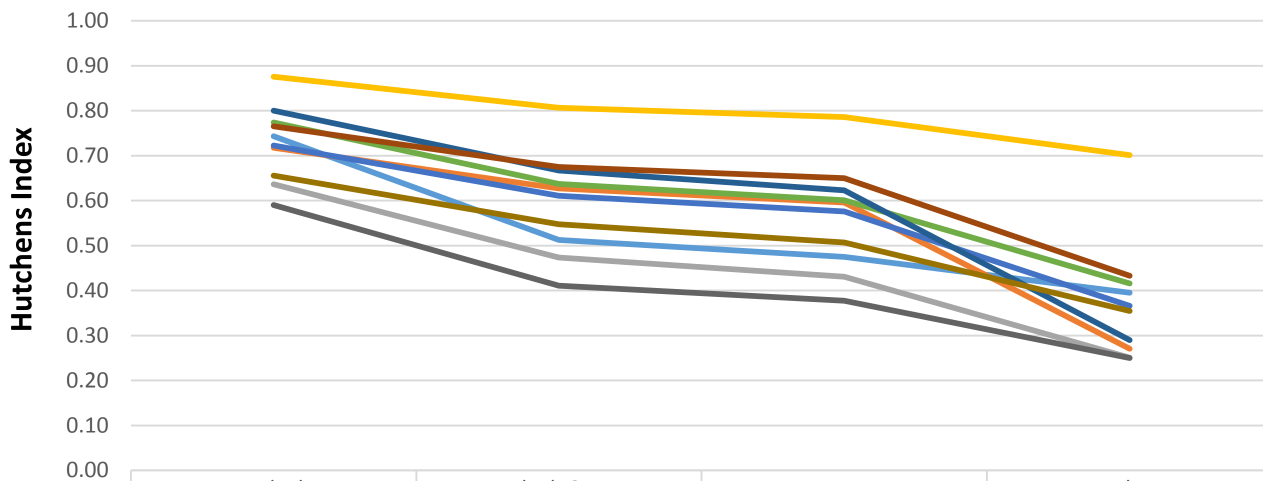
	V Block	V Block Group	V Tract	V Place
Atlanta, GA	0.6163	0.5436	0.5181	0.1170
Boston, MA	0.5432	0.4946	0.4659	0.1657
Chicago, IL	0.7791	0.7416	0.7250	0.3670
Detroit, MI	0.8008	0.7736	0.7604	0.6904
Houston, TX	0.6323	0.5712	0.5307	0.1368
Los Angeles, CA	0.6253	0.5774	0.5630	0.1749
Minneapolis, MN	0.3841	0.3032	0.2672	0.1008
New York, NY	0.7720	0.7480	0.7307	0.0658
Philadelphia, PA	0.6911	0.6372	0.6035	0.2725
Washington, DC	0.5717	0.5240	0.5012	0.1957

Figure 9. Residential Segregation Between Nested Units in Small MSAs - Hutchens



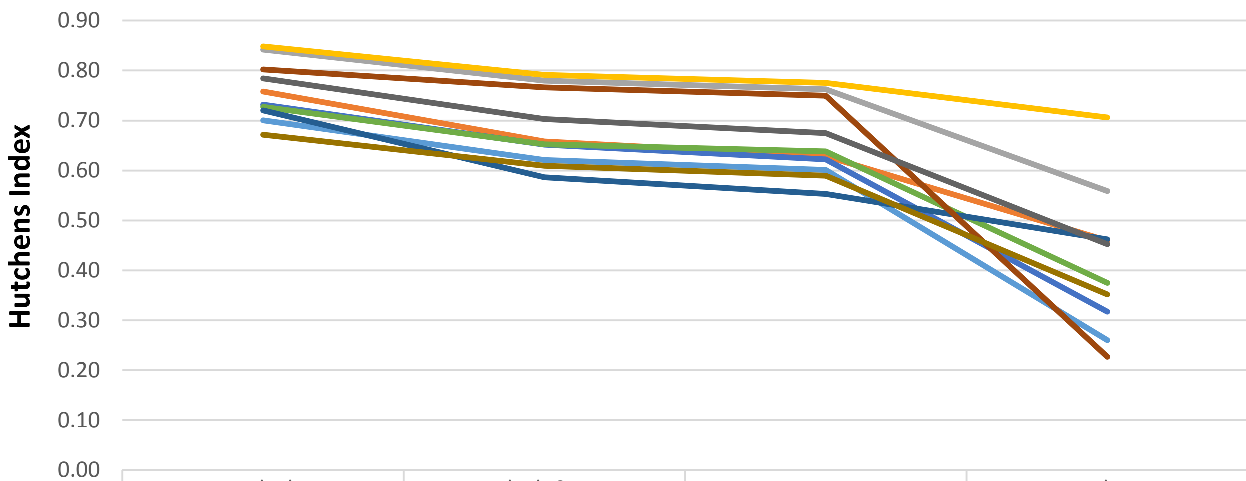
	R Block	R Block Group	R Tract	R Place
Cheyenne, WY	0.6730	0.3514	0.3151	0.0916
Enid, OK	0.6852	0.3623	0.3044	0.2343
Flagstaff, AZ	0.7028	0.4351	0.3666	0.2691
Jonesboro, AR	0.6925	0.5312	0.4603	0.3602
Las Cruces, NM	0.6601	0.3584	0.2752	0.1082
McAllen, TX	0.8412	0.6142	0.5266	0.2919
Pittsfield, MA	0.7008	0.4711	0.3951	0.2657
San Angelo, TX	0.6899	0.4495	0.3682	0.2045
Victoria, TX	0.6738	0.4413	0.3991	0.1830
Yuma, AZ	0.6581	0.4562	0.4153	0.2882

Figure 10. Residential Segregation Between Nested Units in Moderate MSAs - Hutchens



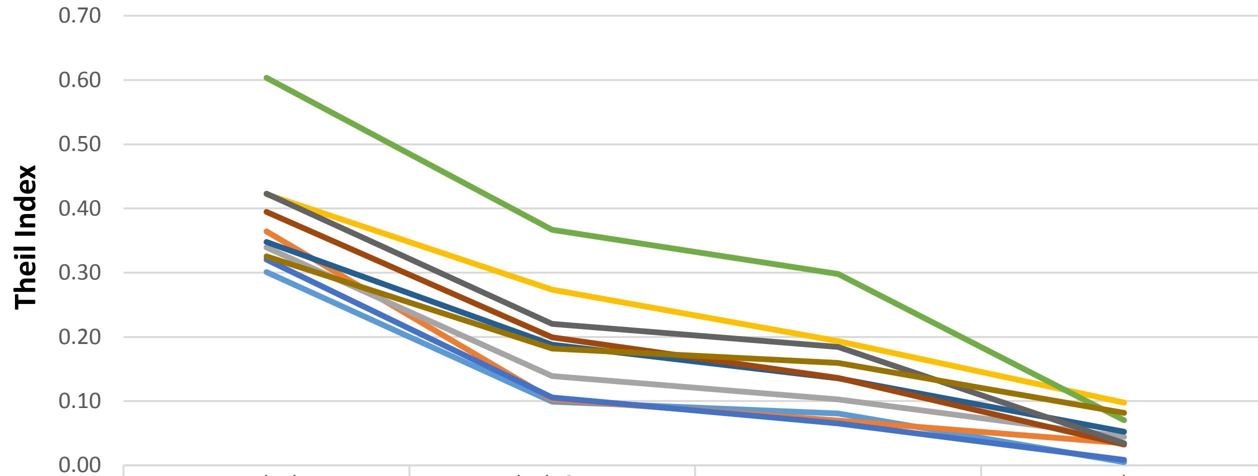
	R Block	R Block Group	R Tract	R Place
Allentown, PA	0.7431	0.5126	0.4749	0.3949
Ann Arbor, MI	0.7180	0.6269	0.5959	0.2708
Charleston, SC	0.6364	0.4734	0.4306	0.2505
Gary, IN	0.8757	0.8065	0.7857	0.7010
Little Rock, AR	0.7224	0.6111	0.5761	0.3660
Mobile, AL	0.7736	0.6373	0.6008	0.4157
Sarasota, FL	0.8002	0.6670	0.6227	0.2900
Toledo, OH	0.7651	0.6752	0.6503	0.4327
Tucson, AZ	0.5901	0.4109	0.3771	0.2502
Wilmington, DE	0.6558	0.5478	0.5068	0.3545

Figure 11. Residential Segregation Between Nested Units in Large MSAs - Hutchens



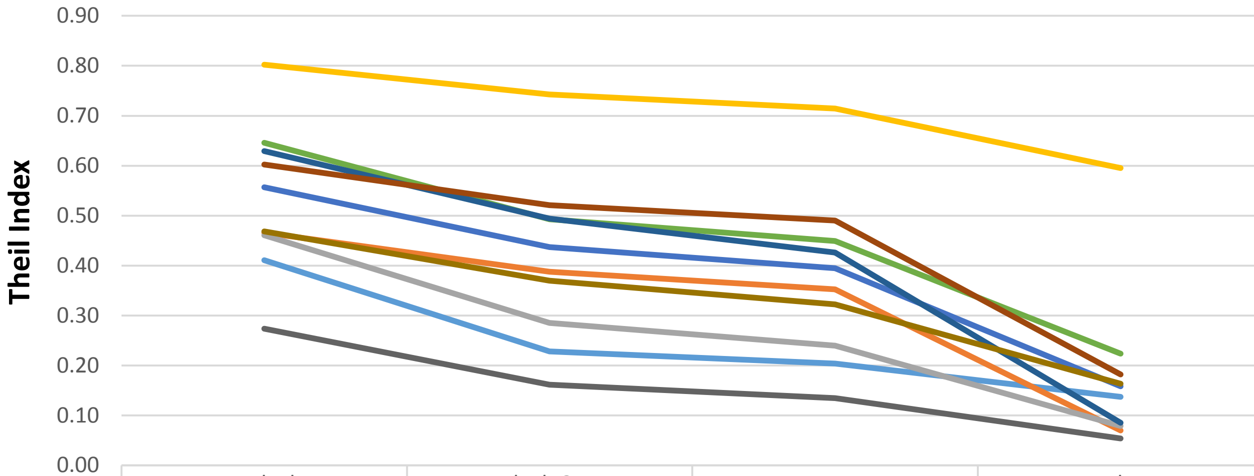
	R Block	R Block Group	R Tract	R Place
Atlanta, GA	0.7002	0.6212	0.6009	0.2605
Boston, MA	0.7578	0.6584	0.6287	0.4593
Chicago, IL	0.8418	0.7798	0.7627	0.5585
Detroit, MI	0.8484	0.7911	0.7751	0.7059
Houston, TX	0.7318	0.6515	0.6221	0.3173
Los Angeles, CA	0.7275	0.6524	0.6383	0.3749
Minneapolis, MN	0.7201	0.5864	0.5529	0.4623
New York, NY	0.8020	0.7661	0.7495	0.2269
Philadelphia, PA	0.7844	0.7026	0.6745	0.4522
Washington, DC	0.6718	0.6094	0.5894	0.3521

Figure 12. Residential Segregation Between Nested Units in Small MSAs - Theil



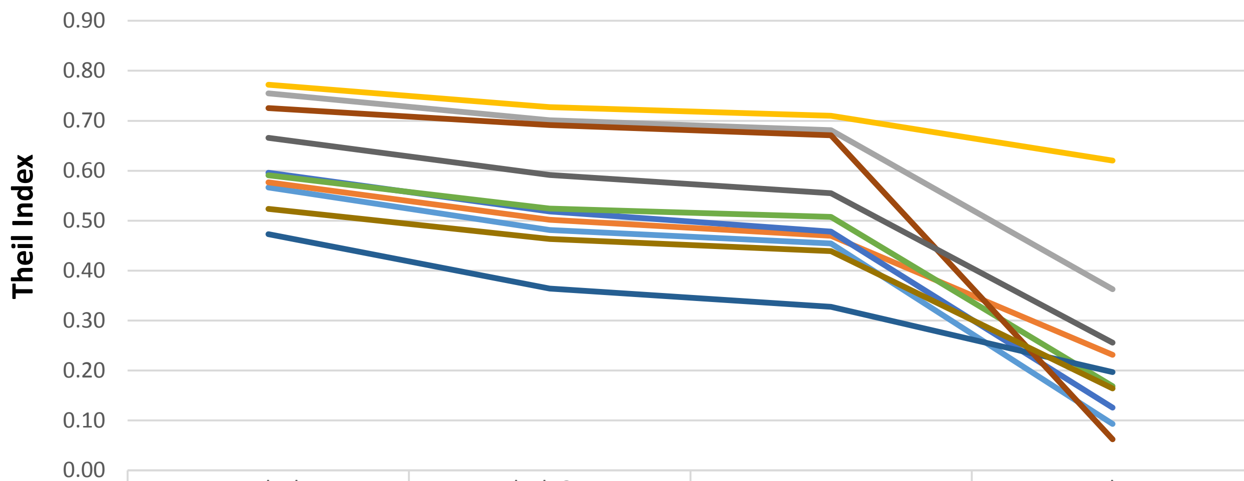
	H Block	H Block Group	H Tract	H Place
Cheyenne, WY	0.3009	0.0991	0.0807	0.0048
Enid, OK	0.3645	0.1027	0.0700	0.0346
Flagstaff, AZ	0.3393	0.1391	0.1027	0.0446
Jonesboro, AR	0.4222	0.2735	0.1936	0.0975
Las Cruces, NM	0.3207	0.1057	0.0655	0.0087
McAllen, TX	0.6035	0.3668	0.2983	0.0705
Pittsfield, MA	0.3478	0.1882	0.1358	0.0522
San Angelo, TX	0.3946	0.1993	0.1360	0.0326
Victoria, TX	0.4233	0.2201	0.1845	0.0343
Yuma, AZ	0.3256	0.1818	0.1597	0.0819

Figure 13. Residential Segregation Between Nested Units in Moderate MSAs - Theil



	H Block	H Block Group	H Tract	H Place
Allentown, PA	0.4105	0.2279	0.2036	0.1374
Ann Arbor, MI	0.4658	0.3877	0.3524	0.0700
Charleston, SC	0.4607	0.2850	0.2398	0.0786
Gary, IN	0.8021	0.7427	0.7145	0.5953
Little Rock, AR	0.5571	0.4372	0.3945	0.1582
Mobile, AL	0.6458	0.4926	0.4492	0.2240
Sarasota, FL	0.6290	0.4941	0.4264	0.0853
Toledo, OH	0.6025	0.5210	0.4904	0.1820
Tucson, AZ	0.2738	0.1617	0.1348	0.0538
Wilmington, DE	0.4687	0.3699	0.3226	0.1635

Figure 14. Residential Segregation Between Nested Units in Large MSAs - Theil



	H Block	H Block Group	H Tract	H Place
Atlanta, GA	0.5663	0.4811	0.4545	0.0928
Boston, MA	0.5770	0.5018	0.4695	0.2315
Chicago, IL	0.7548	0.7010	0.6812	0.3624
Detroit, MI	0.7724	0.7275	0.7103	0.6203
Houston, TX	0.5957	0.5183	0.4782	0.1258
Los Angeles, CA	0.5910	0.5242	0.5077	0.1688
Minneapolis, MN	0.4729	0.3641	0.3277	0.1965
New York, NY	0.7250	0.6915	0.6707	0.0625
Philadelphia, PA	0.6657	0.5914	0.5547	0.2555
Washington, DC	0.5235	0.4636	0.4388	0.1643

It is argued that blocks can produce upwardly biased segregation measures because they are too low of a level that results in homogeneous populations (Lee et al. 2008:779; Wong 1997:131; Winship 1977; Fossett 2016b). This view is not supported in the data reviewed here. This impact is the same in small, medium, and large metropolitan areas and so cannot drive the important differences in segregation documented in the figures just reviewed.

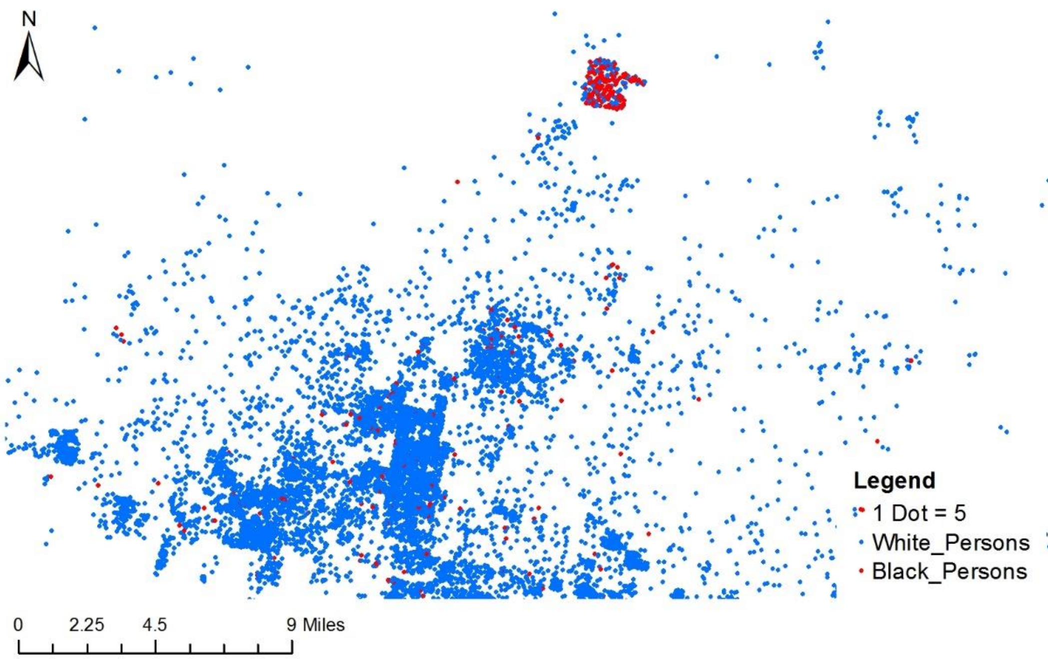
The first set of decomposition figures show that for moderate and large MSAs, choice of scale may not matter. Using blocks or tracts, measures of segregation produce similar results that differ by a few points. MSAs that are found to have high segregation using block data are still highly segregated using tract data. In contrast, scale choice matters by large amounts for small MSAs. Segregation scores using blocks were much higher than scores captured at the tract level. The differences were enough to classify an MSA as having high segregation at the block level or moderate segregation at the tract level.

There are two points to consider. The first is that: scale choice may not matter for moderate or large MSAs but may matter for small MSAs. The second is that the concern that blocks may be considered too homogeneous for segregation research does not appear to be supported; instead the data here suggest the possibility that tracts may be too large to capture the true level of segregation of population groups in small MSAs. I analyze this a little further by examining the population distribution of McAllen, TX MSA (Figure 15). We can see a high concentration of the black population in the northernmost part of the MSA while the white population is spread out along major arterials.

Upon closer inspection, the concentrated black population falls within a single Census block (Figure 15). When moving to block groups, the concentrated black population now resides within a block group that includes substantial numbers of whites from adjacent areas (Figure 16). At the tract level, the concentrated black population is now included in a unit that includes a larger white population (Figure 16). For McAllen, TX MSA, as the spatial unit became larger, the area with the highest concentration of isolated blacks is included in areas that are more diverse and less homogeneously black. Thus, tracts were indeed masking the true population distribution because in tracts the concentrated black population was considered in the same tract as whites who were residing miles away. Ultimately, Census blocks capture segregation better than Census tracts regardless of size of the MSA.

This conclusion cannot be easily dismissed. One basis for setting it aside is to argue that block-level segregation is not sociologically meaningful while tract-level segregation is sociologically meaningful. For many concerns, this argument can be dismissed. For example, the block with concentrated black presence in the figure is just outside of city-limit boundaries and thus potentially experiences disparities in services and infrastructure. Ethnographic studies of segregation patterns even in large metropolitan areas suggest that neighborhood outcomes and life chances vary even at the level of small scale neighborhoods such as city blocks. Thus, while it might be reasonable to conclude that tracts are adequate for capturing segregation in major metropolitan areas that does not lead to the conclusion that the additional segregation observed at smaller spatial scales is sociologically unimportant.

Figure 15. McAllen, TX MSA Black & White Population - 2000



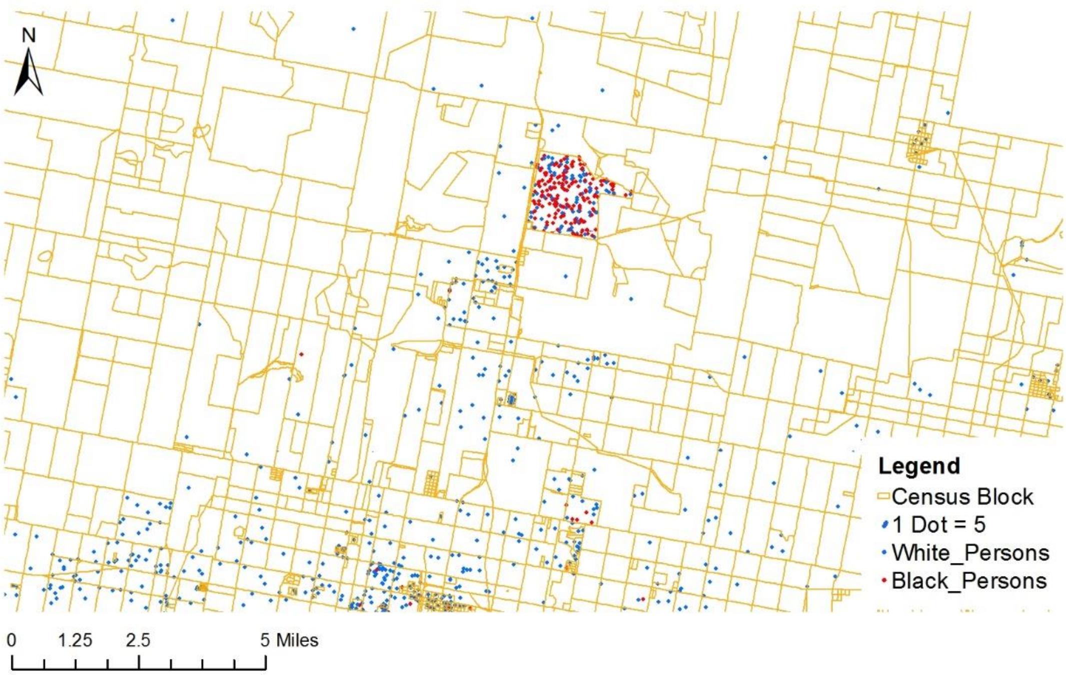
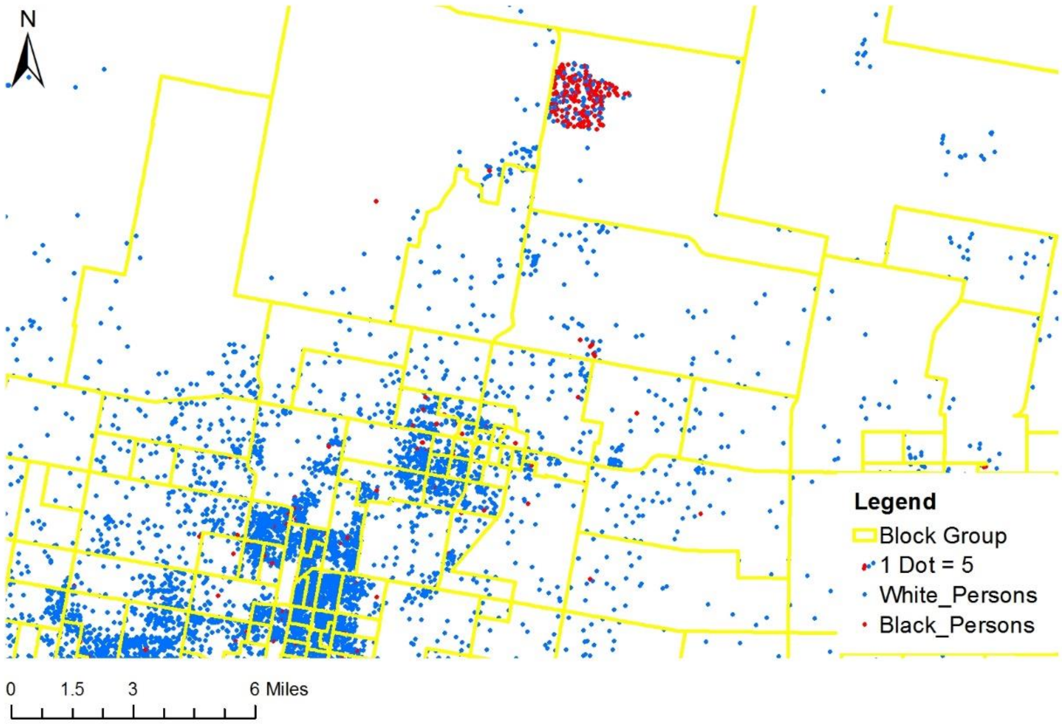
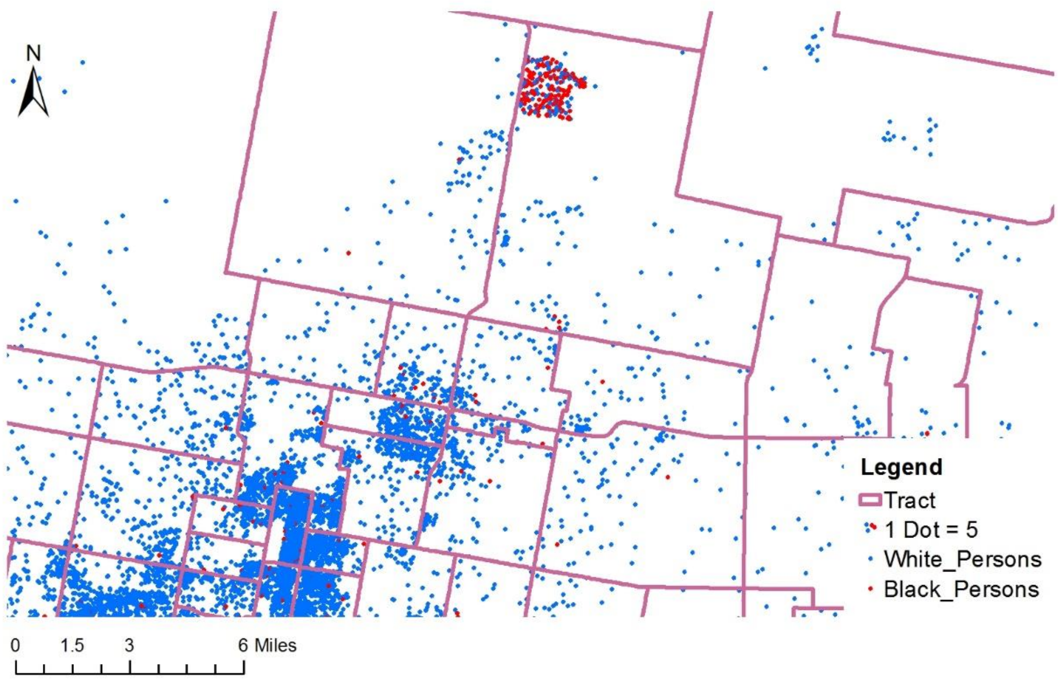


Figure 16. McAllen, TX MSA Black & White Population Distribution - 2000

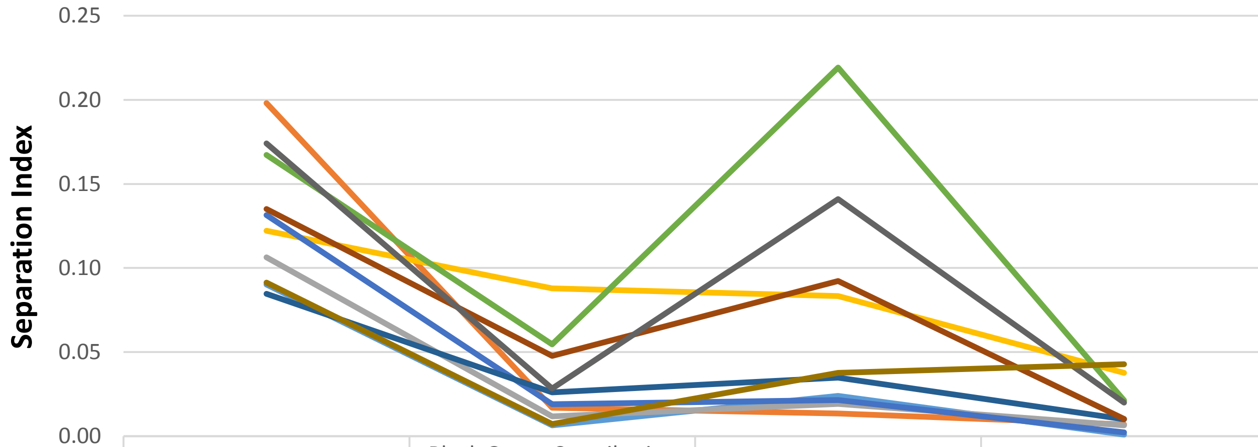




Figures 17 thru 25 are similar in that they are also organized by measure of segregation and size of the MSA. These figures differ than the preceding because they depict each unit's contribution to the segregation score which was obtained using the simple method of decomposition. The previous figures conclude that scale choice does matter and generally using Census tracts to measure segregation across MSAs may not be adequate in analyses examining segregation across metropolitan areas of differing size. In the next section I examine the data seen in the previous figures in ways that are better suited to revealing the spatial scale at which segregation coalesces. The following figures may be of greater importance because they display the source of influence to the segregation score thus determining whether segregation may be the result of lower level blocks or larger fragments, such as place units.

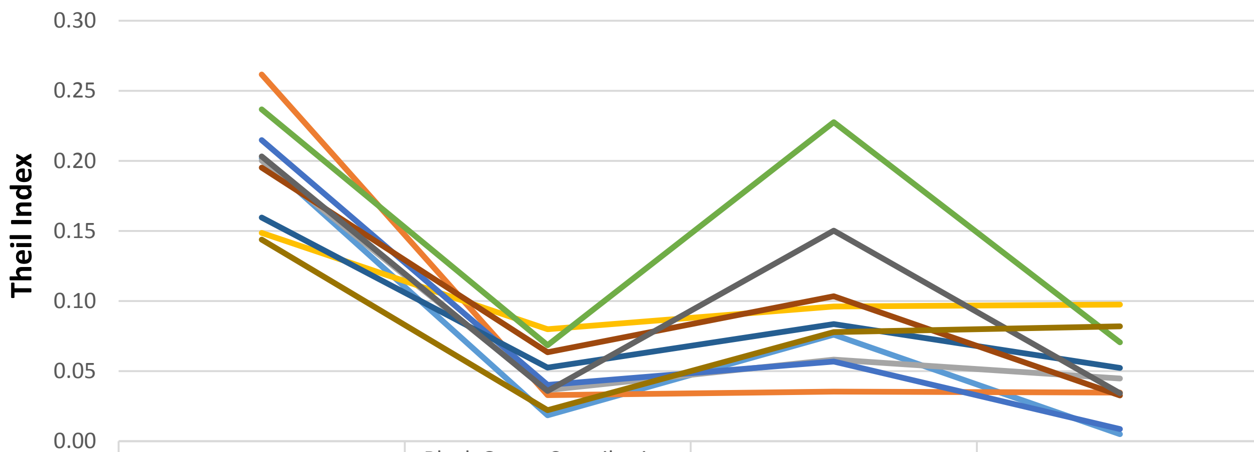
The following analysis used the simple method of decomposition to determine how segregation at each spatial scale contributes to the city's overall segregation score. The dissimilarity index was used in the previous section for more descriptive purposes but since it does not satisfy additive organizational decomposition properties it is not used in the following analyses. Each unit's contribution to the segregation score was calculated for the separation index, Theil index, and Hutchens index.

Figure 17. Residential Segregation within Nested Units in Small MSAs - Separation - Unit Contribution



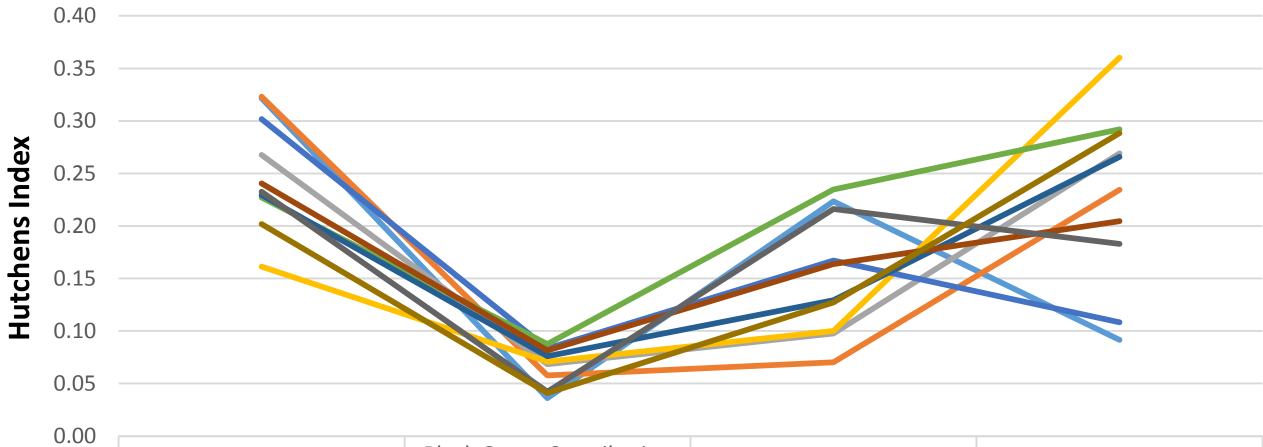
	Block Contribution (S)	Block Group Contribution (S)	Tract Contribution (S)	Place Contribution (S)
Cheyenne, WY	0.0902	0.0063	0.0240	0.0008
Enid, OK	0.1982	0.0168	0.0133	0.0070
Flagstaff, AZ	0.1063	0.0117	0.0192	0.0063
Jonesboro, AR	0.1222	0.0878	0.0833	0.0375
Las Cruces, NM	0.1315	0.0189	0.0214	0.0023
McAllen, TX	0.1673	0.0545	0.2192	0.0213
Pittsfield, MA	0.0846	0.0260	0.0348	0.0100
San Angelo, TX	0.1350	0.0477	0.0923	0.0102
Victoria, TX	0.1741	0.0283	0.1410	0.0198
Yuma, AZ	0.0913	0.0072	0.0376	0.0428

Figure 18. Residential Segregation within Nested Units in Small MSAs - Theil - Unit Contribution



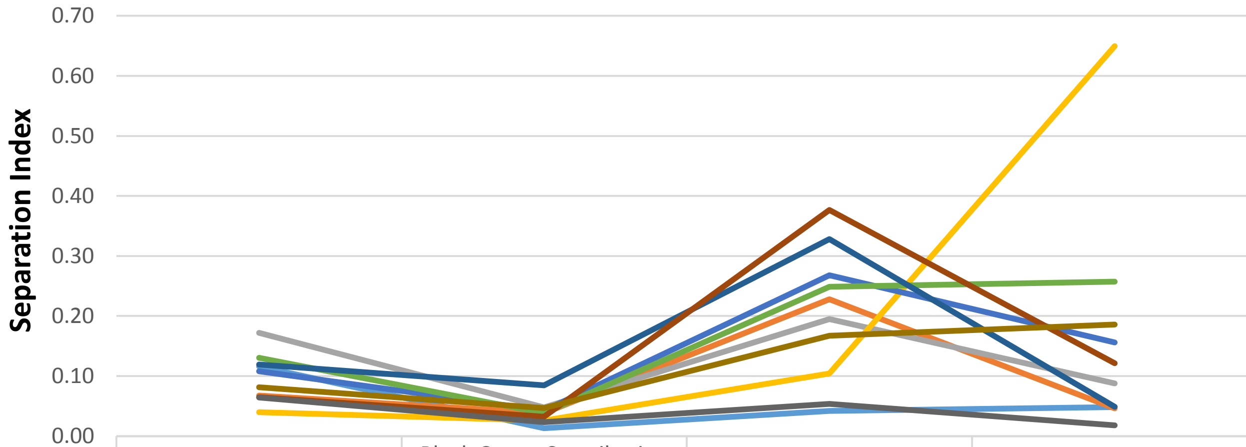
	Block Contribution (H)	Block Group Contribution (H)	Tract Contribution (H)	Place Contribution (H)
Cheyenne, WY	0.2018	0.0183	0.0759	0.0048
Enid, OK	0.2617	0.0328	0.0354	0.0346
Flagstaff, AZ	0.2001	0.0365	0.0581	0.0446
Jonesboro, AR	0.1487	0.0799	0.0961	0.0975
Las Cruces, NM	0.2149	0.0402	0.0569	0.0087
McAllen, TX	0.2368	0.0685	0.2278	0.0705
Pittsfield, MA	0.1597	0.0523	0.0836	0.0522
San Angelo, TX	0.1952	0.0633	0.1034	0.0326
Victoria, TX	0.2032	0.0357	0.1502	0.0343
Yuma, AZ	0.1438	0.0221	0.0777	0.0819

Figure 19. Residential Segregation within Nested Units in Small MSAs - Hutchens - Unit Contribution



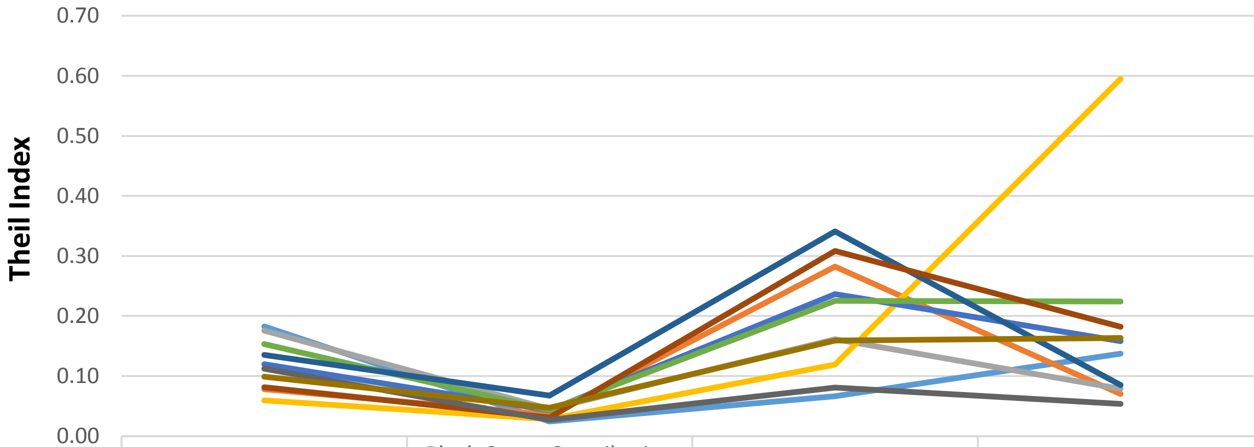
	Block Contribution (R)	Block Group Contribution (R)	Tract Contribution (R)	Place Contribution (R)
Cheyenne, WY	0.3216	0.0363	0.2236	0.0916
Enid, OK	0.3229	0.0578	0.0701	0.2343
Flagstaff, AZ	0.2677	0.0684	0.0975	0.2691
Jonesboro, AR	0.1614	0.0708	0.1002	0.3602
Las Cruces, NM	0.3017	0.0832	0.1670	0.1082
McAllen, TX	0.2270	0.0877	0.2347	0.2919
Pittsfield, MA	0.2297	0.0760	0.1294	0.2657
San Angelo, TX	0.2404	0.0814	0.1637	0.2045
Victoria, TX	0.2324	0.0422	0.2161	0.1830
Yuma, AZ	0.2019	0.0410	0.1271	0.2882

Figure 20. Residential Segregation within Nested Units in Moderate MSAs - Separation - Unit Contribution



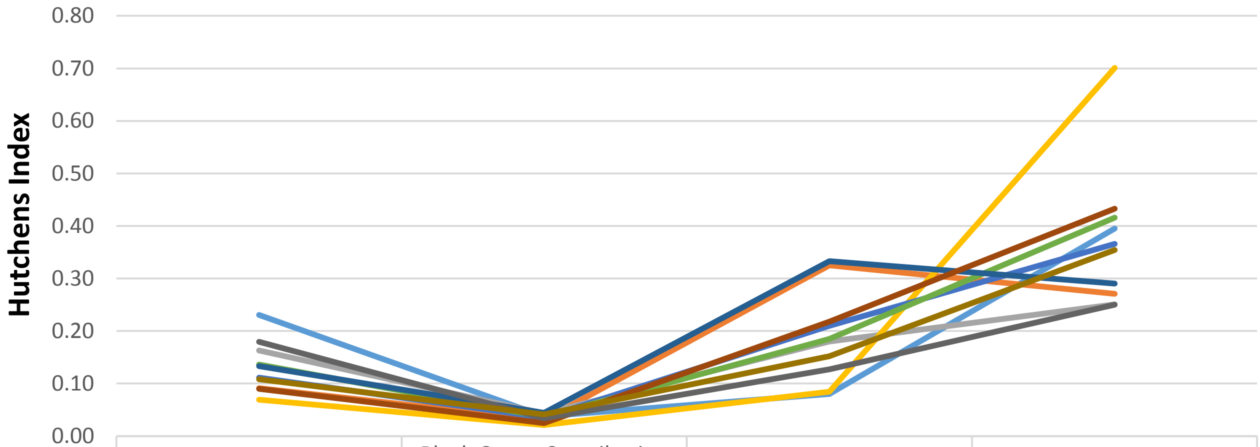
	Block Contribution (S)	Block Group Contribution (S)	Tract Contribution (S)	Place Contribution (S)
Allentown, PA	0.1158	0.0129	0.0418	0.0481
Ann Arbor, MI	0.0677	0.0380	0.2278	0.0459
Charleston, SC	0.1718	0.0477	0.1949	0.0876
Gary, IN	0.0400	0.0257	0.1040	0.6496
Little Rock, AR	0.1081	0.0423	0.2677	0.1562
Mobile, AL	0.1305	0.0383	0.2486	0.2573
Sarasota, FL	0.1194	0.0844	0.3282	0.0488
Toledo, OH	0.0645	0.0321	0.3766	0.1214
Tucson, AZ	0.0641	0.0233	0.0537	0.0178
Wilmington, DE	0.0815	0.0465	0.1670	0.1858

Figure 21. Residential Segregation within Nested Units in Moderate MSAs - Theil - Unit Contribution



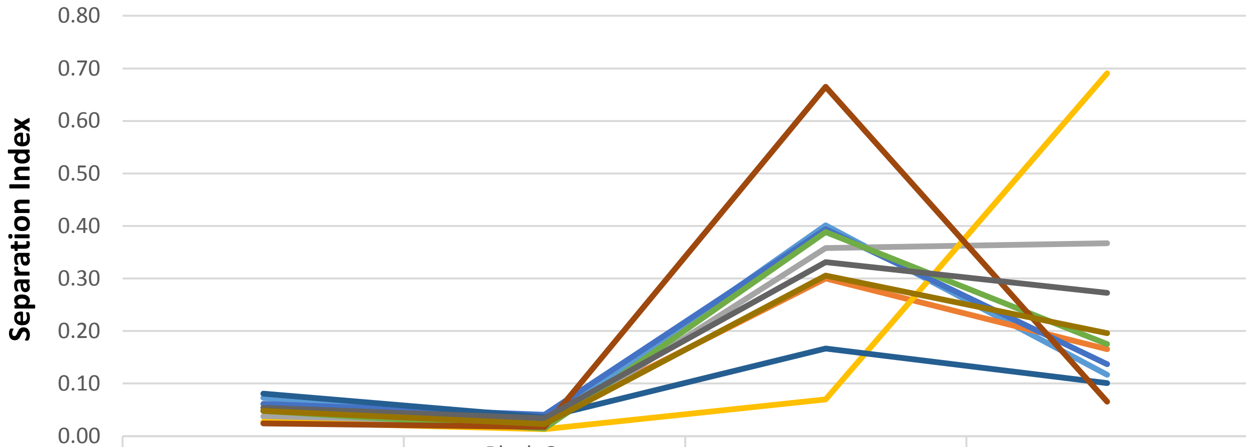
	Block Contribution (H)	Block Group Contribution (H)	Tract Contribution (H)	Place Contribution (H)
Allentown, PA	0.1826	0.0243	0.0662	0.1374
Ann Arbor, MI	0.0781	0.0354	0.2824	0.0700
Charleston, SC	0.1758	0.0451	0.1613	0.0786
Gary, IN	0.0594	0.0282	0.1192	0.5953
Little Rock, AR	0.1198	0.0427	0.2363	0.1582
Mobile, AL	0.1532	0.0434	0.2253	0.2240
Sarasota, FL	0.1349	0.0677	0.3411	0.0853
Toledo, OH	0.0815	0.0307	0.3084	0.1820
Tucson, AZ	0.1122	0.0269	0.0809	0.0538
Wilmington, DE	0.0988	0.0472	0.1592	0.1635

Figure 22. Residential Segregation within Nested Units in Moderate MSAs - Hutchens - Unit Contribution



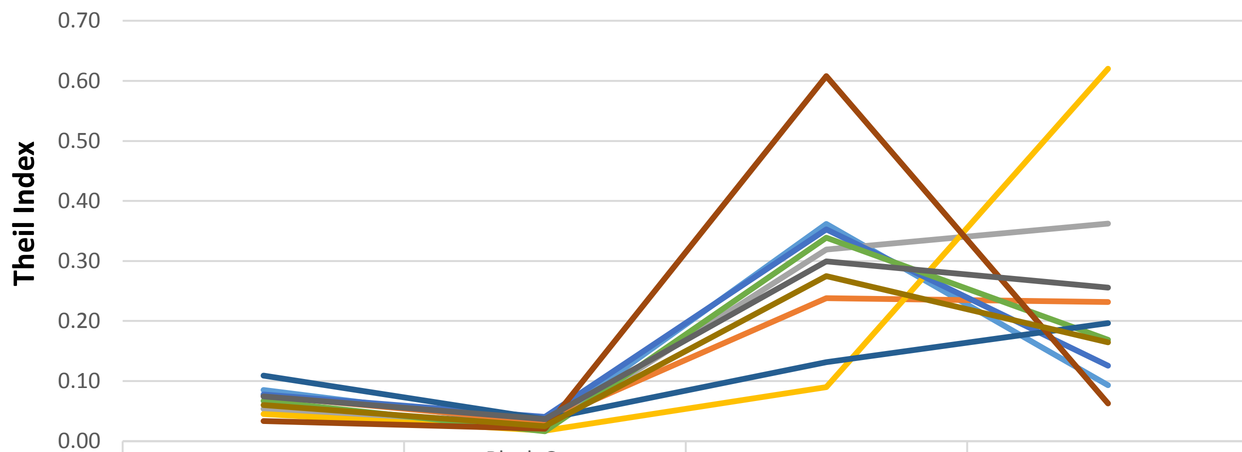
	Block Contribution (R)	Block Group Contribution (R)	Tract Contribution (R)	Place Contribution (R)
Allentown, PA	0.2305	0.0377	0.0800	0.3949
Ann Arbor, MI	0.0911	0.0310	0.3251	0.2708
Charleston, SC	0.1630	0.0428	0.1800	0.2505
Gary, IN	0.0692	0.0208	0.0847	0.7010
Little Rock, AR	0.1112	0.0350	0.2102	0.3660
Mobile, AL	0.1363	0.0365	0.1851	0.4157
Sarasota, FL	0.1332	0.0443	0.3327	0.2900
Toledo, OH	0.0899	0.0249	0.2176	0.4327
Tucson, AZ	0.1792	0.0338	0.1268	0.2502
Wilmington, DE	0.1080	0.0411	0.1523	0.3545

Figure 23. Residential Segregation within Nested Units in Large MSAs - Separation - Unit Contribution



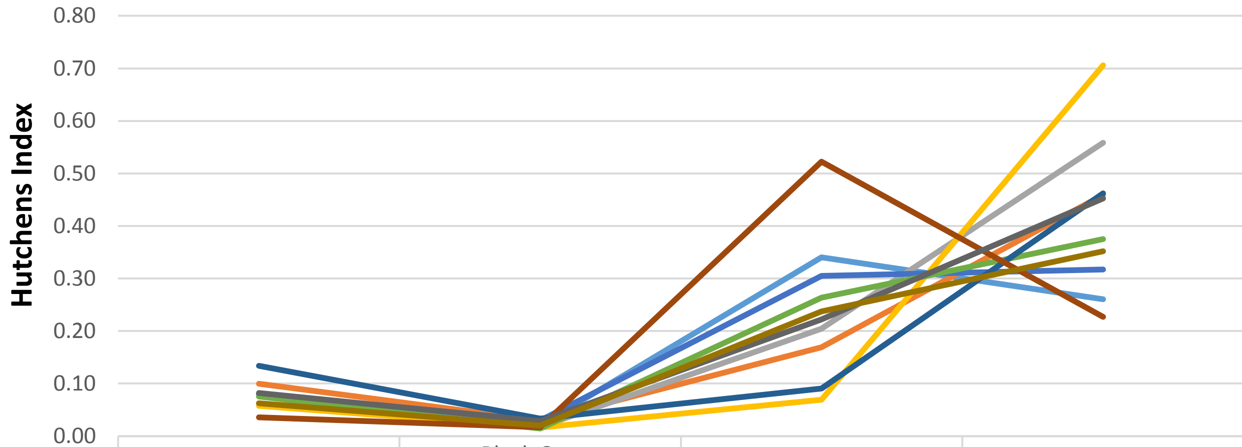
	Block Contribution (S)	Block Group Contribution (S)	Tract Contribution (S)	Place Contribution (S)
Atlanta, GA	0.0727	0.0255	0.4011	0.1170
Boston, MA	0.0487	0.0287	0.3003	0.1657
Chicago, IL	0.0375	0.0167	0.3580	0.3670
Detroit, MI	0.0272	0.0132	0.0700	0.6904
Houston, TX	0.0611	0.0405	0.3939	0.1368
Los Angeles, CA	0.0479	0.0144	0.3881	0.1749
Minneapolis, MN	0.0809	0.0360	0.1664	0.1008
New York, NY	0.0240	0.0173	0.6649	0.0658
Philadelphia, PA	0.0538	0.0337	0.3310	0.2725
Washington, DC	0.0476	0.0228	0.3055	0.1957

Figure 24. Residential Segregation within Nested Units in Large MSAs - Theil - Unit Contribution



	Block Contribution (H)	Block Group Contribution (H)	Tract Contribution (H)	Place Contribution (H)
Atlanta, GA	0.0852	0.0266	0.3617	0.0928
Boston, MA	0.0752	0.0323	0.2380	0.2315
Chicago, IL	0.0538	0.0198	0.3188	0.3624
Detroit, MI	0.0448	0.0173	0.0899	0.6203
Houston, TX	0.0775	0.0400	0.3525	0.1258
Los Angeles, CA	0.0667	0.0165	0.3389	0.1688
Minneapolis, MN	0.1088	0.0364	0.1312	0.1965
New York, NY	0.0335	0.0208	0.6083	0.0625
Philadelphia, PA	0.0743	0.0367	0.2992	0.2555
Washington, DC	0.0599	0.0247	0.2746	0.1643

Figure 25. Residential Segregation within Nested Units in Large MSAs - Hutchens - Unit Contribution



	Block Contribution (R)	Block Group Contribution (R)	Tract Contribution (R)	Place Contribution (R)
Atlanta, GA	0.0790	0.0204	0.3404	0.2605
Boston, MA	0.0994	0.0297	0.1693	0.4593
Chicago, IL	0.0620	0.0171	0.2042	0.5585
Detroit, MI	0.0573	0.0160	0.0691	0.7059
Houston, TX	0.0803	0.0294	0.3048	0.3173
Los Angeles, CA	0.0751	0.0141	0.2634	0.3749
Minneapolis, MN	0.1337	0.0335	0.0906	0.4623
New York, NY	0.0358	0.0166	0.5226	0.2269
Philadelphia, PA	0.0817	0.0281	0.2223	0.4522
Washington, DC	0.0624	0.0200	0.2373	0.3521

Segregation originates at various unit levels according the size of the MSA and measure of segregation. For small MSAs, separation and Theil indices display similar patterns. Block level units have greater contributions to the overall segregation score. Several of the smaller MSAs have blocks and tracts both equally, or more, contributing to the overall segregation score. Generally, block groups, as do place units, do not seem to contribute to the overall segregation score relative to blocks and tracts. For example, McAllen, TX MSA has a separation index contribution score of .1673 at the block level and a .2192 contribution score at the tract level but its block group and place scores are .0545 and .0213, respectively (Figure 17).

The Hutchens index produced patterns that differed from the separation and Theil indices. For small MSAs, block, tract, and place level contributions to the overall segregation were mostly greater than contributions at the block group level. For example, recall that McAllen, TX MSA had greater contributions at the block and tract level for separation and Theil. For Hutchens, McAllen, TX MSA has a Hutchens contribution score of .2270 at the block level, .2347 at the tract level, and a .2347 contribution score at the place level (Figure 19). The block group contribution is a .0877.

Moving to moderate sized MSAs, separation, Theil, and Hutchens indices all display somewhat similar patterns to each other. In moderately sized MSAs, you see place level units begin to have greater influence in contribution to the overall segregation score. First, block level contribution to the overall segregation score becomes less important and almost at the level of block groups' contribution. For Theil and separation, tracts mostly have the greatest contribution to the overall segregation score with place contribution not far behind. The Hutchens index is interesting because it also shows block contribution at similar levels as block groups but instead of tracts having the most of the contribution to the overall segregation score, place level contribution surpasses tract contribution in most moderate sized MSAs.

One moderate sized MSA, Gary, IN, stood out from other MSAs in all measures of segregation. Gary, IN MSA has a separation contribution score of .04 at the block level, .0257 at the block group level, .1040 at the tract level, and .6496 at the place level (Figure 20). The Theil contribution scores were .0594, .0282, .1192, and .5953 at the block, block group, tract, and place level, respectively (Figure 21). The Hutchens contribution scores were .0692, .0208, .0847, and .7010 at the block, block group, tract, and place level respectively (Figure 22).

Large MSAs have contribution patterns across all measures of segregation. Blocks and block groups have consistently weak contributions to the overall segregation score. For Theil and separation, the place level contribution continue to increase over moderately sized MSAs. The Hutchens index again captures segregations greatest contribution at the place level.

Two MSAs, New York, NY and Detroit, MI, stand out from the large sized MSAs. First, New York, NY, in all measures of segregation, captures a high degree of segregation at the tract level leaving all other unit levels with weak contributions. That is a departure from other MSAs since most other areas have most of their segregation contribution split between two of the nested levels where in New York, it’s mostly at the tract level. For example, New York, NY has a .0240, .0173, .6649, and .0658 separation index contribution score at the block, block group, tract, and place level (Figure 23).

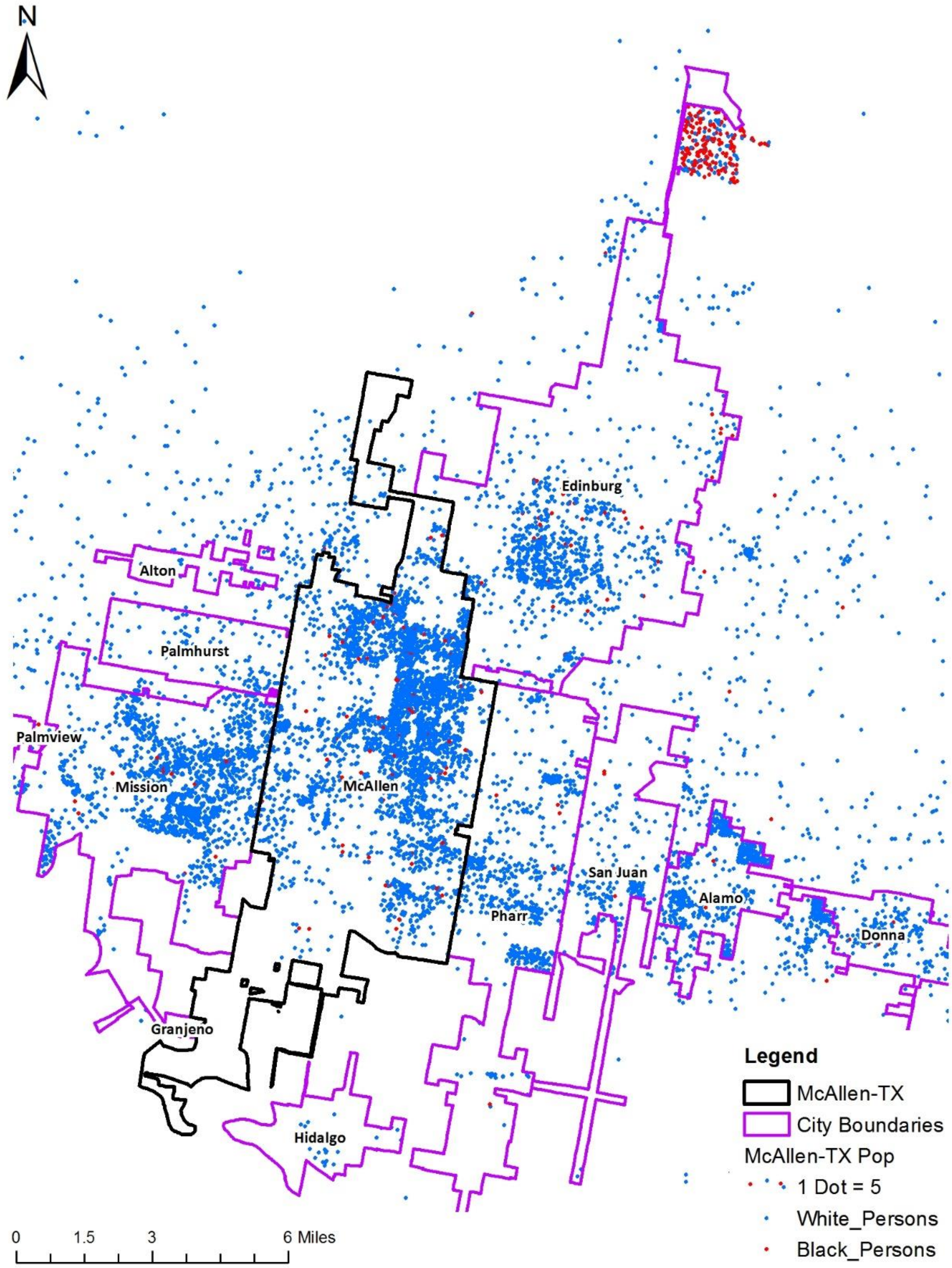
Similarly, Detroit, MI MSA, in all measures of segregation, captures a high degree of segregation at a single level as opposed to splitting the contribution between two levels. Detroit, MI has its greatest contribution to the overall segregation score at the place level leaving block, block group, and tract to have a minimal contribution to segregation. For example, Detroit, MI has a .0573, .0160, .0691, and .7059 Hutchens contribution score at the block, block group, tract, and place respectively (Figure 25).

Overall, the Hutchens decomposition has found that segregation coalesces around place boundaries for most MSAs. As the size of the MSA increases, the place contribution to the overall segregation score becomes more apparent. The Theil and separation decompositions also found that segregation mostly coalesces around place levels but not for small sized MSAs. In small sized MSAs, blocks and tracts had greater contributions to segregation.

For the purpose of this dissertation, which is to investigate the impact of fragmentation on segregation, I placed a greater focus in occasions where the place contribution was significant or the highest level of contribution. Patterns where segregation coalesced around places appeared in moderate and large MSAs and never in small MSAs across all measures of segregation. For small MSAs, segregation coalesced around places only when measured using the Hutchens index. To examine these differences amongst small to large MSAs I visually inspected the population distribution of a small, moderate, and large MSAs and how the distribution aligns with city boundaries within the MSA.

I examine McAllen, TX for the small MSAs (Figure 26). The McAllen, TX MSA has whites mostly concentrated within place boundaries with some whites residing in unincorporated areas of the MSA. The distribution of the black population is much different relative to whites. Non-Hispanic blacks are located sparsely within city boundaries or alongside the white population. The majority of the black population resides north of the non-Hispanic white population concentration in the unincorporated area. In fact, this concentration of blacks are underbounded. In this case, the City of Edinburg has gone through a ‘flag’, or ‘shoestring’, annexation by opting to annex territory north of the concentrated black households without having to annex the black population. Thereby underbounding the black community.

Figure 26. McAllen, TX MSA Black & White Population Distribution with Place Boundaries - 2000



For the moderate MSA, I examine Gary, IN (Figure 27). Gary, IN has a much larger black and white population than McAllen, TX which had a mostly white population. In this instance, the non-Hispanic black population is concentrated within city boundaries. Although blacks now reside within city boundaries, they are not residing alongside white residents. The two groups are clearly delineated by city boundaries with the City of Gary containing the majority of the black population. Gary, IN MSA is also unique in that the two population groups are not only separated by city but by dead spaces or areas with no population. These areas are large industrial sites and an airport.

Finally, for the large MSA, I examine Detroit, MI (Figure 28). Similar to Gary, IN, the non-Hispanic black population resides within cities and is segregated from cities that are almost entirely white. Detroit, MI MSA has a handful of cities that contain almost the entire black population while a small portion seems to reside in the western portion of the MSA.

Figure 27. Gary, IN MSA Black & White Population Distribution with Place Boundaries - 2000

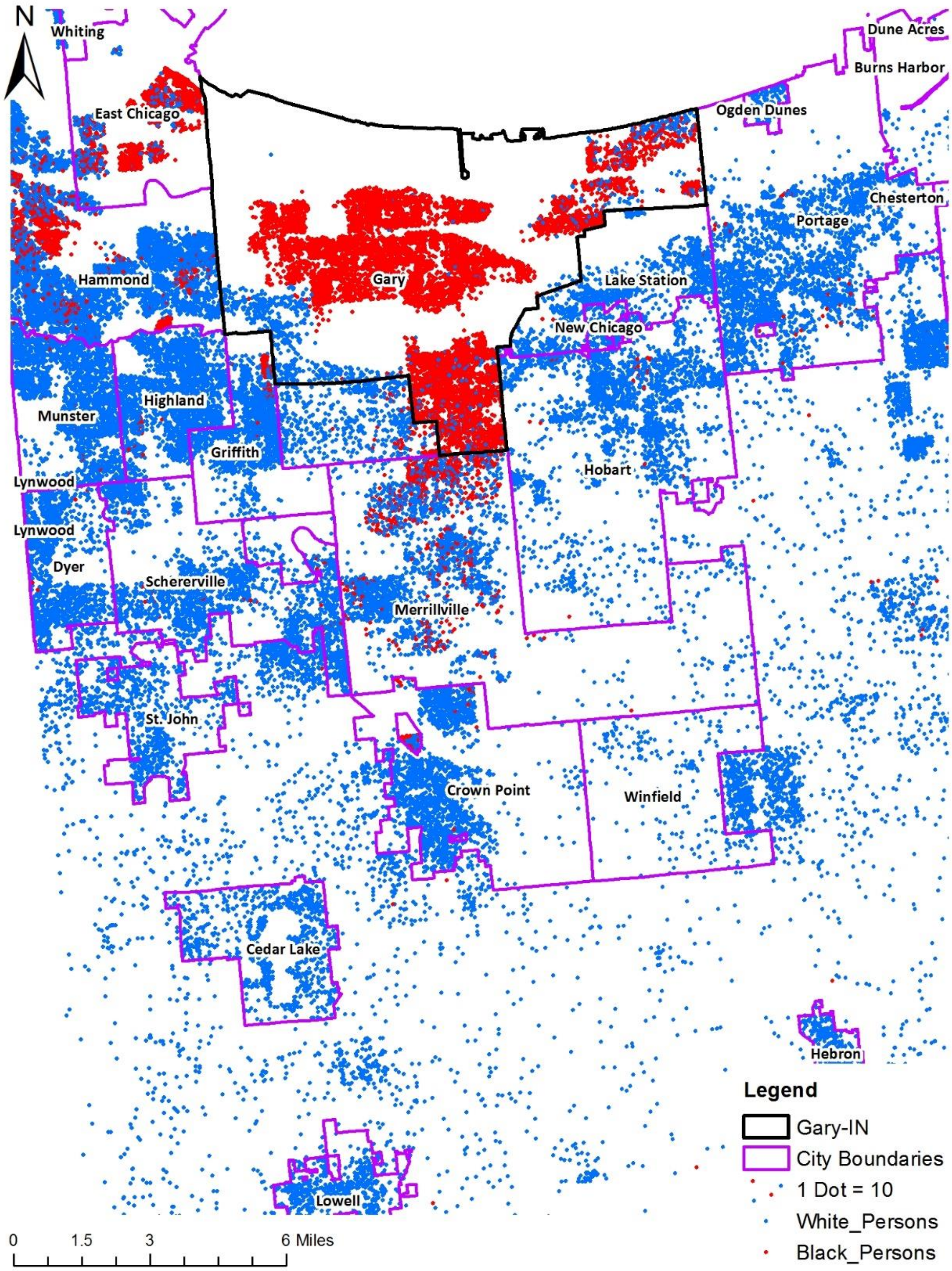
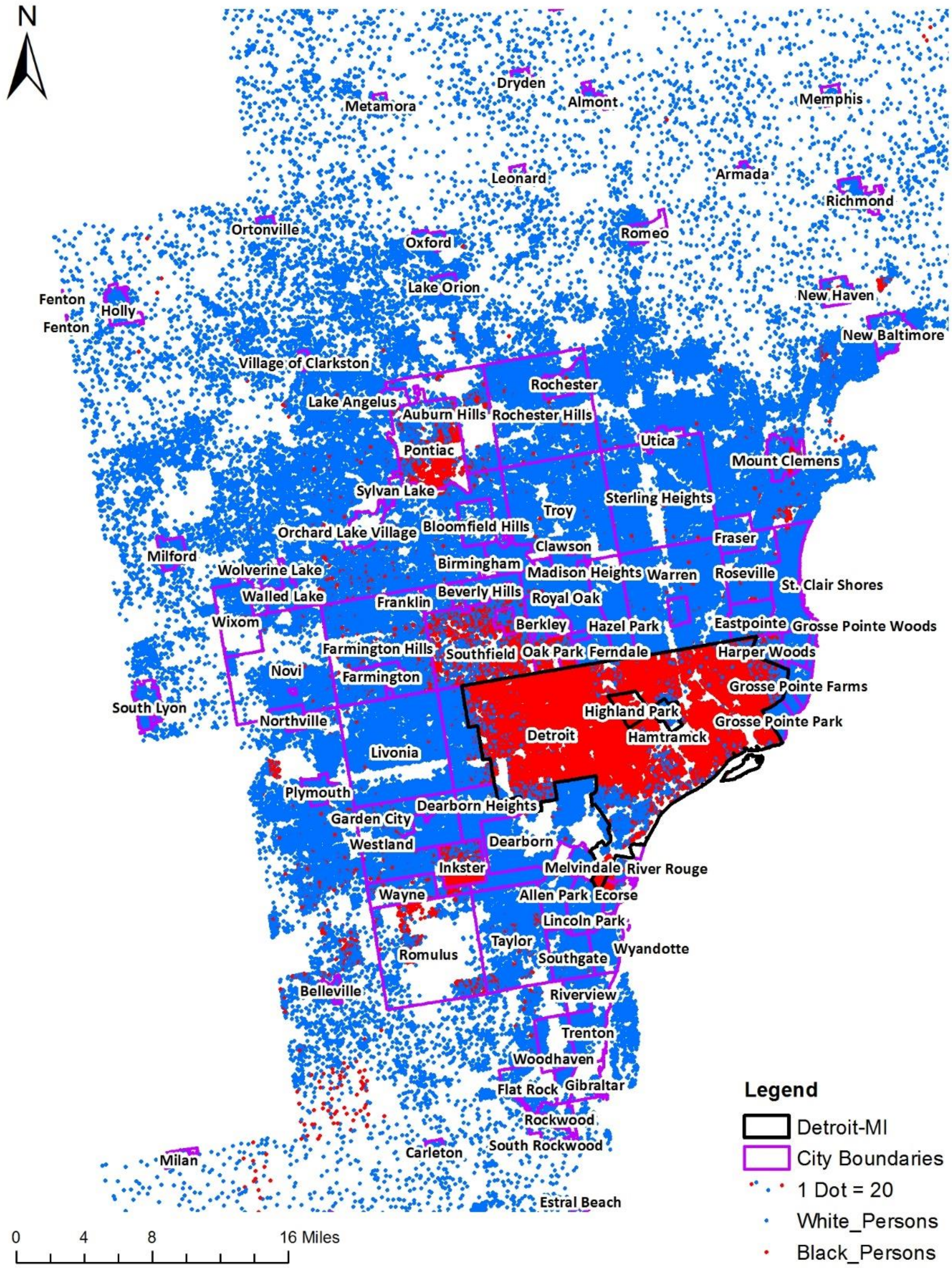


Figure 28. Detroit, MI MSA Black & White Population Distribution with Place Boundaries - 2000



The visual analysis put the previous unit level contribution analyses into perspective. Examining the three MSAs, we are able to see the reasons behind the place level contribution being low in small MSAs and high in moderate and large MSAs. The interesting point in small MSAs was that a significant amount of the black population was underbounded and considered residing alongside rural whites. Thus decreasing the degree to which place contributes to the total segregation score. Another interesting point of the visual analysis was between Gary, IN and Detroit, MI. Both MSAs have places that equally contribute to the overall segregation score but both are spatially different in terms of their population distribution. Segregation between blacks and whites in Gary, IN is by place boundary on top of the two groups having spatial distance between each other. Segregation between blacks and whites in Detroit, MI is also by place boundary but the two groups do not have any spatial distance between each other. In Detroit, MI MSA, the two population groups exactly align along city boundaries.

Regression Analyses

The following section is one in which I make new contributions to the literature measuring municipal boundaries and their effect on residential segregation. Utilizing the results from decomposing segregation at nested Census units, I implement the contribution scores at each level into regression analyses. Rather than use the overall segregation scores as modeled in the Chapter 5 metropolitan level analysis, I model the contribution scores as the dependent variable. I regress fragmentation on segregation derived from a variety of spatial unit contributions to determine the robustness of the findings and whether the geographic unit used in assessing segregation affects the extent to which the two are related (Firebaugh 1989; Wan and Zhou 2005). The results will aid in concluding whether segregation crystallizes along fragment borders. Lastly, rather than include all measures of fragmentation and control variables, the regression models in this section utilize the fragmentation measures and control variables that were most promising in the metropolitan level analysis.

The fragmentation measures used in this analysis are the total number of cities with a minimum 2,500 population per 1 million MSA residents and the MSA share of the population residing outside the largest city. The control variables used are: percentage of the white population, percentage of the population in the armed forces, percentage of the housing units built post-FHA, natural log of the population, and recent population growth. Recent population growth is a new addition to the list of control variables. Researchers note that in some cases the size of the population may not have an effect on residential segregation rather the recent growth of the population will positively affect residential segregation (Logan et al. 2004:13). Recent population growth is the growth in MSA total population from 1990 to 2000 measured as a percentage.

Table 16 reports the descriptive statistics for the variables used in the regression analysis. The table is organized by fragmentation measures, segregation measures, and control variables. Previous analyses in this dissertation find that place fragmentation matters more in MSAs with large total populations and less in MSAs with small total populations. As such, I also organize the descriptive statistics into small, medium, and large MSAs which correspond to cities with less than 250,000 total population, cities with at least a 250,000 but less than 1,000,000 total population, and cities with at least a 1,000,000 total population, respectively (Lichter et al. 2015:844).

Grouping the MSAs into small, medium, and large will aid in interpreting the results of the regression. In Table 16 we see that as the size of the MSA goes from small, medium, to large, the mean of the spatial contribution increases. For example, Hutchens has a mean of .2715, .3440, and .3864 at the place level contribution for small, medium, and large MSAs, respectively. Although these patterns remain consistent with previous findings, descriptive statistics can only be used for descriptive purposes. Descriptive statistics cannot attest to the relationship between place boundaries and residential segregation which the decomposition regression can.

Table 16. Descriptive Statistics: Political Fragmentation, Residential Segregation (Unit Contribution) and Controls

Variable		Small			Medium			Large			All		
		N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Fragmentation Measure	**Frag2***	151	21.2497	12.0610	110	21.2399	11.2757	50	17.4345	10.1697	311	20.6329	11.5501
	Frag3*	150	10.7979	5.0496	110	9.5673	4.9126	50	9.0684	4.6078	310	10.0823	4.9684
	Frag4*	151	61.0970	20.4490	110	69.3780	16.1087	50	73.7132	16.6078	311	66.0543	19.0401
Separation Contribution	**Block**	151	0.1203	0.0534	110	0.0974	0.0390	50	0.0703	0.0272	311	0.1042	0.0486
	Block Group	151	0.0374	0.0287	110	0.0367	0.0213	50	0.0294	0.0112	311	0.0359	0.0242
	Tract	151	0.1226	0.0997	110	0.1772	0.1053	50	0.2426	0.1021	311	0.1612	0.1106
	Place	151	0.0519	0.0631	110	0.1143	0.1110	50	0.1714	0.1270	311	0.0932	0.1039
Theil Contribution	**Block**	151	0.1604	0.0438	110	0.1261	0.0380	50	0.0891	0.0288	311	0.1368	0.0474
	Block Group	151	0.0439	0.0217	110	0.0391	0.0162	50	0.0309	0.0093	311	0.0401	0.0188
	Tract	151	0.1330	0.0800	110	0.1684	0.0798	50	0.2178	0.0875	311	0.1591	0.0864
	Place	151	0.0803	0.0638	110	0.1420	0.1011	50	0.1850	0.1134	311	0.1190	0.0960
Hutchens Contribution	**Block**	151	0.1963	0.0638	110	0.1502	0.0606	50	0.1049	0.0427	311	0.1653	0.0684
	Block Group	151	0.0523	0.0204	110	0.0398	0.0168	50	0.0278	0.0085	311	0.0439	0.0198
	Tract	151	0.1646	0.0775	110	0.1641	0.0637	50	0.1802	0.0703	311	0.1669	0.0718
	Place	151	0.2715	0.1055	110	0.3440	0.1187	50	0.3864	0.1127	311	0.3156	0.1199
Control Variables	**% White**	151	89.3850	10.9975	110	86.5763	11.7473	50	82.5651	10.3340	311	87.2951	11.3949
	% Armed Forces	151	1.6837	4.8076	110	1.1464	2.8402	50	0.7175	1.8181	311	1.3383	3.8309
	% Built Post-FHA	151	53.4856	14.7248	110	52.7265	14.2772	50	51.9748	16.7162	311	52.9742	14.8682
	Population Log	151	11.8448	0.3415	110	12.9982	0.3879	50	14.3937	0.4879	311	12.6625	0.9980
	Population Growth	151	12.0256	11.1107	110	13.4755	9.9898	50	17.1656	14.8320	311	13.3648	11.5240

* Frag2 refers to total number of cities with a minimum 2,500 population per 1 million MSA residents. Frag3 refers to total number of cities with a minimum 10,000 population per 1 million MSA residents. Frag4 refers to total share of the MSA population residing outside the largest city.

Table 17 reports models where fragmentation is measured using total number of cities with a minimum 2,500 population per 1 million MSA residents and segregation is measured using the separation index. Fragmentation has its strongest positive and statistically significant effect on residential segregation measured as place contribution to the segregation score. Block and block group contributions have weaker and significant relationships with fragmentation.

A significant finding in this model is that between city size, measured using log of the population, and residential segregation. Log of the population has negative and statistically significant relationships with block level and block group level contribution scores. The relationship becomes positive and significant at the tract level and even stronger for place contribution. These findings are promising because they display similar patterns found in previous analyses. Segregation coalesces around fragmentation to a greater degree in cities with larger populations.

Overall, the control variables have consistent, statistically significant effects in the expected direction across models with the exception of percentage of the housing units built post-FHA. Percentage of the housing units built post-FHA has a positive and statistically significant relationship at the block level contribution. This changes to a negative relationship in tract and place contribution models although the effect is statistically insignificant.

These findings differ in that previous research suggests that cities with a greater number of housing units built post-FHA may tend to have lower degrees of residential segregation. The relationship in this model suggests that this may be the case in cities with large populations but inversely related in cities with small populations. Percentage of the housing units built post-FHA may allow for greater opportunities for whites and blacks to segregate in smaller communities MSAs. MSA percent white and percent in the armed forces have negative relationships and statistically significant relationships with residential segregation. The effects of the control variables tend to be consistent across the models so I will not comment further on the effects of control variables unless they depart in important ways from the above summary.

Table 18 presents the model results where fragmentation is measured by total number of cities with a minimum 10,000 population per 1 million MSA residents and residential segregation is measured by the separation index. Fragmentations effect on residential segregation has more than doubled to 0.051 in the place contribution model than in the previous fragmentation measure. City size also slightly increased 0.432 effect on residential segregation.

Table 19 presents the model results where fragmentation is measured using MSA population share residing outside the largest city and segregation is measured by the separation index. Again, fragmentation and residential segregation has positive and statistically significant relationships at the block, block group, and place level contribution scores. Fragmentation has its greatest strength at the place level contribution with a .022. Although fragmentation's greatest strength is at the place level, log of the population has an even stronger relationship with a 0.261 that is statistically significant at the 0.001 level.

Table 17. Residential Segregation Unit Contribution and Place Fragmentation I - Separation

	Block Contribution	Block Group Contribution	Tract Contribution	Place Contribution
Number of Cities 2,500 per 1M MSA Residents	0.010***	0.009**	-0.004	0.022***
	(0.002)	(0.003)	(0.003)	(0.005)
% White	-0.015***	-0.020***	-0.034***	-0.046***
	(0.002)	(0.004)	(0.003)	(0.006)
% in Armed Forces	-0.018***	-0.033***	-0.037***	-0.062**
	(0.004)	(0.008)	(0.009)	(0.022)
	0.015***	0.009	-0.004	-0.013
% Housing Units Built Post-FHA	(0.003)	(0.005)	(0.005)	(0.010)
Population Log	-0.234***	-0.109**	0.242***	0.413***
	(0.024)	(0.041)	(0.044)	(0.053)
Population Growth	-0.010**	-0.011	-0.003	-0.019
	(0.004)	(0.006)	(0.008)	(0.012)
Constant	1.196*	-0.700	-1.450	-3.160*
	(0.493)	(0.864)	(0.818)	(1.259)
Observations	311	311	311	311

Note: Regression coefficients with standard errors in parentheses
* p<0.05 **p<0.01 ***p<0.001

Table 18. Residential Segregation Unit Contribution and Place Fragmentation II - Separation

	Block Contribution	Block Group Contribution	Tract Contribution	Place Contribution
Number of Cities 10,000 per 1M MSA Residents	0.002	-0.000	-0.018*	0.051***
	(0.005)	(0.007)	(0.008)	(0.012)
% White	-0.013***	-0.019***	-0.034***	-0.042***
	(0.002)	(0.004)	(0.003)	(0.005)
% in Armed Forces	-0.023***	-0.039***	-0.037***	-0.067**
	(0.004)	(0.009)	(0.009)	(0.021)
% Housing Units Built Post-FHA	0.014***	0.008	-0.005	-0.011
	(0.003)	(0.005)	(0.005)	(0.009)
Population Log	-0.240***	-0.118**	0.233***	0.432***
	(0.024)	(0.042)	(0.044)	(0.051)
Population Growth	-0.011**	-0.012	-0.003	-0.027*
	(0.004)	(0.006)	(0.008)	(0.011)
Constant	1.417**	-0.443	-1.208	-3.859**
	(0.495)	(0.880)	(0.824)	(1.201)
Observations	310	310	310	310

Note: Regression coefficients with standard errors in parentheses

* p<0.05 **p<0.01 ***p<0.001

Table 19. Residential Segregation Unit Contribution and Place Fragmentation III - Separation

	Block Contribution	Block Group Contribution	Tract Contribution	Place Contribution
MSA Population Share Residing Outside CC	0.007***	0.009***	-0.004	0.022***
	(0.001)	(0.002)	(0.002)	(0.004)
% White	-0.015***	-0.022***	-0.033***	-0.053***
	(0.002)	(0.004)	(0.004)	(0.006)
% in Armed Forces	-0.019***	-0.034***	-0.038***	-0.067**
	(0.004)	(0.008)	(0.009)	(0.025)
	0.012***	0.006	-0.003	-0.022**
% Housing Units Built Post-FHA	(0.003)	(0.005)	(0.005)	(0.007)
Population Log	-0.294***	-0.181***	0.272***	0.261***
	(0.024)	(0.041)	(0.049)	(0.059)
Population Growth	-0.008*	-0.008	-0.005	-0.011
	(0.003)	(0.006)	(0.008)	(0.009)
Constant	1.902***	0.114	-1.789*	-1.331
	(0.459)	(0.813)	(0.866)	(1.116)
Observations	311	311	311	311

Note: Regression coefficients with standard errors in parentheses

* p<0.05 **p<0.01 ***p<0.001

Table 20 presents the model results for fragmentation measured by the total number of cities with a minimum 2,500 population per 1 million MSA residents and residential segregation measured by the Theil index. As in previous tables, fragmentation has its greatest strength at the place level contribution with a 0.018 effect that is statistically significant at the 0.001 level. Log of the population also has its greatest effect on residential segregation at the place level contribution with a .319. MSA percent white begins to depart from previous relationships. At the block contribution level, MSA percent white has a 0.003 effect on residential segregation that is statistically significant at the 0.05 level. This is a departure from previous analyses since MSA percent white tends to have a negative relationship with residential segregation.

Table 21 presents the model results for fragmentation measured by the total number of cities with a minimum 10,000 population per 1 million MSA residents and residential segregation measured by the Theil index. Again, fragmentations greatest effect is when modeled with place contribution as the segregation score. Here fragmentation also increases in effect to 0.038 which is greater than the effect found in the previous fragmentation measure.

Table 22 presents the model results where fragmentation is measured by the MSA share of the population residing outside the largest city and residential segregation is measured by the Theil index. The findings in these models are identical to the results of the previous models. Fragmentation has the greatest strength with place contribution over other unit level contributions with log of the population has the strongest relationship of all the variables.

Table 20. Residential Segregation Unit Contribution and Place Fragmentation I - Theil

	Block Contribution	Block Group Contribution	Tract Contribution	Place Contribution
Number of Cities 2,500 per 1M MSA Residents	0.005***	0.007**	-0.004	0.018***
	(0.002)	(0.002)	(0.003)	(0.004)
% White	0.003*	-0.011***	-0.024***	-0.021***
	(0.002)	(0.003)	(0.003)	(0.004)
% in Armed Forces	-0.020***	-0.036***	-0.032***	-0.056***
	(0.003)	(0.006)	(0.007)	(0.017)
	0.012***	0.007*	-0.004	-0.018*
% Housing Units Built Post-FHA	(0.002)	(0.003)	(0.004)	(0.007)
Population Log	-0.243***	-0.148***	0.170***	0.319***
	(0.018)	(0.029)	(0.036)	(0.040)
Population Growth	-0.004	-0.008	-0.001	-0.009
	(0.003)	(0.004)	(0.007)	(0.008)
Constant	0.255	-0.751	-1.408*	-3.615***
	(0.363)	(0.604)	(0.704)	(0.881)
Observations	311	311	311	311

Note: Regression coefficients with standard errors in parentheses
* p<0.05 **p<0.01 ***p<0.001

Table 21. Residential Segregation Unit Contribution and Place Fragmentation II - Theil

	Block Contribution	Block Group Contribution	Tract Contribution	Place Contribution
Number of Cities 10,000 per 1M MSA Residents	0.004	0.002	-0.018**	0.038***
	(0.004)	(0.005)	(0.007)	(0.009)
% White	0.004*	-0.010***	-0.024***	-0.017***
	(0.002)	(0.003)	(0.003)	(0.004)
% in Armed Forces	-0.022***	-0.040***	-0.032***	-0.062***
	(0.004)	(0.007)	(0.007)	(0.017)
% Housing Units Built Post-FHA	0.011***	0.007*	-0.005	-0.016*
	(0.002)	(0.003)	(0.004)	(0.007)
Population Log	-0.244***	-0.152***	0.160***	0.331***
	(0.018)	(0.029)	(0.037)	(0.039)
Population Growth	-0.005	-0.009*	-0.000	-0.016
	(0.003)	(0.004)	(0.007)	(0.009)
Constant	0.313	-0.601	-1.158	-4.076***
	(0.362)	(0.604)	(0.715)	(0.874)
Observations	310	310	310	310

Note: Regression coefficients with standard errors in parentheses

* p<0.05 **p<0.01 ***p<0.001

Table 22. Residential Segregation Unit Contribution and Place Fragmentation III - Theil

	Block Contribution	Block Group Contribution	Tract Contribution	Place Contribution
MSA Population Share Residing Outside CC	0.003**	0.005***	-0.003	0.014***
	(0.001)	(0.001)	(0.002)	(0.003)
% White	0.003*	-0.012***	-0.023***	-0.023***
	(0.002)	(0.002)	(0.003)	(0.004)
% in Armed Forces	-0.021***	-0.037***	-0.032***	-0.061**
	(0.003)	(0.006)	(0.007)	(0.019)
	0.010***	0.005	-0.003	-0.023***
% Housing Units Built Post-FHA	(0.002)	(0.003)	(0.005)	(0.005)
Population Log	-0.270***	-0.193***	0.193***	0.216***
	(0.019)	(0.029)	(0.042)	(0.046)
Population Growth	-0.004	-0.007	-0.002	-0.006
	(0.003)	(0.004)	(0.008)	(0.007)
Constant	0.585	-0.223	-1.676*	-2.394**
	(0.359)	(0.578)	(0.747)	(0.811)
Observations	311	311	311	311

Note: Regression coefficients with standard errors in parentheses

* p<0.05 **p<0.01 ***p<0.001

Table 23 presents the results where fragmentation is measured by the total number of cities with a minimum 2,500 population per 1 million MSA residents and residential segregation is measured by the Hutchens index. Table 24 presents the results whree fragmentation is measured by the total number of cities with a minimum 10,000 population per 1 million MSA residents and residential segregation is measured by the Hutchens index. Table 25 presents the results where fragmentation is measured by the total share of the MSA population residing outside the largest city and residential segregation measured by the Hutchens index. The analysis in both of these tables repeat patterns seen in previous tables. Overall, the analysis with the Hutchens index slightly departs from the pattern of the previous segregation measures. For the first time, city size becomes statistically insignificant although only at the tract level. At the block level, all measures of fragmentation are statistically insignificant while having their strongest, positive, effects at the place level contribution. Log of the population continues to have the strongest effect of all variables on residential segregation in the place level contribution model.

Table 23. Residential Segregation Unit Contribution and Place Fragmentation I - Hutchens

	Block Contribution	Block Group Contribution	Tract Contribution	Place Contribution
Number of Cities 2,500 per 1M	0.000	0.005*	-0.010***	0.014***
MSA Residents	(0.002)	(0.002)	(0.003)	(0.002)
% White	0.022***	0.005*	-0.012***	-0.006*
	(0.002)	(0.002)	(0.003)	(0.003)
% in Armed Forces	-0.008*	-0.026***	-0.010	-0.026**
	(0.004)	(0.006)	(0.006)	(0.009)
	0.011***	0.009**	0.006	-0.016***
% Housing Units Built Post-FHA	(0.003)	(0.003)	(0.004)	(0.004)
Population Log	-0.237***	-0.235***	0.018	0.190***
	(0.021)	(0.024)	(0.030)	(0.025)
Population Growth	-0.002	-0.004	-0.003	0.000
	(0.004)	(0.004)	(0.006)	(0.005)
Constant	-1.106*	-1.133*	-0.824	-2.121***
	(0.452)	(0.520)	(0.594)	(0.519)
Observations	311	311	311	311

Note: Regression coefficients with standard errors in parentheses

* p<0.05 **p<0.01 ***p<0.001

Table 24. Residential Segregation Unit Contribution and Place Fragmentation II - Hutchens

	Block Contribution	Block Group Contribution	Tract Contribution	Place Contribution
Number of Cities 10,000 per 1M	0.004	0.007	-0.027***	0.024***
MSA Residents	(0.004)	(0.005)	(0.006)	(0.005)
% White	0.022***	0.006*	-0.013***	-0.004
	(0.002)	(0.002)	(0.003)	(0.003)
% in Armed Forces	-0.008*	-0.028***	-0.007	-0.031***
	(0.004)	(0.006)	(0.006)	(0.009)
% Housing Units Built Post-FHA	0.011***	0.009**	0.006	-0.016***
	(0.003)	(0.003)	(0.004)	(0.004)
Population Log	-0.233***	-0.233***	0.007	0.196***
	(0.021)	(0.024)	(0.031)	(0.025)
Population Growth	-0.002	-0.005	-0.001	-0.003
	(0.004)	(0.004)	(0.006)	(0.005)
Constant	-1.190**	-1.142*	-0.576	-2.270***
	(0.454)	(0.508)	(0.623)	(0.541)
Observations	310	310	310	310

Note: Regression coefficients with standard errors in parentheses

* p<0.05 **p<0.01 ***p<0.001

Table 25. Residential Segregation Unit Contribution and Place Fragmentation III - Hutchens

	Block Contribution	Block Group Contribution	Tract Contribution	Place Contribution
MSA Population Share Residing Outside CC	0.000	0.002*	-0.004*	0.007***
	(0.001)	(0.001)	(0.002)	(0.002)
% White	0.022***	0.005*	-0.012***	-0.006*
	(0.002)	(0.002)	(0.003)	(0.003)
% in Armed Forces	-0.008*	-0.027***	-0.008	-0.029**
	(0.004)	(0.006)	(0.006)	(0.010)
	0.011***	0.008**	0.008	-0.019***
% Housing Units Built Post-FHA	(0.003)	(0.003)	(0.004)	(0.004)
Population Log	-0.238***	-0.259***	0.059	0.133***
	(0.023)	(0.024)	(0.037)	(0.030)
Population Growth	-0.002	-0.004	-0.003	0.001
	(0.004)	(0.004)	(0.007)	(0.004)
Constant	-1.087*	-0.832	-1.363*	-1.386**
	(0.458)	(0.518)	(0.639)	(0.525)
Observations	311	311	311	311

Note: Regression coefficients with standard errors in parentheses

* p<0.05 **p<0.01 ***p<0.001

The regression analysis at the aggregate level from Chapter 5 was an attempt to measure the relationship between political fragmentation and residential segregation. The regression analysis in this Chapter was an attempt to measure the relationship between political fragmentation and residential segregation as it relates to the unit the population groups coalesce around. If the relationship between political fragmentation and residential segregation had proven to be fruitful in the place contribution model it would further the finding that residential segregation coalescing around place boundaries is related to the degree an area is fragmented.

In all measures of segregation, fragmentation has its strongest, positive, and statistically significant, relationship when modeled with the place contribution score. This is encouraging because the results from the aggregate level regression in Chapter 5 show that fragmentation and segregation are positively related, although weak. The strength of the relationship in Chapter 5 was not definitive enough to conclude that segregation coalesces around social fragments in space. The decomposition regression in this section shows that this positive relationship was due to place boundary contributions to the total segregation score.

Lastly, the decomposition regression confirmed the findings of previous analyses which found place fragmentation mattering most in cities with large populations. The decomposition regression results had city size mattering most in the place level contribution models for all measures of segregation but negatively related in cities where block level contribution matters most, such as cities with small populations.

Decomposing Macro and Micro Place Segregation

The final decomposition analysis examines the possibility that segregation coalesces at larger spatial areas, such as cities, rather than smaller spatial areas, such as Census administrative units. This analysis models segregation in five ways: between central city, suburban places, and fringe; between suburban places; within the central city; within suburban place; and within the fringe area.

The following analysis is organized by measure of segregation and size of the MSA. Table 26 reports the results for macro and micro place segregation where residential segregation measured by the separation index. For small MSAs, the greatest amount of segregation comes from either within central city, within suburban places, or within fringe area. Several of the MSAs have within components that are similar to their total segregation score while others are starkly different. For example, Enid, OK has a 23.53 total segregation score while it's within fringe area has a 51.36 segregation score. McAllen, TX has a 46.24 segregation score while it's within fringe area has a 60.77 segregation score. A few of the MSAs have null segregation scores for suburban place components. These small MSAs have a central city without any additional cities that qualify as suburban.

Moderate MSAs have their scores distributed more so than small MSAs. Small MSAs were likelier to have a high segregation score in a single component. Moderate MSAs are likelier to have high segregation scores in more than one component. For example, Sarasota, FL has a 58.08 total segregation score, 64.15 within central city score, and 66.13 within suburban places score. Charleston, SC has a 50.19 total segregation score, 59.92 within central city score, 48.23 within suburban places score, and a 47.40 within fringe area score. Much like small MSAs, most of the between scores for moderate MSAs remain low except for Gary, IN and Mobile, AL. Gary, IN has a 81.93 total segregation score, and 55.14 between central city, suburban places, and fringe score, but its highest was a 60.50 within suburban places score. Mobile, AL has a 67.47 total segregation score and a 50.71 between suburban places score but its highest was a 76.69 within suburban places score.

Large MSAs display a pattern where the within central city component of segregation consistently scores highest of all components. The one exception to this is Detroit, MI. Detroit, MI has a 80.08 total segregation score 59.69 between central city, suburban places, and fringe score, with the highest within score being 58.08 captured within suburban places. The overall pattern displayed for separation is that as the MSAs become larger in size their component scores are likelier to be greater at the within central city component. The largest mean scores for small MSAs was 24.34 at the within fringe area component while moderate and large MSAs had their largest mean scores at the within central city component.

Table 26. Decomposed Segregation for 30 Selected Metropolitan Areas - Separation

	Metropolitan Area	Total (S)	Between Central City, Suburban Places, and Fringe	Between Suburban Places	Within Central City	Within Suburban Places	Within Fringe Area
Small	Cheyenne, WY MSA	12.13	1.07	3.18	13.59	4.24	8.13
	Enid, OK MSA	23.53	0.69	0.50	22.86	13.04	51.36
	Flagstaff, AZ MSA	14.35	0.38	2.17	12.78	25.59	10.86
	Jonesboro, AR MSA	33.09	3.73	1.73	30.81	20.41	14.63
	Las Cruces, NM MSA	17.40	0.33	7.84	15.94	12.36	21.30
	McAllen, TX MSA	46.24	1.83	1.19	21.43	39.82	60.77
	Pittsfield, MA MSA	15.54	1.00	.	14.98	.	12.89
	San Angelo, TX MSA	28.53	1.02	.	28.19	.	13.91
	Victoria, TX MSA	36.32	1.98	.	35.06	.	34.88
	Yuma, AZ MSA	17.90	2.66	12.19	15.74	16.86	14.10
	Mean	24.50	1.47	4.11	21.14	18.90	24.28
Moderate	Allentown, PA MSA	21.87	2.63	5.80	22.64	20.82	11.95
	Ann Arbor, MI PMSA	37.94	0.21	23.71	17.65	51.69	41.30
	Charleston, SC MSA	50.19	0.24	21.36	59.92	48.23	47.40
	Gary, IN PMSA	81.93	55.14	29.79	59.06	60.50	51.16
	Little Rock, AR MSA	57.42	10.88	13.75	56.25	45.13	58.31
	Mobile, AL MSA	67.47	13.57	50.71	58.55	76.69	52.47
	Sarasota, FL MSA	58.08	2.88	7.16	64.15	66.13	48.27
	Toledo, OH MSA	59.46	12.12	0.78	57.13	5.84	24.07
	Tucson, AZ MSA	15.89	1.68	2.78	15.47	12.60	9.34
	Wilmington, DE PMSA	48.07	17.20	4.17	57.58	26.32	32.39
	Mean	49.83	11.66	16.00	46.84	41.40	37.67
Large	Atlanta, GA MSA	61.63	6.17	27.98	77.23	51.84	58.29
	Boston, MA PMSA	54.32	15.59	4.49	67.46	21.60	17.67
	Chicago, IL PMSA	77.91	21.39	43.25	82.44	60.71	41.05
	Detroit, MI PMSA	80.08	59.69	39.23	43.83	58.08	29.98
	Houston, TX PMSA	63.23	10.87	24.59	68.78	53.01	41.64
	Los Angeles, CA PMSA	62.53	0.89	36.05	67.03	55.60	71.51
	Minneapolis, MN MSA	38.41	6.53	6.25	44.89	27.43	10.50
	New York, NY PMSA	77.20	4.83	23.44	78.34	57.48	45.83
	Philadelphia, PA PMSA	69.11	19.57	44.03	73.98	60.56	39.95
	Washington, DC PMSA	57.17	8.84	24.31	73.54	43.15	51.36
	Mean	64.16	15.44	27.36	67.75	48.95	40.78

Table 27 reports the results for macro and micro place segregation where residential segregation measured by the Theil index. Small MSAs continue to have their highest segregation scores within fringe areas or within suburban places. As with the separation index, Enid, OK had a stark contrast with its total segregation score of 36.45 and a within fringe area score of 72.15. Both the within suburban places and within fringe area mean segregation scores were significantly higher than the mean total segregation score. The between scores for small MSAs are very low and are mostly a fraction of the total segregation score.

The within central city component begins to display high segregation scores for moderate MSAs although the within suburban places and within fringe area component consistently have larger segregation scores. Charleston, SC, Sarasota, FL, and Wilmington, DE all had their strongest component scores in within central city. The more stark differences appeared in Mobile, AL which has a 64.58 total segregation score and 73.8 within suburban places segregation score. Although not higher than the total segregation mean score, the within central city, within suburban places, and within fringe area component mean scores all have significantly sized segregation scores.

Similar to the separation index, Large MSAs begin to display stronger relationships in the within central city component when measured with the Theil index. Atlanta, GA has a 56.63 total segregation score but a 72.62 within central city component score. Boston, MA has a 57.70 total segregation score but a 62.70 within central city component score. Using the Theil index, Detroit, MI has a 77.24 total segregation score and its highest component score is a 60.86 captured within suburban places. Whereas

Detroit's highest component score using the separation index was in the between central city, suburban places, and fringe component. The within central city component had the highest mean score of all components in large MSAs.

Tables 28 reports the results for macro and micro place segregation where residential segregation measured by the Hutchens index. The within suburban places and within fringe area components had the higher segregation scores for Small MSA components. Again, Enid, OK has the starkest differences with a 68.52 total segregation score but a 93.82 within fringe area segregation score and an 85.63 within suburban places segregation score. Cheyenne, WY has a 67.30 total segregation and 73.57 within fringe area score. San Angelo, TX has a 68.99 total segregation score and an 83.7 within fringe area score. Both the within suburban places component and within fringe area component had the strongest segregation scores of all components.

Moderate MSAs continue to display higher segregation scores in the within suburban places and within fringe area components. Charleston, SC and Wilmington, DE shift some importance to their within central city components. Charleston, NC has a 63.63 total segregation score, 69.16 within central city score, 62.46 within suburban places score, and 62.04 within fringe area score. Wilmington, DE has a 65.58 total segregation score, 67.41 within central city score, 546.69 within suburban places score, and 59.60 within fringe area score. The between component scores did not reach a highest level for any MSA although the between component was still significant in size for some moderate MSAs.

Using the Hutchens index, large MSAs had their greatest segregation mean score of 75.48 at the within central city component. Still, the within suburban places component and within fringe area component are not far behind with a 69.72 and 72.44 segregation score, respectively. Detroit, MI is the only MSA that has a sizeable segregation in every component. Detroit, MI has an 84.84 total segregation score, 61.66 between central city, suburban places, and fringe score, 58.66 between suburban places score, 65.97 within central city score, 77.88 within suburban places score, and a 72.63 within fringe area score. The within central city mean segregation score continued to have the highest of all components at 75.48.

Table 27. Decomposed Segregation for 30 Selected Metropolitan Areas - Theil

	Metropolitan Area	Total (H)	Between Central City, Suburban Places, and Fringe	Between Suburban Places	Within Central City	Within Suburban Places	Within Fringe Area
Small	Cheyenne, WY MSA	30.09	3.73	8.99	30.48	10.84	31.62
	Enid, OK MSA	36.45	3.29	7.98	33.40	46.53	72.15
	Flagstaff, AZ MSA	33.93	2.47	14.64	28.33	51.53	33.90
	Jonesboro, AR MSA	42.22	9.45	16.40	35.71	50.02	44.31
	Las Cruces, NM MSA	32.07	1.05	18.89	27.76	26.49	40.18
	McAllen, TX MSA	60.35	5.45	5.58	39.49	59.69	69.18
	Pittsfield, MA MSA	34.78	5.22	.	29.60	.	38.32
	San Angelo, TX MSA	39.46	3.26	.	37.07	.	45.54
	Victoria, TX MSA	42.33	3.43	.	38.81	.	47.06
	Yuma, AZ MSA	32.56	6.64	15.67	26.12	24.62	35.53
	Mean	38.42	4.40	12.59	32.68	38.53	45.78
Moderate	Allentown, PA MSA	41.05	7.80	16.02	31.43	39.67	36.56
	Ann Arbor, MI PMSA	46.58	0.36	35.83	21.51	57.71	51.85
	Charleston, SC MSA	46.07	0.19	18.97	54.74	44.44	43.54
	Gary, IN PMSA	80.21	46.10	34.32	59.25	64.34	64.37
	Little Rock, AR MSA	55.71	10.03	16.00	51.07	45.72	62.67
	Mobile, AL MSA	64.58	12.03	43.26	53.85	73.83	55.66
	Sarasota, FL MSA	62.90	4.83	14.33	62.97	67.94	57.00
	Toledo, OH MSA	60.25	17.94	6.01	53.88	27.22	42.33
	Tucson, AZ MSA	27.38	5.08	7.55	22.62	27.43	26.14
	Wilmington, DE PMSA	46.87	13.88	6.16	52.56	31.06	35.60
	Mean	53.16	11.82	19.85	46.39	47.94	47.57
Large	Atlanta, GA MSA	56.63	4.54	23.73	72.62	47.36	53.79
	Boston, MA PMSA	57.70	20.76	9.96	62.70	32.12	36.81
	Chicago, IL PMSA	75.48	18.72	43.15	78.81	62.15	54.57
	Detroit, MI PMSA	77.24	50.38	40.66	45.64	60.86	43.61
	Houston, TX PMSA	59.57	9.26	25.80	63.91	53.65	42.37
	Los Angeles, CA PMSA	59.10	0.81	33.76	62.34	53.81	67.47
	Minneapolis, MN MSA	47.29	10.74	14.57	42.91	40.06	42.35
	New York, NY PMSA	72.50	4.44	22.32	73.42	54.98	51.30
	Philadelphia, PA PMSA	66.57	18.00	40.58	69.60	58.95	45.82
	Washington, DC PMSA	52.35	6.54	21.10	68.79	40.15	47.38
	Mean	62.44	14.42	27.56	64.07	50.41	48.55

Table 28. Decomposed Segregation for 30 Selected Metropolitan Areas - Hutchens

	Metropolitan Area	Total (R)	Between Central City, Suburban Places, and Fringe	Between Suburban Places	Within Central City	Within Suburban Places	Within Fringe Area
Small	Cheyenne, WY MSA	67.30	21.00	36.37	66.72	41.42	73.57
	Enid, OK MSA	68.52	21.92	42.36	64.39	85.63	93.82
	Flagstaff, AZ MSA	70.28	18.39	47.49	62.43	84.35	75.11
	Jonesboro, AR MSA	69.25	34.51	53.10	61.29	84.72	84.78
	Las Cruces, NM MSA	66.01	10.83	48.77	60.51	62.44	74.23
	McAllen, TX MSA	84.12	24.30	27.17	73.72	86.50	86.69
	Pittsfield, MA MSA	70.08	26.57	.	62.82	.	77.79
	San Angelo, TX MSA	68.99	20.45	.	65.82	.	83.77
	Victoria, TX MSA	67.38	18.30	.	63.27	.	74.54
	Yuma, AZ MSA	65.81	26.97	38.04	57.77	55.24	73.86
	Mean	69.77	22.32	41.90	63.87	71.47	79.82
Moderate	Allentown, PA MSA	74.31	29.35	43.83	60.79	73.40	76.04
	Ann Arbor, MI PMSA	71.80	5.74	61.35	46.69	77.66	76.43
	Charleston, SC MSA	63.64	3.72	38.76	69.16	62.46	62.04
	Gary, IN PMSA	87.57	58.69	56.30	75.23	80.90	85.60
	Little Rock, AR MSA	72.24	27.83	38.60	66.75	66.46	80.04
	Mobile, AL MSA	77.36	30.36	58.02	69.20	83.19	74.64
	Sarasota, FL MSA	80.02	21.01	41.26	77.06	82.24	78.06
	Toledo, OH MSA	76.51	42.27	31.79	69.72	69.45	74.95
	Tucson, AZ MSA	59.01	24.21	28.28	51.33	62.61	63.82
	Wilmington, DE PMSA	65.58	31.42	23.98	67.41	56.69	59.60
	Mean	72.80	27.46	42.22	65.34	71.51	73.12
Large	Atlanta, GA MSA	70.02	17.74	42.47	80.46	63.82	68.26
	Boston, MA PMSA	75.78	42.74	32.70	74.09	61.76	71.28
	Chicago, IL PMSA	84.18	37.76	60.48	85.18	78.14	80.17
	Detroit, MI PMSA	84.84	61.66	58.66	65.97	77.88	72.63
	Houston, TX PMSA	73.18	26.23	47.15	75.41	71.89	63.22
	Los Angeles, CA PMSA	72.75	7.85	52.35	74.02	70.12	78.15
	Minneapolis, MN MSA	72.01	32.30	40.34	61.94	69.19	84.93
	New York, NY PMSA	80.20	18.81	43.10	80.52	70.68	72.50
	Philadelphia, PA PMSA	78.44	37.34	57.77	79.28	74.41	69.27
	Washington, DC PMSA	67.18	21.31	40.60	77.89	59.34	63.95
	Mean	75.86	30.37	47.56	75.48	69.72	72.44

The pattern remains consistent across each measure of segregation. Small MSAs have higher degrees of segregation within suburban places and within fringe areas. Moderate MSAs being to shift their highest degree of segregation to the within central city component but still have most of their highest scores at the within suburban places and within fringe area components. Large MSAs shift almost all of their highest segregation scores to the within central city component. Large MSAs not only shift their highest segregation score to a single component, they have moderate to high degrees of segregation across almost all components.

To aid in interpreting the process by which segregation coalesces at various macro place components, we can revert back to figure 26 thru figure 28 which were utilized in the visual analysis of McAllen, TX, Gary, IN, and Detroit, MI MSAs. All measures find higher degrees of segregation in the within fringe area component of McAllen, TX. This is likely due to the large underbounded black community in the northern part of the unincorporated territory. The within central city, within suburban places, and within fringe area components have moderately strong segregation scores in Gary, IN. The black population in Gary, IN is considerable in size to the point where the majority reside in the central city, Gary, as well as in suburban places such as East Chicago, Hammond, and Merrillville. The black population in the Detroit, MI MSA is also considerable in size that non-Hispanic blacks are heavily concentrated in the central city, as well as several suburban cities. Thus Detroit, MI MSA components with the higher segregation scores are the within suburban places component and the between central city, suburban places, and fringe area component. Detroit, MI differs from Gary, IN in that the central city for

Gary, IN is spatially large enough to have a high concentration of the black population as well as a small portion of the white population even though the two groups have a spatial buffer in between them. Detroit, MI MSA central city is almost entirely black including several of the suburban cities such as Grosse Pointe Park which would explain the higher segregation score in the between component.

Discussion

The preceding analyses investigate the empirical relationship between residential segregation and political fragmentation by decomposing segregation to examine whether segregation in cities aligns with fragmentation. Utilizing a simple method of decomposition, I analyzed segregation between and within nested and non-nested Census units. If the analyses had found that segregation crystallizes along fragment boundaries, I may have greater confidence in concluding that fragmentation matters. I then implemented the spatial level contribution scores in a decomposition regression. Finally, I decomposed segregation into macro and micro place components.

There are several findings in the decomposition analyses. First, scale choice matters. Although the most common unit used in segregation research are census tracts, researchers are better served using census blocks when possible. Blocks capture similar amounts of segregation for moderate and large MSAs as census tracts. Blocks capture segregation better than tracts for small MSAs since tracts were likelier to mask the true distribution of population groups.

Second, segregation coalesces around place boundaries and this crystallization becomes more apparent as the size of the MSA increases. Upon further review, place boundaries are less influential for small MSAs because of less population density. Thus a greater spatial area buffer exist between blacks and whites regardless if they live in the same place boundary or not. Segregation coalescing around place boundaries becomes more apparent in moderate and large MSAs. For moderate and large MSAs, high concentrations of black residents mostly follow place boundaries.

Finally, the macro decomposition analysis finds that segregation matters within suburban places and within fringe areas in small MSAs. This is due to smaller MSAs having suburban places and fringe areas where blacks and whites reside together but spatially far apart. As the size of the MSA population increases, segregation becomes more apparent within the central city and, in some cases, the between central city, suburban places, and fringe area component.

CHAPTER VIII

ANALYSIS COMPARING SEGREGATION FROM OBSERVED AND ARBITRARY FRAGMENTS

This chapter examines the empirical relationship between residential segregation and political fragmentation across the U.S. by calculating measures of segregation for each city using arbitrarily drawn boundaries and then examining their covariation with observed boundaries. The preceding analyses attempt to measure the relationship between political fragmentation and residential segregation but cannot attest to how the relationship stands up to arbitrarily drawn boundaries. Here I address my hypothesis that segregation coalesces more around observed boundaries than arbitrarily drawn boundaries. Observed boundaries have greater sociological meaning than arbitrarily drawn boundaries since they are affected by social and political forces. Thus I argue that arbitrarily drawn boundaries will not capture segregation equally as well as geographic boundaries shaped by social and political processes. The following sections will briefly review the data, methods, and measures which are also used in previous chapter analyses.

Arbitrary Fragment Data, Methods, and Measures

I begin by using Census 2000 block level data for the entire U.S. Using STATA, I then randomly assign each block unit population to a new location within the MSA. With each census block now having a randomly assigned population, I recalculate dissimilarity, separation, Theil, and Hutchens segregation scores at each nested spatial unit and examine their covariation with segregation scores calculated with their observed spatial unit counterpart.

Initially this dissertation study had proposed developing arbitrarily drawn place boundaries using GIS tools. During pre-analyses I attempted to develop arbitrarily drawn place boundaries using Voronoi Diagrams which would draw new place boundaries based on randomly dropped points. Empirically, metropolitan areas have large central cities with smaller cities on the periphery. The arbitrary polygons created with the Voronoi diagram were smaller and spatially clustered in the center and larger in the periphery. The arbitrary polygons created with the Voronoi diagram would have created spurious findings since spatially smaller fragments will capture greater degrees of segregation also known as scale effect. An arbitrarily drawn fragment in GIS would have produced contiguous blocks but randomly aggregating block populations in STATA achieves the same result since the measures of segregation are aspatial and block contiguity is irrelevant.

Arbitrary Fragment Analyses

First, I begin by examining summary statistics for segregation scores calculated for observed and arbitrary fragments. I then measure how different arbitrary segregation scores are from their observed counterparts. I conclude with a review of correlation statistics between observed and arbitrary segregation scores. Table 29 reports the summary statistics by measure of segregation and then by spatial unit. For all measures of segregation, the mean scores for arbitrary block groups, tracts, and places are lower than the segregation scores for their observed counterparts.

Table 29. Summary Statistics - Observed and Arbitrary Segregation Scores

	Variable	N	Mean	Standard Deviation	Minimum	Maximum
Dissimilarity	**Block**	311	0.7070	0.0801	0.4139	0.8968
	Arbitrary Block Group	311	0.2785	0.0712	0.1404	0.6948
	Observed Block Group	311	0.5782	0.1192	0.3051	0.8699
	Arbitrary Tract	311	0.1870	0.0676	0.0872	0.6746
	Observed Tract	311	0.5388	0.1296	0.2436	0.8552
	Arbitrary Place	311	0.0580	0.0530	0.0000	0.4201
	Observed Place	311	0.3664	0.1586	0.0000	0.8366
Separation	**Block**	311	0.3940	0.1926	0.0404	0.8193
	Arbitrary Block Group	311	0.0583	0.0424	0.0025	0.2996
	Observed Block Group	311	0.2952	0.1893	0.0043	0.7794
	Arbitrary Tract	311	0.0267	0.0244	0.0010	0.2193
	Observed Tract	311	0.2593	0.1832	0.0021	0.7604
	Arbitrary Place	311	0.0042	0.0069	0.0000	0.0554
	Observed Place	311	0.0932	0.1039	0.0000	0.6904
Theil	**Block**	311	0.4621	0.1267	0.1967	0.8021
	Arbitrary Block Group	311	0.0792	0.0449	0.0220	0.3948
	Observed Block Group	311	0.3254	0.1486	0.0542	0.7427
	Arbitrary Tract	311	0.0380	0.0330	0.0097	0.3034
	Observed Tract	311	0.2852	0.1481	0.0354	0.7145
	Arbitrary Place	311	0.0074	0.0150	0.0000	0.1326
	Observed Place	311	0.1190	0.0960	0.0000	0.6203
Hutchens	**Block**	311	0.7040	0.0711	0.4503	0.8757
	Arbitrary Block Group	311	0.2712	0.0685	0.1315	0.6197
	Observed Block Group	311	0.5386	0.1063	0.2995	0.8065
	Arbitrary Tract	311	0.1810	0.0615	0.0863	0.5577
	Observed Tract	311	0.4947	0.1161	0.2318	0.7857
	Arbitrary Place	311	0.0701	0.0503	0.0000	0.3820
	Observed Place	311	0.3156	0.1199	0.0000	0.7059

Table 30 reports the summary statistics for the measure of segregation calculated differences between arbitrary and observed at each spatial unit level. The dissimilarity index calculated at the block group level is on average .2997 points lower for arbitrary units than observed units. The dissimilarity index calculated at the tract level is on average .3518 points lower for arbitrary units than observed units. The dissimilarity index calculated at the place level is on average .3084 points lower for arbitrary units than observed units.

The Separation index calculated at the block group level is on average .2369 points lower for arbitrary units than observed units. The Separation index calculated at the tract level is on average .2329 points lower for arbitrary units than observed units. The Separation index calculated at the place level is on average .0889 points lower for arbitrary units than observed units.

The Theil index calculated at the block group level is on average .2462 points lower for arbitrary units than observed units. The Theil index calculated at the tract level is on average .2472 points lower for arbitrary units than observed units. The Theil index calculated at the place level is on average .1116 points lower for arbitrary units than observed units.

The Hutchens index calculated at the block group level is on average .2674 points lower for arbitrary units than observed units. The Hutchens index calculated at the tract level is on average .3136 points lower for arbitrary units than observed units. The Hutchens index calculated at the place level is on average .2455 points lower for arbitrary units than observed units.

Table 30. Summary Statistics - Observed and Arbitrary Segregation Score Differences

Variable		N	Mean	Standard Deviation	Minimum	Maximum
Dissimilarity Difference	Block Group	311	0.2997	0.1092	0.0201	0.5907
	Tract	311	0.3518	0.1284	0.0186	0.6870
	Place	311	0.3084	0.1675	-0.1783	0.8033
Separation Difference	Block Group	311	0.2369	0.1642	-0.0049	0.6930
	Tract	311	0.2326	0.1734	-0.0397	0.7248
	Place	311	0.0889	0.1038	-0.0511	0.6877
Theil Difference	Block Group	311	0.2462	0.1363	0.0109	0.6601
	Tract	311	0.2472	0.1449	0.0107	0.6830
	Place	311	0.1116	0.0980	-0.0860	0.6179
Hutchens Difference	Block Group	311	0.2674	0.1021	0.0216	0.5477
	Tract	311	0.3137	0.1172	0.0375	0.6279
	Place	311	0.2455	0.1239	-0.1462	0.6625

Review of the correlations reported in Tables 31 thru 34 shows that some of the relationships significantly differ from zero (i.e., $|r| > 0.12$). Highlighted cells in the tables are relationships I am most concerned with which is that between arbitrary and observed units of similar spatial unit size. In all measures of segregation, the block group and tract spatial unit relationship between arbitrary and observed units is positive and statistically significant. The relationship is negative between arbitrary and observed place units although statistically insignificant for Dissimilarity and Theil measures of segregation. The relationship is positive between arbitrary and observed place units for Separation and Hutchens measures of segregation although only statistically significant with the Huthchens index.

Table 31. Observed and Arbitrary Segregation Correlation - Dissimilarity

		Observed				Arbitrary		
		Block	Block Group	Tract	Place	Block Group	Tract	Place
Observed	Block	1.0000						
	Block Group	0.7767	1.0000					
	Tract	0.7341	0.9892	1.0000				
	Place	0.6431	0.7819	0.7931	1.0000			
Arbitrary	Block Group	0.5629	0.4340	0.4167	0.2999	1.0000		
	Tract	0.4053	0.2853	0.2794	0.1310	0.9342	1.0000	
	Place	0.3017	0.0761	0.0561	-0.0062	0.6902	0.7755	1.0000

N = 311; Correlations with absolute values above 0.12 are statistically significant at $p < 0.05$.

Table 32. Observed and Arbitrary Segregation Correlation - Theil

		Observed				Arbitrary		
		Block	Block Group	Tract	Place	Block Group	Tract	Place
Observed	Block	1.0000						
	Block Group	0.9532	1.0000					
	Tract	0.9243	0.9920	1.0000				
	Place	0.7012	0.7733	0.7964	1.0000			
Arbitrary	Block Group	0.4119	0.4133	0.3869	0.1919	1.0000		
	Tract	0.2494	0.2306	0.2065	0.0155	0.9433	1.0000	
	Place	0.1110	0.0433	0.0138	-0.0564	0.6845	0.7562	1.0000

N = 311; Correlations with absolute values above 0.12 are statistically significant at $p < 0.05$.

Table 33. Observed and Arbitrary Segregation Correlation - Separation

		Observed				Arbitrary		
		Block	Block Group	Tract	Place	Block Group	Tract	Place
Observed	Block	1.0000						
	Block Group	0.9733	1.0000					
	Tract	0.9470	0.9921	1.0000				
	Place	0.7350	0.7944	0.8157	1.0000			
Arbitrary	Block Group	0.6552	0.6650	0.6389	0.4206	1.0000		
	Tract	0.4794	0.4777	0.4564	0.2465	0.9142	1.0000	
	Place	0.1598	0.1198	0.0878	0.0488	0.4979	0.5647	1.0000

N = 311; Correlations with absolute values above 0.12 are statistically significant at $p < 0.05$.

Table 34. Observed and Arbitrary Segregation Correlation - Hutchens

		Observed				Arbitrary		
		Block	Block Group	Tract	Place	Block Group	Tract	Place
Observed	Block	1.0000						
	Block Group	0.7721	1.0000					
	Tract	0.7047	0.9879	1.0000				
	Place	0.6234	0.7675	0.7746	1.0000			
Arbitrary	Block Group	0.5586	0.3822	0.3266	0.2525	1.0000		
	Tract	0.4247	0.2834	0.2437	0.1152	0.9362	1.0000	
	Place	0.4034	0.1958	0.1464	0.1288	0.7287	0.8035	1.0000

N = 311; Correlations with absolute values above 0.12 are statistically significant at $p < 0.05$.

Discussion

In this chapter, I investigated whether segregation coalesces more around observed boundaries than arbitrarily drawn boundaries. Randomly assigning non-Hispanic white and non-Hispanic black populations to census blocks, I calculate segregation and compared the results to observed boundaries. The results show that observed boundaries do have higher segregation scores than arbitrarily aggregated boundaries. In the correlation analysis, arbitrarily aggregated places had statistically significant and positive relationships when residential segregation is measured by the Hutchens index. Thus, it seems that observed boundaries do have greater sociological meaning than arbitrarily aggregated boundaries.

CHAPTER IV

SUMMARY AND CONCLUSION

This dissertation study examined the effect political fragments have on the residential segregation of minority groups within the U.S. I began with the hypothesis that political boundaries have greater sociological impact because of their ability to restrict population movement. Since scale is an important issue in segregation studies, i.e. more fragmentation in an MSA means greater amounts of segregation captured at the place boundary, I aimed to rule out any chance of spuriousness by incorporating alternative measures and alternative analyses, each one designed to test the extent to which two groups are segregated as a result of MSA fragmentation.

Summary

First, examining the covariation between residential segregation and political fragmentation I find that in most cases fragmentation measures are positively related with residential segregation and statistically significant. On further examination in the regression analysis, I find that fragmentation mostly has a weak, but positive and statistically significant, relationship with residential segregation although the relationship was not definitive enough to conclude that segregation coalesced around place boundaries.

Before moving to the subsequent analyses, I reviewed two approaches to decomposing segregation, the formal calculation and the simple calculation. I show that when all one wants to know is the between and within component segregation scores there is a much more efficient method to obtain them, the simple calculation method.

Decomposing segregation at the block, block group, tract, and place level I find that scale choice matters and that census blocks, when available, should be used to measure segregation in the U.S. This is due to Census tracts potentially masking true population distributions in an area, especially small MSAs.

Analyzing each unit's contribution to the total segregation score, I find that segregation coalesces around places boundaries for moderate to large MSAs. For small MSAs, due to larger spatial buffers between population groups, I find that blacks and whites reside in smaller pockets which are captured better using census blocks and minimally captured using place boundaries.

I implement the contribution scores in a decomposition regression analyses and find that the relationship between political fragmentation and residential segregation is indeed there and that place boundaries matter most in cities with large populations. I follow this up with a macro-micro place decomposition analysis which finds that segregation becomes more apparent within central cities and, sometimes, between central city, suburban places, and fringe areas in moderate to large MSAs. I conclude with an analysis comparing segregation captured for observed and arbitrary boundaries and find that segregation coalesces more around observed boundaries than arbitrarily drawn boundaries.

Conclusion

This dissertation analysis finds that a relationship exists between political fragmentation and residential segregation. The relationship varies with the size of the metropolitan area being studied but its impact is greatest at the largest and most meaningful cities in the U.S. Ultimately, place boundaries in the U.S. do have an impact on the movement of non-Hispanic white and non-Hispanic black population groups.

The number of alternative analyses incorporated in this dissertation study addresses limitations in previous research that examines the relationship between political fragmentation and residential segregation. Previous research has found relationships between political fragmentation and residential segregation but has failed conclude whether the relationships were spurious or not due to the nature of more fragmentation automatically capturing greater degrees of segregation. I address these limitations by determining at which levels segregation occurs most and testing whether empirical results perform better than arbitrarily drawn places.

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APPENDIX A

Table 35. Residential Segregation and Total Number of Cities per 1 Million MSA Population - Separation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Cities per 1m Population	-0.074	0.139	-0.088	-0.094	-0.139	-0.067	0.177	0.029
	(0.103)	(0.086)	(0.102)	(0.103)	(0.106)	(0.103)	(0.109)	(0.102)
% White		-0.051***						
		(0.004)						
% Housing Units Vacant			0.024*					
			(0.011)					
% of Population in Armed Forces				-0.028***				
				(0.007)				
% of Housing Built Post-FHA					-0.008*			
					(0.003)			
Suburbanization						0.001		
						(0.002)		
Total Population (log)							0.353***	
							(0.040)	
Age of the MSA 1900 & earlier								0.524***
								(0.144)
Age of the MSA 1910 to 1940								0.301*
								(0.135)
Age of the MSA 1950 to 1960								0.127
								(0.170)
Age of the MSA 1970 & later								-0.289
								(0.152)
Constant	-0.394***	3.916***	-0.582***	-0.348***	0.038	-0.438***	-5.005***	-0.595***
	(0.073)	(0.344)	(0.112)	(0.076)	(0.198)	(0.117)	(0.543)	(0.133)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 35. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of Cities per 1m Population	0.087	0.184*	0.157*	0.246**	0.139	0.071	0.127	0.127
	(0.111)	(0.077)	(0.080)	(0.077)	(0.078)	(0.079)	(0.079)	(0.078)
% White		-0.054***	-0.050***	-0.051***	-0.053***	-0.055***	-0.054***	-0.054***
		(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
% Housing Units Vacant	0.055***		0.051***	0.040***	0.049***	0.044***	0.053***	0.052***
	(0.013)		(0.010)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)
% of Population in Armed Forces	-0.013	-0.051***		-0.056***	-0.053***	-0.059***	-0.053***	-0.052***
	(0.008)	(0.010)		(0.010)	(0.010)	(0.011)	(0.010)	(0.010)
% of Housing Built Post-FHA	-0.007	-0.009**	-0.016***		-0.015***	-0.011***	-0.014***	-0.015***
	(0.004)	(0.003)	(0.003)		(0.003)	(0.003)	(0.002)	(0.003)
Suburbanization	-0.004	-0.003	-0.005**	-0.005**		0.000	-0.004**	-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)		(0.002)	(0.001)	(0.002)
Total Population (log)	0.387***	0.253***	0.351***	0.246***	0.255***		0.283***	0.319***
	(0.061)	(0.047)	(0.047)	(0.044)	(0.040)		(0.030)	(0.044)
Age of the MSA 1900 & earlier	-0.027	-0.233	-0.223	0.079	-0.047	0.410***		-0.203
	(0.200)	(0.144)	(0.144)	(0.132)	(0.129)	(0.112)		(0.137)
Age of the MSA 1910 to 1940	0.045	-0.181	-0.124	-0.023	0.019	0.246*		-0.111
	(0.156)	(0.118)	(0.116)	(0.107)	(0.102)	(0.101)		(0.109)
Age of the MSA 1950 to 1960	0.042	-0.132	-0.076	-0.061	0.058	0.167		-0.038
	(0.181)	(0.132)	(0.134)	(0.123)	(0.120)	(0.117)		(0.122)
Age of the MSA 1970 & later	-0.169	-0.261*	-0.161	-0.254*	-0.075	-0.104		-0.122
	(0.158)	(0.121)	(0.116)	(0.108)	(0.108)	(0.113)		(0.109)
Constant	-5.271***	1.805**	0.113	0.746	1.394*	4.445***	1.122	0.855
	(0.718)	(0.661)	(0.662)	(0.677)	(0.634)	(0.424)	(0.592)	(0.638)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 36. Residential Segregation and Total Number of Cities 2500+ per 1 Million MSA Population - Separation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Cities 2500+ per 1m Population	0.328	1.359***	0.228	0.187	0.128	0.308	0.628	0.562
	(0.372)	(0.289)	(0.380)	(0.377)	(0.390)	(0.375)	(0.360)	(0.389)
% White		-0.053***						
		(0.004)						
% Housing Units Vacant			0.022*					
			(0.011)					
% of Population in Armed Forces				-0.026***				
				(0.007)				
% of Housing Built Post-FHA					-0.006*			
					(0.003)			
Suburbanization						0.001		
						(0.002)		
Total Population (log)							0.338***	
							(0.039)	
Age of the MSA 1900 & earlier								0.550***
								(0.145)
Age of the MSA 1910 to 1940								0.337*
								(0.139)
Age of the MSA 1950 to 1960								0.177
								(0.173)
Age of the MSA 1970 & later								-0.264
								(0.155)
Constant	-0.498***	3.874***	-0.665***	-0.436***	-0.122	-0.535***	-4.855***	-0.724***
	(0.090)	(0.338)	(0.115)	(0.095)	(0.212)	(0.116)	(0.516)	(0.158)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 36. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of Cities 2500+ per 1m Population	0.273	1.088***	0.973**	1.214***	0.660*	0.821**	0.752*	0.753*
	(0.421)	(0.284)	(0.312)	(0.285)	(0.311)	(0.316)	(0.299)	(0.305)
% White		-0.055***	-0.050***	-0.052***	-0.054***	-0.056***	-0.054***	-0.054***
		(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
% Housing Units Vacant	0.054***		0.048***	0.038***	0.047***	0.041***	0.051***	0.050***
	(0.014)		(0.010)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)
% of Population in Armed Forces	-0.013	-0.048***		-0.052***	-0.052***	-0.056***	-0.050***	-0.050***
	(0.008)	(0.010)		(0.010)	(0.010)	(0.011)	(0.009)	(0.010)
% of Housing Built Post-FHA	-0.007	-0.008**	-0.015***		-0.015***	-0.009***	-0.013***	-0.014***
	(0.004)	(0.003)	(0.003)		(0.003)	(0.003)	(0.002)	(0.003)
Suburbanization	-0.004*	-0.004*	-0.006***	-0.006***		-0.001	-0.005***	-0.006***
	(0.002)	(0.002)	(0.002)	(0.002)		(0.002)	(0.001)	(0.002)
Total Population (log)	0.380***	0.237***	0.332***	0.230***	0.233***		0.277***	0.305***
	(0.061)	(0.045)	(0.045)	(0.042)	(0.040)		(0.029)	(0.044)
Age of the MSA 1900 & earlier	-0.023	-0.186	-0.179	0.094	-0.008	0.438***		-0.172
	(0.205)	(0.143)	(0.147)	(0.133)	(0.135)	(0.112)		(0.140)
Age of the MSA 1910 to 1940	0.052	-0.136	-0.084	0.009	0.056	0.274**		-0.083
	(0.161)	(0.116)	(0.118)	(0.110)	(0.107)	(0.102)		(0.112)
Age of the MSA 1950 to 1960	0.044	-0.091	-0.039	-0.026	0.085	0.201		-0.014
	(0.185)	(0.133)	(0.134)	(0.124)	(0.124)	(0.118)		(0.125)
Age of the MSA 1970 & later	-0.165	-0.245*	-0.151	-0.232*	-0.065	-0.099		-0.117
	(0.159)	(0.119)	(0.115)	(0.108)	(0.108)	(0.113)		(0.108)
Constant	-5.184***	1.871**	0.248	0.950	1.583*	4.304***	1.148*	0.941
	(0.690)	(0.641)	(0.646)	(0.659)	(0.629)	(0.421)	(0.581)	(0.627)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 37. Residential Segregation and Total Number of Cities 10,000+ per 1 Million MSA Population - Separation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Cities 10,000+ per 1m Population	-0.249	0.764	-0.352	-0.338	-0.331	-0.352	0.710	1.445
	(1.050)	(0.782)	(1.066)	(1.043)	(1.015)	(1.075)	(0.958)	(1.011)
% White		-0.050***						
		(0.004)						
% Housing Units Vacant			0.023*					
			(0.011)					
% of Population in Armed Forces				-0.026***				
				(0.007)				
% of Housing Built Post-FHA					-0.007*			
					(0.003)			
Suburbanization						0.001		
						(0.002)		
Total Population (log)							0.335***	
							(0.039)	
Age of the MSA 1900 & earlier								0.569***
								(0.148)
Age of the MSA 1910 to 1940								0.359*
								(0.142)
Age of the MSA 1950 to 1960								0.196
								(0.173)
Age of the MSA 1970 & later								-0.277
								(0.154)
Constant	-0.404***	3.858***	-0.587***	-0.361***	-0.041	-0.441***	-4.750***	-0.762***
	(0.109)	(0.341)	(0.129)	(0.109)	(0.188)	(0.128)	(0.536)	(0.169)
Observations	310	310	310	310	310	310	310	310

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 37. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of Cities 10000+ per 1m Population	1.385	1.331	1.587*	2.034**	1.086	1.507*	1.336*	1.383*
	(0.948)	(0.686)	(0.676)	(0.668)	(0.661)	(0.669)	(0.624)	(0.648)
% White		-0.054***	-0.049***	-0.051***	-0.053***	-0.055***	-0.053***	-0.053***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
% Housing Units Vacant	0.056***		0.053***	0.041***	0.050***	0.045***	0.055***	0.054***
	(0.013)		(0.010)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)
% of Population in Armed Forces	-0.012	-0.051***		-0.056***	-0.053***	-0.058***	-0.052***	-0.052***
	(0.008)	(0.010)		(0.010)	(0.010)	(0.011)	(0.009)	(0.010)
% of Housing Built Post-FHA	-0.007*	-0.010***	-0.017***		-0.016***	-0.011***	-0.015***	-0.016***
	(0.003)	(0.003)	(0.003)		(0.003)	(0.003)	(0.002)	(0.003)
Suburbanization	-0.005*	-0.003*	-0.006***	-0.006***		-0.001	-0.005***	-0.006***
	(0.002)	(0.002)	(0.002)	(0.002)		(0.002)	(0.001)	(0.002)
Total Population (log)	0.379***	0.235***	0.336***	0.221***	0.235***		0.281***	0.307***
	(0.060)	(0.046)	(0.046)	(0.043)	(0.040)		(0.029)	(0.043)
Age of the MSA 1900 & earlier	0.013	-0.216	-0.186	0.130	-0.010	0.444***		-0.170
	(0.206)	(0.148)	(0.147)	(0.136)	(0.133)	(0.112)		(0.139)
Age of the MSA 1910 to 1940	0.092	-0.154	-0.078	0.033	0.062	0.290**		-0.071
	(0.162)	(0.121)	(0.120)	(0.113)	(0.107)	(0.103)		(0.113)
Age of the MSA 1950 to 1960	0.086	-0.126	-0.042	-0.041	0.080	0.204		-0.013
	(0.187)	(0.136)	(0.138)	(0.129)	(0.126)	(0.120)		(0.126)
Age of the MSA 1970 & later	-0.166	-0.265*	-0.160	-0.258*	-0.069	-0.104		-0.122
	(0.160)	(0.120)	(0.116)	(0.109)	(0.109)	(0.113)		(0.109)
Constant	-5.263***	2.023**	0.229	0.960	1.589*	4.303***	1.124	0.927
	(0.682)	(0.644)	(0.649)	(0.662)	(0.631)	(0.423)	(0.587)	(0.627)
Observations	310	310	310	310	310	310	310	310

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 38. Residential Segregation and Total Population Share Residing Outside Largest City - Separation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MSA Population Share Residing Outside Largest City	0.765**	1.082***	0.685**	0.708**	0.738**	1.260***	0.274	0.647**
	(0.236)	(0.186)	(0.243)	(0.238)	(0.232)	(0.353)	(0.225)	(0.240)
% White		-0.051***						
		(0.004)						
% Housing Units Vacant			0.018					
			(0.010)					
% of Population in Armed Forces				-0.022**				
				(0.007)				
% of Housing Built Post-FHA					-0.006*			
					(0.003)			
Suburbanization						-0.007*		
						(0.003)		
Total Population (log)							0.316***	
							(0.041)	
Age of the MSA 1900 & earlier								0.548***
								(0.142)
Age of the MSA 1910 to 1940								0.378**
								(0.138)
Age of the MSA 1950 to 1960								0.223
								(0.166)
Age of the MSA 1970 & later								-0.195
								(0.156)
Constant	-0.938***	3.326***	-1.037***	-0.873***	-0.602*	-1.012***	-4.620***	-1.070***
	(0.166)	(0.340)	(0.169)	(0.171)	(0.234)	(0.176)	(0.505)	(0.215)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 38. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
MSA Population Share Residing Outside Largest City	0.381	1.570***	1.452***	1.533***	0.378*	1.440***	1.251***	1.264***
	(0.323)	(0.289)	(0.309)	(0.283)	(0.186)	(0.291)	(0.270)	(0.280)
% White		-0.057***	-0.053***	-0.054***	-0.054***	-0.058***	-0.056***	-0.056***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
% Housing Units Vacant	0.053***		0.044***	0.034***	0.046***	0.037***	0.046***	0.046***
	(0.014)		(0.009)	(0.008)	(0.010)	(0.009)	(0.009)	(0.009)
% of Population in Armed Forces	-0.011	-0.044***		-0.049***	-0.053***	-0.051***	-0.046***	-0.046***
	(0.008)	(0.010)		(0.009)	(0.010)	(0.010)	(0.009)	(0.009)
% of Housing Built Post-FHA	-0.007	-0.008**	-0.014***		-0.016***	-0.009***	-0.012***	-0.013***
	(0.004)	(0.003)	(0.003)		(0.003)	(0.003)	(0.002)	(0.003)
Suburbanization	-0.007*	-0.013***	-0.014***	-0.014***		-0.009***	-0.012***	-0.012***
	(0.003)	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.002)
Total Population (log)	0.373***	0.208***	0.295***	0.198***	0.203***		0.229***	0.274***
	(0.061)	(0.042)	(0.042)	(0.041)	(0.044)		(0.029)	(0.041)
Age of the MSA 1900 & earlier	-0.037	-0.241	-0.225	0.023	0.005	0.331**		-0.208
	(0.198)	(0.129)	(0.129)	(0.124)	(0.133)	(0.105)		(0.124)
Age of the MSA 1910 to 1940	0.050	-0.139	-0.088	-0.010	0.079	0.236*		-0.081
	(0.156)	(0.109)	(0.110)	(0.105)	(0.109)	(0.095)		(0.104)
Age of the MSA 1950 to 1960	0.048	-0.072	-0.020	-0.024	0.096	0.200		0.005
	(0.181)	(0.128)	(0.132)	(0.123)	(0.123)	(0.118)		(0.122)
Age of the MSA 1970 & later	-0.150	-0.166	-0.085	-0.164	-0.032	-0.036		-0.062
	(0.160)	(0.115)	(0.114)	(0.107)	(0.111)	(0.110)		(0.107)
Constant	-5.204***	1.928**	0.452	1.120	1.916**	4.046***	1.431*	1.059
	(0.686)	(0.612)	(0.609)	(0.624)	(0.638)	(0.403)	(0.560)	(0.599)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 39. Residential Segregation and Gini Concentration of Fragmentation - Separation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gini Place Concentration Score	1.608**	2.105***	1.752**	1.469*	1.416*	1.592*	-0.620	0.172
	(0.621)	(0.613)	(0.627)	(0.613)	(0.611)	(0.626)	(0.607)	(0.583)
% White		-0.051***						
		(0.004)						
% Housing Units Vacant			0.026*					
			(0.011)					
% of Population in Armed Forces				-0.023**				
				(0.007)				
% of Housing Built Post-FHA					-0.005			
					(0.003)			
Suburbanization						0.001		
						(0.002)		
Total Population (log)							0.356***	
							(0.045)	
Age of the MSA 1900 & earlier								0.505***
								(0.146)
Age of the MSA 1910 to 1940								0.289*
								(0.134)
Age of the MSA 1950 to 1960								0.119
								(0.166)
Age of the MSA 1970 & later								-0.288
								(0.152)
Constant	-0.293***	4.158***	-0.495***	-0.275***	-0.041	-0.321**	-5.002***	-0.558***
	(0.068)	(0.319)	(0.111)	(0.068)	(0.166)	(0.115)	(0.603)	(0.125)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 39. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Gini Place Concentration Score	-1.275*	0.162	-0.137	0.219	-0.151	0.812	-0.148	-0.157
	(0.609)	(0.559)	(0.525)	(0.508)	(0.477)	(0.510)	(0.481)	(0.483)
% White		-0.054***	-0.049***	-0.051***	-0.053***	-0.056***	-0.053***	-0.053***
		(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
% Housing Units Vacant	0.057***		0.053***	0.040***	0.050***	0.044***	0.055***	0.054***
	(0.013)		(0.010)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)
% of Population in Armed Forces	-0.015*	-0.052***		-0.058***	-0.054***	-0.059***	-0.054***	-0.053***
	(0.007)	(0.011)		(0.011)	(0.010)	(0.011)	(0.010)	(0.010)
% of Housing Built Post-FHA	-0.009**	-0.011***	-0.018***		-0.017***	-0.011***	-0.016***	-0.017***
	(0.003)	(0.003)	(0.003)		(0.003)	(0.003)	(0.002)	(0.003)
Suburbanization	-0.004*	-0.003	-0.005**	-0.005**		-0.001	-0.004**	-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)		(0.002)	(0.001)	(0.002)
Total Population (log)	0.431***	0.232***	0.347***	0.209***	0.249***		0.273***	0.317***
	(0.063)	(0.051)	(0.051)	(0.048)	(0.045)		(0.036)	(0.048)
Age of the MSA 1900 & earlier	-0.048	-0.272	-0.255	0.069	-0.070	0.322**		-0.229
	(0.198)	(0.146)	(0.145)	(0.135)	(0.130)	(0.115)		(0.137)
Age of the MSA 1910 to 1940	0.044	-0.208	-0.142	-0.044	0.008	0.188		-0.125
	(0.156)	(0.120)	(0.118)	(0.112)	(0.103)	(0.102)		(0.111)
Age of the MSA 1950 to 1960	0.000	-0.170	-0.111	-0.113	0.030	0.139		-0.067
	(0.175)	(0.133)	(0.134)	(0.124)	(0.122)	(0.119)		(0.122)
Age of the MSA 1970 & later	-0.179	-0.262*	-0.161	-0.267*	-0.073	-0.099		-0.122
	(0.158)	(0.122)	(0.117)	(0.109)	(0.109)	(0.113)		(0.110)
Constant	-5.789***	2.280**	0.306	1.364	1.573*	4.683***	1.317*	0.990
	(0.734)	(0.742)	(0.730)	(0.749)	(0.703)	(0.433)	(0.672)	(0.704)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 40. Residential Segregation and the Likelihood of Two Students in an MSA Attending Different School Districts - Separation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Likelihood of Two Students in MSA Attending								
Different Districts	-0.661	-1.746**	-0.756	-0.638	-0.509	-0.654	1.121	0.438
	(0.645)	(0.542)	(0.634)	(0.643)	(0.640)	(0.645)	(0.692)	(0.676)
% White		-0.051***						
		(0.004)						
% Housing Units Vacant			0.024*					
			(0.010)					
% of Population in Armed Forces				-0.027***				
				(0.007)				
% of Housing Built Post-FHA					-0.006*			
					(0.003)			
Suburbanization						0.001		
						(0.002)		
Total Population (log)							0.362***	
							(0.043)	
Age of the MSA 1900 & earlier								0.547***
								(0.150)
Age of the MSA 1910 to 1940								0.309*
								(0.133)
Age of the MSA 1950 to 1960								0.125
								(0.165)
Age of the MSA 1970 & later								-0.287
								(0.151)
Constant	-0.380***	4.178***	-0.571***	-0.348***	-0.061	-0.426***	-5.110***	-0.622***
	(0.065)	(0.338)	(0.114)	(0.066)	(0.167)	(0.109)	(0.577)	(0.127)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 40. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Likelihood of Two Students in MSA Attending Different Districts	1.457*	-0.678	-0.144	-0.531	-0.501	-1.151*	-0.348	-0.419
	(0.682)	(0.565)	(0.550)	(0.534)	(0.528)	(0.524)	(0.527)	(0.532)
% White		-0.055***	-0.050***	-0.051***	-0.054***	-0.057***	-0.054***	-0.054***
		(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)
% Housing Units Vacant	0.057***		0.052***	0.039***	0.050***	0.044***	0.054***	0.053***
	(0.014)		(0.010)	(0.009)	(0.010)	(0.009)	(0.010)	(0.010)
% of Population in Armed Forces	-0.013	-0.054***		-0.060***	-0.055***	-0.061***	-0.054***	-0.054***
	(0.007)	(0.011)		(0.011)	(0.011)	(0.012)	(0.010)	(0.010)
% of Housing Built Post-FHA	-0.009*	-0.011***	-0.018***		-0.017***	-0.012***	-0.015***	-0.016***
	(0.003)	(0.003)	(0.003)		(0.003)	(0.003)	(0.002)	(0.003)
Suburbanization	-0.005*	-0.003	-0.005**	-0.005**		-0.000	-0.004**	-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)		(0.002)	(0.001)	(0.002)
Total Population (log)	0.423***	0.218***	0.337***	0.201***	0.229***		0.255***	0.297***
	(0.063)	(0.050)	(0.050)	(0.048)	(0.043)		(0.033)	(0.048)
Age of the MSA 1900 & earlier	-0.027	-0.284	-0.257	0.059	-0.083	0.295*		-0.236
	(0.199)	(0.147)	(0.145)	(0.135)	(0.130)	(0.115)		(0.138)
Age of the MSA 1910 to 1940	0.031	-0.207	-0.143	-0.043	0.003	0.189		-0.127
	(0.152)	(0.120)	(0.119)	(0.113)	(0.104)	(0.102)		(0.111)
Age of the MSA 1950 to 1960	0.020	-0.173	-0.109	-0.118	0.030	0.124		-0.064
	(0.174)	(0.133)	(0.134)	(0.127)	(0.122)	(0.119)		(0.124)
Age of the MSA 1970 & later	-0.157	-0.269*	-0.161	-0.274*	-0.078	-0.117		-0.125
	(0.155)	(0.121)	(0.116)	(0.110)	(0.109)	(0.115)		(0.110)
Constant	-5.712***	2.567***	0.478	1.540*	1.956**	4.811***	1.632*	1.343
	(0.735)	(0.731)	(0.755)	(0.773)	(0.711)	(0.440)	(0.674)	(0.725)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 41. Residential Segregation and Total Number of School Districts per 1 Million MSA Students Enrolled - Separation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of School Districts per 1m MSA Students Enrolled	0.051**	0.068***	0.050**	0.046**	0.045*	0.055***	0.049**	0.028
	(0.016)	(0.013)	(0.016)	(0.017)	(0.018)	(0.016)	(0.015)	(0.017)
% White		-0.051***						
		(0.004)						
% Housing Units Vacant			0.022*					
			(0.010)					
% of Population in Armed Forces				-0.020**				
				(0.008)				
% of Housing Built Post-FHA					-0.003			
					(0.003)			
Suburbanization						0.003		
						(0.002)		
Total Population (log)							0.328***	
							(0.038)	
Age of the MSA 1900 & earlier								0.486***
								(0.142)
Age of the MSA 1910 to 1940								0.290*
								(0.134)
Age of the MSA 1950 to 1960								0.122
								(0.164)
Age of the MSA 1970 & later								-0.265
								(0.152)
Constant	-1.139***	3.093***	-1.309***	-1.044***	-0.892*	-1.289***	-5.268***	-0.958***
	(0.230)	(0.368)	(0.242)	(0.240)	(0.366)	(0.253)	(0.513)	(0.259)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 41. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of School Districts per 1m MSA Enrolled	0.019	0.033*	0.024	0.037**	0.016	0.013	0.012	0.012
	(0.016)	(0.015)	(0.014)	(0.012)	(0.013)	(0.014)	(0.013)	(0.013)
% White		-0.054***	-0.049***	-0.051***	-0.053***	-0.055***	-0.053***	-0.053***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
% Housing Units Vacant	0.053***		0.049***	0.037***	0.048***	0.043***	0.053***	0.052***
	(0.014)		(0.010)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)
% of Population in Armed Forces	-0.012	-0.049***		-0.053***	-0.052***	-0.058***	-0.052***	-0.052***
	(0.008)	(0.010)		(0.010)	(0.010)	(0.011)	(0.010)	(0.010)
% of Housing Built Post-FHA	-0.006	-0.009**	-0.016***		-0.015***	-0.010***	-0.014***	-0.015***
	(0.004)	(0.003)	(0.003)		(0.003)	(0.003)	(0.002)	(0.003)
Suburbanization	-0.004	-0.003	-0.005**	-0.005**		0.000	-0.004**	-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)		(0.002)	(0.001)	(0.002)
Total Population (log)	0.379***	0.243***	0.338***	0.230***	0.245***		0.265***	0.309***
	(0.061)	(0.048)	(0.047)	(0.044)	(0.040)		(0.029)	(0.044)
Age of the MSA 1900 & earlier	-0.051	-0.280	-0.263	0.006	-0.083	0.381***		-0.233
	(0.200)	(0.149)	(0.147)	(0.139)	(0.130)	(0.109)		(0.139)
Age of the MSA 1910 to 1940	0.033	-0.204	-0.146	-0.060	-0.002	0.229*		-0.128
	(0.157)	(0.120)	(0.119)	(0.111)	(0.103)	(0.100)		(0.111)
Age of the MSA 1950 to 1960	0.016	-0.181	-0.119	-0.126	0.020	0.142		-0.071
	(0.179)	(0.132)	(0.133)	(0.125)	(0.122)	(0.116)		(0.124)
Age of the MSA 1970 & later	-0.165	-0.251*	-0.158	-0.244*	-0.074	-0.103		-0.120
	(0.158)	(0.119)	(0.115)	(0.107)	(0.108)	(0.113)		(0.109)
Constant	-5.403***	1.504*	0.020	0.579	1.371*	4.283***	1.222	0.886
	(0.702)	(0.756)	(0.702)	(0.688)	(0.677)	(0.513)	(0.627)	(0.687)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 42. Residential Segregation and Share of Population Residing Outside Largest School District - Separation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of Population Residing Outside Largest District	0.277	0.679***	0.417*	0.207	0.141	0.267	-0.304	-0.217
	(0.184)	(0.158)	(0.194)	(0.186)	(0.199)	(0.188)	(0.181)	(0.199)
% White		-0.052***						
		(0.004)						
% Housing Units Vacant			0.029*					
			(0.012)					
% of Population in Armed Forces				-0.024**				
				(0.007)				
% of Housing Built Post-FHA					-0.006			
					(0.003)			
Suburbanization						0.001		
						(0.002)		
Total Population (log)							0.361***	
							(0.042)	
Age of the MSA 1900 & earlier								0.554***
								(0.149)
Age of the MSA 1910 to 1940								0.303*
								(0.133)
Age of the MSA 1950 to 1960								0.097
								(0.163)
Age of the MSA 1970 & later								-0.317*
								(0.149)
Constant	-0.579***	3.757***	-0.894***	-0.511***	-0.209	-0.594***	-4.855***	-0.462**
	(0.111)	(0.327)	(0.174)	(0.116)	(0.239)	(0.127)	(0.517)	(0.143)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 42. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Share of Population Residing Outside Largest District	-0.447*	-0.082	0.131	0.373*	-0.049	0.288	0.080	0.076
	(0.211)	(0.189)	(0.186)	(0.165)	(0.162)	(0.166)	(0.170)	(0.174)
% White		-0.054***	-0.050***	-0.052***	-0.053***	-0.056***	-0.054***	-0.054***
		(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)
% Housing Units Vacant	0.053***		0.053***	0.044***	0.050***	0.047***	0.055***	0.054***
	(0.013)		(0.011)	(0.010)	(0.010)	(0.011)	(0.010)	(0.011)
% of Population in Armed Forces	-0.017*	-0.053***		-0.056***	-0.054***	-0.058***	-0.053***	-0.053***
	(0.008)	(0.011)		(0.010)	(0.010)	(0.011)	(0.010)	(0.010)
% of Housing Built Post-FHA	-0.011**	-0.011***	-0.017***		-0.017***	-0.010***	-0.015***	-0.016***
	(0.004)	(0.003)	(0.003)		(0.003)	(0.003)	(0.002)	(0.003)
Suburbanization	-0.003	-0.003	-0.006***	-0.007***		-0.001	-0.004**	-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.002)
Total Population (log)	0.411***	0.245***	0.331***	0.204***	0.249***		0.260***	0.304***
	(0.061)	(0.053)	(0.051)	(0.044)	(0.046)		(0.034)	(0.048)
Age of the MSA 1900 & earlier	-0.054	-0.273	-0.251	0.034	-0.075	0.349**		-0.227
	(0.200)	(0.148)	(0.143)	(0.132)	(0.132)	(0.114)		(0.136)
Age of the MSA 1910 to 1940	0.023	-0.208	-0.140	-0.048	0.002	0.213*		-0.125
	(0.156)	(0.121)	(0.117)	(0.109)	(0.104)	(0.102)		(0.110)
Age of the MSA 1950 to 1960	-0.014	-0.180	-0.097	-0.081	0.026	0.158		-0.058
	(0.180)	(0.134)	(0.134)	(0.125)	(0.123)	(0.118)		(0.124)
Age of the MSA 1970 & later	-0.194	-0.268*	-0.151	-0.225*	-0.077	-0.085		-0.115
	(0.158)	(0.122)	(0.117)	(0.110)	(0.110)	(0.114)		(0.111)
Constant	-5.093***	2.134**	0.456	1.336	1.636*	4.409***	1.455*	1.124
	(0.681)	(0.681)	(0.683)	(0.693)	(0.651)	(0.426)	(0.611)	(0.656)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 43. Residential Segregation and Total Number of Cities per 1 Million MSA Population - Dissimilarity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Cities per 1m Population	0.256***	0.259***	0.252***	0.219***	0.163**	0.251***	0.349***	0.294***
	(0.056)	(0.057)	(0.056)	(0.050)	(0.051)	(0.057)	(0.054)	(0.053)
% White		-0.001						
		(0.002)						
% Housing Units Vacant			0.006					
			(0.004)					
% of Population in Armed Forces				-0.046***				
				(0.005)				
% of Housing Built Post-FHA					-0.010***			
					(0.001)			
Suburbanization						-0.001		
						(0.001)		
Total Population (log)							0.134***	
							(0.021)	
Age of the MSA 1900 & earlier								0.305***
								(0.062)
Age of the MSA 1910 to 1940								0.099
								(0.061)
Age of the MSA 1950 to 1960								-0.041
								(0.079)
Age of the MSA 1970 & later								-0.099
Constant	0.755***	0.822***	0.709***	0.839***	1.362***	0.785***	-0.981***	0.676***
	(0.034)	(0.172)	(0.047)	(0.032)	(0.083)	(0.059)	(0.277)	(0.059)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 43. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of Cities per 1m Population	0.181***	0.214***	0.212***	0.274***	0.188***	0.163***	0.192***	0.181***
	(0.044)	(0.046)	(0.049)	(0.046)	(0.044)	(0.046)	(0.043)	(0.044)
% White		-0.004**	-0.000	-0.002	-0.004**	-0.004**	-0.004**	-0.004**
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.030***		0.028***	0.020***	0.028***	0.026***	0.029***	0.029***
	(0.005)		(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
% of Population in Armed Forces	-0.039***	-0.040***		-0.043***	-0.041***	-0.043***	-0.041***	-0.041***
	(0.004)	(0.005)		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
% of Housing Built Post-FHA	-0.011***	-0.008***	-0.013***		-0.012***	-0.010***	-0.011***	-0.012***
	(0.001)	(0.002)	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.002	-0.001	-0.002	-0.002		0.000	-0.001	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.136***	0.093***	0.159***	0.077**	0.109***		0.113***	0.131***
	(0.025)	(0.028)	(0.028)	(0.027)	(0.022)		(0.017)	(0.025)
Age of the MSA 1900 & earlier	-0.020	-0.044	-0.048	0.183*	0.021	0.220***		-0.035
	(0.070)	(0.081)	(0.078)	(0.071)	(0.062)	(0.052)		(0.070)
Age of the MSA 1910 to 1940	-0.025	-0.073	-0.049	0.035	0.008	0.112*		-0.039
	(0.060)	(0.068)	(0.067)	(0.062)	(0.051)	(0.052)		(0.059)
Age of the MSA 1950 to 1960	-0.033	-0.087	-0.069	-0.049	-0.003	0.049		-0.040
	(0.067)	(0.072)	(0.081)	(0.067)	(0.061)	(0.060)		(0.066)
Age of the MSA 1970 & later	0.039	-0.032	0.010	-0.046	0.063	0.056		0.044
Constant	-0.462	0.549	-0.652	-0.095	0.172	1.452***	0.123	-0.009
	(0.275)	(0.330)	(0.361)	(0.361)	(0.310)	(0.182)	(0.288)	(0.319)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 44. Residential Segregation and Total Number of Cities 2,500+ per 1 Million MSA Population - Dissimilarity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Cities 2500+ per 1m Population	1.386***	1.420***	1.371***	1.115***	1.099***	1.426***	1.476***	1.476***
	(0.179)	(0.179)	(0.182)	(0.155)	(0.165)	(0.179)	(0.173)	(0.174)
% White		-0.002						
		(0.002)						
% Housing Units Vacant			0.004					
			(0.004)					
% of Population in Armed Forces				-0.042***				
				(0.005)				
% of Housing Built Post-FHA					-0.010***			
					(0.001)			
Suburbanization						-0.002*		
						(0.001)		
Total Population (log)							0.108***	
							(0.020)	
Age of the MSA 1900 & earlier								0.324***
								(0.063)
Age of the MSA 1910 to 1940								0.154*
								(0.062)
Age of the MSA 1950 to 1960								0.021
								(0.075)
Age of the MSA 1970 & later								-0.055
								(0.066)
Constant	0.601***	0.765***	0.574***	0.716***	1.176***	0.678***	-0.779**	0.485***
	(0.043)	(0.164)	(0.052)	(0.037)	(0.087)	(0.056)	(0.257)	(0.068)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 44. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of Cities 2500+ per 1m Population	0.874***	1.082***	1.133***	1.250***	0.873***	0.944***	0.940***	0.911***
	(0.149)	(0.150)	(0.172)	(0.150)	(0.149)	(0.152)	(0.148)	(0.149)
% White		-0.005***	-0.001	-0.003*	-0.004**	-0.005***	-0.004***	-0.005***
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.028***		0.025***	0.018***	0.026***	0.024***	0.027***	0.027***
	(0.005)		(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
% of Population in Armed Forces	-0.036***	-0.037***		-0.040***	-0.039***	-0.041***	-0.038***	-0.039***
	(0.004)	(0.005)		(0.005)	(0.004)	(0.005)	(0.005)	(0.004)
% of Housing Built Post-FHA	-0.010***	-0.007***	-0.011***		-0.011***	-0.009***	-0.010***	-0.011***
	(0.001)	(0.002)	(0.002)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.002**	-0.002	-0.003**	-0.003**		-0.001	-0.002**	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.120***	0.076**	0.137***	0.057*	0.081***		0.104***	0.113***
	(0.024)	(0.026)	(0.026)	(0.026)	(0.022)		(0.016)	(0.023)
Age of the MSA 1900 & earlier	0.012	-0.005	-0.003	0.205**	0.076	0.227***		-0.002
	(0.067)	(0.076)	(0.074)	(0.068)	(0.061)	(0.049)		(0.067)
Age of the MSA 1910 to 1940	0.008	-0.032	-0.005	0.072	0.060	0.131**		-0.005
	(0.060)	(0.066)	(0.065)	(0.062)	(0.052)	(0.051)		(0.058)
Age of the MSA 1950 to 1960	-0.008	-0.052	-0.032	-0.015	0.038	0.071		-0.014
	(0.066)	(0.070)	(0.076)	(0.064)	(0.059)	(0.058)		(0.063)
Age of the MSA 1970 & later	0.046	-0.016	0.021	-0.027	0.081	0.063		0.052
	(0.053)	(0.063)	(0.062)	(0.053)	(0.053)	(0.055)		(0.054)
Constant	-0.376	0.676*	-0.447	0.160	0.441	1.390***	0.230	0.148
	(0.259)	(0.308)	(0.339)	(0.343)	(0.295)	(0.173)	(0.274)	(0.304)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 45. Residential Segregation and Total Number of Cities 10k per 1 Million MSA Population - Dissimilarity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Cities 10000+ per 1m Population	1.095*	1.091*	1.068*	0.922*	0.974*	1.279**	1.393**	1.719***
	(0.486)	(0.488)	(0.492)	(0.416)	(0.417)	(0.483)	(0.464)	(0.477)
% White		0.000						
		(0.002)						
% Housing Units Vacant			0.007					
			(0.004)					
% of Population in Armed Forces				-0.047***				
				(0.005)				
% of Housing Built Post-FHA					-0.012***			
					(0.001)			
Suburbanization						-0.002		
						(0.001)		
Total Population (log)							0.100***	
							(0.022)	
Age of the MSA 1900 & earlier								0.301***
								(0.067)
Age of the MSA 1910 to 1940								0.124
								(0.067)
Age of the MSA 1950 to 1960								-0.043
								(0.082)
Age of the MSA 1970 & later								-0.104
								(0.071)
Constant	0.773***	0.754***	0.720***	0.857***	1.407***	0.841***	-0.519	0.646***
	(0.053)	(0.172)	(0.060)	(0.045)	(0.086)	(0.062)	(0.293)	(0.079)
Observations	310	310	310	310	310	310	310	310

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 45. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of Cities 10000+ per 1m Population	1.188**	1.153**	1.428***	1.693***	1.034**	1.215**	1.307***	1.199***
	(0.365)	(0.382)	(0.429)	(0.390)	(0.365)	(0.375)	(0.343)	(0.358)
% White		-0.004**	-0.000	-0.002	-0.004**	-0.004**	-0.004**	-0.004**
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.032***		0.030***	0.022***	0.030***	0.028***	0.031***	0.032***
	(0.005)		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
% of Population in Armed Forces	-0.039***	-0.040***		-0.044***	-0.042***	-0.043***	-0.041***	-0.041***
	(0.004)	(0.005)		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
% of Housing Built Post-FHA	-0.012***	-0.009***	-0.014***		-0.013***	-0.011***	-0.012***	-0.013***
	(0.001)	(0.002)	(0.002)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.003**	-0.001	-0.003**	-0.003**		-0.001	-0.003**	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.125***	0.077**	0.146***	0.052	0.086***		0.106***	0.120***
	(0.024)	(0.027)	(0.027)	(0.028)	(0.022)		(0.017)	(0.023)
Age of the MSA 1900 & earlier	-0.013	-0.045	-0.038	0.219**	0.049	0.212***		-0.027
	(0.070)	(0.083)	(0.078)	(0.075)	(0.064)	(0.052)		(0.070)
Age of the MSA 1910 to 1940	-0.003	-0.058	-0.021	0.075	0.047	0.126*		-0.016
	(0.062)	(0.071)	(0.068)	(0.067)	(0.054)	(0.053)		(0.061)
Age of the MSA 1950 to 1960	-0.019	-0.086	-0.048	-0.045	0.022	0.062		-0.026
	(0.068)	(0.073)	(0.082)	(0.069)	(0.063)	(0.061)		(0.066)
Age of the MSA 1970 & later	0.041	-0.034	0.012	-0.059	0.076	0.057		0.046
	(0.055)	(0.065)	(0.064)	(0.057)	(0.054)	(0.057)		(0.056)
Constant	-0.286	0.839*	-0.451	0.185	0.478	1.480***	0.274	0.163
	(0.269)	(0.328)	(0.352)	(0.364)	(0.304)	(0.177)	(0.291)	(0.310)
Observations	310	310	310	310	310	310	310	310

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 46. Residential Segregation and Total Population Share Residing Outside Largest City - Dissimilarity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MSA Population Share Residing Outside Largest City	0.615***	0.616***	0.603***	0.478***	0.573***	1.416***	0.521***	0.531***
	(0.118)	(0.117)	(0.120)	(0.103)	(0.102)	(0.210)	(0.127)	(0.116)
% White		-0.000						
		(0.002)						
% Housing Units Vacant			0.003					
			(0.004)					
% of Population in Armed Forces				-0.044***				
				(0.005)				
% of Housing Built Post-FHA					-0.011***			
					(0.001)			
Suburbanization						-0.010***		
						(0.002)		
Total Population (log)							0.061*	
							(0.025)	
Age of the MSA 1900 & earlier								0.266***
								(0.065)
Age of the MSA 1910 to 1940								0.119
								(0.066)
Age of the MSA 1950 to 1960								-0.039
								(0.082)
Age of the MSA 1970 & later								-0.039
								(0.070)
Constant	0.478***	0.493**	0.462***	0.631***	1.111***	0.361***	-0.227	0.460***
	(0.080)	(0.190)	(0.081)	(0.071)	(0.104)	(0.087)	(0.288)	(0.100)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 46. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
MSA Population Share Residing Outside Largest City	0.667***	0.923***	0.943***	0.973***	0.275**	0.811***	0.727***	0.738***
	(0.168)	(0.183)	(0.209)	(0.191)	(0.096)	(0.179)	(0.171)	(0.171)
% White		-0.006***	-0.002	-0.004**	-0.004**	-0.006***	-0.005***	-0.005***
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.028***		0.024***	0.016***	0.027***	0.023***	0.025***	0.026***
	(0.004)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
% of Population in Armed Forces	-0.036***	-0.037***		-0.040***	-0.042***	-0.040***	-0.038***	-0.039***
	(0.004)	(0.004)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
% of Housing Built Post-FHA	-0.011***	-0.008***	-0.012***		-0.013***	-0.010***	-0.010***	-0.011***
	(0.001)	(0.002)	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.006***	-0.007***	-0.008***	-0.008***		-0.005***	-0.006***	-0.007***
	(0.001)	(0.002)	(0.002)	(0.002)		(0.002)	(0.001)	(0.001)
Total Population (log)	0.108***	0.058*	0.117***	0.032	0.064*		0.067***	0.098***
	(0.025)	(0.027)	(0.027)	(0.028)	(0.025)		(0.017)	(0.024)
Age of the MSA 1900 & earlier	-0.044	-0.070	-0.077	0.141	0.049	0.131**		-0.061
	(0.067)	(0.076)	(0.074)	(0.072)	(0.068)	(0.050)		(0.067)
Age of the MSA 1910 to 1940	-0.020	-0.057	-0.038	0.036	0.047	0.082		-0.034
	(0.059)	(0.065)	(0.065)	(0.065)	(0.058)	(0.049)		(0.058)
Age of the MSA 1950 to 1960	-0.027	-0.063	-0.050	-0.046	0.020	0.043		-0.031
	(0.072)	(0.075)	(0.083)	(0.074)	(0.067)	(0.064)		(0.070)
Age of the MSA 1970 & later	0.071	0.027	0.059	0.000	0.102	0.093		0.080
	(0.053)	(0.059)	(0.061)	(0.055)	(0.056)	(0.054)		(0.053)
Constant	-0.280	0.856**	-0.222	0.395	0.741*	1.377***	0.590*	0.317
	(0.265)	(0.303)	(0.330)	(0.342)	(0.319)	(0.176)	(0.265)	(0.294)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 47. Residential Segregation and Gini Concentration of Fragmentation - Dissimilarity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gini Place Concentration Score	1.310***	1.308***	1.356***	1.038***	0.946***	1.356***	1.025**	0.815**
	(0.285)	(0.285)	(0.284)	(0.245)	(0.253)	(0.287)	(0.320)	(0.283)
% White		0.000						
		(0.002)						
% Housing Units Vacant			0.009*					
			(0.004)					
% of Population in Armed Forces				-0.045***				
				(0.005)				
% of Housing Built Post-FHA					-0.011***			
					(0.001)			
Suburbanization						-0.002		
						(0.001)		
Total Population (log)							0.049	
							(0.026)	
Age of the MSA 1900 & earlier								0.181**
								(0.065)
Age of the MSA 1910 to 1940								0.016
								(0.065)
Age of the MSA 1950 to 1960								-0.125
								(0.081)
Age of the MSA 1970 & later								-0.107
								(0.069)
Constant	0.998***	0.980***	0.924***	1.038***	1.533***	1.077***	0.350	0.954***
	(0.032)	(0.162)	(0.046)	(0.028)	(0.078)	(0.056)	(0.348)	(0.060)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 47. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Gini Place Concentration Score	0.367	0.598*	0.479	0.712**	0.460*	0.738***	0.446	0.455
	(0.237)	(0.281)	(0.271)	(0.260)	(0.233)	(0.223)	(0.228)	(0.237)
% White		-0.005***	-0.001	-0.002	-0.004**	-0.005***	-0.004**	-0.004**
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.031***		0.029***	0.020***	0.029***	0.027***	0.030***	0.031***
	(0.005)		(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
% of Population in Armed Forces	-0.040***	-0.041***		-0.045***	-0.043***	-0.044***	-0.042***	-0.042***
	(0.004)	(0.005)		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
% of Housing Built Post-FHA	-0.012***	-0.010***	-0.014***		-0.013***	-0.011***	-0.012***	-0.013***
	(0.001)	(0.002)	(0.002)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.002*	-0.001	-0.002*	-0.002*		-0.001	-0.001	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.112***	0.054	0.129***	0.020	0.075**		0.071***	0.102***
	(0.028)	(0.031)	(0.032)	(0.032)	(0.025)		(0.021)	(0.028)
Age of the MSA 1900 & earlier	-0.061	-0.091	-0.098	0.159*	-0.012	0.103		-0.077
	(0.071)	(0.083)	(0.080)	(0.078)	(0.063)	(0.054)		(0.071)
Age of the MSA 1910 to 1940	-0.054	-0.108	-0.083	0.003	-0.014	0.035		-0.069
	(0.062)	(0.070)	(0.070)	(0.069)	(0.052)	(0.053)		(0.061)
Age of the MSA 1950 to 1960	-0.063	-0.121	-0.105	-0.098	-0.026	0.001		-0.069
	(0.070)	(0.074)	(0.084)	(0.071)	(0.063)	(0.062)		(0.068)
Age of the MSA 1970 & later	0.043	-0.027	0.014	-0.056	0.072	0.060		0.049
	(0.055)	(0.065)	(0.064)	(0.057)	(0.054)	(0.056)		(0.056)
Constant	0.065	1.358***	0.020	0.883*	0.848*	1.794***	0.867*	0.614
	(0.316)	(0.396)	(0.426)	(0.429)	(0.349)	(0.184)	(0.338)	(0.366)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 48. Residential Segregation and the Likelihood of Two Students in an MSA Attending Different School Districts - Dissimilarity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Likelihood of Two Students in MSA Attending Different Districts	-0.405	-0.400	-0.436	-0.352	-0.132	-0.412	0.033	0.100
	(0.278)	(0.282)	(0.279)	(0.241)	(0.266)	(0.278)	(0.289)	(0.281)
% White		0.000						
		(0.002)						
% Housing Units Vacant			0.008					
			(0.004)					
% of Population in Armed Forces				-0.047***				
				(0.005)				
% of Housing Built Post-FHA					-0.012***			
					(0.001)			
Suburbanization						-0.001		
						(0.001)		
Total Population (log)							0.092***	
							(0.024)	
Age of the MSA 1900 & earlier								0.247***
								(0.066)
Age of the MSA 1910 to 1940								0.053
								(0.065)
Age of the MSA 1950 to 1960								-0.126
								(0.080)
Age of the MSA 1970 & later								-0.119
								(0.071)
Constant	0.912***	0.890***	0.852***	0.976***	1.510***	0.969***	-0.288	0.853***
	(0.032)	(0.176)	(0.044)	(0.029)	(0.077)	(0.055)	(0.312)	(0.059)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group.
*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 48. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Likelihood of Two Students in MSA Attending Different Districts	0.344	0.060	0.448	0.103	0.195	-0.062	0.207	0.228
	(0.225)	(0.256)	(0.268)	(0.252)	(0.228)	(0.232)	(0.235)	(0.232)
% White		-0.004**	0.000	-0.002	-0.003*	-0.004**	-0.003*	-0.004*
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.032***		0.031***	0.021***	0.030***	0.027***	0.031***	0.032***
	(0.005)		(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)
% of Population in Armed Forces	-0.040***	-0.041***		-0.046***	-0.042***	-0.044***	-0.042***	-0.042***
	(0.004)	(0.005)		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
% of Housing Built Post-FHA	-0.013***	-0.010***	-0.015***		-0.014***	-0.011***	-0.012***	-0.013***
	(0.001)	(0.002)	(0.002)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.002*	-0.001	-0.003*	-0.002*		-0.000	-0.001	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.137***	0.080**	0.163***	0.050	0.100***		0.097***	0.128***
	(0.026)	(0.030)	(0.030)	(0.030)	(0.023)		(0.019)	(0.026)
Age of the MSA 1900 & earlier	-0.058	-0.091	-0.091	0.170*	-0.006	0.160**		-0.073
	(0.071)	(0.083)	(0.079)	(0.077)	(0.063)	(0.053)		(0.071)
Age of the MSA 1910 to 1940	-0.052	-0.104	-0.078	0.012	-0.008	0.076		-0.065
	(0.061)	(0.071)	(0.069)	(0.069)	(0.052)	(0.052)		(0.061)
Age of the MSA 1950 to 1960	-0.072	-0.134	-0.114	-0.113	-0.033	0.008		-0.078
	(0.068)	(0.073)	(0.081)	(0.071)	(0.062)	(0.060)		(0.067)
Age of the MSA 1970 & later	0.044	-0.033	0.015	-0.066	0.071	0.056		0.047
	(0.055)	(0.065)	(0.063)	(0.058)	(0.054)	(0.057)		(0.056)
Constant	-0.287	0.946*	-0.556	0.350	0.434	1.660***	0.436	0.175
	(0.290)	(0.369)	(0.403)	(0.409)	(0.329)	(0.187)	(0.322)	(0.347)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 49. Residential Segregation and Total Number of School Districts Relative to MSA Enrollment - Dissimilarity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of School Districts per 1m MSA Enrolled	0.040***	0.040***	0.040***	0.027***	0.016	0.039***	0.038***	0.030***
	(0.009)	(0.009)	(0.009)	(0.008)	(0.010)	(0.009)	(0.009)	(0.009)
% White		0.000						
		(0.002)						
% Housing Units Vacant			0.007					
			(0.004)					
% of Population in Armed Forces				-0.044***				
				(0.005)				
% of Housing Built Post-FHA					-0.010***			
					(0.002)			
Suburbanization						-0.000		
						(0.001)		
Total Population (log)							0.087***	
							(0.021)	
Age of the MSA 1900 & earlier								0.206***
								(0.061)
Age of the MSA 1910 to 1940								0.043
								(0.063)
Age of the MSA 1950 to 1960								-0.124
								(0.077)
Age of the MSA 1970 & later								-0.091
								(0.069)
Constant	0.337**	0.328	0.287*	0.576***	1.216***	0.363**	-0.747*	0.455***
	(0.120)	(0.205)	(0.115)	(0.108)	(0.190)	(0.137)	(0.297)	(0.127)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.
*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 49. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of School Districts per 1m MSA								
Enrolled	-0.005	0.007	0.005	0.017*	-0.004	-0.004	-0.006	-0.005
	(0.008)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
% White		-0.004**	-0.000	-0.002	-0.004**	-0.004**	-0.003**	-0.004**
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.033***		0.029***	0.019***	0.030***	0.028***	0.031***	0.032***
	(0.005)		(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
% of Population in Armed Forces	-0.040***	-0.041***		-0.044***	-0.043***	-0.045***	-0.043***	-0.043***
	(0.004)	(0.005)		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
% of Housing Built Post-FHA	-0.013***	-0.010***	-0.014***		-0.014***	-0.012***	-0.013***	-0.014***
	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.001)	(0.002)
Suburbanization	-0.002*	-0.001	-0.002*	-0.002		-0.000	-0.002	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.128***	0.078**	0.149***	0.053	0.094***		0.092***	0.122***
	(0.025)	(0.029)	(0.028)	(0.029)	(0.022)		(0.017)	(0.025)
Age of the MSA 1900 & earlier	-0.062	-0.092	-0.099	0.139	-0.009	0.167**		-0.076
	(0.071)	(0.084)	(0.081)	(0.078)	(0.064)	(0.052)		(0.071)
Age of the MSA 1910 to 1940	-0.052	-0.103	-0.080	0.003	-0.009	0.079		-0.065
	(0.062)	(0.071)	(0.071)	(0.068)	(0.053)	(0.053)		(0.061)
Age of the MSA 1950 to 1960	-0.069	-0.134	-0.116	-0.115	-0.031	0.012		-0.076
	(0.069)	(0.072)	(0.082)	(0.070)	(0.063)	(0.061)		(0.067)
Age of the MSA 1970 & later	0.040	-0.030	0.011	-0.052	0.069	0.056		0.044
	(0.055)	(0.065)	(0.064)	(0.058)	(0.054)	(0.057)		(0.056)
Constant	-0.069	0.844*	-0.377	0.114	0.611	1.724***	0.662*	0.400
	(0.299)	(0.405)	(0.400)	(0.390)	(0.341)	(0.235)	(0.321)	(0.352)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 50. Residential Segregation and Share of Population Residing Outside Largest School District - Dissimilarity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of Population Residing Outside Largest District	0.472***	0.479***	0.548***	0.328***	0.229*	0.517***	0.392***	0.301**
	(0.092)	(0.092)	(0.093)	(0.081)	(0.096)	(0.097)	(0.103)	(0.099)
% White		-0.001						
		(0.002)						
% Housing Units Vacant			0.015***					
			(0.004)					
% of Population in Armed Forces				-0.043***				
				(0.005)				
% of Housing Built Post-FHA					-0.010***			
					(0.002)			
Suburbanization						-0.003*		
						(0.001)		
Total Population (log)							0.052*	
							(0.025)	
Age of the MSA 1900 & earlier								0.189**
								(0.068)
Age of the MSA 1910 to 1940								0.042
								(0.066)
Age of the MSA 1950 to 1960								-0.097
								(0.081)
Age of the MSA 1970 & later								-0.084
								(0.069)
Constant	0.633***	0.718***	0.467***	0.770***	1.297***	0.714***	0.018	0.705***
	(0.055)	(0.170)	(0.073)	(0.048)	(0.109)	(0.063)	(0.296)	(0.072)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 50. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Share of Population Residing Outside Largest District	0.127	0.066	0.222*	0.379***	0.112	0.241**	0.163	0.168
	(0.088)	(0.099)	(0.104)	(0.090)	(0.085)	(0.084)	(0.087)	(0.086)
% White		-0.005**	-0.001	-0.003*	-0.004**	-0.005***	-0.004**	-0.004**
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.033***		0.032***	0.025***	0.031***	0.030***	0.032***	0.033***
	(0.005)		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
% of Population in Armed Forces	-0.039***	-0.041***		-0.044***	-0.042***	-0.043***	-0.042***	-0.042***
	(0.004)	(0.005)		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
% of Housing Built Post-FHA	-0.012***	-0.010***	-0.013***		-0.013***	-0.010***	-0.011***	-0.012***
	(0.001)	(0.002)	(0.002)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.002*	-0.001	-0.003**	-0.003**		-0.001	-0.002*	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.118***	0.073*	0.133***	0.032	0.082***		0.077***	0.109***
	(0.026)	(0.031)	(0.029)	(0.030)	(0.024)		(0.019)	(0.026)
Age of the MSA 1900 & earlier	-0.059	-0.091	-0.096	0.134	0.001	0.133*		-0.074
	(0.070)	(0.083)	(0.077)	(0.074)	(0.064)	(0.053)		(0.070)
Age of the MSA 1910 to 1940	-0.047	-0.103	-0.074	0.009	0.002	0.063		-0.061
	(0.061)	(0.071)	(0.068)	(0.067)	(0.054)	(0.052)		(0.060)
Age of the MSA 1950 to 1960	-0.059	-0.129	-0.095	-0.075	-0.017	0.018		-0.063
	(0.069)	(0.074)	(0.082)	(0.071)	(0.064)	(0.063)		(0.068)
Age of the MSA 1970 & later	0.048	-0.031	0.025	-0.024	0.080	0.071		0.056
	(0.055)	(0.066)	(0.064)	(0.057)	(0.055)	(0.057)		(0.056)
Constant	-0.140	1.014**	-0.209	0.544	0.626*	1.546***	0.638*	0.376
	(0.277)	(0.356)	(0.370)	(0.388)	(0.319)	(0.186)	(0.298)	(0.328)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 51. Residential Segregation and Total Number of Cities per 1 Million MSA Population - Theil

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Cities per 1m Population	0.107	0.200***	0.098	0.078	0.028	0.107	0.271***	0.176**
	(0.065)	(0.061)	(0.064)	(0.063)	(0.062)	(0.066)	(0.066)	(0.060)
% White		-0.022***						
		(0.002)						
% Housing Units Vacant			0.016*					
			(0.006)					
% of Population in Armed Forces				-0.041***				
				(0.006)				
% of Housing Built Post-FHA					-0.009***			
					(0.002)			
Suburbanization						-0.000		
						(0.001)		
Total Population (log)							0.233***	
							(0.027)	
Age of the MSA 1900 & earlier								0.391***
								(0.087)
Age of the MSA 1910 to 1940								0.186*
								(0.082)
Age of the MSA 1950 to 1960								0.037
								(0.106)
Age of the MSA 1970 & later								-0.196*
								(0.088)
Constant	-0.206***	1.707***	-0.330***	-0.138**	0.321**	-0.205**	-3.239***	-0.335***
	(0.047)	(0.219)	(0.069)	(0.047)	(0.123)	(0.076)	(0.351)	(0.078)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 51. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of Cities per 1m Population	0.140*	0.198***	0.182***	0.255***	0.164***	0.120*	0.159***	0.154***
	(0.059)	(0.047)	(0.050)	(0.049)	(0.046)	(0.048)	(0.046)	(0.046)
% White		-0.026***	-0.021***	-0.023***	-0.025***	-0.026***	-0.025***	-0.025***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
% Housing Units Vacant	0.043***		0.039***	0.029***	0.038***	0.034***	0.040***	0.040***
	(0.008)		(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)
% of Population in Armed Forces	-0.030***	-0.047***		-0.052***	-0.049***	-0.053***	-0.049***	-0.049***
	(0.005)	(0.007)		(0.007)	(0.007)	(0.008)	(0.007)	(0.007)
% of Housing Built Post-FHA	-0.009***	-0.008***	-0.014***		-0.013***	-0.010***	-0.012***	-0.013***
	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.001)	(0.002)
Suburbanization	-0.003*	-0.002	-0.004**	-0.003**		0.000	-0.003**	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.253***	0.162***	0.244***	0.154***	0.172***		0.187***	0.213***
	(0.036)	(0.033)	(0.032)	(0.030)	(0.026)		(0.020)	(0.029)
Age of the MSA 1900 & earlier	-0.041	-0.138	-0.136	0.115	-0.016	0.290***		-0.119
	(0.110)	(0.097)	(0.094)	(0.084)	(0.078)	(0.069)		(0.086)
Age of the MSA 1910 to 1940	0.002	-0.122	-0.083	0.002	0.015	0.166*		-0.071
	(0.090)	(0.082)	(0.079)	(0.071)	(0.064)	(0.065)		(0.072)
Age of the MSA 1950 to 1960	0.006	-0.102	-0.067	-0.052	0.034	0.106		-0.033
	(0.107)	(0.092)	(0.096)	(0.084)	(0.079)	(0.077)		(0.083)
Age of the MSA 1970 & later	-0.064	-0.144	-0.067	-0.149*	-0.004	-0.023		-0.038
	(0.085)	(0.082)	(0.078)	(0.069)	(0.069)	(0.073)		(0.070)
Constant	-3.114***	0.595	-0.842	-0.260	0.191	2.252***	0.036	-0.160
	(0.409)	(0.421)	(0.432)	(0.440)	(0.397)	(0.253)	(0.373)	(0.400)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 52. Residential Segregation and Total Number of Cities 2,500+ per 1 Million MSA Population - Theil

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Cities 2500+ per 1m Population	0.909***	1.361***	0.849***	0.703**	0.654**	0.925***	1.096***	1.064***
	(0.227)	(0.199)	(0.232)	(0.222)	(0.228)	(0.230)	(0.215)	(0.232)
% White		-0.024***						
		(0.002)						
% Housing Units Vacant			0.014*					
			(0.006)					
% of Population in Armed Forces				-0.038***				
				(0.005)				
% of Housing Built Post-FHA					-0.008***			
					(0.002)			
Suburbanization						-0.001		
						(0.001)		
Total Population (log)							0.211***	
							(0.025)	
Age of the MSA 1900 & earlier								0.412***
								(0.089)
Age of the MSA 1910 to 1940								0.234**
								(0.086)
Age of the MSA 1950 to 1960								0.095
								(0.107)
Age of the MSA 1970 & later								-0.157
								(0.090)
Constant	-0.340***	1.657***	-0.442***	-0.249***	0.145	-0.310***	-3.057***	-0.499***
	(0.057)	(0.212)	(0.070)	(0.057)	(0.129)	(0.073)	(0.332)	(0.096)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 52. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of Cities 2500+ per 1m Population	0.606*	1.076***	1.037***	1.212***	0.765***	0.875***	0.841***	0.831***
	(0.235)	(0.181)	(0.201)	(0.182)	(0.192)	(0.197)	(0.182)	(0.188)
% White		-0.026***	-0.022***	-0.024***	-0.025***	-0.027***	-0.025***	-0.025***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
% Housing Units Vacant	0.041***		0.036***	0.028***	0.036***	0.032***	0.038***	0.038***
	(0.008)		(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)
% of Population in Armed Forces	-0.029***	-0.044***		-0.048***	-0.047***	-0.050***	-0.046***	-0.046***
	(0.005)	(0.007)		(0.007)	(0.007)	(0.007)	(0.006)	(0.006)
% of Housing Built Post-FHA	-0.009***	-0.007***	-0.012***		-0.012***	-0.009***	-0.011***	-0.012***
	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.001)	(0.002)
Suburbanization	-0.004**	-0.003*	-0.004***	-0.004***		-0.001	-0.004***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.241***	0.146***	0.223***	0.136***	0.147***		0.180***	0.198***
	(0.035)	(0.030)	(0.030)	(0.028)	(0.026)		(0.019)	(0.028)
Age of the MSA 1900 & earlier	-0.022	-0.094	-0.092	0.134	0.031	0.306***		-0.087
	(0.113)	(0.093)	(0.093)	(0.083)	(0.082)	(0.069)		(0.086)
Age of the MSA 1910 to 1940	0.023	-0.078	-0.041	0.038	0.060	0.189**		-0.040
	(0.093)	(0.080)	(0.080)	(0.073)	(0.068)	(0.066)		(0.073)
Age of the MSA 1950 to 1960	0.021	-0.064	-0.030	-0.017	0.067	0.132		-0.007
	(0.110)	(0.092)	(0.095)	(0.083)	(0.081)	(0.077)		(0.084)
Age of the MSA 1970 & later	-0.058	-0.127	-0.055	-0.126	0.011	-0.016		-0.030
	(0.086)	(0.079)	(0.076)	(0.068)	(0.068)	(0.072)		(0.069)
Constant	-3.027***	0.692	-0.670	-0.038	0.422	2.153***	0.103	-0.039
	(0.391)	(0.403)	(0.417)	(0.425)	(0.394)	(0.248)	(0.367)	(0.391)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 53. Residential Segregation and Total Number of Cities 10k+ per 1 Million MSA Population - Theil

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Cities 10000+ per 1m Population	0.501	0.940	0.435	0.368	0.390	0.564	1.098	1.611*
	(0.669)	(0.571)	(0.680)	(0.644)	(0.614)	(0.682)	(0.606)	(0.636)
% White		-0.022***						
		(0.002)						
% Housing Units Vacant			0.016*					
			(0.006)					
% of Population in Armed Forces				-0.041***				
				(0.005)				
% of Housing Built Post-FHA					-0.009***			
					(0.002)			
Suburbanization						-0.001		
						(0.001)		
Total Population (log)							0.205***	
							(0.027)	
Age of the MSA 1900 & earlier								0.408***
								(0.092)
Age of the MSA 1910 to 1940								0.227*
								(0.090)
Age of the MSA 1950 to 1960								0.066
								(0.110)
Age of the MSA 1970 & later								-0.192*
								(0.092)
Constant	-0.200**	1.640***	-0.326***	-0.135*	0.309**	-0.178*	-2.860***	-0.426***
	(0.070)	(0.216)	(0.081)	(0.068)	(0.117)	(0.082)	(0.359)	(0.106)
Observations	310	310	310	310	310	310	310	310

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 53. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of Cities 10000+ per 1m Population	1.328*	1.270**	1.539**	1.882***	1.104*	1.389**	1.354***	1.340**
	(0.555)	(0.465)	(0.470)	(0.458)	(0.437)	(0.450)	(0.399)	(0.424)
% White		-0.025***	-0.021***	-0.023***	-0.025***	-0.026***	-0.025***	-0.025***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
% Housing Units Vacant	0.044***		0.041***	0.031***	0.039***	0.036***	0.042***	0.042***
	(0.008)		(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
% of Population in Armed Forces	-0.030***	-0.048***		-0.052***	-0.050***	-0.052***	-0.048***	-0.048***
	(0.005)	(0.007)		(0.007)	(0.007)	(0.007)	(0.006)	(0.007)
% of Housing Built Post-FHA	-0.010***	-0.009***	-0.015***		-0.014***	-0.010***	-0.013***	-0.013***
	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.001)	(0.002)
Suburbanization	-0.004**	-0.002*	-0.005***	-0.005***		-0.001	-0.004***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.242***	0.145***	0.229***	0.129***	0.150***		0.182***	0.201***
	(0.035)	(0.032)	(0.030)	(0.030)	(0.026)		(0.020)	(0.028)
Age of the MSA 1900 & earlier	-0.015	-0.127	-0.109	0.162	0.019	0.304***		-0.094
	(0.113)	(0.101)	(0.096)	(0.088)	(0.083)	(0.071)		(0.087)
Age of the MSA 1910 to 1940	0.038	-0.098	-0.042	0.054	0.059	0.197**		-0.035
	(0.094)	(0.086)	(0.082)	(0.077)	(0.070)	(0.068)		(0.075)
Age of the MSA 1950 to 1960	0.034	-0.099	-0.037	-0.038	0.058	0.129		-0.011
	(0.111)	(0.095)	(0.099)	(0.088)	(0.084)	(0.080)		(0.086)
Age of the MSA 1970 & later	-0.061	-0.147	-0.064	-0.155*	0.006	-0.022		-0.036
	(0.087)	(0.082)	(0.078)	(0.071)	(0.069)	(0.073)		(0.070)
Constant	-3.007***	0.846*	-0.689	-0.023	0.437	2.189***	0.105	-0.044
	(0.394)	(0.414)	(0.425)	(0.438)	(0.398)	(0.250)	(0.377)	(0.394)
Observations	310	310	310	310	310	310	310	310

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 54. Residential Segregation and Total Population Share Residing Outside Largest City - Theil

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MSA Population Share Residing Outside Largest City	0.692***	0.804***	0.642***	0.593***	0.653***	1.357***	0.419**	0.591***
	(0.152)	(0.132)	(0.156)	(0.148)	(0.142)	(0.250)	(0.151)	(0.151)
% White		-0.022***						
		(0.002)						
% Housing Units Vacant			0.012					
			(0.006)					
% of Population in Armed Forces				-0.037***				
				(0.005)				
% of Housing Built Post-FHA					-0.009***			
					(0.002)			
Suburbanization						-0.009***		
						(0.002)		
Total Population (log)							0.175***	
							(0.029)	
Age of the MSA 1900 & earlier								0.379***
								(0.088)
Age of the MSA 1910 to 1940								0.232**
								(0.087)
Age of the MSA 1950 to 1960								0.081
								(0.106)
Age of the MSA 1970 & later								-0.119
								(0.091)
Constant	-0.609***	1.267***	-0.672***	-0.496***	-0.112	-0.708***	-2.643***	-0.670***
	(0.105)	(0.224)	(0.107)	(0.105)	(0.146)	(0.114)	(0.345)	(0.132)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.
*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 54. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
MSA Population Share Residing Outside Largest City	0.549**	1.185***	1.132***	1.185***	0.302**	1.065***	0.929***	0.945***
	(0.200)	(0.203)	(0.223)	(0.202)	(0.114)	(0.200)	(0.181)	(0.188)
% White		-0.028***	-0.024***	-0.025***	-0.025***	-0.028***	-0.026***	-0.027***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
% Housing Units Vacant	0.041***		0.034***	0.025***	0.036***	0.030***	0.035***	0.036***
	(0.008)		(0.006)	(0.005)	(0.007)	(0.006)	(0.006)	(0.006)
% of Population in Armed Forces	-0.028***	-0.042***		-0.046***	-0.049***	-0.047***	-0.044***	-0.044***
	(0.005)	(0.006)		(0.006)	(0.007)	(0.007)	(0.006)	(0.006)
% of Housing Built Post-FHA	-0.009***	-0.008***	-0.013***		-0.014***	-0.009***	-0.011***	-0.012***
	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.001)	(0.002)
Suburbanization	-0.007***	-0.009***	-0.011***	-0.011***		-0.007***	-0.008***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.002)
Total Population (log)	0.231***	0.123***	0.196***	0.108***	0.126***		0.139***	0.176***
	(0.036)	(0.030)	(0.029)	(0.029)	(0.029)		(0.020)	(0.026)
Age of the MSA 1900 & earlier	-0.059	-0.156	-0.152	0.071	0.019	0.207**		-0.135
	(0.108)	(0.087)	(0.083)	(0.081)	(0.084)	(0.065)		(0.077)
Age of the MSA 1910 to 1940	0.006	-0.097	-0.063	0.009	0.060	0.145*		-0.056
	(0.090)	(0.075)	(0.074)	(0.072)	(0.071)	(0.061)		(0.068)
Age of the MSA 1950 to 1960	0.011	-0.064	-0.033	-0.035	0.059	0.115		-0.010
	(0.109)	(0.091)	(0.097)	(0.087)	(0.084)	(0.080)		(0.085)
Age of the MSA 1970 & later	-0.036	-0.069	-0.007	-0.083	0.035	0.028		0.010
	(0.086)	(0.075)	(0.075)	(0.067)	(0.071)	(0.069)		(0.068)
Constant	-2.985***	0.825*	-0.452	0.177	0.725	2.038***	0.433	0.114
	(0.395)	(0.384)	(0.393)	(0.406)	(0.411)	(0.239)	(0.351)	(0.371)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 55. Residential Segregation and Gini Concentration of Fragmentation - Theil

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gini Place Concentration Score	1.463***	1.620***	1.563***	1.243**	1.164**	1.483***	0.329	0.550
	(0.409)	(0.412)	(0.409)	(0.386)	(0.387)	(0.415)	(0.398)	(0.371)
% White		-0.022***						
		(0.002)						
% Housing Units Vacant			0.019**					
			(0.007)					
% of Population in Armed Forces				-0.039***				
				(0.006)				
% of Housing Built Post-FHA					-0.008***			
					(0.002)			
Suburbanization						-0.001		
						(0.001)		
Total Population (log)							0.185***	
							(0.031)	
Age of the MSA 1900 & earlier								0.311***
								(0.090)
Age of the MSA 1910 to 1940								0.134
								(0.085)
Age of the MSA 1950 to 1960								-0.014
								(0.108)
Age of the MSA 1970 & later								-0.199*
								(0.090)
Constant	-0.025	1.892***	-0.170*	0.005	0.380***	0.009	-2.470***	-0.159*
	(0.044)	(0.201)	(0.070)	(0.042)	(0.106)	(0.075)	(0.407)	(0.078)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 55. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Gini Place Concentration Score	-0.350	0.405	0.208	0.482	0.183	0.748*	0.174	0.180
	(0.353)	(0.378)	(0.354)	(0.341)	(0.310)	(0.319)	(0.311)	(0.315)
% White		-0.026***	-0.021***	-0.023***	-0.025***	-0.026***	-0.025***	-0.025***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
% Housing Units Vacant	0.044***		0.040***	0.029***	0.039***	0.035***	0.041***	0.041***
	(0.008)		(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
% of Population in Armed Forces	-0.032***	-0.049***		-0.054***	-0.050***	-0.053***	-0.050***	-0.050***
	(0.005)	(0.007)		(0.007)	(0.007)	(0.008)	(0.007)	(0.007)
% of Housing Built Post-FHA	-0.011***	-0.010***	-0.016***		-0.014***	-0.011***	-0.013***	-0.014***
	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.001)	(0.002)
Suburbanization	-0.003*	-0.002	-0.004**	-0.004**		-0.001	-0.003**	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.258***	0.131***	0.224***	0.107**	0.151***		0.160***	0.196***
	(0.038)	(0.037)	(0.036)	(0.035)	(0.030)		(0.025)	(0.033)
Age of the MSA 1900 & earlier	-0.071	-0.179	-0.174	0.099	-0.042	0.190**		-0.151
	(0.111)	(0.100)	(0.096)	(0.090)	(0.081)	(0.073)		(0.087)
Age of the MSA 1910 to 1940	-0.014	-0.151	-0.107	-0.022	-0.001	0.102		-0.091
	(0.091)	(0.085)	(0.083)	(0.078)	(0.067)	(0.067)		(0.074)
Age of the MSA 1950 to 1960	-0.029	-0.137	-0.101	-0.101	0.009	0.068		-0.061
	(0.107)	(0.095)	(0.098)	(0.087)	(0.082)	(0.081)		(0.085)
Age of the MSA 1970 & later	-0.064	-0.140	-0.063	-0.158*	0.003	-0.017		-0.034
	(0.086)	(0.083)	(0.078)	(0.070)	(0.069)	(0.072)		(0.071)
Constant	-3.033***	1.254*	-0.386	0.540	0.640	2.535***	0.523	0.242
	(0.440)	(0.501)	(0.509)	(0.518)	(0.458)	(0.261)	(0.442)	(0.465)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 56. Residential Segregation and the Likelihood of Two Students in an MSA Attending Different School Districts - Theil

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Likelihood of Two Students in MSA Attending Different Districts	-0.598	-1.017**	-0.665	-0.564	-0.376	-0.600	0.418	0.153
	(0.394)	(0.359)	(0.386)	(0.382)	(0.386)	(0.394)	(0.407)	(0.400)
% White		-0.022***						
		(0.002)						
% Housing Units Vacant			0.017**					
			(0.006)					
% of Population in Armed Forces				-0.042***				
				(0.006)				
% of Housing Built Post-FHA					-0.009***			
					(0.002)			
Suburbanization						-0.000		
						(0.001)		
Total Population (log)							0.210***	
							(0.029)	
Age of the MSA 1900 & earlier								0.361***
								(0.092)
Age of the MSA 1910 to 1940								0.161
								(0.084)
Age of the MSA 1950 to 1960								-0.013
								(0.106)
Age of the MSA 1970 & later								-0.206*
								(0.090)
Constant	-0.106*	1.856***	-0.240***	-0.055	0.362***	-0.091	-2.842***	-0.236**
	(0.042)	(0.215)	(0.069)	(0.042)	(0.105)	(0.071)	(0.379)	(0.078)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 56. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Likelihood of Two Students in	0.724	-0.320	0.123	-0.243	-0.178	-0.599	-0.099	-0.124
MSA Attending Different Districts	(0.376)	(0.349)	(0.344)	(0.330)	(0.311)	(0.311)	(0.314)	(0.315)
% White		-0.026***	-0.021***	-0.023***	-0.025***	-0.027***	-0.025***	-0.025***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
% Housing Units Vacant	0.045***		0.040***	0.029***	0.039***	0.035***	0.041***	0.041***
	(0.009)		(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)
% of Population in Armed Forces	-0.031***	-0.050***		-0.055***	-0.051***	-0.055***	-0.050***	-0.050***
	(0.005)	(0.007)		(0.008)	(0.007)	(0.008)	(0.007)	(0.007)
% of Housing Built Post-FHA	-0.011***	-0.010***	-0.016***		-0.014***	-0.011***	-0.013***	-0.014***
	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.001)	(0.002)
Suburbanization	-0.003**	-0.002	-0.004***	-0.004**		-0.000	-0.003**	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.265***	0.138***	0.237***	0.117***	0.153***		0.164***	0.199***
	(0.037)	(0.035)	(0.035)	(0.034)	(0.028)		(0.022)	(0.031)
Age of the MSA 1900 & earlier	-0.061	-0.185	-0.172	0.100	-0.047	0.202**		-0.153
	(0.111)	(0.101)	(0.095)	(0.090)	(0.081)	(0.071)		(0.087)
Age of the MSA 1910 to 1940	-0.017	-0.149	-0.105	-0.017	-0.001	0.120		-0.090
	(0.089)	(0.085)	(0.082)	(0.078)	(0.067)	(0.066)		(0.074)
Age of the MSA 1950 to 1960	-0.024	-0.145	-0.104	-0.111	0.005	0.063		-0.064
	(0.105)	(0.093)	(0.097)	(0.088)	(0.082)	(0.079)		(0.085)
Age of the MSA 1970 & later	-0.055	-0.147	-0.063	-0.167*	-0.001	-0.029		-0.036
	(0.084)	(0.082)	(0.078)	(0.072)	(0.069)	(0.073)		(0.071)
Constant	-3.145***	1.181*	-0.592	0.371	0.621	2.534***	0.467	0.198
	(0.425)	(0.468)	(0.496)	(0.508)	(0.440)	(0.260)	(0.427)	(0.453)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group.
*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 57. Residential Segregation and Total Number of School Districts Relative to MSA Enrollment - Theil

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of School Districts per 1m MSA Enrolled	0.046***	0.052***	0.046***	0.037***	0.031*	0.048***	0.044***	0.030**
	(0.010)	(0.009)	(0.010)	(0.010)	(0.012)	(0.010)	(0.010)	(0.011)
% White		-0.022***						
		(0.002)						
% Housing Units Vacant			0.015*					
			(0.006)					
% of Population in Armed Forces				-0.036***				
				(0.005)				
% of Housing Built Post-FHA					-0.007**			
					(0.002)			
Suburbanization						0.001		
						(0.001)		
Total Population (log)							0.195***	
							(0.026)	
Age of the MSA 1900 & earlier								0.316***
								(0.087)
Age of the MSA 1910 to 1940								0.150
								(0.084)
Age of the MSA 1950 to 1960								-0.012
								(0.104)
Age of the MSA 1970 & later								-0.179*
								(0.089)
Constant	-0.791***	1.060***	-0.908***	-0.619***	-0.207	-0.840***	-3.230***	-0.637***
	(0.144)	(0.244)	(0.144)	(0.145)	(0.249)	(0.158)	(0.344)	(0.161)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 57. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of School Districts per 1m								
MSA Enrolled	0.007	0.019	0.013	0.025**	0.005	0.004	0.002	0.002
	(0.010)	(0.011)	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
% White		-0.025***	-0.021***	-0.022***	-0.025***	-0.026***	-0.025***	-0.025***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
% Housing Units Vacant	0.043***		0.039***	0.028***	0.038***	0.035***	0.041***	0.041***
	(0.009)		(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
% of Population in Armed Forces	-0.031***	-0.047***		-0.051***	-0.050***	-0.054***	-0.050***	-0.049***
	(0.005)	(0.007)		(0.007)	(0.007)	(0.008)	(0.007)	(0.007)
% of Housing Built Post-FHA	-0.010***	-0.009***	-0.015***		-0.014***	-0.011***	-0.013***	-0.014***
	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.002)	(0.002)
Suburbanization	-0.003*	-0.002	-0.004**	-0.003**		-0.000	-0.003**	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.243***	0.149***	0.231***	0.133***	0.159***		0.167***	0.203***
	(0.036)	(0.034)	(0.032)	(0.031)	(0.027)		(0.020)	(0.029)
Age of the MSA 1900 & earlier	-0.072	-0.183	-0.177	0.062	-0.046	0.248***		-0.151
	(0.112)	(0.102)	(0.098)	(0.092)	(0.082)	(0.070)		(0.088)
Age of the MSA 1910 to 1940	-0.016	-0.147	-0.106	-0.028	-0.002	0.142*		-0.090
	(0.092)	(0.085)	(0.083)	(0.077)	(0.067)	(0.066)		(0.074)
Age of the MSA 1950 to 1960	-0.025	-0.149	-0.109	-0.115	0.001	0.074		-0.065
	(0.108)	(0.093)	(0.097)	(0.087)	(0.082)	(0.078)		(0.085)
Age of the MSA 1970 & later	-0.060	-0.136	-0.062	-0.144*	0.001	-0.021		-0.035
	(0.086)	(0.081)	(0.078)	(0.071)	(0.069)	(0.073)		(0.071)
Constant	-2.951***	0.621	-0.721	-0.218	0.422	2.319***	0.371	0.083
	(0.421)	(0.520)	(0.482)	(0.465)	(0.443)	(0.321)	(0.416)	(0.452)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.
*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 58. Residential Segregation and Share of Population Residing Outside Largest School District - Theil

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of Population Residing Outside Largest District	0.379**	0.546***	0.491***	0.270*	0.182	0.405**	0.075	0.064
	(0.124)	(0.113)	(0.126)	(0.119)	(0.128)	(0.130)	(0.127)	(0.130)
% White		-0.023***						
		(0.002)						
% Housing Units Vacant			0.023**					
			(0.007)					
% of Population in Armed Forces				-0.038***				
				(0.005)				
% of Housing Built Post-FHA					-0.008***			
					(0.002)			
Suburbanization						-0.001		
						(0.001)		
Total Population (log)							0.191***	
							(0.030)	
Age of the MSA 1900 & earlier								0.340***
								(0.094)
Age of the MSA 1910 to 1940								0.155
								(0.086)
Age of the MSA 1950 to 1960								-0.009
								(0.106)
Age of the MSA 1970 & later								-0.200*
								(0.089)
Constant	-0.354***	1.578***	-0.604***	-0.247***	0.183	-0.314***	-2.610***	-0.254**
	(0.074)	(0.209)	(0.109)	(0.073)	(0.147)	(0.082)	(0.353)	(0.092)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 58. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Share of Population Residing Outside Largest District	-0.132	-0.003	0.172	0.361**	0.028	0.250*	0.115	0.117
	(0.130)	(0.130)	(0.128)	(0.111)	(0.108)	(0.108)	(0.112)	(0.113)
% White		-0.025***	-0.022***	-0.024***	-0.025***	-0.027***	-0.025***	-0.025***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
% Housing Units Vacant	0.043***		0.041***	0.034***	0.039***	0.038***	0.042***	0.042***
	(0.008)		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
% of Population in Armed Forces	-0.032***	-0.049***		-0.052***	-0.050***	-0.053***	-0.049***	-0.049***
	(0.005)	(0.007)		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
% of Housing Built Post-FHA	-0.011***	-0.010***	-0.015***		-0.014***	-0.010***	-0.013***	-0.014***
	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.002)	(0.002)
Suburbanization	-0.003*	-0.002	-0.004***	-0.005***		-0.001	-0.003**	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.253***	0.147***	0.220***	0.111***	0.155***		0.158***	0.195***
	(0.036)	(0.037)	(0.034)	(0.032)	(0.030)		(0.023)	(0.031)
Age of the MSA 1900 & earlier	-0.073	-0.180	-0.172	0.071	-0.039	0.217**		-0.149
	(0.112)	(0.101)	(0.093)	(0.086)	(0.082)	(0.072)		(0.086)
Age of the MSA 1910 to 1940	-0.019	-0.149	-0.101	-0.020	0.004	0.128		-0.087
	(0.092)	(0.086)	(0.081)	(0.075)	(0.068)	(0.067)		(0.073)
Age of the MSA 1950 to 1960	-0.033	-0.146	-0.090	-0.075	0.010	0.084		-0.054
	(0.108)	(0.094)	(0.098)	(0.087)	(0.083)	(0.080)		(0.086)
Age of the MSA 1970 & later	-0.069	-0.145	-0.053	-0.124	0.004	-0.007		-0.028
	(0.086)	(0.083)	(0.078)	(0.071)	(0.070)	(0.073)		(0.072)
Constant	-2.841***	0.998*	-0.443	0.347	0.541	2.289***	0.461	0.171
	(0.402)	(0.452)	(0.457)	(0.469)	(0.419)	(0.258)	(0.398)	(0.422)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.
*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 59. Residential Segregation and Total Number of Cities per 1 Million MSA Population - Hutchens

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Cities per 1m Population	0.244***	0.241***	0.239***	0.211***	0.168***	0.239***	0.317***	0.275***
	(0.047)	(0.047)	(0.046)	(0.041)	(0.042)	(0.048)	(0.046)	(0.044)
% White		0.001						
		(0.002)						
% Housing Units Vacant			0.007					
			(0.004)					
% of Population in Armed Forces				-0.040***				
				(0.004)				
% of Housing Built Post-FHA					-0.009***			
					(0.001)			
Suburbanization						-0.001		
						(0.001)		
Total Population (log)							0.105***	
							(0.019)	
Age of the MSA 1900 & earlier								0.231***
								(0.055)
Age of the MSA 1910 to 1940								0.070
								(0.055)
Age of the MSA 1950 to 1960								-0.030
								(0.071)
Age of the MSA 1970 & later								-0.093
								(0.061)
Constant	0.746***	0.674***	0.689***	0.819***	1.245***	0.778***	-0.621*	0.690***
	(0.030)	(0.148)	(0.040)	(0.027)	(0.072)	(0.050)	(0.243)	(0.052)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 59. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of Cities per 1m Population	0.173***	0.204***	0.200***	0.251***	0.180***	0.157***	0.181***	0.173***
	(0.036)	(0.038)	(0.040)	(0.038)	(0.036)	(0.038)	(0.036)	(0.036)
% White		-0.002	0.001	-0.000	-0.002	-0.002	-0.001	-0.002
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.028***		0.026***	0.019***	0.026***	0.024***	0.027***	0.027***
	(0.004)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
% of Population in Armed Forces	-0.035***	-0.035***		-0.038***	-0.036***	-0.038***	-0.036***	-0.036***
	(0.004)	(0.004)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
% of Housing Built Post-FHA	-0.009***	-0.006***	-0.010***		-0.010***	-0.008***	-0.009***	-0.010***
	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.002*	-0.001	-0.002*	-0.002*		0.000	-0.001*	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.115***	0.077**	0.137***	0.068**	0.091***		0.094***	0.112***
	(0.022)	(0.025)	(0.025)	(0.024)	(0.020)		(0.015)	(0.022)
Age of the MSA 1900 & earlier	-0.040	-0.056	-0.059	0.134*	0.009	0.172***		-0.047
	(0.063)	(0.073)	(0.070)	(0.063)	(0.055)	(0.046)		(0.063)
Age of the MSA 1910 to 1940	-0.033	-0.071	-0.047	0.022	0.008	0.090		-0.038
	(0.054)	(0.062)	(0.061)	(0.056)	(0.046)	(0.047)		(0.054)
Age of the MSA 1950 to 1960	-0.020	-0.067	-0.048	-0.031	0.015	0.054		-0.023
	(0.062)	(0.067)	(0.074)	(0.062)	(0.056)	(0.055)		(0.061)
Age of the MSA 1970 & later	0.029	-0.039	0.002	-0.044	0.051	0.042		0.031
	(0.050)	(0.058)	(0.058)	(0.050)	(0.049)	(0.052)		(0.051)
Constant	-0.266	0.453	-0.619	-0.146	0.115	1.193***	0.075	-0.065
	(0.242)	(0.301)	(0.324)	(0.320)	(0.282)	(0.162)	(0.262)	(0.290)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 60. Residential Segregation and Total Number of Cities 2,500+ per 1 Million MSA Population - Hutchens

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Cities 2500+ per 1m Population	1.285***	1.288***	1.264***	1.049***	1.048***	1.324***	1.353***	1.359***
	(0.154)	(0.154)	(0.157)	(0.133)	(0.143)	(0.155)	(0.150)	(0.152)
% White		-0.000						
		(0.002)						
% Housing Units Vacant			0.005					
			(0.004)					
% of Population in Armed Forces				-0.037***				
				(0.004)				
% of Housing Built Post-FHA					-0.008***			
					(0.001)			
Suburbanization						-0.002*		
						(0.001)		
Total Population (log)							0.082***	
							(0.017)	
Age of the MSA 1900 & earlier								0.247***
								(0.056)
Age of the MSA 1910 to 1940								0.120*
								(0.056)
Age of the MSA 1950 to 1960								0.026
								(0.069)
Age of the MSA 1970 & later								-0.052
								(0.060)
Constant	0.606***	0.622***	0.567***	0.706***	1.077***	0.682***	-0.440*	0.516***
	(0.038)	(0.140)	(0.045)	(0.032)	(0.075)	(0.047)	(0.224)	(0.061)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 60. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of Cities 2500+ per 1m Population	0.837***	1.018***	1.048***	1.138***	0.818***	0.884***	0.878***	0.857***
	(0.131)	(0.133)	(0.150)	(0.132)	(0.131)	(0.134)	(0.131)	(0.131)
% White		-0.003*	0.000	-0.001	-0.002	-0.003*	-0.002	-0.002*
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.026***		0.024***	0.018***	0.024***	0.023***	0.025***	0.026***
	(0.004)		(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
% of Population in Armed Forces	-0.032***	-0.032***		-0.035***	-0.034***	-0.035***	-0.033***	-0.034***
	(0.004)	(0.004)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
% of Housing Built Post-FHA	-0.009***	-0.006***	-0.009***		-0.009***	-0.007***	-0.008***	-0.009***
	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.002**	-0.002*	-0.003**	-0.003***		-0.001	-0.002***	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.100***	0.062**	0.116***	0.050*	0.064***		0.085***	0.096***
	(0.020)	(0.022)	(0.023)	(0.022)	(0.019)		(0.014)	(0.021)
Age of the MSA 1900 & earlier	-0.010	-0.020	-0.018	0.154*	0.059	0.177***		-0.016
	(0.060)	(0.067)	(0.066)	(0.060)	(0.054)	(0.044)		(0.060)
Age of the MSA 1910 to 1940	-0.001	-0.033	-0.007	0.055	0.056	0.107*		-0.008
	(0.054)	(0.059)	(0.059)	(0.055)	(0.047)	(0.046)		(0.053)
Age of the MSA 1950 to 1960	0.004	-0.034	-0.014	-0.001	0.051	0.072		0.001
	(0.060)	(0.065)	(0.070)	(0.060)	(0.055)	(0.054)		(0.059)
Age of the MSA 1970 & later	0.036	-0.024	0.012	-0.027	0.067	0.048		0.039
	(0.049)	(0.057)	(0.056)	(0.048)	(0.048)	(0.050)		(0.049)
Constant	-0.185	0.578*	-0.422	0.088	0.373	1.139***	0.181	0.087
	(0.225)	(0.280)	(0.303)	(0.303)	(0.269)	(0.154)	(0.251)	(0.275)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 61. Residential Segregation and Total Number of Cities 10k+ per 1 Million MSA Population - Hutchens

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Cities 10000+ per 1m Population	1.130**	1.095*	1.097*	0.976**	1.027**	1.312**	1.354***	1.635***
	(0.424)	(0.430)	(0.430)	(0.363)	(0.370)	(0.420)	(0.411)	(0.424)
% White		0.002						
		(0.002)						
% Housing Units Vacant			0.008*					
			(0.004)					
% of Population in Armed Forces				-0.041***				
				(0.005)				
% of Housing Built Post-FHA					-0.010***			
					(0.001)			
Suburbanization						-0.002*		
						(0.001)		
Total Population (log)							0.075***	
							(0.019)	
Age of the MSA 1900 & earlier								0.228***
								(0.060)
Age of the MSA 1910 to 1940								0.095
								(0.061)
Age of the MSA 1950 to 1960								-0.034
								(0.075)
Age of the MSA 1970 & later								-0.097
								(0.064)
Constant	0.755***	0.606***	0.692***	0.828***	1.286***	0.822***	-0.222	0.658***
	(0.047)	(0.147)	(0.053)	(0.039)	(0.075)	(0.054)	(0.258)	(0.072)
Observations	310	310	310	310	310	310	310	310

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 61. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of Cities 10000+ per 1m Population	1.199***	1.162***	1.404***	1.619***	1.043**	1.218***	1.278***	1.203***
	(0.323)	(0.345)	(0.380)	(0.348)	(0.329)	(0.335)	(0.307)	(0.321)
% White		-0.002	0.001	-0.000	-0.002	-0.002	-0.002	-0.002
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.030***		0.029***	0.021***	0.028***	0.027***	0.029***	0.030***
	(0.005)		(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
% of Population in Armed Forces	-0.035***	-0.035***		-0.038***	-0.036***	-0.037***	-0.036***	-0.036***
	(0.004)	(0.004)		(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
% of Housing Built Post-FHA	-0.010***	-0.008***	-0.012***		-0.011***	-0.009***	-0.010***	-0.011***
	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.003**	-0.001	-0.003**	-0.003**		-0.001	-0.002***	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.104***	0.062*	0.124***	0.045	0.069***		0.087***	0.101***
	(0.021)	(0.024)	(0.023)	(0.024)	(0.019)		(0.015)	(0.021)
Age of the MSA 1900 & earlier	-0.030	-0.054	-0.046	0.169**	0.038	0.167***		-0.036
	(0.062)	(0.074)	(0.070)	(0.066)	(0.057)	(0.047)		(0.062)
Age of the MSA 1910 to 1940	-0.008	-0.054	-0.018	0.061	0.048	0.106*		-0.013
	(0.055)	(0.064)	(0.062)	(0.060)	(0.049)	(0.048)		(0.055)
Age of the MSA 1950 to 1960	-0.007	-0.066	-0.028	-0.027	0.037	0.064		-0.010
	(0.063)	(0.068)	(0.075)	(0.063)	(0.059)	(0.057)		(0.062)
Age of the MSA 1970 & later	0.031	-0.042	0.003	-0.055	0.062	0.042		0.033
	(0.050)	(0.059)	(0.058)	(0.051)	(0.049)	(0.052)		(0.051)
Constant	-0.107	0.720*	-0.438	0.099	0.397	1.209***	0.206	0.091
	(0.236)	(0.298)	(0.317)	(0.323)	(0.278)	(0.158)	(0.267)	(0.283)
Observations	310	310	310	310	310	310	310	310

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 62. Residential Segregation and Total Population Share Residing Outside Largest City - Hutchens

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MSA Population Share Residing Outside Largest City	0.533***	0.527***	0.513***	0.412***	0.496***	1.252***	0.472***	0.466***
	(0.103)	(0.103)	(0.105)	(0.091)	(0.089)	(0.175)	(0.110)	(0.102)
% White		0.001						
		(0.002)						
% Housing Units Vacant			0.005					
			(0.004)					
% of Population in Armed Forces				-0.039***				
				(0.004)				
% of Housing Built Post-FHA					-0.010***			
					(0.001)			
Suburbanization						-0.009***		
						(0.002)		
Total Population (log)							0.039	
							(0.021)	
Age of the MSA 1900 & earlier								0.193***
								(0.058)
Age of the MSA 1910 to 1940								0.085
								(0.060)
Age of the MSA 1950 to 1960								-0.033
								(0.075)
Age of the MSA 1970 & later								-0.042
								(0.063)
Constant	0.516***	0.393*	0.490***	0.652***	1.049***	0.411***	0.063	0.512***
	(0.070)	(0.163)	(0.072)	(0.063)	(0.091)	(0.075)	(0.251)	(0.088)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 62. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
MSA Population Share Residing Outside Largest City	0.624***	0.837***	0.841***	0.862***	0.234**	0.725***	0.651***	0.665***
	(0.138)	(0.154)	(0.175)	(0.158)	(0.084)	(0.148)	(0.141)	(0.142)
% White		-0.004**	-0.000	-0.002	-0.002	-0.003**	-0.003*	-0.003*
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.026***		0.023***	0.016***	0.025***	0.022***	0.024***	0.025***
	(0.004)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
% of Population in Armed Forces	-0.032***	-0.032***		-0.035***	-0.036***	-0.035***	-0.033***	-0.034***
	(0.003)	(0.004)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
% of Housing Built Post-FHA	-0.009***	-0.007***	-0.010***		-0.011***	-0.008***	-0.008***	-0.010***
	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.006***	-0.006***	-0.007***	-0.008***		-0.005***	-0.006***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.088***	0.045	0.099***	0.027	0.051*		0.052***	0.083***
	(0.021)	(0.024)	(0.024)	(0.024)	(0.022)		(0.015)	(0.021)
Age of the MSA 1900 & earlier	-0.064	-0.083	-0.088	0.096	0.029	0.089*		-0.074
	(0.060)	(0.069)	(0.066)	(0.064)	(0.060)	(0.045)		(0.060)
Age of the MSA 1910 to 1940	-0.028	-0.059	-0.040	0.022	0.039	0.061		-0.036
	(0.053)	(0.059)	(0.059)	(0.058)	(0.052)	(0.044)		(0.052)
Age of the MSA 1950 to 1960	-0.015	-0.047	-0.034	-0.031	0.030	0.045		-0.017
	(0.065)	(0.069)	(0.075)	(0.067)	(0.062)	(0.059)		(0.064)
Age of the MSA 1970 & later	0.059	0.014	0.046	-0.004	0.084	0.075		0.064
	(0.048)	(0.054)	(0.056)	(0.049)	(0.050)	(0.049)		(0.048)
Constant	-0.092	0.749**	-0.222	0.299	0.635*	1.138***	0.513*	0.243
	(0.231)	(0.276)	(0.296)	(0.303)	(0.291)	(0.153)	(0.242)	(0.268)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 63. Residential Segregation and Gini Concentration of Fragmentation - Hutchens

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gini Place Concentration Score	1.096***	1.086***	1.146***	0.852***	0.785**	1.140***	0.928**	0.727**
	(0.267)	(0.265)	(0.266)	(0.232)	(0.241)	(0.269)	(0.308)	(0.273)
% White		0.002						
		(0.002)						
% Housing Units Vacant			0.010**					
			(0.004)					
% of Population in Armed Forces				-0.040***				
				(0.005)				
% of Housing Built Post-FHA					-0.009***			
					(0.001)			
Suburbanization						-0.002		
						(0.001)		
Total Population (log)							0.029	
							(0.023)	
Age of the MSA 1900 & earlier								0.118*
								(0.059)
Age of the MSA 1910 to 1940								-0.006
								(0.059)
Age of the MSA 1950 to 1960								-0.108
								(0.074)
Age of the MSA 1970 & later								-0.101
								(0.063)
Constant	0.963***	0.806***	0.883***	0.999***	1.414***	1.040***	0.586	0.946***
	(0.029)	(0.142)	(0.042)	(0.026)	(0.068)	(0.049)	(0.309)	(0.055)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 63. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Gini Place Concentration Score	0.360	0.538*	0.426	0.620*	0.407	0.644**	0.389	0.403
	(0.228)	(0.269)	(0.258)	(0.251)	(0.225)	(0.217)	(0.223)	(0.229)
% White		-0.003*	0.001	-0.000	-0.002	-0.003*	-0.002	-0.002
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.029***		0.027***	0.020***	0.027***	0.026***	0.028***	0.029***
	(0.005)		(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
% of Population in Armed Forces	-0.036***	-0.036***		-0.040***	-0.037***	-0.038***	-0.037***	-0.037***
	(0.004)	(0.005)		(0.005)	(0.004)	(0.005)	(0.005)	(0.004)
% of Housing Built Post-FHA	-0.011***	-0.008***	-0.012***		-0.011***	-0.010***	-0.010***	-0.011***
	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.002*	-0.001	-0.002*	-0.002*		-0.001	-0.001*	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.091***	0.042	0.109***	0.018	0.060**		0.055**	0.086***
	(0.025)	(0.028)	(0.029)	(0.028)	(0.022)		(0.019)	(0.025)
Age of the MSA 1900 & earlier	-0.079	-0.101	-0.105	0.113	-0.023	0.065		-0.086
	(0.065)	(0.075)	(0.073)	(0.069)	(0.056)	(0.049)		(0.065)
Age of the MSA 1910 to 1940	-0.059	-0.104	-0.079	-0.007	-0.013	0.021		-0.066
	(0.057)	(0.065)	(0.065)	(0.062)	(0.048)	(0.049)		(0.057)
Age of the MSA 1950 to 1960	-0.048	-0.100	-0.082	-0.077	-0.008	0.008		-0.051
	(0.064)	(0.069)	(0.076)	(0.065)	(0.058)	(0.058)		(0.063)
Age of the MSA 1970 & later	0.033	-0.035	0.005	-0.054	0.059	0.045		0.036
	(0.050)	(0.059)	(0.058)	(0.050)	(0.049)	(0.051)		(0.051)
Constant	0.244	1.203***	-0.001	0.725	0.738*	1.506***	0.755*	0.509
	(0.281)	(0.358)	(0.384)	(0.382)	(0.317)	(0.164)	(0.306)	(0.332)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.
*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 64. Residential Segregation and the Likelihood of Two Students in an MSA Attending Different School Districts - Hutchens

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Likelihood of Two Students in MSA Attending Different Districts	-0.336	-0.301	-0.372	-0.289	-0.105	-0.344	-0.020	0.047
	(0.252)	(0.253)	(0.252)	(0.220)	(0.244)	(0.252)	(0.265)	(0.258)
% White		0.002						
		(0.002)						
% Housing Units Vacant			0.009*					
			(0.004)					
% of Population in Armed Forces				-0.042***				
				(0.005)				
% of Housing Built Post-FHA					-0.010***			
					(0.001)			
Suburbanization						-0.001		
						(0.001)		
Total Population (log)							0.066**	
							(0.021)	
Age of the MSA 1900 & earlier								0.174**
								(0.059)
Age of the MSA 1910 to 1940								0.026
								(0.059)
Age of the MSA 1950 to 1960								-0.110
								(0.073)
Age of the MSA 1970 & later								-0.112
								(0.064)
Constant	0.892***	0.727***	0.822***	0.948***	1.395***	0.950***	0.031	0.860***
	(0.028)	(0.152)	(0.039)	(0.025)	(0.067)	(0.048)	(0.275)	(0.053)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 64. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Likelihood of Two Students in MSA Attending Different Districts	0.243	0.043	0.388	0.091	0.165	-0.051	0.187	0.197
	(0.212)	(0.235)	(0.247)	(0.231)	(0.212)	(0.213)	(0.217)	(0.215)
% White		-0.002	0.002	0.000	-0.001	-0.002	-0.001	-0.001
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.030***		0.029***	0.020***	0.028***	0.026***	0.029***	0.030***
	(0.005)		(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
% of Population in Armed Forces	-0.036***	-0.036***		-0.040***	-0.037***	-0.039***	-0.037***	-0.037***
	(0.004)	(0.004)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
% of Housing Built Post-FHA	-0.011***	-0.008***	-0.013***		-0.012***	-0.010***	-0.010***	-0.011***
	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.002*	-0.001	-0.002*	-0.002*		-0.000	-0.002*	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.112***	0.064*	0.139***	0.044	0.081***		0.079***	0.109***
	(0.023)	(0.027)	(0.027)	(0.027)	(0.021)		(0.017)	(0.024)
Age of the MSA 1900 & earlier	-0.077	-0.101	-0.098	0.123	-0.018	0.115*		-0.083
	(0.064)	(0.076)	(0.072)	(0.069)	(0.057)	(0.047)		(0.065)
Age of the MSA 1910 to 1940	-0.058	-0.100	-0.074	0.001	-0.007	0.056		-0.062
	(0.056)	(0.065)	(0.064)	(0.062)	(0.048)	(0.047)		(0.056)
Age of the MSA 1950 to 1960	-0.056	-0.111	-0.090	-0.090	-0.015	0.014		-0.058
	(0.062)	(0.068)	(0.074)	(0.065)	(0.057)	(0.056)		(0.062)
Age of the MSA 1970 & later	0.033	-0.041	0.006	-0.063	0.058	0.042		0.034
	(0.050)	(0.059)	(0.057)	(0.051)	(0.049)	(0.052)		(0.051)
Constant	-0.059	0.840*	-0.507	0.261	0.377	1.389***	0.375	0.125
	(0.259)	(0.335)	(0.364)	(0.364)	(0.300)	(0.167)	(0.293)	(0.316)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 65. Residential Segregation and Total Number of School Districts Relative to MSA Enrollment - Hutchens

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of School Districts per 1m MSA Enrolled	0.035***	0.034***	0.034***	0.023***	0.015	0.034***	0.034***	0.027***
	(0.008)	(0.008)	(0.007)	(0.007)	(0.009)	(0.008)	(0.008)	(0.008)
% White		0.002						
		(0.002)						
% Housing Units Vacant			0.008*					
			(0.004)					
% of Population in Armed Forces				-0.039***				
				(0.004)				
% of Housing Built Post-FHA					-0.009***			
					(0.001)			
Suburbanization						-0.001		
						(0.001)		
Total Population (log)							0.063***	
							(0.019)	
Age of the MSA 1900 & earlier								0.140*
								(0.055)
Age of the MSA 1910 to 1940								0.018
								(0.057)
Age of the MSA 1950 to 1960								-0.108
								(0.070)
Age of the MSA 1970 & later								-0.086
								(0.063)
Constant	0.394***	0.249	0.333**	0.604***	1.125***	0.428***	-0.391	0.496***
	(0.106)	(0.177)	(0.101)	(0.095)	(0.169)	(0.122)	(0.260)	(0.114)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 65. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Number of School Districts per 1m MSA Enrolled	-0.004	0.007	0.004	0.014*	-0.003	-0.004	-0.005	-0.005
	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
% White		-0.002	0.001	0.000	-0.002	-0.002	-0.001	-0.002
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.030***		0.027***	0.019***	0.028***	0.027***	0.029***	0.030***
	(0.005)		(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)
% of Population in Armed Forces	-0.036***	-0.036***		-0.038***	-0.038***	-0.039***	-0.037***	-0.037***
	(0.004)	(0.004)		(0.004)	(0.004)	(0.005)	(0.005)	(0.004)
% of Housing Built Post-FHA	-0.011***	-0.008***	-0.012***		-0.012***	-0.010***	-0.011***	-0.012***
	(0.001)	(0.002)	(0.002)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.002*	-0.001	-0.002*	-0.002*		-0.000	-0.002*	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.106***	0.063*	0.126***	0.046	0.076***		0.073***	0.103***
	(0.022)	(0.026)	(0.026)	(0.025)	(0.020)		(0.015)	(0.023)
Age of the MSA 1900 & earlier	-0.079	-0.102	-0.106	0.096	-0.020	0.121**		-0.086
	(0.065)	(0.077)	(0.074)	(0.069)	(0.057)	(0.047)		(0.065)
Age of the MSA 1910 to 1940	-0.057	-0.099	-0.076	-0.006	-0.008	0.059		-0.063
	(0.056)	(0.065)	(0.065)	(0.061)	(0.048)	(0.048)		(0.056)
Age of the MSA 1950 to 1960	-0.054	-0.112	-0.092	-0.092	-0.014	0.017		-0.057
	(0.063)	(0.068)	(0.075)	(0.064)	(0.058)	(0.056)		(0.062)
Age of the MSA 1970 & later	0.030	-0.037	0.003	-0.050	0.056	0.042		0.032
	(0.050)	(0.059)	(0.058)	(0.052)	(0.049)	(0.052)		(0.051)
Constant	0.110	0.728*	-0.354	0.060	0.521	1.443***	0.572*	0.317
	(0.264)	(0.366)	(0.356)	(0.344)	(0.307)	(0.211)	(0.290)	(0.318)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 66. Residential Segregation and Share of Population Residing Outside Largest School District - Hutchens

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of Population Residing								
Outside Largest District	0.394***	0.388***	0.470***	0.266***	0.187*	0.436***	0.343***	0.264**
	(0.082)	(0.082)	(0.082)	(0.072)	(0.084)	(0.086)	(0.091)	(0.088)
% White		0.001						
		(0.002)						
% Housing Units Vacant			0.015***					
			(0.004)					
% of Population in Armed Forces				-0.039***				
				(0.004)				
% of Housing Built Post-FHA					-0.008***			
					(0.001)			
Suburbanization						-0.003**		
						(0.001)		
Total Population (log)							0.032	
							(0.022)	
Age of the MSA 1900 & earlier								0.126*
								(0.061)
Age of the MSA 1910 to 1940								0.017
								(0.060)
Age of the MSA 1950 to 1960								-0.084
								(0.074)
Age of the MSA 1970 & later								-0.080
								(0.062)
Constant	0.659***	0.591***	0.492***	0.781***	1.221***	0.734***	0.277	0.726***
	(0.048)	(0.147)	(0.065)	(0.042)	(0.094)	(0.055)	(0.256)	(0.064)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.
*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)

Table 66. Continued

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Share of Population Residing Outside Largest District	0.132	0.058	0.200*	0.331***	0.098	0.214**	0.146	0.153
	(0.078)	(0.090)	(0.094)	(0.080)	(0.077)	(0.076)	(0.079)	(0.078)
% White		-0.002	0.001	-0.001	-0.002	-0.003*	-0.002	-0.002
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
% Housing Units Vacant	0.031***		0.030***	0.024***	0.029***	0.028***	0.030***	0.030***
	(0.005)		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
% of Population in Armed Forces	-0.035***	-0.036***		-0.038***	-0.037***	-0.038***	-0.036***	-0.037***
	(0.004)	(0.004)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
% of Housing Built Post-FHA	-0.010***	-0.008***	-0.011***		-0.011***	-0.009***	-0.009***	-0.010***
	(0.001)	(0.002)	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)
Suburbanization	-0.002**	-0.001	-0.003**	-0.003***		-0.001	-0.002*	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Total Population (log)	0.097***	0.058*	0.113***	0.028	0.066**		0.061***	0.092***
	(0.023)	(0.028)	(0.025)	(0.026)	(0.022)		(0.017)	(0.023)
Age of the MSA 1900 & earlier	-0.077	-0.101	-0.103	0.091	-0.011	0.091		-0.084
	(0.063)	(0.075)	(0.070)	(0.066)	(0.057)	(0.048)		(0.063)
Age of the MSA 1910 to 1940	-0.053	-0.099	-0.071	-0.002	0.001	0.045		-0.059
	(0.056)	(0.065)	(0.062)	(0.059)	(0.049)	(0.048)		(0.055)
Age of the MSA 1950 to 1960	-0.044	-0.107	-0.073	-0.057	-0.001	0.023		-0.045
	(0.064)	(0.069)	(0.075)	(0.065)	(0.059)	(0.058)		(0.063)
Age of the MSA 1970 & later	0.039	-0.038	0.015	-0.026	0.066	0.055		0.042
	(0.050)	(0.059)	(0.058)	(0.050)	(0.050)	(0.051)		(0.051)
Constant	0.043	0.894**	-0.205	0.430	0.541	1.289***	0.557*	0.299
	(0.243)	(0.324)	(0.333)	(0.345)	(0.292)	(0.166)	(0.273)	(0.299)
Observations	311	311	311	311	311	311	311	311

Note: Regression coefficients with standard errors in parentheses. Age of the MSA is a dummy variable with multiple categories. Central cities that never reached 50k are the reference group. Fragmentation coefficients are multiplied by 100.

*p<0.05; **p<0.01; ***p<0.001 (two-tailed tests)