POLITICAL FRAGMENTATION AND ITS EFFECTS ON RESIDENTIAL SEGREGATION

A Thesis

by

GABRIEL HERNANDEZ AMARO

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Chair of Committee,	Mark Fossett
Committee Members,	W. Alex McIntosh
	Wenquan Charles Zhang
Head of Department,	Jane Sell

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ABSTRACT

In this thesis, I investigate the relationship between black-white residential segregation in U.S. metropolitan areas, and the amount of political fragmentation within the metro area. Using the dissimilarity index calculated by metropolitan statistical area (MSA) at the census track level as a measure of segregation and measures of fragmentation based on ‘places’ as defined by the U.S. Census, I perform multivariate regression analyses to ascertain the strength and relationship fragmentation has on segregation. In addition, I analyze the inclusion of alternative measures of segregation and fragmentation for comparative purposes. The results indicate that while the effect of fragmentation can vary depending on operationalization used there is a mild to moderate relationship between dissimilarity and political fragmentation, thus indicating that higher levels of political fragments in an MSA are associated with higher levels of residential segregation. Some measures of fragmentation proved to be more fruitful than others but reaffirm for all measures of segregation that higher levels of political fragmentation are associated with residential segregation.

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CHAPTER I

INTRODUCTION

This thesis is an investigation of whether greater levels of political fragmentation within metropolitan areas lead to higher levels of race and ethnic residential segregation. The literature on residential segregation, one of the oldest empirical research traditions in sociology, is extensive and has cumulated over nearly a century. Many prominent researchers have undertaken studies of residential segregation, its causes, and its implications (Massey & Mullan 1984; Weiher 1991; Feagin 1998; Massey & Denton 1993). This study will examine the role of one factor that may relate to residential segregation namely, the political subdivision or fragmentation of urban space and how it may affect the differential spatial distribution of social groups in an area.

Residential segregation has a long history in the U.S. and has been carefully documented in a large research literature including quantitative, qualitative, and historical studies and spanning many decades. Following the passage of the Fair Housing Act in 1968, many, particularly many in the lay public, assumed that residential segregation and the problems associated with it were solved and a thing of the fading past (Massey and Denton 1993). In the U.S., the Fair Housing Act was in fact a turning point for housing discrimination, and researchers have shown that trends of declining residential segregation followed its passage and continue into recent decades (Iceland, Weinberg, and Steinmetz 2002). However, trends of declining segregation are modest at best indicating that certain ongoing social processes continue to maintain ethnic segregation. This backdrop makes it plausible to hypothesize that segregation continues in part because racism and discrimination work indirectly through regulations such as zoning laws and through the establishment and revision of political boundaries of various kinds that serve to separate ethnic populations in urban areas.

The most immediate goal of this study is to examine the relationship between political fragments and residential segregation. But the motivation for examining this relationship springs from an interest in a more general hypothesis that political fragments may serve as mechanisms through which the impact of racism and discrimination coalesces. Although I am guided by this “background” hypothesis, it is important to note that inferences regarding the operation of racism and discrimination will necessarily be indirect because currently, there are no measurements available to permit one to directly examine how racism and discrimination vary across metropolitan areas. I will draw upon relevant qualitative and historical evidence in order to speculate about the role of racism and discrimination.

This study will analyze the role that political fragments play in shaping variation in residential segregation, between non-Hispanic whites and non-Hispanic blacks, across metropolitan areas. Political fragments, such as suburban and urban divisions, and the proliferation of zoning regulations within them, carry the potential to maintain or foster higher levels of residential segregation (Byun and Esparza 2005). Political fragments include governmental jurisdictions and administrative boundaries. Some examples of relevant political fragments include county and city governments, local community governments, and school districts. Zoning regulations include building restrictions that maintaining certain types of populations, lifestyles, and land-use patterns within the particular area in question. For example, zoning an area as residential and restricted to single-family, detached housing with a minimum lot size of one-half acre ensures that an area will have low population density, and a population consisting primarily of middle to upper income families. Zoning regulations can pertain to business, residential, and environmental restrictions, to name a few. Through certain mechanisms such as market dynamics and salience in neighborhood choice dynamics these types of political and administrative boundaries may foster residential segregation. This study will analyze the existence and strength of its relationship to residential segregation.

This thesis draws on data from the U.S. Census 2000 to perform regression analyses that utilize measures of uneven distribution – for example – the dissimilarity index, as the dependent variable. The dissimilarity index is a familiar and widely used measure for summarizing the comparison of how two groups are dispersed over the areas of a city. Like other measures of uneven distribution, the dissimilarity index evaluates the comparison in relation to the standard of even distribution. The dissimilarity index represents "the proportion of minority members that would need to change their residence to achieve an even distribution" (Massey and Denton 1988:284; Iceland et al. 2002). In addition, to assure that my findings regarding the relationship between political fragmentation and segregation are robust to the choice of specific measures, I also will perform analyses using other alternative measures of segregation including the Gini index (*G*), the entropy index (*H*), and the correlation ratio (*V*).

I consider several different operational definitions in order to capture the amount of political fragmentation within the area. Several variations are definitions used in previous research. A key, and most commonly used, measure of fragmentation in previous research is the total amount of cities with a minimum of 10,000 residents per 1 million Metropolitan Statistical Areas (MSA) residents. Other measures of fragmentation include total number of cities per 1 million MSA residents, total number of cities with a minimum 2,500 residents per 1 million MSA residents, the share of the MSA population that is residing outside of the largest city, the share of the MSA population residing within cities, and the *Gini* concentration ratio (*G*). In addition, control variables that have been used in previous research will be included in selected regression analyses in order to ascertain the strength of the statistical model's key independent variable on dissimilarity in the face of competing explanations for variation in residential segregation. The control variables include: the percentage of housing units that were built after the Fair Housing Act in 1968; the percentage of housing units vacant in the MSA; the percentage of the total labor force that is in the armed forces; the percentage of the population that identifies as white; the log of the total population; and the age of the MSA.

CHAPTER II

BACKGROUND AND THEORY

In this section, I briefly mention selected points from the broader literature on residential segregation, and provide a brief historical overview of residential segregation. The historical analysis will include a focus on the importance of black-white segregation, as well as focus on studies analyzing the development of segregated neighborhoods and communities pre-Fair Housing Act. I also consider studies analyzing the trend of residential segregation post-Fair Housing Act to identify additional factors that are potentially relevant as control variables. Finally, I provide a brief discussion reviewing the potential role of political fragmentation, zoning laws, and related factors may have for segregation patterns.

Importance of Segregation

Metropolitan areas of the United States are characterized by high levels of racial segregation; it is the norm, not the exception. What are the consequences? Massey and Denton (1993:2) state that “residential segregation is not a neutral fact; it systematically undermines the social and economic well-being of (minorities) in the United States.” What occurs as a result of residential segregation is that minorities and people of color are subjected to continued conditions of poverty, joblessness, and welfare being the norm. The educational system is lackluster resulting in high educational failure rates (Kozol 2005; Massey and Denton 1993). Urban poverty and the development of an urban underclass result from higher levels of segregation (Massey and Denton 1993).

Continued exposure to these types of environments decreases the chances that disadvantaged racially segregated groups will achieve social and economic success. The following section reviews research documenting that segregation is extensive, high in magnitude, and enduring.

History of Residential Segregation

Residential segregation has a deep rooted history in the U.S. Massey and Denton (1988:282) identify residential segregation as "the degree to which two or more groups live separately from one another, in different parts of urban environment." In another sense, it is "the lack of social contact between status groups due to structured opportunities and spatial mismatch" (Berry 2008:204). The deep rooted history refers to the fact that segregated neighborhoods were well established prior to the Fair Housing Act and largely was a result of social economic practices (Hershberg, Burstein, Ericksen, Greenberg, and Yancey 1979; Massey and Denton 1993; Lieberson 1981). Although residential segregation has come in several forms, the focus of the history section will be on white-black segregation in U.S. metropolitan areas.

1850-1899 – Modes of segregation

Residential segregation of ethnic groups in U.S. urban areas emerged over many decades. In major industrial cities that were migrant destinations, public transportation (horse-pulled trolley) was affordable only to the wealthy elite which were, more often than not, whites (Hershberg et al. 1979:63). During this time, blacks and other immigrants, and migrants, tended to concentrate their residential locations in the city core in part to ensure walking access to manufacturing jobs and other employment opportunities concentrated near city centers (Hershberg et al. 1979:64). Between 1860 and 1899, cities became hubs and refuges for a number of newly arriving blacks and immigrants seeking better opportunities than those they encountered in the South and rural areas, for blacks, and abroad for immigrants (Massey and Denton 1993:18).

Massey and Denton (1993:19-20) note that the development of racially segregated neighborhoods in the late 19th century initially was not the result of housing discrimination, but was tied more closely to discrimination in employment. The high-skill and high-wage employment opportunities were reserved for whites which, thus led to the limited capacity for housing affordability in people of color. As Hershberg et al. (1979:64) state, "industry was more important than ethnicity in organizing the city's residential patterns." Hershberg et al (1979:25-29) argue that the residential segregation of blacks has not followed similar patterns as white immigrants from Europe such as Italians, Polish, and Irish. White immigrants groups already present in metropolitan cores reached mild levels of segregation in comparison to the segregation of blacks (Hershberg et al 1979). In the following time periods it became evident that the residential segregation of blacks was on the path to become a greater social issue than that of previously arriving immigrant groups, which began to fade in importance (Hershberg et al 1979).

1900-1939 – Emerging discrimination and formation of ghettos

Beginning in 1900, "the era of integrated living" and "interracial contact" was gone because of the "industrialization of America and the concomitant movement of blacks from farms to cities" (Massey and Denton 1993:26). Industrialization in the North created "social, economic, and technological changes" that promoted segregation while there was a continued "stream" of black migrants (Massey and Denton 1993:26-27). Between 1900 and 1920, whites became "increasingly intolerant of black neighbors" and saw racial integration as an "invasion" spreading into and across their neighborhoods (Massey and Denton 1993:30). This coincided much with the occurrence of the "Great Migration", which was movement of blacks in large numbers from the South to urban areas in the North (Lieberson 1981; Tolnay 2003; Grossman 1989). Not only did the population of blacks in the North begin to increase, but so did the level of their segregation from whites which led to the early formation of ghettos. "Conservation" efforts arise when the "racial reserves" of groups are perceived to be "invaded" thus attempting to maintain the social order (Park 1924:344). By the 1930s, blacks were highly concentrated in industrial urban centers yet were employed minimally in manufacturing jobs (Hershberg, Burstein, Ericksen, Greenberg, and Yancey 1979:72). Beginning in the 1930s, the Home Owners' Loan Corporation (HOLC) had "institutionalized" a practice known as "redlining" (Massey and Denton 1993:51-52). Redlining was a discriminatory practice that restricted housing loans to white neighborhoods while the neighborhoods that were classified as black or ethnically mixed were "redlined" and denied loan opportunities (Massey and Denton 1993:51-55). Redlining institutionalized local discriminatory covenants at the federal level to satisfy the HOLC's concern of black movement (Massey and Denton 1993:52). Residential segregation as we know it today emerged during the 1930's decade. Hershberg et al.

(1979) notes that in Philadelphia the population of blacks rose from 4.8 percent, in the year 1900, to 11.3 percent, in the year 1930, while their dissimilarity index went from 52, in 1880, to 68, in 1940.

1940-1967 – Stability and consolidation of the ghetto

Industrialization, in the North, combined with mechanization of agriculture and reduced demand for agricultural labor in the early 20th century created a strong migration of blacks from farms and rural areas to cities, thus increasing the amount of segregated neighborhoods. In this transition era, "ghettos" on a much larger scale began to form in American urban areas. Between the 1940s and 50s, Duncan and Duncan (1955b:502) found "that spatial distances between occupation groups are closely related to their social distances." In the 1940s, the U.S. entered into World War II, which brought housing construction to a stop. This event fixed the availability of housing supply, overall, which further restricted black migrants to the "urban environment" (Massey and Denton 1993:43). Blacks, who in an earlier era had been able to move into more affluent, predominantly white, neighborhoods if they had the economic means to do so, were now restricted to the lower class neighborhoods consisting mostly of blacks. Segregated communities continued to grow as a confluence of many different social forces ranging from "institutional practices, private behaviors, and public policies designed by whites" to restrict the movement of blacks and people of color (Massey and Denton 1993:10). It was during this time that protests and violence erupted in communities across the U.S. During the 1960s, urban unrest punctuated by episodes of violent social upheaval stemming from employment and educational disadvantages occurred in black neighborhoods in sixty cities across the U.S. (Massey and Denton 1993:58). The protests and violence were a result of built up frustration in segregated neighborhoods and with white institutions often the target of the disruption (Massey and Denton 1993:58-59).

CHAPTER III

GRADUAL AND RESISTANT DECLINE IN SEGREGATION - 1968 - PRESENT

In this section, I discuss factors that have played a role in shaping segregation over time. Looking back it is clear that segregation did not decline quickly in the short run after the FHA, and has fallen only slowly over the following four decades (Massey and Denton 1993; Glaeser and Vigdor 2001). By the time of the Civil Rights Era and the passage of the Fair Housing Act, communities were highly segregated but saw hope in the passage of anti-discriminatory regulation. Many in the lay public assumed that "following the passage of the Fair Housing Act in 1968, the problem of housing discrimination was declared solved" as the focus for Civil Rights leaders, politicians, and academicians now turned to employment, educational policies, familial structure, institutional racism, and the federal welfare system (Massey and Denton 1993:4). Despite the popular belief, and as a result of the lack of attention, segregation persisted at high levels long after the passage of the Fair Housing Act in 1968. This raises questions about the factors that play a role in shaping trends in segregation, and how the roles of different factors have changed or have not changed over time.

Role of Formal and Informal Discrimination to Block Minority Movement

In the post-Civil Rights Era, each segregated community responded differently to social change in that they relied heavily on local social processes which may have hindered or allowed dispersion. Post-Fair Housing Act, Silver (1995:61) notes that "even though (segregated communities) had access to the same" Federal urban development funding “the local political culture (directly) affected the allocation of these resources in Black community development.” The FHA was legislation that prohibited racial discrimination in the housing market but without mechanisms to enforce its provisions on those causing discrimination (Massey and Denton 1993:195). Discriminatory practices at the local level, informal and formal, could be questioned by the Federal government but never actually regulated (Massey and Denton 1993:195-196).

Forces that promote segregation have become less overt and more covert in recent decades. A segregation process known as “steering” is an example of a covert practice used by the real estate industry (Turner, Ross, Galster, Yinger, Godfrey, Bednarz, Herbig, Lee, Hossain, and Zhao 2002). In an audit conducted by the Housing and Urban Development Administration (HUD), Turner et al. (2002) found that discriminatory practices were in fact pervasive in the real estate industry, more specifically through the actions of the realtor. Realtors were found to steer potential buyers to certain neighborhoods based on their race or ethnicity. In addition, potential buyers, who were people of color, were least likely to be told about financial opportunities in purchasing a home than their white counterparts. Massey and Denton (1993:96-98) describe this as “discrimination with a smile.” Black homeseekers, “instead of being greeted with the derisive rejection”, were “met by a realtor with a smiling face who, through a series of ruses, lies, and deceptions, makes it hard for them to learn about, inspect, rent, or purchase homes in white neighborhoods” (Massey and Denton 1993:97).

Homeowner Associations (HOA) existed well before the FHA but saw a rapid increase in numbers post-FHA (Stabile 2000; Davis 2006). Davis (2006:244-246) notes that homeowner associations were successful in arguing against low-income and senior housing. In addition, HOAs played a role in the shaping of communities of cities largely resulting in the separation of affluent and middle-class neighborhoods from the poor and minority populations (Davis 2006: 244-246). HOAs were sanctioned, and even encouraged, by the Fair Housing Administration as a tool that could bridge the gap between low and high income housing (Stabile 2000:105). Rather, HOAs were used to draw a clearer line of separation between communities (Davis 2006).

Role of Economic Inequality and Market Forces

During the 1970s, segregated communities "changed so little" (Massey and Denton 1993:84). Massey and Denton (1993:84) state that a few years after the passage of the Fair Housing Act 1968 minorities' "economic progress stalled" which "increased poverty as a result of income inequality." Segregation levels between blacks and whites had shown improvement in previous decades that the stall became highly noticeable. Massey and Denton (1993:84) note that "if the economic progress of the 1950s and 1960s had been sustained into the 1970s, segregation levels might have fallen more significantly" and blacks would have had a greater economic opportunity to move into neighborhoods that only whites could previously afford.

"Successive recessions, bursts of inflation, and increased foreign competition eliminated many high-paying jobs in manufacturing, lowered wages, and decreased the real value of welfare payments," all of which disproportionately affected the income of blacks (Massey and Denton 1993:125). Massey and Denton (1993:184) also argue that inner-city manufacturing jobs were dislocated at greater rates because of lack of investment and relocation to non-metropolitan areas which drove up the rate of black poverty. Massey and Denton (1993:126) find that this turn of economic events generated an increase in the "geographic concentration" of poverty stricken blacks. Blacks in poverty were pressured into a more a spatially concentrated area of other poor blacks. Massey and Denton (1993:130-131) stress that the poverty of blacks is not a neutral social factor rather, it goes hand in hand with "family instability, welfare dependency, crime, housing abandonment, and low educational achievement." These social factors coupled with existing segregated communities "guarantees that blacks will face a harsh and uniquely disadvantaged social environment, no matter what their personal characteristics" (Massey and Denton 1993:131).

Communities have also been deemed to be class and income segregated. Massey and Denton (1993:145-146) note that racial income disparities between blacks and whites perpetuated segregated communities. During the 1970s, black-white segregation had little change which alluded to racial segregation because blacks whose incomes and education increased tended to remain in highly segregated black communities (Massey and Denton 1993:145). If a black household could afford to move into a neighborhood previously afforded only to whites they were still likely to remain segregated. Massey and Denton (1993:84-87) note that residential segregation is a matter of race rather than class because detailed analysis of segregation patterns show that as the economic status of minority households increase the likelihood of residing in a segregated neighborhood largely remains the same.

Role of Preferences and Household Residential Location Decisions

Group differences in residential preferences regarding contact with the same or other groups, based off prejudices, are sometimes hypothesized to play a role in residential segregation. Blacks tend to be more accepting of racially mixed neighborhoods but often still prefer to avoid areas with limited black presence for fear of retribution or discrimination by whites. Whites are more accepting of minimally desegregated neighborhoods with limited black presence yet remain uncomfortable with significant numbers of blacks moving into their neighborhood or themselves locating in majority black neighborhoods because of negative black stereotypes (Massey and Denton 1993). The attitudes among different group's leads to a disparity in the demand for racially mixed communities.

Robert Park (1924:343) notes that the prejudices between groups were a "spontaneous disposition to maintain social distances." These social processes fall in line with the notion that the greater presence of black residents in a community leads to White flight (Massey and Denton 1993). Clark (1986) notes in his study that once a neighborhood reaches a 50 percent black composition the majority of whites prefer to relocate. Other studies have found different "tipping" points than those of the racial attitude composition. Ellen (2000:124) found the probability of a white homeowner relocating increases 2.75 percentage points, on average, when "the black population has grown by ten percentage points over the decade." As Ellen (2000:109) states these attitudes are “hypothetical” and “only reflect how households believe they would react rather than how they would actually react.” Preferences vary largely on different characteristics of homeowners; for example, whether they have children, whether they have a vested interest in the quality of their community, and whether they have the socioeconomic ability to move (Ellen 2000:124-130). Ellen (2000) notes that white flight is a social phenomenon that has helped shape segregated communities today but the preferences of neighborhood characteristics play a larger role in shaping the entry decisions of homeseekers.

Researchers have found other types of preferences that shape neighborhood composition (Alesina, Baqir, and Easterly 1999). Alesina, Baqir, and Easterly (1999) found that racial residential segregation can be related to the amount and type of public goods and services offered in the community. Racial and ethnic minorities display a preference to move to locations where spending is greater in healthcare, welfare, education, etc. (Alesina, Baqir, and Easterly 1999:1260-1263).

Since the 1970s, segregation continues to decline but, as discussed above, it continues to be both high and persistent. Glaeser and Vigdor (2001) find that segregation in the U.S. today is at its lowest point since the 1920s. Researchers (Glaeser and Vigdor 2001:4) note that, although levels of segregation are at their lowest point since the 1920s, this should not obscure the “existence of very segregated metropolitan areas.” In addition, Glaeser and Vigdor (2001:5) note that regions within the U.S. continue their respective segregation history with the West and South being more integrated and the Northeast and Midwest remaining highly segregated. This leads one to examine other social and political factors that may play a role in the maintenance of segregated communities in metropolitan areas.

CHAPTER IV

THE ROLE OF POLITICAL DIVISIONS AND FRAGMENTATION IN URBAN SPACE

Political fragmentation is defined as "the autonomous regulatory authority that every locality (jurisdiction) has over land use and land development decisions" (Byun and Esparza 2005;253). It is a "proliferation of autonomous jurisdictions" (Bischoff 2008:182). Researchers describe political fragmentation as a ubiquitous "fact" in contemporary urban America (Baird and Landon 1972:171). In this section, I introduce political fragmentation and its relation to residential segregation. A discussion of the role of political fragmentation in urban space will follow. It is important to note that political fragmentation and zoning may be a new phenomenon relative to the development of segregated communities. Zoning regulations were legally established in 1920 through the Zoning Enabling Act (Rothwell and Massey 2010:1131). In addition, political fragment and zoning regulatory boundaries may have been drawn post - segregation to reflect this residential separation (Rothwell and Massey 2010:1131).

Political fragmentation may occur in many ways, but in this study, it will be referring to populated "places". These populated places will be looked at how densely they have been drawn and not where they have been drawn. It is also important to note that political fragmentation will not be alluding to political entities such as congressional districts. This is not to suppose that congressional districts are not political fragments or that they have no relationship to residential segregation, rather it is that considering this and other potentially relevant types of fragmentation is beyond the scope of this study.

A discussion on the relationship that zoning regulations have within political fragments and the effects the regulations have on residential segregation will follow.

Role of Political Fragmentation

Weiher (1991) argues that political and administrative jurisdictions, otherwise known as fragments, can play an important role in supporting and maintaining patterns of residential segregation. Weiher (1991:166) states that "political boundaries support the recruitment that is the complement to exclusion in urban sorting." Morgan and Mareschal (1999:579) argue that, while although it may remain in dispute, political fragmentation contributes to the current inner-city problems the U.S. endures today. These inner-city problems include residential segregation and such social phenomenon is the precise result created by those who dominate the social process, the most powerful (Morgan and Mareschal 1999:579). Bischoff (2008) states that political fragmentation may be needed to regulate certain social processes within a community, in that local neighborhoods require specialized monitoring for social services, but the racial stratification outcome is harmful to the communities.

Morgan and Mareschal (1999:589) found that a single suburb increase (per 1,000,000 people), on average, leads to a 2.01 unit increase (0-100 scale) in black racial isolation meaning as the amount of suburbs increase so does the likelihood of blacks only coming in contact with blacks. These outcomes could be unintended consequences resulting from the pursuit of other goals, or they could be desired consequences pursued by covert means. Alesina, Baqir, and Hoxby (2004:391) find that increases in white ethnic heterogeneity increases the number of municipalities within jurisdictions. Alesina et al (2004:394) also find that residents who can afford it will avoid large population municipalities because of their demand of social goods and resources. The avoidance generates smaller municipalities with racially homogenous populations.

Baird and Landon (1972) note that municipalities that have larger populations are seen as unappealing to some population groups because of their demand for public resource output is smaller, making less densely settled, population fragments an attractive choice. This rests on the assumption that greater public goods output is closely associated with higher taxes but research indicates that the relationship is inconsequential (Baird and Landon 1972:180-182). Ultimately, residents seek out areas with many municipalities with the conception that the local jurisdiction will ensure tax expenditures are spent on social goods that directly affect those within (Baird and Landon 1972:175-176).

The Effects of Zoning

Zoning regulations, by definition, are "the separation of land use according to each area's impact and neighborhood relevance" (Maltz 2006:49). Some research has found that the phenomenon of restrictive zoning and multiple political fragments go hand-in-hand (Burgess 1996; Weiher 1991; Orfield 1999). As communities develop on the edges of the metropolitan they aim to enact low-density and restrictive zoning regulations in an effort to keep outer ring neighborhood composition "as is" and to prevent the urban population from moving in (Orfield 1999:34-36; Bassett 1936). Researchers (Byun and Esparza 2005; Frieden 1979; Plotkin 1987:30) find that supporting arguments for zoning laws usually come in the form of the protection of environmental quality, maintenance of property values, and the stabilization of local taxes to name a few.

Officials within political fragments of Metropolitan Statistical Areas (MSA) have the ability to enact these types of land use regulations (zoning) whether they are intended for businesses, residential, agricultural, etc. Weiher (1991:87 & 162) notes that we are unable to fully know the intentions of elected officials but certain zoning policies produce spatial consequences for disadvantaged social groups and, ultimately, provide whites with "altered and institutional forms" of averting blacks. Zoning takes the "good fences make good neighbors" idea to the next level by protecting the boundaries and quality of life for residents within (Plotkin 1987:20). Enacted zoning laws do not state "minorities are not welcome" or "Keep Out!" but nevertheless may marginalize groups in society through legal regulation (Plotkin 1987:20-21, Popper 1981:11; Silver 1997).

Plotkin (1987:23) argues that zoning regulations utilize exclusionary practices which "raise charges by limiting housing supplies, encouraging land speculation, monopolizing public services, and leapfrogging away from preexisting utilities, thus forcing the construction of expensive new facilities and wasting land." Burgess (1996:213-214), a researcher in housing and residential development, notes that, in practice and implementation, zoning is a method to protect wealthy areas while neglecting the low-income areas. In some situations, zoning policies in low-income areas were ineffective in defending the interests of the residents in these areas from actions by local government boards when development worked in the favor of those serving on the board and against the residents of low-income areas (Burgess 1996:214; Bassett 1936).

Today local governments within political fragments enact zoning laws and regulations affecting population density, large-minimum lot, and land use to name a few examples. Publicly stated justifications for these types of zoning and related land use regulations do not specify a goal racial segregation. What is stated may or may not be the only motivation for the proposal and adoption of the regulations or the support they receive. The effects of political fragmentation and zoning regulations extend beyond regulating and protecting the quality of life for those within the boundary. Although zoning is a legal regulation enacted within political fragments to protect the quality of life within for residents it results in the maintenance of residential segregation. These types of social policies, in the form of building regulations and political boundaries, along with other social factors have continued to foster group separation thus leading to inadequate access of social resources.

CHAPTER V

DATA, MEASURES, AND METHODS OF ANALYSIS

The following section will cover this thesis' source of data as well as go into detail on the adopted methods of analysis to measure political fragmentation and its relationship to residential segregation.

Source of Data

This research utilized data from Census 2000 Summary File 1 data to examine the effects of political fragmentation on black-white residential segregation. Summary File 1 tabulations are based on the U.S. decennial census and are widely used in segregation research. They are based on the 100%, or "complete coverage", counts of the Census, and provide the most comprehensive data on racial residential distributions. The U.S. Census 2000 is being utilized because the most current 2010 data had not been released at the time of the study.

Units of Analysis, Sampling, and Sample Restriction

The U.S. Census 2000 data set yields 331 units of metropolitan statistical areas (MSAs). MSAs contain a place with a minimum 50,000 population or at least one Census defined Urban Area with a total Metropolitan Area population of 100,000 (U.S. Census Geographic Definitions). Metropolitan statistical areas are defined by their principle or central city which does not extend beyond the MSA boundary. In some cases, an MSA may contain two or more central cities, central counties, as well as one or more outlying counties (U.S. Census Definitions; Farrell 2008:475).

MSAs have been used widely in previous studies analyzing residential segregation (Farley 1977; Iceland et al 2002; Farrell 2008). Metropolitan statistical areas have been determined to be an ideal geographical candidate for being representative of communities within (Iceland et al 2002). Iceland et al (2002:7) note that geographies larger than MSAs span greater populations that may not be representative of the local community, while geographies smaller than MSAs cannot capture the spatial distribution of a community since "individuals need only move across the street to be in another jurisdiction."

I will examine MSAs with a minimum of 50,000 total households and a minimum 2,500 black households. This restriction brings the total amount of MSAs in the study to 205. The restriction stems from the dissimilarity index requiring that there be a minimum population present for both groups to help obtain trustworthy scores. Researchers have set minimum requirements at 1,000, 2,500, and 5,000 with the higher the amounts being a "safer" approach to measuring dissimilarity with less uncertainty (Eitle 2009; Glaeser and Vigdor 2001; Logan, Stultz, and Farley 2004; Massey and Denton 1992; Massey and Fischer 1999; Hill 1974). Researchers note that when a minority population becomes too low relative to the number of census tracts in the MSA the dissimilarity index can become biased, inflated, and unreliable (Denton and Massey 1988:804; Winship 1977:1059). Winship (1977:1062) notes that the D index for "two cities with 25 households per block", with one city being 10 percent black and the other 50 percent black, the dissimilarity index would be .272 and .161, respectively. Both cities have identical segregation patterns but because one city has a smaller black population a greater proportion of their households would need to move to achieve desegregation.

The spatial unit used to measure segregation is the census tract which comprises between 1,500 and 8,000 inhabitants and averages about 4,000 inhabitants (U.S. Census Geographic Definitions; Iceland and Wilkes 2006). Census tracts take shape from "local input" and "are intended to represent neighborhoods (Iceland and Steinmetz 2003; Iceland et al 2002:8). Census tracts will be used in this study for several reasons: to maintain consistency with most previous research on segregation (Glaeser and Vigdor 2001:2); to minimize the issue of handling geographic units with little to no population such as blocks and block groups (Iceland et al 2002:8); to obtain a reasonably accepted neighborhood size and composition for research (Farrell 2008:476); statistical adequacy for capturing segregation patterns in most U.S. cities; and because tracts are created for the purpose of capturing meaningful social areas (U.S. Census Geographic Definitions). Census tracts are useful for present research purposes because of their conceptual and statistical properties. Census tracts are homogenous representations of population characteristics, and thus provide accurate tabulations on relevant race and ethnic composition and group counts such as non-Hispanic white, non-Hispanic black, Hispanic or Latino, Asian, etc.

Population of Interest

The U.S. Census Bureau gathers detailed information on the racial and ethnic identities of the U.S. population. For the purpose of this study, tabulations on non-Hispanic whites and non-Hispanic blacks are of particular focus. The U.S. Census (SF1

Technical Documentation 2000:B-12) classifies non-Hispanic whites as persons having "origins in any of the original peoples of Europe, the Middle East, or North Africa." Non-Hispanic blacks are persons "having origins in any of the black racial groups of Africa (SF1 Technical Documentation 2000:B-12). It is important to criterion race because Hispanics and Latinos can identify as any race and may be subject to different residential dynamics and distributions.

Segregation Measures

Data for the dependent variables was gathered from U.S. Census Population and Housing report (U.S. Census Housing Patterns 2000) which contained multiple indices pertaining to U.S. segregation patterns. Using Non-Hispanic whites as a reference, segregation scores were calculated for each race and ethnic group in the U.S. This study used several measures including the dissimilarity, Gini, entropy, and Theil index scores, for blacks, calculated by the Census at the tract level. The indices are discussed in further detail below.

Strategies of Data Analysis

Bivariate ordinary least squares (OLS) regression analysis is used for the initial analysis of the effect of political fragmentation on residential segregation. An OLS regression analysis was chosen to assess the kind of relationship political fragmentation has on residential segregation as well to assess the strength and direction of the effects of the independent variable and control variables. Following the bivariate analysis, multiple regression analyses will be conducted to assess the impact of the independent variable and control variables, as defined in the literature, which may have an effect on residential segregation. These regression models will be utilized as an effort to ascertain the strength of the variables with the inclusion and exclusion of particular control variables that relate to the social and economic conditions of the MSA.

Measures

For the purpose of this study multiple dependent and independent variables will be utilized, as well as several control variables, while paying attention to specified key variables. The key variables will be identified as the most commonly used and widely accepted variables in previous research literature. In addition, a systematic dataset on zoning ordinances in metropolitan areas is non-existent. Zoning may be considered a surrogate of political fragmentation although in this study it is being treated independently from political fragmentation. Measurements of zoning and other land use ordinances will hopefully be applied in future research.

Dependent variable

A key dependent variable for the thesis will be the index of dissimilarity (*D*).

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

D is a segregation measure that displays the amount of dissimilarity between whites and blacks based on a single point on the curve or "the maximum vertical distance between the Lorenz curve and the diagonal line of evenness" (Massey and Denton 1988:284). The Lorenz curve "plots the cumulative proportion of (minority members) against the cumulative proportion of (majority members) across aerial units, ordered from smallest to largest minority proportions" (Massey and Denton 1988:284).

The dissimilarity index "captures the degree to which blacks and whites are evenly spread among neighborhoods in a city" (Massey and Denton 1993:20). *D* varies between 0 and 1, with 0 being complete integration, while 1 represents complete segregation. It is popular in part because it has an appealing interpretation; its numeric value indicates the minimum proportion of one group that would have to change neighborhoods to bring about an even distribution (Massey and Denton 1988:284; Iceland et al. 2002:8; Fossett 2008:2; White 1986:202-203). Today, *D* is the most commonly used and accepted measure of segregation (Massey and Denton 1988). In this study, *D* has a mean of 49.96, standard deviation of 14, and a minimum of 18.8 (*Bismarck, ND* MSA) and a maximum of 84.6 (*Detroit, MI* MSA).

For comparative purposes I will also analyze other segregation indices. The second dependent variable is a segregation measure of evenness known as the Gini index (*G*).

$$\frac{\sum_{i=1}^{n}\sum_{j=1}^{n} t_i t_j \left|(p_i - p_j)\right|}{2T^2 P(1-P)}$$

The Gini index uses a different approach at measuring segregation but, like the index of dissimilarity, varies on a scale from 0 to 1.0 (*M* = 64.23 *SD* = 15.22). The Gini index is expressed as a proportion which "represents the area between the Lorenz curve and the diagonal of evenness" (Massey and Denton 1988:285; Duncan and Duncan 1955a). *G* represents the full shape of the segregation curve as opposed to *D*'s single point on the curve making it "sensitive to all transfers of minority and majority members between areas" (Massey and Denton 1988:285). In this study, *G* has a mean of 64.23, a standard deviation of 15.22, and a minimum of 25.6 (*Missoula, MT* MSA) and a maximum of 94.4 (*Gary, IN* MSA).

A third dependent variable is an evenness measure known as the entropy index (*H*), or Theil index.

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

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

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

The entropy index, sometimes known as the information index, also varies on a scale from 0 to 1.0, and measures a departure from evenness by assessing each unit's departure from the racial, or ethnic entropy of the whole city, or the extent of its two groups reaching a maximum 50/50 diversity (Massey and Denton 1988). The entropy index has a mean of 25.28, a standard deviation of 14.90, and a minimum of 1.6 (*Missoula, MT* MSA) and a maximum of 69.8 (*Gary, IN* MSA).

A fourth dependent variable is a segregation measure of evenness known as the correlation ratio (*V*).

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

The correlation ratio measures the extent to which minorities, group one, are exposed to majority members, group two. It is measured on a scale of 0 to 1.0 and has multiple interpretations (Stearns and Logan 1986a; Massey and Denton 1988). Stearns and Logan (1986a:127) note that the correlation ratio "measures the difference in racial composition of various neighborhoods." The correlation ratio is the "variance in racial composition between neighborhoods to the total variance in racial composition," thus representing an indication of the extent to which neighborhoods are "polarizing" between all-white and all-black (Stearns and Logan 1986a:127-128). The correlation ratio has a mean of 23.46, a standard deviation of 18, and a minimum of .1 (*Missoula, MT* MTA) and a maximum of 75 (*Detroit, MI* MSA).

Several measures of segregation are incorporated to increase the level of confidence by determining if findings are consistent across alternative measures. The measures of segregation are commonly used and accepted measures of unevenness.

Independent variable

Currently, data available to measure political fragmentation is limited. The measurement of fragmentation is operationalized relying greatly on the type of data that is available, as well as what type of fragmentation researchers are aiming to analyze.

This study follows previous research by analyzing fragmentation using Census-designated-places (CDP). CDPs are cities within an MSA. CDPs are developed by the Census Bureau for statistical purposes to identify locations by name, but their boundaries are not necessarily identical to those recognized by the State. MSAs with greater amounts of CDPs are thought to have greater fragmentation. The CDPs range in size from a zero populated area to 3.7 million populated area.

Political fragmentation has been operationalized in several ways utilizing CDP's (Hawkins and Dye 1970). Six alternative measurements will be used in this study. Each has a distinct substantive interpretation. Using multiple measures allows for checking consistency of results.

The first independent variable measuring political fragmentation is the total number of cities per 1 million MSA residents. This operationalization of the CDPs is commonly used in previous research to capture political fragmentation. This particular measure of fragmentation takes into account all incorporated places recognized by the Census, regardless of the size of their population. In this case, CDPs that had a zero population were included in the measurement. CDPs with a zero population are not ideal for fragmentation and segregation measurement but are included in the analysis as an alternative. The total number of cities per 1 million MSA residents has a mean of 78.77, a 51.32 standard deviation, and a minimum of 3.84 (*Anchorage, AK* MSA) and amaximum of 296.62 (*Johnstown, PA* MSA).

The second independent variable measuring political fragmentation is the total number of cities with a minimum 2,500 population per 1 million MSA residents. This, a slightly different variation than the previous measure of fragmentation, is also used in previous research studies analyzing political fragmentation. This operationalization of the CDPs takes into account all incorporated places recognized by the Census, as long as they contain a minimum population of 2,500. CDPs with a population smaller than 2,500 are more fruitful for political fragmentation measurement, than the previous measure, but are not meaningful for segregation research. These CDPs are not ideal as a measure of fragmentation because their populations are miniscule to non-existent, to foster segregation between groups. The total number of cities with a minimum of 2,500 population per 1 million MSA residents has a mean of 32.81, a 14.89 standard deviation, and a minimum of 3.84 (*Anchorage, AK* MSA) and maximum of 86.12 (*Barnstable-Yarmouth, MA* MSA).

The third, and key, independent variable measuring political fragmentation, the most commonly used method in previous research studies, is the total amount of cities with a minimum of 10,000 residents per 1 million MSA residents (Bischoff 2008:193; Morgan and Mareschal 1999). According to researchers, this definition of political fragmentation is an attractive measure of decentralization and "assumes that more political units afford greater opportunities for separation and escape," which leads to a greater amount of central-city and urban problems (Morgan and Mareschal 1999:585, Weiher 1991). This operationalization allows researchers to account for special districts, which, while not directly measured, are more likely to occur in cities with a minimum 10,000 population (Morgan and Mareschal 1999:585). Special districts may include school districts, water districts, sewage districts, fire protection districts all of which affect city growth and the ability for residents to relocate (Carruthers 2003; Morgan and Mareschal 1999). The total amount of cities with a minimum 10,000 residents per 1 million MSA residents has a mean of 13.02, a standard deviation of 5.81, and a minimum of 2.68 (*Reading, PA* MSA) and maximum of 35.93 (*Yuba City, CA* MSA).

The fourth fragmentation measure is the MSA population share residing outside of the largest city. This measure of fragmentation captures the share of the population that is residing outside of the largest recognized CDP. The MSA population share residing outside of the largest city has a mean of 64.22, a standard deviation of 19.02, and a minimum of 0 (*Anchorage, AK* MSA) and a maximum of 97.95 (*Nassau-Suffolk, NY* MSA).

The fifth fragmentation measure is the MSA population residing within cities. This particular measure captures the degree to which the total population resides within all CDP's against those who reside in places not recognized by the Census. The MSA population residing within cities has a mean of 71.87, a standard deviation of 15.53, and a minimum of 22.8 (*Ocala, FL* MSA) and a maximum of 100 (*Anchorage, AK* MSA).

The sixth, and final, fragmentation measure is the Gini concentration ratio (*G*), also known as the Gini ratio. The Gini ratio is measured on a scale of 0 to 1.0, which is used to describe the distribution of the population across CDPs, with 0 being complete even dispersion across areas and 1.0 being complete concentration (McKibben and Faust 2004:116). As noted earlier, the Gini index also can be adapted to use as a measure of segregation. But here, the Gini concentration ratio is being applied in a different manner and purpose to serve, as a measure of fragmentation (Swanson 2004). The Gini ratio informs us the degree to which the population is concentrated within metropolitan fragments which are Census Designated Places in this study. For this study, the Gini ratio scores of 0 and 100 will equal to low and high fragmentation, respectively. The Gini ratio has a minimum of 8.44 (*San Antonio, TX* MSA) and a maximum of 100 (*Anchorage, AK* MSA).

As previously mentioned, the varying operationalization of fragmentation allows for differing interpretations largely influenced by how Census Designated Places exist within in each MSA. For example, the first fragmentation measure takes into account all CDP's within an MSA, regardless of its population size. While this measure was used in previous research studies it can be criticized for its approach to measuring the degree of fragmentation within certain MSAs. Fragmentation is being measured in terms of how places divide the MSA and its population. The first measure of fragmentation captures all of the CDPs which, as some MSAs have shown, can have a zero population, or even just extremely small populations. Using this particular method may distort the fragmentation result, since a close to zero, or zero population, in a CDP is not a density. Fragments without population cannot directly provide an opportunity for segregation.

The second fragmentation measure has a slightly different criterion than the first by requiring that each CDP contain a minimum population of 2,500. Again, this particular operationalization may distort the fragmentation result with such a small population requirement in each CDP.

The third fragmentation measure, the most commonly used measure of fragmentation, sets the CDP criteria to have a minimum of 10,000 population. This particular measure is quite fruitful in capturing fragmentation because the higher population requirement accounts for many types of fragmentation, i.e. special districts, as mentioned previously.

The three previously mentioned fragmentation measures are commonly used but the conceptual fragmentation that they are able to capture is limited. The MSAs all contain different variations of CDPs, meaning they differ in number, population size, and relative total population size. For example, in the most commonly used fragmentation measure, the total number of cities with a minimum 10,000 population per 1 million residents, has a maximum score in the *Yuba, City, CA* MSA. Yuba City, CA MSA has a relatively small total population (139,149) with a large number of CDPs (12). Of the 12 CDPs, five have populations that are greater than 10,000. Political fragmentation in previous research needs to be reflected on in future research such as this one because it may or may not prove to be adequate. Prior operationalizations may result in high scores in an MSA with low fragmentation and low scores for an MSA with high fragmentation.

The fourth measure captures the share of the population residing outside of the largest city. This particular measure captures, greatly, how densely drawn the fragments are in the MSA. In this case, Yuba City MSA goes from having the greatest amount of fragmentation to a more moderate strength in fragmentation. Yuba City may be a fragmented city, in general, but it may not be as fragmented as the third fragmentation measure says it is. Its fragmentation score in the most commonly used fragmentation measure is distorted by its number of number of CDP's relative to its total population, which is relatively small, as well. The fifth measure, the share of the population that is residing within cities also displays moderate fragmentation for Yuba City.

The sixth, and final, fragmentation measure takes all CDPs into account and generates their relative share to the total population in the MSA. As previously mentioned, Yuba City has a high number of CDPs relative to its small total population. The result is a high level of fragmentation for *Yuba City, CA* MSA. The discussion of *Yuba City, CA* MSA was to illustrate the necessity of having multiple measures of fragmentation. *Yuba City, CA* MSA illustrated how the different measures of fragmentation capture differing substantive concepts and, in some cases, how CDPs may not be capturing fragmentation.

Control Variables

This research study included a number of control variables the previous research suggests may impact segregation. Multiple control variables are needed in an effort to determine whether segregation is the result of phenomenon other than political fragmentation. The control variables will include:

1. *Percentage of occupant housing units built after the Fair Housing Act in 1968*. According to the literature, housing built 1970+ should affect segregation outcomes as they are under "new housing rules" (Denton 1999). Metropolitan areas with greater amounts of housing built post-FHA are expected to have lower amounts of residential segregation (Denton 1999). The percentage of housing built post-FHA has a mean of 53.19, a standard deviation of 14.74, a minimum of 19 (*New York, NY* MSA) and a maximum of 90.18 (*Naples, FL* MSA).

2. *Percentage of housing units vacant*. Previous segregation research has found that segregation varies with the amount of vacancy (Stearns and Logan 1986b; South and Crowder 1998). A larger surplus of housing has an effect on the cost of the homes and those who can afford them in addition to having an effect on the ability for residents to relocate in the first place. Berry (1976) found that neighborhood price levels affected the movement of blacks into white and integrated neighborhoods. In addition, Stearns and Logan (1986b) find that a higher amount of housing units that are vacant relates to lower amounts of black-white segregation. The percent of housing units vacant has a mean of 81.7, a standard deviation of 4.51, a minimum of 2.17 (*Nashua, NH* MSA) and a maximum of 35.03 (*Barnstable-Yarmouth, MA* MSA).
3. *Percentage of the total labor force in the armed forces*. Researchers, such as Iceland et al. (2006), have used varying occupational categories when studying metropolitan areas. Farley (1991:281) found that black-white segregation may be lower in metropolitan areas that have a sizeable military presence. Iceland and Nelson (2010) also find that greater proportions of military populations in an MSA lead to lower segregation scores as a result of the greater likelihood of interracial couples. Percentage of the civilian labor force in the armed forces has a mean of 1.31, a standard deviation of 3.74, a minimum of 0.01 (*Stamford-Norwalk, CT* MSA) and a maximum of 38.07 (*Jacksonville, NC* MSA).
4. *Percentage of the population that is white*. 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; Logan, Stultz and Farley 2004). Areas with a greater white population are expected to have greater amounts of residential segregation. The percentage of the population that is white has a mean of 79.65, a standard deviation of 12.15, a minimum of 21.16 (*Honolulu, HI* MSA) and a maximum of 97.5 (*Altoona, PA* MSA).

5. *Total Population (natural log).* 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 log of the total population has a minimum of 10.97 (*Enid, OK* MSA) and a maximum of 16.07 (*Los Angeles-Long Beach, CA* MSA).

6. *Year the Central City reached 50k.* 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 from historical population patterns and economic hardships, previously mentioned (Logan et al. 2004). The *Year the Central City reached 50k* is determined by the decade (decennial Census) that the central city of the Metropolitan area reached a population of 50,000. *Year the Central City reached*

50k is then operationalized as a dummy variable and broken into four time periods:

1900 and earlier (*M* = .21 *SD* = .41)

1910-1940 (*M* = .25 *SD* = .43)

1950-1960 (*M* = .12 *SD* = .33)

1970 and later (*M* = .27 *SD* = .44).

Most of the Central Cities reached a 50,000 population. Central cities that never reached a 50,000 population remain as the reference group.

The listed control variables are not exhaustive of all possibilities but are adequate to serve the needs of this study. Research studies have used other social and economic variables which include *economic specialization, percent black population, region, supply of new housing, suburbanization, total size of the population, total labor force in public administration* and *metropolitan per capita income* to analyze residential segregation. While these variables could have been included in this research study they are essentially different variations of, or have close relationships with, those already being used as control variables. Accordingly, they add little potential value to the analysis, as including them could result in multi-collinearity, erratic estimates of coefficients, and other problems.

To confirm this notion, a few of the variables listed as being used in other research studies were included in the analysis to determine whether they should be included in the final analysis or not. The findings indicated that while the variables were sometimes associated with segregation it did not serve the purpose of this study to include them. For example, *Region* captures much of the phenomena that *Year the Central City reached 50k* captures, but distorts the results when included simultaneously with *Year the Central City reached 50k*. The year that the central city reached 50k and the region that the MSA is located in are closely related as a result of historical patterns of settlement and urban growth. Cities that are located in the Northeast and parts of the South were settled well before cities on the West. The time of the city's settlement and the start of its population growth are closely related to the region that the core city is located in.

Note that *Year the Central City reached 50k* is a multi-category variable represented by multiple dummy variables. In standard regression analyses one category is omitted and serves as a "reference point" for interpreting the effects of the other dummy variables. Because 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. They should instead be tested as a set because the several 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 significance of *Year Central City reached 50k*. Utilizing a Global F test, the categorical dummy variables can be tested as a group to ascertain whether *Year Central City reached 50k* improves the model predictions significantly.

Table 1, below, summarizes the descriptive statistics of all variables. Table 2, below, summarizes the descriptive statistics of all variables in the final analyses utilizing MSAs with a minimum 50,000 total households and a minimum 2,500 black households.

Table 1. Descriptive Statistics: Segregation, Political Fragmentation, and Control Variables

	Variable	N	Mean	Standard Deviation	Minimum	Maximum
Segregation Measures	Dissimilarity (D)	331	49.96	14	18.8	84.6
	Gini (G)	331	64.23	15.22	25.6	94.4
	Entropy (H)	331	25.28	14.9	1.6	69.8
	Correlation Ratio (V)	331	23.46	18	0.1	75
Fragmentation Measures	Total Number of Cities per 1 Million Population	331	78.77	51.32	3.84	296.62
	Total Number of Cities 2,500+ per 1 Million Population	331	32.81	14.89	3.84	86.12
	Total Number of Cities 10,000+ per 1 Million Population	331	13.02	5.81	2.68	35.93
	MSA Population Share Residing Outside Largest City	331	64.22	19.05	0	97.95
	MSA Population Share Residing Within Cities	331	71.87	15.53	22.8	100
	Gini Concentration Ratio	331	26.55	10.79	8.44	100
Control Variables	Percentage of the Labor Force in the Armed Forces	331	1.31	3.74	0.01	38.07
	Percentage of Housing Units built post-Fair Housing Act 1970+	331	53.19	14.74	19	90.18
	Percentage of Housing Units Vacant	331	8.17	4.51	2.17	35.03
	Percentage of the White Population	331	79.65	12.15	21.16	97.5
	Total Population (Log)	331	12.77	1.04	10.97	16.07
	Year the Central City Reached 50k Population 1900 & Earlier*	69	0.2085	0.4068	0	1
	Year the Central City Reached 50k Population 1910 to 1940*	82	0.2477	0.4324	0	1
	Year the Central City Reached 50k Population 1950 to 1960*	42	0.1269	0.3333	0	1
	Year the Central City Reached 50k Population 1970 & Later*	89	0.2689	0.4441	0	1

*Dummy Variable - Central Cities that never reached 50k population is the reference category

Table 2. Descriptive Statistics: Segregation, Political Fragmentation, and Control Variables (MSA's with a Minimum 50,000 Total Households and a Minimum 2,500 Black Households)

	Variable	N	Mean	Standard Deviation	Minimum	Maximum
Segregation Measures	Dissimilarity (D)	205	55.9454	11.8046	29.5	84.6
	Gini (G)	205	71.1005	11.823	42.9	94.4
	Entropy (H)	205	32.1698	13.1629	7.9	69.8
	Correlation Ratio (V)	205	32.0776	15.6827	2.7	75
Fragmentation Measures	Total Number of Cities per 1 Million Population	205	63.8755	35.0303	3.8420	226.7355
	Total Number of Cities 2,500+ per 1 Million Population	205	31.3634	13.8858	3.8420	80.9624
	Total Number of Cities 10,000+ per 1 Million Population	205	12.9691	5.783	2.6764	35.5857
	MSA Population Share Residing Outside Largest City	205	68.5431	17.5051	0	97.9464
	MSA Population Share Residing Within Cities	205	72.2608	16.7236	22.8001	100
	Gini Concentration Ratio	205	25.2166	10.9237	8.44	100
Control Variables	Percentage of the Labor Force in the Armed Forces	205	1.3218	3.401	0.01	24.15
	Percentage of Housing Units built post-Fair Housing Act 1970+	205	53.7358	15.0083	19	90.18
	Percentage of Housing Units Vacant	205	8.1692	4.4829	2.32	33.13
	Percentage of the White Population	205	76.1959	11.3526	21.16	96.16
	Total Population (Log)	205	13.2802	0.9681	11.8041	16.0688
	Year the Central City Reached 50k Population 1900 & Earlier*	61	0.2976	0.4583	0	1
	Year the Central City Reached 50k Population 1910 to 1940*	70	0.3415	0.4754	0	1
	Year the Central City Reached 50k Population 1950 to 1960*	28	0.1366	0.3442	0	1
	Year the Central City Reached 50k Population 1970 & Later*	32	0.1561	0.3638	0	1

*Dummy Variable - Central Cities that never reached 50k population is the reference category

CHAPTER VI

RESULTS

Several linear regression models of analysis were designed to ascertain the impact or effect of the independent variable on the dissimilarity index of the MSAs. Several models were developed with the dissimilarity index and independent variable with the previously listed control variables. Also, linear regression models were developed to include several alternative segregation indices previously mentioned. In addition, alternative measures of political fragmentation were included in regression models for comparative purposes.

The regression models were designed to ascertain the strength of the impact of political fragmentation, the primary independent variable, on the dependent variable, and to ascertain how that strength differs with the addition the control variables. As such, several different model variations, a total of 336, were developed that included the control variables, as well as without them. Every model will not be focused on specifically rather they will be used to evaluate the robustness of control effects across different specifications. The model equations that contain all of the control variables will be given particular attention to.

Dissimilarity and Fragmentation

Tables 3 - 8, below, list the different model variations that include the dissimilarity index. Table 3 displays the model analyses for dissimilarity and the first fragmentation measure, the *total number of cities per 1 million population*. This particular fragmentation measure displays a somewhat weak relationship in all of the variations. This relationship is proven to be insignificant in all of the model variations except for the model (6), which includes the *total population (log)*. In the model with *total population (log)*, the fragmentation measure has a coefficient of 5.381, meaning that for every unit increase in the measure of political fragmentation there is a 5.381 average increase in residential segregation.

The control variables listed with the first fragmentation measure display a much stronger and significant relationship with dissimilarity, compared to the strength of fragmentation. In models 8-14, the percentage of the housing units that are vacant displayed a weak to moderate, significant, relationship with residential segregation. In this particular model, the percentage of the housing units vacant has a coefficient of .844, meaning that for every unit increase in *percentage vacant* there is an average of .844 unit increase in *dissimilarity*. In every model, the percentage of the housing units that were built after the Fair Housing Act displayed a moderate, significant, relationship with residential segregation. This relationship ranged from a coefficient of -.315 in model 9 to a -.478 in model 13. In model 13, for every unit increase in the percentage of housing units built after the Fair Housing Act there is a .478 average unit decrease in residential segregation. The log of the total population also displayed a weak to moderate, significant, relationship in every model variation except for model 11.

The log of the total population displayed its greatest strength when placed as a lone control variable in model 6. In this model, *total population (log)* estimated a regression coefficient of 5.381 indicating that for every unit increase in the log of the total population there is an average of 5.381 unit increase in residential segregation.

Year the Central City reached 50k is assessed using a set of dummy variables. F tests for the set of dummy variables indicate that *Year the Central City reached 50k* does not have a significant impact on dissimilarity. Although *Year the Central City reached 50k* produces insignificant results in the Global F test, the variable displays a pattern where older cities have higher levels of segregation. The effects grew larger with each age step in a near linear fashion. Contrasts between the central city reaching 50,000 population by 1900 & earlier, and 1910-1940, were especially large in comparison with the reference category.

Table 3. Residential Segregation and Total Number of Cities per 1 Million Population - Dissimilarity (D)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Total Number of Cities per 1 Million	0.004	-0.015	0.013	-0.007	-0.014	0.059*	0.036
	(0.024)	(0.025)	(0.024)	(0.022)	(0.019)	(0.023)	(0.020)
% White		0.161*					
		(0.078)					
% Housing Vacant			-0.253				
			(0.191)				
% Armed Forces				-1.204***			
				(0.230)			
% Housing Built After FHA					-0.459***		
					(0.045)		
Total Population (Log)						5.381***	
						(0.842)	
Year Central City reached 50k							
1900 & earlier							16.729
1910-1940							8.821
1950-1960							3.437
1970 and later							-2.071
Constant	55.662***	44.692***	57.185***	57.967***	81.543***	-19.302	45.529***
	(1.722)	(5.615)	(2.068)	(1.679)	(2.910)	(11.830)	(3.150)
N	205	205	205	205	205	205	205

(continued)

Table 3. ***(continued)***

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Total Number of Cities per 1 Million	-0.004	0.016	-0.004	0.019	-0.024	-0.012	-0.009
	(0.019)	(0.020)	(0.020)	(0.022)	(0.020)	(0.019)	(0.019)
% White		0.068	0.110	0.099	0.013	0.061	0.063
		(0.063)	(0.058)	(0.067)	(0.059)	(0.059)	(0.059)
% Housing Vacant	0.844***		0.840***	0.371*	0.792***	0.768***	0.841***
	(0.159)		(0.163)	(0.168)	(0.164)	(0.153)	(0.159)
% Armed Forces	-0.639***	-0.587**		-0.692**	-0.679***	-0.628***	-0.590**
	(0.177)	(0.195)		(0.208)	(0.187)	(0.182)	(0.182)
% Housing Built After FHA	-0.427***	-0.315***	-0.435***		-0.377***	-0.478***	-0.423***
	(0.054)	(0.053)	(0.055)		(0.055)	(0.045)	(0.054)
Total Population (Log)	3.020***	2.862**	3.547***	1.816		4.166***	3.213***
	(0.807)	(0.879)	(0.840)	(0.923)		(0.683)	(0.826)
Year Central City reached 50k							
1900 & earlier	7.623	4.346	8.077	15.966	12.621		7.670
1910-1940	6.122	2.716	6.784	9.554	8.379		6.329
1950-1960	4.494	0.874	5.303	4.350	5.751		4.730
1970 and later	2.569	-0.948	2.602	0.840	2.297		2.860
Constant	27.587*	27.189*	11.368	12.235	63.443***	16.958	20.137
	(10.768)	(13.621)	(12.845)	(14.641)	(6.603)	(11.938)	(12.833)
N	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 4 displays the model analyses for dissimilarity and the second fragmentation measure, the *total number of cities with a minimum 2,500 population per 1 million MSA residents.* This fragmentation measure displays a weak, and mostly insignificant, relationship throughout all of the models. In models 3, 6, and 7, fragmentation displays a weak but significant relationship. Its greatest strength is in model 7, which estimates a regression coefficient of .169 indicating that for every unit increase in fragmentation there is a .169 average unit increase in residential segregation.

The control variables continue to display a weak to strong, significant, relationship with residential segregation, mostly. Percentage of the housing units vacant displayed a significant relationship with the exception of model 11. Model 10 is where percentage of the housing units vacant displayed its strongest relationship. In this model, percentage of the housing units vacant estimates a regression coefficient of .833 indicating that for every unit increase in percentage of the housing units vacant there is an average of .833 unit increase in residential segregation. Percentage of the population in the armed forces maintained a negative, but significant, relationship in all of the models with its greatest strength in model 4, which is the variation with no other control variables. In this model, percentage of the population in the armed forces estimated a regression coefficient of -1.175 indicating that for every unit increase in the percentage of the population in the armed forces there is a 1.175 average unit decrease in residential segregation.

The percentage of the housing units built after the Fair Housing Act continued to maintain a moderately, significant, relationship with residential segregation. Its greatest strength was in model 13, which contains all of the control variables except for *Year the Central City reached 50k*. In this model, percentage of the housing units built after the Fair Housing Act estimated a regression coefficient of -.482 indicating that for every unit increase in the percentage of housing units built post-FHA there is an average of .482 unit decrease in residential segregation. The log of the total population also generated positive, significant, results in all of the model variations with model 6 containing its greatest strength. In this model, the log of the total population estimated a 4.79 regression coefficient indicating that for every unit increase in the log of the total population there is a 4.79 unit increase in residential segregation.

As mentioned previously, the effect of *Year the Central City reached 50k* was assessed utilizing an F test. The Global F test for this model estimated a .15 which proves to be insignificant. Although insignificant, *Year the Central City reached 50k* continued to maintain a near linear relationship with segregation. In general, older cities have higher levels of segregation. MSA's that reached a 50,000 population 1900 & earlier, and those reached it between 1910 and 1940, had their greatest strength in model 7.

Table 4. Residential Segregation and Total Number of Cities 2500+ per 1 Million Population - Dissimilarity

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Total Number of Cities 2500+ per 1 Million	0.104	0.075	0.156*	0.085	0.060	0.138*	0.169**
	(0.059)	(0.062)	(0.064)	(0.056)	(0.049)	(0.055)	(0.053)
% White		0.115					
		(0.076)					
% Housing Vacant			-0.416*				
			(0.198)				
% Armed Forces				-1.175***			
				(0.228)			
% Housing Built After FHA					-0.451***		
					(0.045)		
Total Population (Log)						4.792***	
						(0.787)	
Year Central City reached 50k							
1900 & earlier							18.689
1910-1940							11.558
1950-1960							6.265
1970 and later							0.261
Constant	52.692***	44.856***	54.441***	54.843***	78.318***	-12.019	40.235***
	(2.030)	(5.566)	(2.178)	(1.959)	(3.055)	(10.787)	(3.683)
Observations	205	205	205	205	205	205	205

(continued)

Table 4. ***(Continued)***

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Total Number of Cities 2500+ per 1 Million	0.009	0.098	-0.001	0.105	0.027	-0.040	-0.003
	(0.050)	(0.050)	(0.053)	(0.056)	(0.053)	(0.049)	(0.051)
% White		0.052	0.107	0.083	-0.014	0.064	0.057
		(0.062)	(0.058)	(0.066)	(0.058)	(0.059)	(0.058)
% Housing Vacant	0.825***		0.833***	0.293	0.707***	0.806***	0.828***
	(0.168)		(0.172)	(0.174)	(0.172)	(0.167)	(0.168)
% Armed Forces	-0.632***	-0.592**		-0.694***	-0.666***	-0.619***	-0.585**
	(0.175)	(0.193)		(0.206)	(0.188)	(0.182)	(0.182)
% Housing Built After FHA	-0.422***	-0.305***	-0.433***		-0.355***	-0.482***	-0.419***
	(0.055)	(0.053)	(0.056)		(0.055)	(0.046)	(0.055)
Total Population (Log)	3.050***	2.572**	3.583***	1.502		4.318***	3.291***
	(0.780)	(0.852)	(0.832)	(0.890)		(0.657)	(0.818)
Year Central City reached 50k							
1900 & earlier	7.773	6.178	8.080	17.039	13.344		7.664
1910-1940	6.297	4.646	6.791	10.958	9.022		6.331
1950-1960	4.678	2.730	5.322	5.822	6.402		4.759
1970 and later	2.633	0.343	2.569	1.854	2.310		2.783
Constant	26.444**	28.092*	10.830	15.029	62.092***	15.141	18.975
	(9.955)	(13.144)	(12.593)	(14.256)	(6.801)	(11.581)	(12.562)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 5, below, displays the model analyses for dissimilarity and the third fragmentation measure, the *total number of cities with a minimum 10,000 population per 1 million MSA population*. This particular measure of fragmentation displays a slightly greater than weak relationship with dissimilarity but is significant in only five of the models. This measure of fragmentation has its greatest strength in model 7 which is the model variation that includes control variable *Year the Central City reached 50k*. In this model, political fragmentation estimated a .303 regression coefficient indicating that for every unit increase in fragmentation there is a .303 average unit increase in residential segregation.

The control variables in these models also maintained moderately strong and significant relationships with *dissimilarity*. The percentage of the housing units that are vacant produced moderately strong coefficients that were significant in all models except for model 3. Its greatest strength, in model 10, estimated a .794 regression coefficient indicating for every unit increase in the percentage of the housing units residential segregation would increase an average of .794 units. The percentage of the labor force in the armed forces maintained a negative, but significant, relationship in all of the models. Model 4 estimates its greatest strength. In this model, percentage of the labor force in the armed forces estimated a -1.252 regression coefficient indicating that for every unit increase in percentage in the armed forces residential segregation decreases by an average of 1.252 units.

Again, the percentage of the housing units built after the Fair Housing Act continued to maintain a moderately strong, and significant, relationship with *dissimilarity*, with its greatest strength in model 13. In model 13, the percentage of the housing units post-FHA estimated a -.469 regression coefficient indicating that for every unit increase in the percentage of housing unit built post-FHA residential segregation decreases by an average of .469 units. The log of the total population maintained a strong, and significant, relationship in all of the models, with its strongest coefficient in model 6. In this model, the log of the total population estimated a 4.511 regression coefficient indicating that for every unit increase in the log of the total population *dissimilarity* increases an average of 4.511 units.

In this model, *Year the Central City reached 50k* estimated a .05 in the Global F test which proves to be significant. In addition, *Year the Central City reached 50k* continued to maintain a near linear relationship with segregation. In general, older cities have higher levels of segregation. This is indicated by the positive effects indicating deviation from the reference category of central cities that never reached a 50,000 population. The effects grew larger with each age step in a near linear fashion. Contrasts between the central city reaching 50,000 population by 1900 & earlier, and 1910-1940, were especially large in comparison with the reference category. Central Cities that reached a 50,000 population 1900 & earlier, and those reached it between 1910 and 1940, had their greatest strength in model 11. Model 11 includes all of the control variables with the exception of *percent of the housing units built post-FHA.*

Table 5. Residential Segregation and Total Number of Cities 10k+ per 1 Million Population - Dissimilarity

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Total Number of Cities 10K per 1 Million	0.203	0.216	0.253	0.286*	0.216	0.119	0.303*
	(0.143)	(0.142)	(0.145)	(0.134)	(0.116)	(0.134)	(0.125)
% White		0.147*					
		(0.072)					
% Housing Vacant			-0.297				
			(0.188)				
% Armed Forces				-1.252***			
				(0.228)			
% Housing Built After FHA					-0.457***		
					(0.045)		
Total Population (Log)						4.511***	
						(0.798)	
Year Central City reached 50k*							
1900 & earlier							17.265
1910-1940							10.091
1950-1960							4.399
1970 and later							-1.076
Constant	53.310***	41.932***	55.091***	53.894***	77.703***	-5.495	42.994***
	(2.023)	(5.924)	(2.309)	(1.895)	(2.899)	(10.576)	(3.480)
Observations	205	205	205	205	205	205	205

(continued)

Table 5. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Total Number of Cities 10K per 1 Million	0.163	0.280*	0.125	0.302*	0.264*	0.064	0.166
	(0.110)	(0.114)	(0.112)	(0.123)	(0.110)	(0.106)	(0.110)
% White		0.083	0.111*	0.115	0.005	0.052	0.059
		(0.060)	(0.056)	(0.064)	(0.056)	(0.057)	(0.057)
% Housing Vacant	0.789***		0.794***	0.333*	0.674***	0.718***	0.775***
	(0.156)		(0.161)	(0.165)	(0.159)	(0.154)	(0.157)
% Armed Forces	-0.666***	-0.648***		-0.755***	-0.704***	-0.637***	-0.615***
	(0.175)	(0.193)		(0.206)	(0.186)	(0.184)	(0.182)
% Housing Built After FHA	-0.413***	-0.307***	-0.424***		-0.350***	-0.469***	-0.405***
	(0.053)	(0.053)	(0.055)		(0.053)	(0.045)	(0.053)
Total Population (Log)	2.746***	2.239*	3.358***	1.146		4.208***	2.975***
	(0.802)	(0.865)	(0.845)	(0.903)		(0.668)	(0.831)
Year Central City reached 50k*							
1900 & earlier	8.756	6.437	8.969	17.683	14.053		8.846
1910-1940	7.349	4.960	7.751	11.593	10.258		7.606
1950-1960	5.559	2.795	6.153	6.142	7.515		5.857
1970 and later	3.055	0.275	2.958	1.977	3.027		3.322
Constant	27.619**	29.595*	10.919	15.947	57.159***	15.433	19.511
	(9.757)	(13.045)	(12.554)	(14.176)	(6.943)	(11.596)	(12.494)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 6, below, displays the model analyses for dissimilarity and the fourth fragmentation measure, the *share of the MSA population residing outside of the largest city*. The fourth measure of fragmentation maintains a weak to moderate relationship that is significant, except for models 8, 10, 13, and 14. Fragmentation has its greatest strength in model 3, which is the model variation that includes *percent housing vacant*. In this model, fragmentation estimated a .214 regression coefficient indicating that for every unit increase in fragmentation there is a .214 average unit increase in residential segregation.

Regarding the control variables, the percentage of the housing units that are vacant displays a moderate relationship with residential segregation that is mostly significant, with the exception of model 11. The percentage of the housing units that are vacant maintains its strongest relationship in model 14 which is the model variation that contains all of the variables together. In this model, the percentage the housing units that are vacant estimated a .767 regression coefficient indicating that for every unit increase in the percentage of the housing units that are vacant there is a .767 average unit increase in residential segregation. The percentage of the labor force that is in the armed forces maintains a negative, significant, relationship in all of the models. Its greatest strength is in the model that includes no other control variables, model 4. In this model, the percentage of the labor force in the armed forces estimated a -1.044 regression coefficient indicating that for every unit increase in *percent in armed forces* there is an average decrease of 1.044 units in *dissimilarity*.

The percentage of the housing units built after the Fair Housing Act continues to maintain a very significant relationship with residential segregation with its greatest strength in model 13, which is the model variation that includes all of the control variables except for *Year the Central City reached 50k.* In this model, for every unit increase in the percentage of the housing units built post-FHA there is a .469 average unit decrease in *dissimilarity*. The log of the total population maintains a moderately strong, significant, relationship with the exception of model 11. Its greatest strength is in 13 which is the model variation that includes all of the control variables except for *Year the Central City reached 50k*. In this model, for every unit increase in the log of the total population, *dissimilarity* increases an average 4.173 units.

In this model, *Year the Central City reached 50k* estimated a .06 in the Global F test which proves to be significant at the .10 level. As in the previous tables, *Year Central City reached 50k* maintained a near linear relationship with older central cities having greater amounts of segregation than younger central cities. MSAs with central cities that reached 50k 1900 and prior maintained the strongest positive relationship with *dissimilarity*.

Table 6. Residential Segregation and MSA Population Share Outside Largest City - Dissimilarity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MSA Population Share Residing Outside Largest City	0.195***	0.184***	0.214***	0.157***	0.141***	0.144**	0.176***
	(0.045)	(0.047)	(0.046)	(0.044)	(0.038)	(0.044)	(0.040)
% White		0.071					
		(0.072)					
% Housing Vacant			-0.386*				
			(0.179)				
% Armed Forces				-1.044***			
				(0.227)			
% Housing Built After FHA					-0.432***		
					(0.044)		
Total Population (Log)						3.979***	
						(0.797)	
Year Central City reached 50k							
1900 & earlier							17.709
1910-1940							11.574
1950-1960							5.887
1970 and later							1.056
Constant	42.557***	37.915***	44.417***	46.587***	69.492***	-6.740	33.662***
	(3.204)	(5.683)	(3.290)	(3.178)	(3.813)	(10.329)	(4.251)
Observations	205	205	205	205	205	205	205

(continued)

Table 6. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
MSA Population Share Residing Outside Largest City	0.060	0.106*	0.065	0.122**	0.105**	0.017	0.054
	(0.039)	(0.041)	(0.041)	(0.044)	(0.038)	(0.038)	(0.040)
% White		0.038	0.080	0.062	-0.030	0.045	0.036
		(0.062)	(0.058)	(0.066)	(0.056)	(0.059)	(0.059)
% Housing Vacant	0.767***		0.761***	0.306	0.651***	0.721***	0.767***
	(0.159)		(0.163)	(0.166)	(0.159)	(0.158)	(0.159)
% Armed Forces	-0.588**	-0.551**		-0.643**	-0.600**	-0.617***	-0.561**
	(0.176)	(0.192)		(0.205)	(0.186)	(0.183)	(0.182)
% Housing Built After FHA	-0.404***	-0.299***	-0.412***		-0.345***	-0.469***	-0.401***
	(0.054)	(0.053)	(0.055)		(0.053)	(0.045)	(0.054)
Total Population (Log)	2.630**	1.867*	2.998***	0.708		4.173***	2.819**
	(0.820)	(0.902)	(0.895)	(0.937)		(0.704)	(0.878)
Year Central City reached 50k							
1900 & earlier	8.941	6.881	9.463	17.909	13.786		8.845
1910-1940	7.537	5.300	8.196	11.877	10.269		7.533
1950-1960	5.663	2.959	6.421	6.316	7.458		5.713
1970 and later	3.340	0.738	3.330	2.486	3.480		3.414
Constant	26.565**	33.502*	14.452	21.140	55.922***	16.049	21.626
	(9.735)	(13.100)	(12.711)	(14.293)	(6.955)	(11.756)	(12.658)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 7, below, displays the model analyses for dissimilarity and the fifth fragmentation measure, the *share of the MSA population residing within cities*. The fifth fragmentation measure maintains a weak, negative, relationship in all of the model variations, with only five of the models being significant. This particular measure has a slightly different interpretation than the previous measures of fragmentation. The greater the measure of this fragmentation refers to a greater share of the population that is centralized, thus, the greater the measure, the less fragmentation the MSA is. This measure displays its greatest strength in model 6 which is the model variation that includes the log of the total population. In this model, for every unit increase in the *share of the MSA population residing within cities* residential segregation decreases an average .173 units.

Control variables continue to maintain the same direction as previous tables. The percentage of the housing units that are vacant maintains a moderately positive relationship that is significant in almost all of the models except for model 3. Its greatest strength, model 8, displays that for every unit increase in the percentage of the housing units that are vacant there is an average of .805 unit increase in residential segregation. The percentage of the labor force in the armed forces continues to maintain a negative, significant, relationship in all of the models. Its greatest strength, in model 4, shows that for every unit increase in the percentage of the labor force in the armed forces there is an average decrease in residential segregation by 1.193 units.

The percentage of the housing units built after the Fair Housing Act continues to maintain its moderately, significant, relationship with residential segregation. In its greatest strength, in model 13, for every unit increase in the percentage of housing units built post-FHA residential segregation decreases by an average of .466 points. The log of the total population maintains its positive, and very significant, relationship with residential segregation. In its greatest strength, in model 6, which is the model with no other control variables, for every unit increase in the percentage of the housing units built post-FHA there is an average decrease of 5.795 units in residential segregation.

In this model, *Year the Central City reached 50k* estimated a .0963 in the Global F test which proves to be significant at the .10 level. Central cities that reached a 50,000 population 1900 & earlier displayed its greatest strength in model 7. Central cities that reached a 50,000 population 1910 and 1940 displayed their greatest strengths in model 11. MSA's with older central cities maintained a pattern of having greater amounts of segregation than MSA's with younger central cities.

Table 7. Residential Segregation and MSA Population Share Residing Within Largest City - Dissimilarity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MSA Population Share Residing within Cities	-0.038	-0.002	-0.053	-0.007	-0.026	-0.173***	-0.092*
	(0.049)	(0.053)	(0.050)	(0.047)	(0.040)	(0.049)	(0.042)
% White		0.141					
		(0.078)					
% Housing Vacant			-0.266				
			(0.188)				
% Armed Forces				-1.193***			
				(0.231)			
% Housing Built After FHA					-0.455***		
					(0.045)		
Total Population (Log)						5.795***	
						(0.842)	
Year Central City							
1900 & earlier							17.396
1910-1940							9.478
1950-1960							3.940
1970 and later							-1.066
Constant	58.725***	45.325***	61.942***	57.999***	82.271***	-8.485	53.775
	(3.669)	(8.271)	(4.307)	(3.460)	(3.797)	(10.312)	(3.559)
Observations	205	205	205	205	205	205	205

(continued)

Table 7. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
MSA Population Share Residing within Cities	-0.084*	-0.096*	-0.093*	-0.079	-0.020	-0.074	-0.079
	(0.039)	(0.043)	(0.041)	(0.046)	(0.040)	(0.040)	(0.040)
% White		0.049	0.073	0.089	-0.018	0.026	0.031
		(0.061)	(0.057)	(0.066)	(0.060)	(0.058)	(0.058)
% Housing Vacant	0.805***		0.802***	0.374*	0.731***	0.708***	0.800***
	(0.153)		(0.156)	(0.165)	(0.160)	(0.149)	(0.153)
% Armed Forces	-0.567**	-0.548**		-0.666**	-0.662***	-0.583**	-0.544**
	(0.176)	(0.193)		(0.208)	(0.188)	(0.182)	(0.182)
% Housing Built After FHA	-0.422***	-0.323***	-0.432***		-0.360***	-0.466***	-0.419***
	(0.052)	(0.052)	(0.053)		(0.053)	(0.044)	(0.053)
Total Population (Log)	3.744***	3.387***	4.196***	2.156*		4.706***	3.830***
	(0.832)	(0.899)	(0.856)	(0.944)		(0.689)	(0.848)
Year Central City reached 50k							
1900 & earlier	7.892	4.536	8.306	16.295	13.314		7.913
1910-1940	6.851	3.313	7.428	10.089	8.874		6.933
1950-1960	5.377	1.562	6.084	4.855	6.237		5.475
1970 and later	3.520	0.125	3.531	1.717	2.266		3.601
Constant	23.174*	29.517*	11.626	14.832	64.764***	16.894	19.079
	(9.824)	(13.076)	(12.433)	(14.277)	(7.583)	(11.536)	(12.439)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 8, below, displays the model analyses for dissimilarity and the sixth fragmentation measure, the *Gini concentration*. This particular measure of fragmentation maintained a very weak relationship in all of the model variations. These relationships never reached significance in the models so its discussion will be short.

The percentage of the housing units that are vacant maintained a moderate, significant, relationship in all of the models except for model 3. Its greatest strength, in model 8, shows that for every unit increase in the percentage of the housing units that are vacant there is a .837 average unit increase in residential segregation. The percentage of the labor force in the armed forces maintains a moderate, negative, relationship throughout all of the models. Its greatest strength, in model 4, which is the model that contains no other control variables, shows that for every unit increase in the percentage of the labor force that are in the armed forces residential segregation decreases an average of 1.175 units.

The percentage of the housing units built after the Fair Housing Act continues to display a moderately negative, and significant, relationship in all of the model variations. Its greatest strength, in model 13, shows that for every unit increase in the percentage of the housing units built post-FHA there is an average .474 unit decrease in residential segregation.

Total Population (log) maintains a strong, significant, relationship in all of the models. Its greatest strength, in model 6, which is the model with no other control variables, it shows that for every unit increase in the log of the total population residential segregation decreases an average of 4.523 units. *Year Central City reached 50k* estimated a .1311 in the Global F test which proves to be insignificant. In addition, *Year Central City reached 50k* displays a varying relationship in the equation that does not maintain a pattern displayed in previous models.

Throughout all of the models, the percentage of the population that is white proved to be insignificant and not much of a determinant in the degree of *dissimilarity* relative to the other control variables. Accordingly, it receives little attention in the discussions of effects. The additional control variables continued to maintain their relationships with residential segregation. The maintenance of the control variable pattern provides robustness and confidence in fragmentation's effect on residential segregation.

Fragmentation, in all of its variations, maintained a consistent positive relationship with residential segregation that leads us to conclude that as fragmentation increases so will *dissimilarity*. The primary focus of this study is on the effect of the third fragmentation measure, *total number of cities 10k per 1 million MSA residents*. The third fragmentation is the most commonly used measure of fragmentation because of its ability to capture the degree of MSA fragmentation while not being manipulated by places with smaller to zero populations. *Total number of cities 10k per 1 million MSA residents* maintained a positive direction in all model equations.

Utilizing the two-tailed test, fragmentation reaches significance in five out of the fourteen models. Fragmentation was predicted to have a positive effect on residential segregation and as such would have proven to be significant more often in a one-tailed test. In model 14, which is the model equation that contains all of the control variables, fragmentation is insignificant in the two-tailed test. Fragmentation estimated a 1.51 t-value which reaches significance at the .1 level in a one-tailed test.

Models where fragmentation is insignificant its effect size is small and competing with control variables that may have greater effects on residential segregation, such as *Total Population* and *Year Central City reached 50k*. Given the results as a whole, it would be safe to determine that fragmentation has a positive contribution to the degree of segregation within MSAs.

Table 8. Residential Segregation and Gini Concentration - Dissimilarity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gini Concentration	-0.101	-0.092	-0.094	-0.054	-0.094	-0.038	0.036
	(0.076)	(0.075)	(0.076)	(0.072)	(0.062)	(0.071)	(0.067)
% White		0.137					
		(0.072)					
% Housing Vacant			-0.208				
			(0.184)				
% Armed Forces				-1.175***			
				(0.231)			
% Housing Built After FHA					-0.455***		
					(0.045)		
Total Population (Log)						4.523***	
						(0.804)	
Year Central City reached 50k							
1900 & earlier							16.088
1910-1940							8.265
1950-1960							2.551
1970 and later							-2.342
Constant	58.496***	47.837***	60.026***	58.870***	82.797***	-3.174	47.457
	(2.074)	(6.000)	(2.477)	(1.959)	(2.930)	(11.138)	(3.378)
Observations	205	205	205	205	205	205	205

(continued)

Table 8. *(Continued)*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Gini Concentration	0.001	0.013	-0.004	0.074	0.001	-0.031	0.007
	(0.056)	(0.060)	(0.057)	(0.063)	(0.058)	(0.054)	(0.056)
% White		0.082	0.107	0.121	-0.008	0.049	0.057
		(0.061)	(0.056)	(0.065)	(0.057)	(0.057)	(0.057)
% Housing Vacant	0.837***		0.832***	0.405*	0.740***	0.749***	0.824***
	(0.154)		(0.158)	(0.165)	(0.159)	(0.149)	(0.154)
% Armed Forces	-0.635***	-0.601**		-0.719***	-0.669***	-0.613***	-0.586**
	(0.176)	(0.195)		(0.207)	(0.188)	(0.183)	(0.182)
% Housing Built After FHA	-0.425***	-0.317***	-0.434***		-0.362***	-0.474***	-0.417***
	(0.053)	(0.054)	(0.055)		(0.054)	(0.045)	(0.054)
Total Population (Log)	3.060***	2.709**	3.579***	1.684		4.224***	3.288***
	(0.777)	(0.858)	(0.824)	(0.895)		(0.664)	(0.810)
Year Central City reached 50k							
1900 & earlier	7.645	4.292	8.045	16.624	13.055		7.771
1910-1940	6.155	2.634	6.756	10.234	8.654		6.442
1950-1960	4.537	0.672	5.306	4.654	6.026		4.839
1970 and later	2.557	-0.961	2.569	1.081	2.097		2.812
Constant	26.735**	29.065*	11.078	10.900	62.838***	17.079	18.624
	(10.017)	(13.629)	(12.992)	(14.697)	(7.193)	(12.033)	(12.908)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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)

Gini and Fragmentation

In an effort to assess whether the results are "robust" with respect to the choice for measuring the dependent variable, I compared the findings of my primary analysis using the index of dissimilarity, with results of regression models which used the Gini index as the dependent variables (Tables 9-14, below). This particular measure of segregation continued to maintain patterns with fragmentation and control variables seen in previous models with *dissimilarity*.

Table 9, below, displays the model analyses for the Gini index and the fragmentation measure, *the total number of cities per 1 million MSA residents.* This particular measure of fragmentation maintains a very weak, and mostly insignificant, relationship with the Gini index. Of the two models that are estimated to be significant, model 6 contains its strongest relationship. In this model, for every unit increase in political fragmentation the Gini index increases an average of .065 units.

In regards to the control variables, the percentage of the population that is white was significant in two models, with its greatest strength in model 2, which is the model with no other control variables. In this model, for every unit increase in the percentage of the population that is white the gini index has a .169 average unit increase.

The percentage of the housing units that are vacant proved to be significant in all of the models, except for the model that contains no other control variables, with its greatest strength in model 8. In this model, for every unit increase in the percentage of the housing units that are vacant residential segregation increases by an average of .889 units.

As with all of the previous models, the percentage of the labor force that is in the armed forces maintains a negative, and very significant, relationship with the Gini index. In its greatest strength, model 4, which is the model without other control variables, for every unit increase in the percentage of the labor force that is in the armed forces residential segregation decreases by an average of 1.303 units.

The percentage of the housing units built after the Fair Housing Act also continues to maintain a negatively moderate, and significant, relationship with the Gini index. In its greatest strength, model 13, which is the model that contains all other control variables with the exception of *Year Central City reached 50k*, for every unit increase in the percentage of the housing units built post-FHA, residential segregation decreases an average .447 units.

Total population (log) maintains a very significant, and positive, relationship with the Gini index. In its greatest strength, model 6, which is the model that contains no other control variables, for every unit increase in the log of the total population residential segregation increases an average of 5.425 units.

Again, *Year Central City reached 50k* continued to maintain direction in the models as in previous equations that utilized the *dissimilarity*. *Year Central City reached 50k* displayed a positive relationship with *Gini* meaning MSA's with older central cities had greater levels of residential segregation. Segregation levels then declined as MSA's contained younger central cities. MSA's with central cities that reached 50k after the Fair Housing Act had a negative effect on segregation levels. A Global F test was conducted to determine *Year Central City reached 50k's* significance. *Year Central City reached 50k* estimated a .0277 which reaches significance at the .05 level.

Table 9. Gini Analysis with Total Number of Cities per 1 Million Population

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total Number of Cities per 1 Million	0.010	-0.011	0.016	-0.002	-0.008	0.065**	0.042*
	(0.024)	(0.025)	(0.025)	(0.022)	(0.020)	(0.023)	(0.020)
% White		0.169*					
		(0.078)					
% Housing Vacant			-0.190				
			(0.192)				
% Armed Forces				-1.303***			
				(0.228)			
% Housing Built After FHA					-0.432***		
					(0.047)		
Total Population (Log)						5.425***	
						(0.841)	
Year Central City reached 50k*							
1900 & earlier							16.977
1910-1940							9.679
1950-1960							4.080
1970 and later							-1.891
Constant	70.483***	58.917***	71.625***	72.977***	94.840***	-5.090	59.782***
	(1.724)	(5.616)	(2.074)	(1.662)	(2.999)	(11.828)	(3.151)
Observations	205	205	205	205	205	205	205

(continued)

Table 9. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Total Number of Cities per 1 Million	0.003	0.023	0.002	0.022	-0.018	-0.007	-0.003
	(0.019)	(0.020)	(0.020)	(0.022)	(0.020)	(0.020)	(0.020)
% White		0.077	0.128*	0.104	0.022	0.068	0.071
		(0.063)	(0.059)	(0.066)	(0.060)	(0.060)	(0.059)
% Housing Vacant	0.889***		0.884***	0.462**	0.837***	0.795***	0.885***
	(0.160)		(0.165)	(0.165)	(0.165)	(0.156)	(0.160)
% Armed Forces	-0.755***	-0.696***		-0.791***	-0.786***	-0.748***	-0.699***
	(0.178)	(0.197)		(0.205)	(0.188)	(0.185)	(0.184)
% Housing Built After FHA	-0.386***	-0.267***	-0.396***		-0.336***	-0.447***	-0.381***
	(0.054)	(0.054)	(0.056)		(0.055)	(0.046)	(0.054)
Total Population (Log)	2.927***	2.776**	3.540***	1.886*		4.272***	3.145***
	(0.812)	(0.890)	(0.853)	(0.907)		(0.694)	(0.831)
Year Central City reached 50k*							
1900 & earlier	9.108	5.663	9.643	16.636	14.007		9.162
1910-1940	7.696	4.127	8.470	10.836	9.937		7.931
1950-1960	5.439	1.648	6.385	5.365	6.706		5.707
1970 and later	3.037	-0.642	3.061	1.547	2.816		3.367
Constant	39.968***	38.947**	21.133	24.404	73.914***	28.126*	31.524*
	(10.844)	(13.787)	(13.052)	(14.377)	(6.631)	(12.125)	(12.913)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 10, below, displays the model analyses between the Gini index and *the total number of cities with a minimum 2,500 population per 1 million residents*. In this particular design, fragmentation maintains a weak relationship that is mostly insignificant. Of the four models that achieve significance, its greatest strength, in model 7, which is the model that contains *Year Central City reached 50k*, for every unit increase in fragmentation there is a .178 average unit increase in the Gini index.

For the control variables, the percentage of the population that is white continues be insignificant with the exception of model 10, which contains all of the control variables except for *percent in armed forces*. In this model, for every unit increase in the percentage of the population that is white there is a .128 average unit increase in the Gini index. The percentage of the housing units that are vacant maintains a moderately strong, and mostly significant, relationship with the Gini index. In its greatest strength, in model 10, which contains all of the control variables except for *percent in armed forces,* for every unit increase in the percentage of the housing units that are vacant the Gini index increases an average .883 units. The percentage of the labor force in the armed forces maintains a moderately strong, and significant, relationship in all of the models. Its greatest strength, in model 4, which is the model without other control variables, shows that for every unit increase in the percentage of the labor force in the armed forces the Gini index decreases an average of 1.277 units.

The percentage of the housing units built after the Fair Housing Act continues to maintain a moderately strong, negative, relationship that is significant in all of the models. In its greatest strength, model 13, for every unit increase in the percentage of the housing units built post-FHA the Gini index decreases an average of .455 units. The log of the total population, again, displays its greatest strength in model 6, which is the model without other control variables. In this model, for every unit increase in the *total population (log)* the Gini index increases an average 4.763 units.

Year Central City reached 50k continued to maintain a similar pattern found in previous equations. MSAs with older central cities had greater levels of residential segregation. Segregation levels then decrease as the central city becomes younger. The pattern is similar, and not identical, to previous equations because of central cities that reached a 50k population post-FHA. In previous models, this category was estimated to have negative effects on residential segregation. In Table 9, *Year Central City reached 50k 1970+* produced positive effects. These effects still maintained a pattern of MSAs with younger central cities having lower levels of segregation. In the Global F test *Year Central City reached 50k* produced a .0376 resulting in significance at the .05 level.

Table 10. Gini Analysis with Total Number of Cities 2500 per 1 Million Population

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total Number of Cities 2500+ per 1 Million	0.106	0.074	0.148*	0.085	0.064	0.140*	0.178***
	(0.059)	(0.062)	(0.064)	(0.055)	(0.050)	(0.055)	(0.053)
% White		0.129					
		(0.076)					
% Housing Vacant			-0.337				
			(0.199)				
% Armed Forces				-1.277***			
				(0.226)			
% Housing Built After FHA					-0.425***		
					(0.046)		
Total Population (Log)						4.763***	
						(0.789)	
Year Central City reached 50k*							
1900 & earlier							18.922
1910-1940							12.447
1950-1960							6.917
1970 and later							0.526
Constant	67.782***	58.980***	69.197***	70.121***	91.930***	3.466	54.603***
	(2.033)	(5.564)	(2.189)	(1.939)	(3.144)	(10.816)	(3.687)
Observations	205	205	205	205	205	205	205

(continued)

Table 10. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Total Number of Cities 2500+ per 1 Million	0.016	0.109*	0.004	0.099	0.030	-0.046	0.002
	(0.050)	(0.051)	(0.054)	(0.055)	(0.053)	(0.050)	(0.052)
% White		0.063	0.128*	0.092	-0.000	0.076	0.068
		(0.063)	(0.059)	(0.065)	(0.058)	(0.059)	(0.059)
% Housing Vacant	0.874***		0.883***	0.394*	0.761***	0.851***	0.877***
	(0.169)		(0.175)	(0.171)	(0.172)	(0.169)	(0.169)
% Armed Forces	-0.755***	-0.705***		-0.796***	-0.776***	-0.741***	-0.697***
	(0.177)	(0.195)		(0.203)	(0.188)	(0.185)	(0.183)
% Housing Built After FHA	-0.383***	-0.258***	-0.396***		-0.317***	-0.455***	-0.379***
	(0.056)	(0.054)	(0.057)		(0.055)	(0.047)	(0.056)
Total Population (Log)	2.875***	2.402**	3.512***	1.547		4.383***	3.165***
	(0.785)	(0.862)	(0.846)	(0.875)		(0.667)	(0.823)
Year Central City reached 50k*							
1900 & earlier	9.332	7.627	9.697	17.675	14.663		9.201
1910-1940	7.935	6.189	8.524	12.157	10.562		7.975
1950-1960	5.661	3.608	6.430	6.720	7.338		5.759
1970 and later	3.182	0.776	3.106	2.522	2.907		3.362
Constant	40.096***	40.803**	21.428	27.575	72.597***	26.984*	31.142*
	(10.023)	(13.300)	(12.795)	(14.019)	(6.818)	(11.751)	(12.634)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 11, below, contains the model analyses for the Gini index and *the total number of cities with a minimum 10,000 population per 1 million MSA residents*. This particular measure of fragmentation maintains a weak to strong relationship, with the Gini index, that is significant in five of the models. Fragmentation displays its greatest strength in model 7, which is the model that contains control variable *Year Central City reached 50k*. In this model, for every unit increase in fragmentation the Gini index increases an average .286 units.

The percentage of the population that is white maintains a weak relationship that is significant in only two of the models. Its greatest strength, in model 2, which contains no other control variables, for every unit increase in the percentage of the population that is white the Gini index increases an average .160 units. The percentage of the housing units vacant maintains a moderately strong, and significant, relationship with the Gini index in almost all of the models. Its greatest strength, in model 10, which is the model that contains all of the control variables except for *percentage in the armed forces,* shows that for every unit increase in the percentage of the housing units vacant there is an average of .856 unit increase in the Gini index. The percentage of the labor force in the armed forces continues to maintain a negative, and significant, relationship with the Gini index. Its greatest strength, in model 3, the model without other control variables, shows that for every unit increase in the percentage of the labor force in the armed forces there is a 1.351 average unit decrease in the Gini index.

The percentage of the housing units built after the Fair Housing Act continues to maintain a negative, and very significant, relationship with the Gini index. Its greatest relationship, in model 13, for every unit increase in the percentage of the housing units built post-FHA there is a .442 average unit decrease in the Gini index. The log of the total population also continues to maintain a positive, and very significant, relationship, with its strongest relationship in model 6. In this model, for every unit increase in the log of the total population there is a 4.498 average unit increase in Gini index.

Year Central City reached 50k continues to maintain a pattern seen in previous model equations. MSA's with older central cities had greater levels of residential segregation. As the central cities become younger their segregation levels decrease. Unlike the models with *dissimilarity*, *Year Central City reached 50k 1970+* estimated positive effects on residential segregation. Although the result is positive, the multi-categorical variable maintained segregation patterns seen in previous equations. In a Global F test, *Year Central City reached 50k* estimated a .0118 resulting in significance at the .01 level.

Table 11. Gini Analysis with Total Number of Cities 10k+ per 1 Million Population

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total Number of Cities 10K per 1 Million	0.175	0.188	0.211	0.264*	0.187	0.090	0.286*
	(0.143)	(0.142)	(0.146)	(0.133)	(0.120)	(0.134)	(0.126)
% White		0.160*					
		(0.072)					
% Housing Vacant			-0.215				
			(0.189)				
% Armed Forces				-1.351***			
				(0.226)			
% Housing Built After FHA					-0.431***		
					(0.046)		
Total Population (Log)						4.498***	
						(0.801)	
Year Central City reached 50k**							
1900 & earlier							17.262
1910-1940							10.665
1950-1960							4.725
1970 and later							-1.027
Constant	68.834***	56.451***	70.126***	69.464***	91.852***	10.201	58.124***
	(2.029)	(5.930)	(2.323)	(1.878)	(2.992)	(10.616)	(3.498)
Observations	205	205	205	205	205	205	205

(continued)

Table 11. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Total Number of Cities 10K per 1 Million	0.152	0.278*	0.108	0.279*	0.251*	0.033	0.156
	(0.111)	(0.116)	(0.114)	(0.121)	(0.110)	(0.107)	(0.111)
% White		0.097	0.133*	0.122	0.019	0.063	0.071
		(0.061)	(0.057)	(0.063)	(0.056)	(0.058)	(0.057)
% Housing Vacant	0.850***		0.856***	0.433**	0.736***	0.767***	0.833***
	(0.158)		(0.164)	(0.163)	(0.160)	(0.157)	(0.158)
% Armed Forces	-0.788***	-0.761***		-0.853***	-0.812***	-0.753***	-0.726***
	(0.177)	(0.195)		(0.203)	(0.187)	(0.187)	(0.183)
% Housing Built After FHA	-0.376***	-0.261***	-0.389***		-0.313***	-0.442***	-0.367***
	(0.053)	(0.053)	(0.056)		(0.053)	(0.046)	(0.054)
Total Population (Log)	2.600**	2.085*	3.329***	1.220		4.304***	2.877***
	(0.808)	(0.878)	(0.859)	(0.889)		(0.678)	(0.837)
Year Central City reached 50k**							
1900 & earlier	10.138	7.657	10.392	18.252	15.283		10.247
1910-1940	8.794	6.260	9.276	12.716	11.670		9.105
1950-1960	6.364	3.432	7.074	6.982	8.328		6.724
1970 and later	3.513	0.560	3.406	2.617	3.550		3.836
Constant	41.457***	42.489**	21.502	28.418*	68.053***	27.177*	31.646*
	(9.833)	(13.233)	(12.766)	(13.955)	(6.972)	(11.779)	(12.575)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 12, below, contains the model analyses for the Gini index and *the MSA population share that is residing outside of the largest city*. This particular measure of fragmentation produced a moderately strong, and somewhat significant, relationship with the Gini index. *The MSA share that is residing outside of the largest city* maintained significance in 10 of the models. Its greatest strength, in model 3, which is the model with control variable *percent housing vacant*, shows that for every unit increase in fragmentation there is a .204 average unit increase in the Gini index.

For the control variables, the percentage of the housing units that are vacant maintained a positive, and significant, relationship with the Gini index. In its greatest strength, in model 8, which includes all of the control variables except for *percent white*, shows that for every unit increase in the percentage of the housing units vacant there is a .833 average unit increase in the Gini index. The percentage of the labor force in the armed forces continues to maintain a negative, and significant, relationship, with its greatest relationship in model 4. In this model, for every unit increase in the percentage of the labor force in the armed forces there is a 1.158 average unit decrease in the Gini index.

The percentage of the housing units built after the Fair Housing Act continues to maintain a negative, and very significant, relationship with the Gini index, with its greatest strength in model 13. In this model, for every unit increase in the percentage of the housing units vacant there is a .443 average unit decrease in the Gini index. In this same model, for every unit increase in the log of the total population there is a 4.341 average unit increase in the Gini index.

In regards to *Year Central City reached 50k*, a similar pattern as seen in previous equations continues to be seen. MSAs with central cities that reached 50k 1900 and prior had greater levels of residential segregation than its younger counterparts. Segregation levels decrease as the central cities become younger with *Year Central City reached 50k 1970+* displaying a positive relationship with *Gini*. Regardless of its positive relationship post-FHA, *Year Central City reached 50k* still maintains a relationship as seen in previous model equations. In the Global F test, *Year Central City reached 50k* estimated a .0157 resulting in significance at the .05 level.

Table 12. Gini Analysis with MSA Population Share Residing Outside Largest City

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MSA Population Share Residing Outside Largest City	0.189***	0.174***	0.204***	0.146**	0.137***	0.137**	0.173***
	(0.046)	(0.047)	(0.046)	(0.044)	(0.039)	(0.044)	(0.041)
% White		0.089					
		(0.072)					
% Housing Vacant			-0.309				
			(0.180)				
% Armed Forces				-1.158***			
				(0.225)			
% Housing Built After FHA					-0.407***		
					(0.046)		
Total Population (Log)						3.976***	
						(0.801)	
Year Central City reached 50k*							
1900 & earlier							17.756
1910-1940							12.208
1950-1960							6.270
1970 and later							1.121
Constant	58.178***	52.410***	59.664***	62.647***	83.553***	8.921	48.727***
	(3.220)	(5.703)	(3.320)	(3.157)	(3.941)	(10.386)	(4.274)
Observations	205	205	205	205	205	205	205

(continued)

Table 12. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
MSA Population Share Residing Outside Largest City	0.054	0.101*	0.059	0.107*	0.095*	0.000	0.045
	(0.039)	(0.041)	(0.041)	(0.043)	(0.038)	(0.039)	(0.040)
% White		0.054	0.105	0.076	-0.014	0.063	0.052
		(0.063)	(0.059)	(0.065)	(0.057)	(0.060)	(0.059)
% Housing Vacant	0.833***		0.825***	0.413*	0.718***	0.780***	0.832***
	(0.161)		(0.166)	(0.164)	(0.160)	(0.160)	(0.161)
% Armed Forces	-0.717***	-0.667***		-0.753***	-0.717***	-0.745***	-0.678***
	(0.178)	(0.195)		(0.203)	(0.187)	(0.186)	(0.183)
% Housing Built After FHA	-0.368***	-0.255***	-0.378***		-0.309***	-0.443***	-0.365***
	(0.055)	(0.054)	(0.056)		(0.053)	(0.046)	(0.055)
Total Population (Log)	2.509**	1.750	2.999**	0.862		4.341***	2.782**
	(0.827)	(0.917)	(0.910)	(0.925)		(0.715)	(0.884)
Year Central City reached 50k*							
1900 & earlier	10.258	7.987	10.865	18.368	14.995		10.118
1910-1940	8.912	6.483	9.707	12.860	11.607		8.906
1950-1960	6.414	3.498	7.342	7.035	8.209		6.486
1970 and later	3.747	0.950	3.753	3.010	3.919		3.854
Constant	40.480***	46.225***	24.672	32.895*	67.190***	27.079*	33.337**
	(9.816)	(13.308)	(12.934)	(14.104)	(6.998)	(11.939)	(12.750)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 13, below, contains the model analyses for the Gini index and *the share of the MSA population residing within cities*. This measure of fragmentation maintains a weak relationship that is significant in a few models. In addition, this measure of fragmentation has a different interpretation than the rest of the fragmentation measures. Fragmentation has its greatest strength in model 6 which includes control variable *total population (log)*. In this model, for every unit increase in the share of the population that is residing within cities there is a .173 average unit decrease in the Gini index.

For the control variables, the percentage of the housing units that are vacant continues to maintain a moderately strong, and significant, relationship with the Gini index, with its greatest strength in model 8. In this model, which includes all of the control variables except for *percent white*, shows that for every unit increase in the percentage of the housing units that are vacant there is a .865 average unit increase in the Gini index.

In model 4, for every unit increase in the percentage of the labor force in the armed forces the Gini index decreases an average of 1.298 units. The percentage of the housing units that were built after the Fair Housing Act continues to maintain moderately strong, and negative, relationship that is significant in all models. Its greatest strength, in model 13, for every unit increase in the percentage of the housing units that were built post-FHA there is a.438 average unit decrease in the Gini index.

Year Central City reached 50k continues to display a pattern seen in previous model equations. MSAs whose central city reached 50k earlier had greater levels of residential segregation than MSAs whose central city reached 50k later. *Year Central City reached 50k 1970+* still estimates a positive relationship with *Gini*. In the Global F test, *Year Central City reached 50k* estimated a .0120 resulting in significance at the .01 level.

Table 14, below, contains the model analyses for the *Gini* index and the *Gini* concentration. This particular measure of fragmentation maintains a weak relationship with *Gini* that is almost always insignificant, with the exception of model 5. In this model, which includes control variable *percent housing built after FHA*, for every unit increase in *Gini concentration* there is a .125 average unit decrease in the Gini index.

For the control variables, the percentage of the population that is white maintained a weak relationship that is only significant in two models. Its greatest strength, model 2, which contains no other variables, shows that for every unit increase in the percentage of the population that is white there is a .149 average unit increase in the Gini index.

The percentage of the housing units vacant continues to maintain a moderately strong, and positive, relationship that is mostly significant. Its greatest strength, in model 8, which is the model that contains all other control variables with the exception of *percent white*, shows that for every unit increase in the percentage of the housing units that are vacant there is a .896 average unit increase in the Gini index.

The percentage of the labor force in the armed forces continues to maintain its greatest strength in model 4 which is the model that contains no other control variables. In this model, for every unit increase in the percentage of the labor force in the armed forces there is a 1.267 average unit decrease in the Gini index. The percentage of the housing units built after the Fair Housing Act continues to maintain its greatest strength in model 13. In this model, for every unit increase in the percentage of the housing units built after the Fair Housing Act there is a .447 average unit decrease in the Gini index. The log of the total population continues to maintain its greatest strength in model 6 which is the model that contains no other control variables. In this model, for every unit increase in the *total population (log)* there is a 4.435 average unit increase in the Gini index.

Year Central City reached 50k continues to maintain a relationship seen in previous models. MSAs with older central cities have greater levels of segregation. Segregation levels decrease as the MSAs central city becomes younger. In the Global F test, *Year Central City reached 50k* estimated a .0412 which results in significance at the .05 level.

The *Gini Concentration* displayed a weak, and mostly insignificant, relationship with the Gini index. This weak relationship led to its discussion being quite short. The percentage of the population that is white continues to display a very weak, and mostly insignificant, relationship. As a result, discussion of *percent white* was limited. The rest of the control variables continue to maintain very similar relationships with the Gini index as they did with the Dissimilarity index which is promising for the reliability of the results.

Total Number of Cities 10k per 1 million MSA residents, the focus of this study, maintained a positive direction in all of the models regardless of significance. In Model 14, which contains all of the control variables, fragmentation is insignificant at the .05 level two-tailed test. Fragmentation is predicted to have a positive effect on the level of residential segregation. As such, fragmentation proves to be significant at the .1 level one-tailed test. Fragmentation leading to greater levels of residential segregation can thus be stated with greater confidence.

Table 13. Gini Analysis with MSA Population Share Residing in Largest City

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MSA Population Share Residing within Cities	-0.039	0.001	-0.049	-0.004	-0.027	-0.173***	-0.094*
	(0.050)	(0.053)	(0.051)	(0.047)	(0.042)	(0.049)	(0.043)
% White		0.157*					
		(0.078)					
% Housing Vacant			-0.194				
			(0.189)				
% Armed Forces				-1.298***			
				(0.229)			
% Housing Built After FHA					-0.430***		
					(0.046)		
Total Population (Log)						5.761***	
						(0.845)	
Year Central City reached 50k*							
1900 & earlier							17.514
1910-1940							10.211
1950-1960							4.422
1970 and later							-0.910
Constant	73.916***	59.041***	76.259***	73.126***	96.133***	7.101	68.716***
	(3.674)	(8.268)	(4.324)	(3.424)	(3.909)	(10.346)	(3.570)
Observations	205	205	205	205	205	205	205

(continued)

Table 13. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
MSA Population Share Residing within Cities	-0.080*	-0.091*	-0.090*	-0.072	-0.016	-0.067	-0.073
	(0.040)	(0.043)	(0.042)	(0.046)	(0.040)	(0.041)	(0.041)
% White		0.065	0.097	0.098	-0.001	0.039	0.046
		(0.062)	(0.058)	(0.065)	(0.060)	(0.059)	(0.058)
% Housing Vacant	0.865***		0.860***	0.471**	0.791***	0.748***	0.857***
	(0.154)		(0.159)	(0.162)	(0.160)	(0.151)	(0.154)
% Armed Forces	-0.695***	-0.664***		-0.771***	-0.773***	-0.710***	-0.660***
	(0.177)	(0.196)		(0.204)	(0.189)	(0.185)	(0.183)
% Housing Built After FHA	-0.385***	-0.277***	-0.396***		-0.323***	-0.438***	-0.380***
	(0.052)	(0.053)	(0.054)		(0.054)	(0.045)	(0.053)
Total Population (Log)	3.544***	3.195***	4.114***	2.151*		4.725***	3.669***
	(0.839)	(0.913)	(0.871)	(0.929)		(0.701)	(0.855)
Year Central City reached 50k*							
1900 & earlier	9.335	5.746	9.843	16.967	14.541		9.365
1910-1940	8.339	4.581	9.061	11.323	10.320		8.461
1950-1960	6.207	2.158	7.091	5.789	7.082		6.351
1970 and later	3.963	0.357	3.997	2.373	2.802		4.082
Constant	37.244***	42.424**	22.193	27.387	75.011***	28.582*	31.238*
	(9.905)	(13.279)	(12.650)	(14.043)	(7.605)	(11.731)	(12.531)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 14. Gini Analysis with Gini Concentration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gini Concentration	-0.131	-0.121	-0.127	-0.081	-0.125*	-0.069	0.007
	(0.075)	(0.075)	(0.076)	(0.071)	(0.063)	(0.071)	(0.067)
% White		0.149*					
		(0.072)					
% Housing Vacant			-0.132				
			(0.185)				
% Armed Forces				-1.267***			
				(0.228)			
% Housing Built After FHA					-0.430***		
					(0.046)		
Total Population (Log)						4.435***	
						(0.806)	
Year Central City reached 50k*							
1900 & earlier							15.950
1910-1940							8.705
1950-1960							2.832
1970 and later							-2.245
Constant	74.413***	62.837***	75.384***	74.817***	97.333***	13.948	63.158***
	(2.071)	(5.981)	(2.478)	(1.935)	(3.005)	(11.153)	(3.392)
Observations	205	205	205	205	205	205	205

(continued)

Table 14. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Gini Concentration	-0.019	-0.004	-0.025	0.050	-0.016	-0.058	-0.011
	(0.056)	(0.061)	(0.058)	(0.062)	(0.058)	(0.055)	(0.056)
% White		0.095	0.126*	0.126	0.005	0.057	0.068
		(0.062)	(0.057)	(0.064)	(0.057)	(0.058)	(0.058)
% Housing Vacant	0.896***		0.890***	0.498**	0.800***	0.791***	0.881***
	(0.155)		(0.160)	(0.163)	(0.159)	(0.151)	(0.155)
% Armed Forces	-0.753***	-0.711***		-0.816***	-0.775***	-0.728***	-0.695***
	(0.177)	(0.198)		(0.204)	(0.189)	(0.185)	(0.183)
% Housing Built After FHA	-0.390***	-0.274***	-0.400***		-0.328***	-0.447***	-0.381***
	(0.054)	(0.055)	(0.056)		(0.054)	(0.045)	(0.054)
Total Population (Log)	2.896***	2.546**	3.511***	1.701		4.233***	3.165***
	(0.782)	(0.870)	(0.837)	(0.881)		(0.673)	(0.815)
Year Central City reached 50k*							
1900 & earlier	8.906	5.337	9.381	17.139	14.143		9.055
1910-1940	7.484	3.754	8.196	11.286	9.953		7.824
1950-1960	5.302	1.206	6.214	5.490	6.803		5.660
1970 and later	3.030	-0.700	3.043	1.750	2.643		3.332
Constant	41.351***	42.904**	22.795	24.695	74.314***	30.523*	31.747*
	(10.084)	(13.820)	(13.195)	(14.470)	(7.210)	(12.191)	(12.982)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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)

Entropy and Fragmentation

As mentioned previously, alternative measures of segregation are utilized in this research to determine if results regarding the impact of fragmentation on residential segregation are consistent and "robust" when segregation is measured using different indices. This section discusses the model analyses between the entropy index and the six measures of fragmentation. The models in these analyses are identical to the models in previous tables with the exception that the dependent variable is substituted for the entropy index. The results in the following tables indicate similar findings as previous analyses using *dissimilarity* and *Gini* produced.

Table 15, below, displays the model analyses for *entropy* and the *total number of cities per 1 million MSA residents*. This fragmentation measure displays a very weak relationship with the entropy index that is insignificant in all models. The control variables continue to maintain the same directional relationship with the entropy index as they did with previous measures of segregation. All of the following discussions will focus on the greatest strength the control variable in question produced.

In model 14, which is the model with all control variables, for every unit increase in the percentage of the housing units that are vacant there is a 1.020 average unit increase in the entropy index. In model 4, for every unit increase in the percentage of the labor force in the armed forces there is a 1.192 unit decrease in the entropy index. The percentage of the housing units built after the Fair Housing Act displayed its greatest strength in model 13. In this model, for every unit increase in the percentage of the housing units built post-FHA there is a .481 average unit decrease in the entropy index. The log of the total population continues to maintain its strongest relationship in the model with no other control variables. In this model, model 6, for every unit increase in the log of the total population the entropy index increases an average of 6.349 units.

Year Central City reached 50k continues to maintain a relationship displayed in previous model equations. MSAs with older central cities have greater levels of segregation than MSAs with younger central cities. This pattern differs with central cities that reached 50k 1970+ having a positive relationship with segregation although still less segregation than older central cities. Previous model equations display central cities that reached 50k 1970+ as having a negative relationship with residential segregation. In the Global F test, *Year Central City reached 50k* estimated a .2188 which proves to be insignificant.

Table 15. Entropy Analysis with Total Number of Cities per 1 Million Population

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total Number of Cities per 1 Million	-0.015	-0.016	-0.011	-0.026	-0.032	0.050	0.017
	(0.026)	(0.029)	(0.027)	(0.025)	(0.023)	(0.026)	(0.023)
% White		0.010					
		(0.088)					
% Housing Vacant			-0.117				
			(0.214)				
% Armed Forces				-1.192***			
				(0.260)			
% Housing Built After FHA					-0.436***		
					(0.054)		
Total Population (Log)						6.349***	
						(0.926)	
Year Central City reached 50k							
1900 & earlier							17.619
1910-1940							8.669
1950-1960							3.334
1970 and later							-1.624
Constant	33.105***	32.445***	33.809***	35.386***	57.675***	-55.343***	22.709***
	(1.919)	(6.322)	(2.312)	(1.897)	(3.462)	(13.020)	(3.620)
Observations	205	205	205	205	205	205	205

(continued)

Table 15. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Total Number of Cities per 1 Million	-0.016	0.021	-0.004	0.018	-0.028	-0.011	-0.009
	(0.023)	(0.024)	(0.024)	(0.025)	(0.024)	(0.023)	(0.023)
% White		-0.080	-0.032	-0.051	-0.147*	-0.086	-0.087
		(0.075)	(0.069)	(0.077)	(0.071)	(0.070)	(0.070)
% Housing Vacant	1.016***		1.018***	0.558**	0.960***	0.947***	1.020***
	(0.189)		(0.193)	(0.193)	(0.195)	(0.182)	(0.189)
% Armed Forces	-0.616**	-0.681**		-0.784**	-0.791***	-0.712**	-0.684**
	(0.210)	(0.232)		(0.238)	(0.223)	(0.216)	(0.217)
% Housing Built After FHA	-0.409***	-0.285***	-0.430***		-0.361***	-0.481***	-0.416***
	(0.064)	(0.064)	(0.066)		(0.065)	(0.054)	(0.064)
Total Population (Log)	4.151***	3.458**	4.270***	2.508*		4.995***	3.883***
	(0.961)	(1.049)	(0.998)	(1.057)		(0.811)	(0.984)
Year Central City reached 50k							
1900 & earlier	8.679	4.582	9.084	16.774	14.596		8.613
1910-1940	6.534	1.864	6.774	9.419	8.724		6.246
1950-1960	4.861	-0.145	5.195	4.158	5.765		4.531
1970 and later	3.807	-1.215	3.103	1.415	2.722		3.402
Constant	-13.479	5.443	-13.273	-10.883	49.230***	-7.827	-3.109
	(12.835)	(16.256)	(15.273)	(16.754)	(7.871)	(14.159)	(15.280)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 16, below, contains the model analyses for the entropy index and *the total number of cities with a minimum 2,500 population per 1 million MSA residents.* This particular measure of fragmentation produces a very weak relationship with the entropy index that is insignificant in all of the model variations. After a comparative review of this model variation with the models of the previous measures of segregation, there are no real differences. *Year Central City reached 50k* continued to maintain a pattern seen in Table 14. *Year Central City reached 50k* also estimated a .2853 in the Global F test resulting in the variable being insignificant.

Table 17, below, contains the model analyses for the entropy index and *the total number of cities with a minimum 10,000 population per 1 million MSA residents*. This particular measure of fragmentation produces a moderately strong, and somewhat significant relationship, with the entropy index. Its greatest strength, in model 7, which is the model that contains *Year Central City reached 50k* as a control variable, shows that for every unit increase in fragmentation there is a .4 average unit increase in the entropy index. The control variables continue to maintain their direction and significance. *Year Central City reached 50k* proved to be significant at the .1 level in the Global F test.

Table 16. Entropy Analysis with Total Number of Cities 2500 per 1 Million Population

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Total Number of Cities 2500+ per 1 Million	0.073	0.083	0.107	0.054	0.031	0.114	0.133*
	(0.066)	(0.070)	(0.072)	(0.064)	(0.058)	(0.060)	(0.062)
% White		-0.040					
		(0.085)					
% Housing Vacant			-0.269				
			(0.223)				
% Armed Forces				-1.152***			
				(0.260)			
% Housing Built After FHA					-0.426***		
					(0.054)		
Total Population (Log)						5.848***	
						(0.866)	
Year Central City reached 50k							
1900 & earlier							19.452
1910-1940							11.100
1950-1960							5.904
1970 and later							0.304
Constant	29.890***	32.600***	31.019***	32.000***	54.102***	-49.085***	17.573***
	(2.274)	(6.266)	(2.458)	(2.228)	(3.658)	(11.874)	(4.262)
Observations	205	205	205	205	205	205	205

(continued)

Table 16. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Total Number of Cities 2500+ per 1 Million	-0.045	0.099	-0.025	0.080	0.009	-0.059	-0.027
	(0.060)	(0.060)	(0.063)	(0.065)	(0.063)	(0.058)	(0.061)
% White		-0.093	-0.028	-0.061	-0.174*	-0.078	-0.087
		(0.074)	(0.069)	(0.076)	(0.069)	(0.069)	(0.070)
% Housing Vacant	1.042***		1.043***	0.503*	0.890***	1.015***	1.038***
	(0.200)		(0.205)	(0.199)	(0.205)	(0.197)	(0.200)
% Armed Forces	-0.607**	-0.689**		-0.788**	-0.779***	-0.702**	-0.679**
	(0.209)	(0.231)		(0.237)	(0.224)	(0.216)	(0.217)
% Housing Built After FHA	-0.415***	-0.277***	-0.436***		-0.341***	-0.490***	-0.419***
	(0.066)	(0.064)	(0.067)		(0.065)	(0.055)	(0.066)
Total Population (Log)	4.391***	3.121**	4.362***	2.233*		5.157***	4.023***
	(0.929)	(1.020)	(0.989)	(1.023)		(0.778)	(0.974)
Year Central City reached 50k							
1900 & earlier	8.073	6.377	8.722	17.617	15.182		8.239
1910-1940	5.913	3.749	6.396	10.489	9.150		5.862
1950-1960	4.317	1.649	4.846	5.256	6.200		4.192
1970 and later	3.365	0.077	2.887	2.206	2.557		3.136
Constant	-15.723	7.067	-13.819	-8.306	48.343***	-9.590	-4.358
	(11.865)	(15.734)	(14.967)	(16.385)	(8.110)	(13.720)	(14.948)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 17. Entropy Analysis with Total Number of Cities 10k+ per 1 Million Population

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total Number of Cities 10K per 1 Million	0.293	0.293	0.332*	0.375*	0.305*	0.189	0.400**
	(0.158)	(0.159)	(0.162)	(0.151)	(0.138)	(0.146)	(0.142)
% White		-0.003					
		(0.081)					
% Housing Vacant			-0.232				
			(0.209)				
% Armed Forces				-1.238***			
				(0.257)			
% Housing Built After FHA					-0.430***		
					(0.053)		
Total Population (Log)						5.554***	
						(0.871)	
Year Central City reached 50k							
1900 & earlier							19.111
1910-1940							11.098
1950-1960							5.537
1970 and later							-0.051
Constant	28.367***	28.565***	29.757***	28.945***	51.324***	-44.043***	16.752***
	(2.249)	(6.651)	(2.574)	(2.139)	(3.449)	(11.540)	(3.954)
Observations	205	205	205	205	205	205	205

(continued)

Table 17. *Continued*

	(8)	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**
Total Number of Cities 10K per 1 Million	0.209	0.342*	0.156	0.336*	0.321*	0.106	0.204
	(0.131)	(0.136)	(0.134)	(0.141)	(0.131)	(0.125)	(0.131)
% White		-0.062	-0.030	-0.036	-0.155*	-0.094	-0.091
		(0.071)	(0.066)	(0.073)	(0.067)	(0.067)	(0.067)
% Housing Vacant	0.920***		0.964***	0.510**	0.820***	0.881***	0.942***
	(0.186)		(0.191)	(0.189)	(0.189)	(0.183)	(0.187)
% Armed Forces	-0.636**	-0.755**		-0.852***	-0.822***	-0.731***	-0.715**
	(0.209)	(0.230)		(0.235)	(0.221)	(0.218)	(0.217)
% Housing Built After FHA	-0.384***	-0.276***	-0.416***		-0.328***	-0.471***	-0.395***
	(0.063)	(0.063)	(0.065)		(0.063)	(0.053)	(0.064)
Total Population (Log)	3.933***	2.686**	4.026***	1.797		4.982***	3.580***
	(0.956)	(1.032)	(1.004)	(1.034)		(0.791)	(0.989)
Year Central City reached 50k							
1900 & earlier	10.189	7.125	10.194	18.667	16.318		10.051
1910-1940	8.202	4.593	7.976	11.693	10.998		7.806
1950-1960	6.362	2.185	6.249	6.182	7.899		5.904
1970 and later	4.390	0.277	3.554	2.666	3.623		3.979
Constant	-16.202	8.544	-13.699	-7.179	41.603***	-9.119	-3.704
	(11.634)	(15.561)	(14.921)	(16.225)	(8.269)	(13.737)	(14.869)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 18, below, contains the model analyses for the entropy index and *the share of the MSA population residing outside of the largest city*. This particular measure of fragmentation maintains a weak, and somewhat significant, relationship with the entropy index.

Fragmentation maintained significant relationships in the models that contained up to one other control variable but loses significance in models with additional control variables. Its greatest strength, in model 3, which is the model with control variable the percentage of the housing units vacant, shows that for every unit increase in fragmentation there is a .187 average unit increase in the entropy index. The additional control variables continue to maintain their direction and significance in all of the models which indicates that the previous model findings are reliable. *Year Central City reached 50k* estimated a .2054 in the Global F test which proves to be insignificant.

Table 18. Entropy Analysis with MSA Population Share Outside Largest City

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MSA Population Share Residing Outside Largest City	0.173***	0.186***	0.187***	0.135**	0.122**	0.105*	0.147**
	(0.051)	(0.053)	(0.052)	(0.051)	(0.046)	(0.049)	(0.047)
% White		-0.081					
		(0.082)					
% Housing Vacant			-0.279				
			(0.204)				
% Armed Forces				-1.034***			
				(0.260)			
% Housing Built After FHA					-0.408***		
					(0.053)		
Total Population (Log)						5.234***	
						(0.884)	
Year Central City reached 50k							
1900 & earlier							18.778
1910-1940							11.294
1950-1960							5.784
1970 and later							1.100
Constant	20.297***	25.574***	21.638***	24.289***	45.733***	-44.539***	11.668*
	(3.633)	(6.442)	(3.755)	(3.648)	(4.627)	(11.457)	(4.961)
Observations	205	205	205	205	205	205	205

(continued)

Table 18. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
MSA Population Share Residing Outside Largest City	0.002	0.086	0.034	0.089	0.088	-0.012	0.020
	(0.046)	(0.049)	(0.049)	(0.051)	(0.045)	(0.046)	(0.048)
% White		-0.099	-0.049	-0.075	-0.190**	-0.090	-0.101
		(0.075)	(0.070)	(0.077)	(0.068)	(0.070)	(0.070)
% Housing Vacant	0.979***		0.974***	0.516**	0.825***	0.941***	0.981***
	(0.191)		(0.195)	(0.192)	(0.191)	(0.187)	(0.191)
% Armed Forces	-0.593**	-0.656**		-0.752**	-0.722**	-0.710**	-0.669**
	(0.212)	(0.231)		(0.237)	(0.224)	(0.217)	(0.218)
% Housing Built After FHA	-0.399***	-0.274***	-0.417***		-0.329***	-0.478***	-0.405***
	(0.065)	(0.064)	(0.066)		(0.063)	(0.054)	(0.065)
Total Population (Log)	4.321***	2.570*	4.001***	1.659		5.187***	3.787***
	(0.985)	(1.087)	(1.070)	(1.084)		(0.835)	(1.049)
Year Central City reached 50k							
1900 & earlier	8.802	6.563	9.812	18.216	15.713		9.074
1910-1940	6.713	3.871	7.516	11.106	10.403		6.726
1950-1960	5.087	1.425	5.791	5.555	7.292		4.947
1970 and later	3.778	0.146	3.469	2.633	3.657		3.569
Constant	-17.316	11.815	-11.926	-3.862	42.707***	-10.104	-3.373
	(11.689)	(15.781)	(15.195)	(16.538)	(8.370)	(13.943)	(15.133)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 19, below, contains the model analyses for the entropy index and *the share of the MSA population residing within cities*. Fragmentation displayed a weak, but significant, relationship with entropy in model 6. In this model, for every unit increase in the share of the population that resides within cities there is a .136 average unit decrease in the entropy index. The additional control variables continue to maintain identical relationships, as they did in previous model analyses, providing greater confidence in the findings of the previous models. *Year Central City reached 50k* estimated a .2032 in the Global F test which proves to be insignificant.

Table 20, below, contains the model analyses for the entropy index and *the Gini concentration*. Fragmentation, in this model variation, displayed a weak relationship that is insignificant in all of the models. The additional control variables continue to maintain their directional relationships in the models with no real differences than the previous models. *Year Central City reached 50k* estimated a .2490 in the Global F test which proves to be insignificant.

Total Number of Cities 10k per 1 Million MSA residents maintained similar significances seen in model analyses utilizing previous measures of segregation. *Total Number of Cities 10k per 1 Million MSA residents* estimated a 1.55 t-score in model 14 which contains all control variables. This proves to be insignificant on a two-tailed test. On a one-tailed test, *Total Number of Cities 10k per 1 Million MSA residents* proves to be significant at the .1 level. Because of maintenance of patterns seen in previous analyses, fragmentation can thus be stated as having a positive effect on residential segregation with greater confidence

Table 19. Entropy Analysis with MSA Population Share Residing Within Largest City

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MSA Population Share Residing within Cities	0.018	0.018	0.011	0.050	0.030	-0.136*	-0.034
	(0.055)	(0.060)	(0.056)	(0.053)	(0.048)	(0.054)	(0.049)
% White		0.001					
		(0.088)					
% Housing Vacant			-0.131				
			(0.211)				
% Armed Forces				-1.199***			
				(0.261)			
% Housing Built After FHA					-0.430***		
					(0.054)		
Total Population (Log)						6.628***	
						(0.935)	
Year Central City reached 50k							
1900 & earlier							17.791
1910-1940							8.840
1950-1960							3.428
1970 and later							-1.272
Constant	30.867***	30.741**	32.449***	30.138***	53.102***	-46.004***	26.077***
	(4.096)	(9.308)	(4.828)	(3.911)	(4.533)	(11.446)	(4.106)
Observations	205	205	205	205	205	205	205

(continued)

Table 19. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
MSA Population Share Residing within Cities	-0.044	-0.082	-0.078	-0.061	0.007	-0.059	-0.061
	(0.047)	(0.051)	(0.049)	(0.053)	(0.048)	(0.048)	(0.048)
% White		-0.091	-0.063	-0.056	-0.169*	-0.115	-0.113
		(0.074)	(0.069)	(0.076)	(0.071)	(0.069)	(0.069)
% Housing Vacant	0.965***		0.986***	0.564**	0.904***	0.896***	0.983***
	(0.184)		(0.187)	(0.190)	(0.191)	(0.177)	(0.184)
% Armed Forces	-0.560**	-0.652**		-0.767**	-0.782***	-0.676**	-0.646**
	(0.212)	(0.232)		(0.239)	(0.225)	(0.217)	(0.217)
% Housing Built After FHA	-0.398***	-0.294***	-0.427***		-0.344***	-0.471***	-0.411***
	(0.063)	(0.063)	(0.064)		(0.064)	(0.053)	(0.063)
Total Population (Log)	4.691***	3.837***	4.817***	2.736*		5.439***	4.381***
	(1.002)	(1.080)	(1.025)	(1.084)		(0.822)	(1.016)
Year Central City reached 50k							
1900 & earlier	8.886	4.659	9.277	17.048	14.988		8.810
1910-1940	7.026	2.275	7.313	9.826	8.944		6.725
1950-1960	5.483	0.317	5.851	4.517	5.999		5.126
1970 and later	4.249	-0.316	3.873	2.104	2.428		3.956
Constant	-19.167	8.547	-13.146	-8.456	47.979***	-8.165	-4.282
	(11.835)	(15.709)	(14.883)	(16.394)	(9.042)	(13.745)	(14.894)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 20. Entropy Analysis with Gini Concentration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gini Concentration	-0.112	-0.113	-0.108	-0.067	-0.106	-0.033	0.026
	(0.084)	(0.085)	(0.085)	(0.081)	(0.074)	(0.078)	(0.076)
% White		-0.016					
		(0.081)					
% Housing Vacant			-0.118				
			(0.206)				
% Armed Forces				-1.139***			
				(0.261)			
% Housing Built After FHA					-0.428***		
					(0.054)		
Total Population (Log)						5.622***	
						(0.880)	
Year Central City reached 50k							
1900 & earlier							17.399
1910-1940							8.502
1950-1960							2.981
1970 and later							-1.740
Constant	34.997***	36.235***	35.866***	35.360***	57.837***	-41.656***	23.287***
	(2.313)	(6.749)	(2.768)	(2.219)	(3.500)	(12.182)	(3.859)
Observations	205	205	205	205	205	205	205

(continued)

Table 20. ***Continued***

	(8)	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**
Gini Concentration	-0.000	-0.002	-0.023	0.057	-0.016	-0.044	-0.010
	(0.067)	(0.072)	(0.068)	(0.073)	(0.069)	(0.064)	(0.067)
% White		-0.064	-0.038	-0.032	-0.174*	-0.099	-0.095
		(0.073)	(0.067)	(0.074)	(0.068)	(0.068)	(0.068)
% Housing Vacant	0.982***		1.012***	0.588**	0.902***	0.932***	1.003***
	(0.184)		(0.188)	(0.189)	(0.189)	(0.176)	(0.184)
% Armed Forces	-0.595**	-0.694**		-0.807***	-0.776***	-0.694**	-0.676**
	(0.210)	(0.233)		(0.238)	(0.224)	(0.217)	(0.217)
% Housing Built After FHA	-0.400***	-0.291***	-0.431***		-0.346***	-0.478***	-0.413***
	(0.063)	(0.064)	(0.065)		(0.064)	(0.053)	(0.064)
Total Population (Log)	4.336***	3.254**	4.295***	2.373*		5.024***	3.958***
	(0.928)	(1.024)	(0.979)	(1.025)		(0.787)	(0.964)
Year Central City reached 50k							
1900 & earlier	8.754	4.311	8.861	17.298	14.906		8.544
1910-1940	6.662	1.551	6.547	9.934	8.848		6.185
1950-1960	5.046	-0.527	5.082	4.360	5.973		4.544
1970 and later	3.750	-1.264	3.045	1.614	2.465		3.326
Constant	-17.307	8.878	-12.533	-11.463	49.405***	-6.892	-3.826
	(11.954)	(16.272)	(15.443)	(16.841)	(8.571)	(14.263)	(15.367)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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)

Correlation Ratio and Fragmentation

The final measure of segregation is the correlation ratio. This measure of segregation is used in this section to determine the accuracy of the previous model analyses utilizing *dissimilarity, Gini,* and *entropy*. The goal is to identify similarities and differences across the previous model analyses to determine the reliability of the findings. Fragmentation continued to maintain similar patterns seen in previous model analyses.

This particular section will provide greater focus on the fragmentation measure as opposed to the control variables. The control variable discussion will be limited because their relationship continues to be maintained and is nearly identical to that of the previous models, with the exception of *percent white*. The percentage of the population that is white is beginning to display a moderate, negative, relationship with the correlation ratio that is mostly significant. In every model analysis, the percentage of the population that is white produced significant results, where for every unit increase in *percent white* there would be a decrease in the correlation ratio.

The *total number of cities per 1 million MSA residents* (Table 21) and the *total number of cities with a minimum 2,500 population per 1 million MSA residents* (Table 22) displayed weak, insignificant, relationships. The *total number of cities with a minimum 10,000 population per 1 million MSA residents* (Table 23) displayed moderately strong, and positive, relationships that were mostly significant. Its greatest strength, in model 7, for every unit increase in fragmentation the correlation ratio increased an average of .477 units. The *MSA population share residing outside of the* *largest city* (Table 24) estimated a weak to moderate relationship with the correlation ratio that is significant in three models. Its greatest strength, in model 2, shows that for every unit increase in fragmentation there is a .201 average unit increase in the correlation ratio. The *MSA population share residing within largest city* (Table 25) estimated insignificant results in every model. The *Gini concentration* (Table 26) also estimated insignificant results.

Year Central City reached 50k maintained a similar pattern seen in previous model equations. MSAs with older central cities had greater levels of residential segregation than MSAs whose central city was younger. In the Global F test, *Year Central City reached 50k* proved to be insignificant in all of the models with the exception of Table 23. Table 23 contains *Total Number of Cities 10k per 1 million MSA residents*. In this table, *Year Central City reached 50k* estimated a .0977 which proves to be significant at the .1 level.

Total Number of Cities 10k per 1 million MSA residents estimated a 1.34 t-value in model 14 which contains all control variables. This proves to be insignificant in a two-tailed test but significant at the .1 level in a one-tailed test. Fragmentation continues to maintain direction and strength as seen in previous models allowing one to conclude with greater confidence that as fragmentation increases in an MSA so will the amount of residential segregation.

Table 21. Correlation Ratio Analysis with Total Number of Cities per 1 Million Population

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Total Number of Cities per 1 Million	-0.043	-0.016	-0.044	-0.053	-0.059*	0.029	-0.010
	(0.031)	(0.034)	(0.033)	(0.031)	(0.029)	(0.031)	(0.029)
% White		-0.215*					
		(0.104)					
% Housing Vacant			0.039				
			(0.254)				
% Armed Forces				-1.127***			
				(0.315)			
% Housing Built After FHA					-0.408***		
					(0.068)		
Total Population (Log)						7.063***	
						(1.115)	
Year Central City reached 50k							
1900 & earlier							19.021
1910-1940							9.453
1950-1960							3.875
1970 and later							-0.864
Constant	34.799***	49.467***	34.563***	36.956***	57.782***	-63.592***	23.438***
	(2.277)	(7.425)	(2.746)	(2.294)	(4.355)	(15.671)	(4.476)
Observations	205	205	205	205	205	205	205

(continued)

Table 21. ***Continued***

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Total Number of Cities per 1 Million	-0.039	0.023	-0.007	0.013	-0.031	-0.015	-0.013
	(0.029)	(0.030)	(0.030)	(0.031)	(0.029)	(0.029)	(0.029)
% White		-0.313**	-0.257**	-0.287**	-0.380***	-0.317***	-0.321***
		(0.094)	(0.087)	(0.093)	(0.088)	(0.088)	(0.088)
% Housing Vacant	1.212***		1.226***	0.783***	1.169***	1.146***	1.228***
	(0.246)		(0.243)	(0.234)	(0.243)	(0.230)	(0.239)
% Armed Forces	-0.538	-0.786**		-0.886**	-0.895**	-0.821**	-0.790**
	(0.274)	(0.292)		(0.290)	(0.278)	(0.274)	(0.274)
% Housing Built After FHA	-0.377***	-0.243**	-0.417***		-0.347***	-0.495***	-0.400***
	(0.083)	(0.080)	(0.082)		(0.081)	(0.068)	(0.081)
Total Population (Log)	4.801***	3.299*	4.258***	2.488		5.398***	3.812**
	(1.250)	(1.317)	(1.256)	(1.284)		(1.026)	(1.243)
Year Central City reached 50k							
1900 & earlier	11.560	6.462	11.859	19.175	17.188		11.315
1910-1940	8.590	2.250	8.135	10.581	9.958		7.525
1950-1960	6.316	-0.528	5.868	4.742	6.313		5.102
1970 and later	5.395	-1.656	3.558	1.990	3.235		3.903
Constant	-26.208	22.335	0.303	4.552	63.413***	3.793	12.040
	(16.691)	(20.412)	(19.216)	(20.362)	(9.795)	(17.918)	(19.302)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 22. Correlation Ratio Analysis with Total Number of Cities 2500 per 1 Million Population

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total Number of Cities 2500+ per 1 Million	0.013	0.079	0.024	-0.004	-0.025	0.062	0.073
	(0.079)	(0.082)	(0.086)	(0.077)	(0.074)	(0.073)	(0.077)
% White		-0.263**					
		(0.100)					
% Housing Vacant			-0.080				
			(0.267)				
% Armed Forces				-1.076***			
				(0.316)			
% Housing Built After FHA					-0.397***		
					(0.068)		
Total Population (Log)						6.761***	
						(1.042)	
Year Central City reached 50k							
1900 & earlier							20.514
1910-1940							11.255
1950-1960							5.865
1970 and later							0.354
Constant	31.656***	49.641***	31.992***	33.627***	54.198***	-59.639***	18.995***
	(2.718)	(7.367)	(2.947)	(2.712)	(4.629)	(14.290)	(5.314)
Observations	205	205	205	205	205	205	205

(continued)

Table 22. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Total Number of Cities 2500+ per 1 Million	-0.123	0.096	-0.057	0.046	-0.023	-0.094	-0.060
	(0.078)	(0.075)	(0.079)	(0.079)	(0.078)	(0.073)	(0.077)
% White		-0.323***	-0.248**	-0.290**	-0.403***	-0.301***	-0.315***
		(0.093)	(0.086)	(0.093)	(0.086)	(0.088)	(0.088)
% Housing Vacant	1.297***		1.287***	0.756**	1.132***	1.261***	1.281***
	(0.260)		(0.257)	(0.243)	(0.255)	(0.249)	(0.253)
% Armed Forces	-0.521	-0.796**		-0.891**	-0.884**	-0.807**	-0.784**
	(0.271)	(0.290)		(0.289)	(0.279)	(0.273)	(0.274)
% Housing Built After FHA	-0.394***	-0.236**	-0.430***		-0.333***	-0.511***	-0.412***
	(0.085)	(0.080)	(0.084)		(0.081)	(0.069)	(0.083)
Total Population (Log)	5.393***	2.943*	4.447***	2.299		5.627***	4.056**
	(1.206)	(1.283)	(1.244)	(1.246)		(0.983)	(1.229)
Year Central City reached 50k							
1900 & earlier	9.864	8.169	11.024	19.676	17.468		10.468
1910-1940	6.833	4.038	7.262	11.190	9.961		6.646
1950-1960	4.753	1.161	5.054	5.344	6.324		4.300
1970 and later	4.201	-0.407	3.080	2.455	2.784		3.368
Constant	-30.983*	24.397	-0.624	6.418	63.431***	1.412	10.295
	(15.401)	(19.805)	(18.815)	(19.958)	(10.084)	(17.336)	(18.865)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 23. Correlation Ratio Analysis with Total Number of Cities 10k+ per 1 Million Population

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total Number of Cities 10K per 1 Million	0.347	0.328	0.373	0.423*	0.358*	0.225	0.477**
	(0.189)	(0.187)	(0.194)	(0.184)	(0.175)	(0.174)	(0.176)
% White		-0.227*					
		(0.095)					
% Housing Vacant			-0.155				
			(0.250)				
% Armed Forces				-1.156***			
				(0.313)			
% Housing Built After FHA					-0.396***		
					(0.067)		
Total Population (Log)						6.520***	
						(1.041)	
Year Central City reached 50k							
1900 & earlier							21.560
1910-1940							13.078
1950-1960							7.407
1970 and later							1.262
Constant	27.575***	45.079***	28.506***	28.114***	48.723***	-57.424***	13.804**
	(2.679)	(7.816)	(3.074)	(2.604)	(4.369)	(13.791)	(4.892)
Observations	205	205	205	205	205	205	205

(continued)

Table 23. ***Continued***

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Total Number of Cities 10K per 1 Million	0.241	0.389*	0.167	0.348*	0.337*	0.108	0.222
	(0.171)	(0.171)	(0.168)	(0.172)	(0.163)	(0.158)	(0.166)
% White		-0.292**	-0.257**	-0.275**	-0.390***	-0.327***	-0.327***
		(0.090)	(0.084)	(0.089)	(0.084)	(0.085)	(0.085)
% Housing Vacant	1.060***		1.163***	0.726**	1.018***	1.073***	1.137***
	(0.244)		(0.241)	(0.231)	(0.236)	(0.232)	(0.236)
% Armed Forces	-0.535	-0.870**		-0.952**	-0.927***	-0.840**	-0.822**
	(0.273)	(0.289)		(0.287)	(0.276)	(0.276)	(0.274)
% Housing Built After FHA	-0.336***	-0.232**	-0.401***		-0.311***	-0.483***	-0.376***
	(0.083)	(0.079)	(0.082)		(0.078)	(0.067)	(0.081)
Total Population (Log)	4.777***	2.426	4.018**	1.807		5.419***	3.506**
	(1.249)	(1.300)	(1.265)	(1.260)		(1.002)	(1.252)
Year Central City reached 50k							
1900 & earlier	13.391	9.359	13.057	21.103	19.029		12.893
1910-1940	10.668	5.359	9.434	12.944	12.365		9.240
1950-1960	8.275	2.129	7.016	6.885	8.574		6.620
1970 and later	5.997	0.042	4.024	3.262	4.163		4.512
Constant	-34.075*	25.793	-0.484	7.691	55.368***	1.948	11.002
	(15.198)	(19.589)	(18.793)	(19.781)	(10.330)	(17.396)	(18.815)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 24. Correlation Ratio Analysis with MSA Population Share Residing Outside Largest City

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MSA Population Share Residing Outside Largest City	0.151*	0.201**	0.159*	0.115	0.103	0.068	0.123*
	(0.062)	(0.063)	(0.063)	(0.062)	(0.059)	(0.059)	(0.059)
% White		-0.312**					
		(0.097)					
% Housing Vacant			-0.170				
			(0.247)				
% Armed Forces				-0.962**			
				(0.319)			
% Housing Built After FHA					-0.377***		
					(0.068)		
Total Population (Log)						6.383***	
						(1.065)	
Year Central City reached 50k							
1900 & earlier							20.597
1910-1940							12.226
1950-1960							6.643
1970 and later							1.607
Constant	21.750***	42.018***	22.569***	25.466***	45.259***	-57.323***	12.209
	(4.384)	(7.601)	(4.548)	(4.472)	(5.908)	(13.803)	(6.210)
Observations	205	205	205	205	205	205	205

(continued)

Table 24. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
MSA Population Share Residing Outside Largest City	-0.040	0.099	0.036	0.086	0.087	-0.019	0.020
	(0.060)	(0.062)	(0.061)	(0.062)	(0.056)	(0.058)	(0.060)
% White		-0.336***	-0.278**	-0.313***	-0.426***	-0.320***	-0.338***
		(0.094)	(0.088)	(0.093)	(0.084)	(0.089)	(0.089)
% Housing Vacant	1.177***		1.174***	0.737**	1.028***	1.143***	1.182***
	(0.249)		(0.245)	(0.234)	(0.239)	(0.237)	(0.241)
% Armed Forces	-0.519	-0.757**		-0.852**	-0.825**	-0.820**	-0.773**
	(0.276)	(0.291)		(0.289)	(0.279)	(0.274)	(0.275)
% Housing Built After FHA	-0.369***	-0.231**	-0.402***		-0.312***	-0.492***	-0.388***
	(0.085)	(0.080)	(0.083)		(0.079)	(0.068)	(0.082)
Total Population (Log)	5.529***	2.284	3.998**	1.712		5.673***	3.751**
	(1.284)	(1.366)	(1.346)	(1.321)		(1.057)	(1.326)
Year Central City reached 50k							
1900 & earlier	10.872	8.754	12.632	20.538	18.356		11.781
1910-1940	7.971	4.573	8.927	12.210	11.655		8.014
1950-1960	6.007	1.294	6.514	6.122	7.861		5.539
1970 and later	4.738	-0.086	3.924	3.143	4.128		4.040
Constant	-35.223*	29.558	1.375	10.783	56.890***	0.601	11.252
	(15.231)	(19.833)	(19.126)	(20.141)	(10.447)	(17.644)	(19.122)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 25. Correlation Analysis with MSA Population Share Residing Within Largest City

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MSA Population Share Residing within Cities	0.053	-0.008	0.052	0.083	0.064	-0.122	-0.004
	(0.066)	(0.070)	(0.067)	(0.064)	(0.061)	(0.065)	(0.061)
% White		-0.238*					
		(0.104)					
% Housing Vacant			-0.012				
			(0.251)				
% Armed Forces				-1.129***			
				(0.317)			
% Housing Built After FHA					-0.397***		
					(0.068)		
Total Population (Log)						7.519***	
						(1.125)	
Year Central City reached 50k							
1900 & earlier							19.355
1910-1940							9.775
1950-1960							4.259
1970 and later							-0.716
Constant	28.249***	50.832***	28.394***	27.562***	48.780***	-58.954***	22.829***
	(4.873)	(10.932)	(5.749)	(4.743)	(5.723)	(13.772)	(5.079)
Observations	205	205	205	205	205	205	205

(continued)

Table 25. ***Continued***

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
MSA Population Share Residing within Cities	-0.033	-0.114	-0.107	-0.088	-0.018	-0.088	-0.088
	(0.062)	(0.064)	(0.061)	(0.064)	(0.059)	(0.060)	(0.061)
% White		-0.332***	-0.302***	-0.304**	-0.416***	-0.359***	-0.359***
		(0.093)	(0.086)	(0.092)	(0.088)	(0.088)	(0.087)
% Housing Vacant	1.118***		1.178***	0.774***	1.094***	1.074***	1.176***
	(0.240)		(0.235)	(0.230)	(0.237)	(0.224)	(0.232)
% Armed Forces	-0.462	-0.742*		-0.851**	-0.876**	-0.768**	-0.736**
	(0.277)	(0.291)		(0.289)	(0.279)	(0.274)	(0.274)
% Housing Built After FHA	-0.353***	-0.253**	-0.412***		-0.325***	-0.481***	-0.394***
	(0.082)	(0.079)	(0.080)		(0.079)	(0.067)	(0.079)
Total Population (Log)	5.511***	3.878**	5.024***	2.952*		6.046***	4.528***
	(1.309)	(1.354)	(1.288)	(1.315)		(1.038)	(1.282)
Year Central City reached 50k							
1900 & earlier	11.839	6.636	12.131	19.494	17.985		11.599
1910-1940	9.171	2.896	8.885	11.189	10.511		8.216
1950-1960	7.090	0.210	6.785	5.376	6.862		5.960
1970 and later	5.638	-0.400	4.613	2.933	3.129		4.707
Constant	-36.758*	25.741	0.314	6.402	64.421***	3.562	10.402
	(15.462)	(19.690)	(18.702)	(19.880)	(11.244)	(17.368)	(18.792)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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 26. Correlation Ratio Analysis with Gini Concentration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gini Concentration	-0.134	-0.150	-0.133	-0.093	-0.128	-0.041	0.014
	(0.100)	(0.099)	(0.101)	(0.099)	(0.093)	(0.093)	(0.094)
% White		-0.243*					
		(0.095)					
% Housing Vacant			-0.026				
			(0.246)				
% Armed Forces				-1.037**			
				(0.317)			
% Housing Built After FHA					-0.394***		
					(0.068)		
Total Population (Log)						6.597***	
						(1.051)	
Year Central City reached 50k							
1900 & earlier							19.389
1910-1940							9.832
1950-1960							4.264
1970 and later							-0.765
Constant	35.456***	54.370***	35.644***	35.786***	56.465***	-54.493***	22.127***
	(2.756)	(7.915)	(3.301)	(2.694)	(4.429)	(14.558)	(4.769)
Observations	205	205	205	205	205	205	205

(continued)

Table 26. *Continued*

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Gini Concentration	-0.003	-0.029	-0.053	0.026	-0.045	-0.078	-0.039
	(0.087)	(0.090)	(0.086)	(0.088)	(0.086)	(0.081)	(0.084)
% White		-0.298**	-0.269**	-0.274**	-0.413***	-0.336***	-0.335***
		(0.091)	(0.084)	(0.090)	(0.085)	(0.086)	(0.086)
% Housing Vacant	1.131***		1.215***	0.804***	1.106***	1.130***	1.205***
	(0.239)		(0.236)	(0.230)	(0.235)	(0.223)	(0.232)
% Armed Forces	-0.487	-0.796**		-0.901**	-0.872**	-0.792**	-0.774**
	(0.274)	(0.292)		(0.289)	(0.279)	(0.274)	(0.274)
% Housing Built After FHA	-0.355***	-0.253**	-0.421***		-0.334***	-0.493***	-0.400***
	(0.083)	(0.081)	(0.082)		(0.080)	(0.067)	(0.081)
Total Population (Log)	5.242***	3.061*	4.293***	2.373		5.398***	3.909**
	(1.210)	(1.285)	(1.232)	(1.246)		(0.995)	(1.218)
Year Central City reached 50k							
1900 & earlier	11.709	5.880	11.331	19.449	17.251		10.969
1910-1940	8.865	1.612	7.597	10.814	9.812		7.182
1950-1960	6.742	-1.125	5.587	4.793	6.381		4.970
1970 and later	5.257	-1.756	3.440	2.104	2.911		3.762
Constant	-35.237*	27.599	2.362	4.930	64.891***	6.235	12.328
	(15.594)	(20.419)	(19.418)	(20.479)	(10.654)	(18.029)	(19.405)
Observations	205	205	205	205	205	205	205

Note: Regression coefficients with standard errors in parentheses. Year Central City reached 50k 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)

CHAPTER VII

CONCLUSION

The results of this thesis show that as political fragmentation increases in an MSA, so will the amount of residential segregation. Political fragments are conceptualized as "autonomous jurisdictions", "administrative boundaries", and any type of boundary that complements "urban sorting" (Bischoff 2008:182; Weiher 1991:166). Utilizing CDPs from the U.S. Decennial Census, I was able to operationalize fragmentation in several ways, some of which were commonly used methods in previous research.

A goal of this thesis was to consider alternative measures of fragmentation. The results show that the operationalization of fragmentation will greatly influence whether analysis will detect effects of fragmentation or not. Alternative measures of fragmentation are not interchangeable and vary in terms of conceptual rigor and appeal. Alternative measures of fragmentation also vary in the strength of their relationships with segregation. Based on my analyses, I conclude that some measures of fragmentation are more useful than others while others are less useful. I concluded that the operationalization of political fragmentation as the *total number of cities per 1 million MSA residents* and the *total number of cities with a minimum 2,500 population per 1 million MSA residents* were least ideal to measure fragmentation. The issue at hand is that a CDP can have a small-to-zero population, thus negating the concept of population density. Fragmentation measures can become corrupt, and useless, if CDPs with zero to small populations are included in the operationalization.

A measure of fragmentation that was quite useful for this study was the *total number of cities with a minimum 10,000 population per 1 million MSA residents*. This operationalization is more defensible on conceptuality and methodological grounds. In addition, the findings based on this measure suggest that fragmentation may very well have a positive effect on residential segregation. Utilizing this measure of fragmentation, residential segregation remained consistently positive. In conjunction with all control variables, this measure of fragmentation did not reach significance at the two-tailed 0.05 level, but does reach significance at the one-tailed 0.10 level. Attaining statistical significance at the conventional 0.05 level for the effect of *total number of cities with a minimum 10,000 population per 1 million MSA residents* varied across model specifications involving different combinations of control variables. The direction of the effect was always positive and always attained statistical significance at the less demanding 0.10 level. Given this pattern in the results, it is quite possible that, including a greater number of data points may increase the confidence of fragmentation.

Investigating the effects of different measures of fragmentation allowed for greater overall confidence in understanding the nature of its relationship with residential segregation. Based on the full array of results reviewed in this study, I conclude that the evidence suggests that fragmentation has positive effects on residential segregation when it is operationalized in a way that is most appropriate on conceptual and methodological grounds. Accordingly, I conclude that as the number of political fragments increase in an MSA, so will the amount of residential segregation between blacks and non-Hispanic whites.

Multicollinearity

Fragmentation varying in level of statistical significance across different model specifications was cause for concern that there may have been an issue of multicollinearity (O'Brien 2007:673). In the analyses, *percentage of the labor force in the armed forces, percentage of housing units built post-FHA,* and *year central city reached 50k* had varying effects on fragmentation. For example, in models 7, 9, 11, and 12, fragmentation may be significant with *year central city reached 50k,* but is insignificant in model 13, when *year central city reached 50k* is removed from the equation.

Tolerance tests were conducted to test the presence of multicollinearity in the analyses. In this, each control variable was taken as the dependent variable in any analysis where it is regressed on the other independent variables in the model. These regressions help indicate whether there would be sufficient amount of variance left in each independent variable to test the hypothesis (O'Brien 2007:674). If the tolerance value became too low it could signify the presence of multicollinearity and further tests would be needed (O'Brien 2007:674). The tolerance tests performed in this study indicate that multicollinearity was not an issue. The proportion of variance left in each independent variable net of its associations with the other independent variables was sufficient to determine multicollinearity a non-issue.

Tolerance and power

Tolerance analysis speaks to the question of what proportion of the initial variation in the independent variable remains "available", after controls are introduced, to be used to estimate the relationship between the dependent variable and the independent variable of interest. Tolerance tests are an appropriate first step, but they do not directly answer the questions of (a) whether the initial variation in the independent variable was adequate for assessing its relationship with the dependent variable, and (b) whether the remaining variation net of controls is adequate for assessing its relationship with the dependent variable.

A more rigorous answer to these questions would require that one conduct a formal "power analysis" to determine if substantively meaningful effects can be found under the study design. Formal power tests first require that one establish the minimum effect (minimum value of the regression coefficient) that is meaningful for the purposes of the study, and then perform a mathematical analysis to determine whether study design elements, such as variation in the independent variable and sample size, will sustain reliable detection of this effect in statistical analysis. Rigorous power analysis in the context of multivariate controls is complex and beyond the scope of this study.

A more rudimentary approach is to examine the initial variation in the independent variable and compare that with the variation remaining after it is regressed on controls. Two relevant statistics to consider are the standard deviation for the initial independent variable and the standard deviation of the residuals from the relevant tolerance regression. The residuals from the tolerance regression indicate the variation in the independent variable that is free of association with the control variables. One then considers whether the variation in the independent variable indicated by these statistics is adequate for testing the relationship between the dependent variable and the independent variable at the level of statistical significance desired.

For perspective, one may also examine the interdecile range for the distribution of the initial values of the independent variable and for the distribution of the residuals from the regression equation. Intuitively, one considers the question of whether the magnitude of the difference between cases with low and high values on the independent variable – as measured by the interdecile range – is large enough create a meaningful difference on the dependent variables.

Rigorous power analysis is especially important when one wishes to conclude that “null” findings – that is, findings of no effect – are trustworthy and are not readily attributed to inadequate study design. I view this as a lesser priority for future research. The findings for fragmentation here show that it consistently has effects that are either statistically significant or are “near” statistical significance at conventional levels. Based on this I believe the first priority for future research should be to focus attention on improving sample design by gather more data points (i.e., increasing sample size) and seeking further improvements in the measurement of fragmentation to better capture its effects. If at that point fragmentation continues to fail to consistently attain statistical significance, rigorous power analysis may be appropriate at that point to better establish that the finding of non-significant effects is “real”. For now, however, the evidence suggests to me that fragmentation impacts segregation and that the effect may become clearer in future studies that improve the study design for assessing the impacts of fragmentation. I now note limitations of the current study design and how they might be improved in future studies.

Limitations

This study was an attempt to measure the effect political fragmentation has on residential segregation in the U.S. It was a concerted effort to cover disputes that may arise in the design of the study, but still recognizes its limitations. Political fragmentation, or the measure of jurisdictions and municipalities, is a phenomenon that has intrigued social researchers for many decades. CDPs used in this study may not have been an ideal measure of fragmentation since they do not reflect actual administrative boundaries within an MSA. Alternative measures of fragmentation can be used in future research that will incorporate administrative boundaries in their operationalization.

In addition, researchers have used several ways to measure residential segregation. Currently, there is a consensus that the dissimilarity index provides a fruitful way of measuring the degree to which two groups are segregated in an MSA. It is widely used and accepted. Unfortunately, it is recognized that the dissimilarity index can be biased, especially when trying to measure small populations. In an effort to reduce bias, sample criteria was set for the study to remove MSAs with small populations. This requirement removes over a hundred MSAs from the analysis, thus limiting the study further.

These limitations present a direction for future research. An analysis attempting to test the same hypothesis could use a measure of fragmentation that uses actual count data of the municipalities and other jurisdictions within an MSA. Fragmentation may also be measured utilizing school districts across the U.S., as they do vary in size and shape across metropolitan areas. School districts may be few and large in some metropolitan areas while small and many in other metropolitan areas. Fragmentation may also be measured by a metropolitan's use of zoning regulations. Utilizing zoning regulations would limit a researcher to a single or few metropolitan areas. This would be due to the extensive amount of research needed in each incorporated location's planning department. In addition, the use a segregation measure that is less biased would be fruitful to the analysis. A segregation measure that would allow small populations to be measured without bias would be ideal. This would allow all of the MSAs in the U.S. to be analyzed. Increasing the sample size in this manner could alter the results of the analysis or strengthen the findings of this thesis.

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