Residential Segregation of Blacks In Virginia

Cities:

Assessing Socioeconomic Factors

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(ABSTRACT)

Using data from the 1990 Census of Population and Housing, the relationship between socioeconomic status and residential distribution was examined for the black population in four Virginia cities, Lynchburg, Roanoke, Norfolk, and Richmond.

Three indexes were employed to measure degrees of segregation at the census tract level. These indexes were, dissimilarity, interaction, and isolation. The dissimilarity index is a measure of the evenness of residential distribution of minority members. The interaction index is a measure of the probability of minority residential contact with majority members. The isolation index is a measure of the probability of residential isolation of minority members. Census tracts were classified according to the extent of racial changes that took place in these tracts. Socioeconomic status of black
residents was measured over two dimensions: education and income. The association between minority socioeconomic achievement and degrees of segregation was estimated with multiple regression.

A majority of the regression results supported the human ecology theory that minority spatial assimilation is an outcome of socioeconomic achievements. Findings also suggested that the relationship between minority socioeconomic status and degrees of segregation did not vary in strength in the hierarchical pattern predicted by previous human ecology studies of segregation. The findings provide a minor departure from the traditional theory of human ecology. The regression models estimating the effects of socioeconomic variables on residential dissimilarity and residential isolation showed statistical significance. The regression models estimating the effects of socioeconomic variables on residential contact did not show statistical significance. This might suggest that present measures of residential segregation and socioeconomic status need to improved.
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Chapter One  Statement of the Problem

Patterns of racially segregated housing in American cities trace their historical and political foundations to legal restrictions enacted following the Civil War. The abolition of slavery and the availability of employment in urban areas resulted in the movement of blacks into urban centers. Laws were enacted which restricted black citizens to specific areas within the cities. Similar legislative actions limited access of blacks to other community services.

During the past several decades, a number of legislative changes and judicial decisions have had an impact on white-black interaction patterns. At the turn of this century, the U.S. Supreme Court, in Plessy V. Ferguson case, confirmed a Louisiana law requiring racial segregation on common carriers. The ruling held that separate but equal accommodations did not violate the equal-protection clause of the Fourteenth Amendment. The principle of separate-but-equal was later extended to cover schools, parks, playgrounds, hotels, places of amusement, restaurants, and all types of public transportation facilities (Cushman 1953).

In the Brown v. Topeka County Board of Education case of 1954, the U.S. Supreme Court overruled its earlier decisions
that had supported racial segregation in public schools. The public-school decision of the Supreme Court opened the way for further legal attacks on segregated facilities. On March 14, 1955, the U.S. Fourth Circuit Court of Appeals in Richmond, Virginia, overruled a decision of the federal district court at Baltimore that supported segregation in public recreational facilities. By the year of 1955, public libraries and museums in several southern cities had opened on a nonsegregated basis (Woodward 1955). On July 14, 1955, in a Columbia, South Carolina bus case, the Circuit Court of Appeals in Richmond, Virginia, held that the Supreme Court decree banning segregation in public school should also be applied to cases including transportation. By 1957 bus segregation was prohibited in more than twenty cities in the South, including Lynchburg, Richmond, and Roanoke, Virginia (Yinger 1958). Civil rights statutes were enacted in twenty-two states by 1957; Virginia was one of the states with civil rights statutes. In 1964, a federal Civil Rights Act outlawed racial discrimination in public accommodations, supported the integration of schools, banned discrimination involving federal funds and prohibited discrimination in employment. The Voting Rights Act of 1965 brought the minority groups into the electoral process.
In 1917, residential segregation laws were declared unconstitutional by the U.S. Supreme Court. In its decision in a Louisville, Kentucky case, segregation laws were held to violate the Fourteenth Amendment (Yinger 1958). In 1925, the Court dismissed a similar ordinance in New Orleans, which eluded the prohibition on racial segregation. By referring to its (the local Court) decision in the Louisville case, the ordinance ruled the entry of a minority member into white residential areas to be legal only upon written consent of the residents (Yinger 1958).

Racial discrimination in housing has taken many forms since 1917. Besides paying more rent and higher purchase prices for poorer housing, blacks in urban centers usually had more difficulties in arranging mortgage loans with higher interest rates. Accesses to extension utilities might be denied. But most commonly, housing segregation was brought about by racially restrictive covenants (Yinger 1958).

Segregation in housing resulted in more and more black overcrowding, and more squalor, as the black populations of urban centers continued to grow (Yinger 1958). Prior to 1948, racially discriminatory covenants could be enforced in state courts. In 1948, the Supreme Court ruled that restrictive covenants deny equal protection of the laws
guaranteed by the Fourteenth Amendment. The ruling, however, did not prohibit restrictive covenants completely. According to the Court,

"the right to own, use, and enjoy property are civil rights intended to be protected from discriminatory state action by the Fourteenth Amendment" (Miller 1948).

The Court further contended that restrictive covenants standing alone did not violate the rights guaranteed by the Fourteenth Amendment (Yinger 1958). Despite the limited nature of the Supreme Court 1948 decision, the legal status of restrictive covenants changed.

In 1949, under the pressure from civil rights groups and the attorney general, the Federal Housing Administration ruled that it would not insure mortgages on properties with racially restrictive covenants that had been placed on them after February, 1950. In the same year, a comprehensive housing act was passed by Congress, which provided for urban redevelopment projects. The redevelopment program was designed primarily for private agencies, but public housing authorities could benefit from project subsidies (Abrams 1955).

The Housing Act of 1954 amended existing housing laws. The Act held that nondiscrimination applies to publicly assisted redevelopment and urban renewal programs (McGraw
1955). This decades-long black struggle for equal housing legislation eventually reached its culmination when the Civil Rights Act of 1968 banned racial discrimination in the sale or rental of housing (Farley 1970).

While the legal basis for housing segregation was removed by legislative and judicial actions, the result was not an immediate change in housing patterns. The objective of this study is to examine the extent to which disproportional representation of racial groups is found in census tracts within metropolitan areas.
Chapter 2. Literature Review

There is no principle readily available to categorize the literatures on residential segregation simply because of the variety and complexity of the topic. Literatures to be introduced in this chapter are arranged generally in time order and with respect to their theoretical as well as methodological contributions. The chapter consists of two parts. In the first part, a variety of studies, representing different theoretical interests and emphases on segregation are introduced. The second part of the chapter elaborates on the introduction of the theory of spatial assimilation. Most of the important literatures concerning the theory are introduced to details because this study itself is, in part, a replication of prior ecological models.

I. Studies of Residential Segregation

A voluminous literature concerning the subject of racial residential segregation has been generated over the past several decades by social scientists in several disciplines. The term, "racial residential segregation" refers to the uneven spatial distribution of minority populations within
metropolitan areas. To study the issue, two questions will be asked inevitably:

1). How do we measure the degree of residential segregation?
2). How are various social factors contributing to the segregation patterns?

The impact of interracial socioeconomic inequity on the social and spatial mobility of blacks was studied in the early 1960s (Ballweg and Garbin 1965). Using a sample of a group of Negro and white workers from a midwestern city, the mobility of Negro and white workers was compared (Ballweg and Garbin 1965). The conclusions were consistent with an earlier study (Ballweg and Garbin, 1963). The conclusive findings were that controlling for age, years of job seniority, and education attainment, a significantly larger proportion of whites were upwardly mobile while a larger proportion of Negros were non-upwardly mobile (Ballweg and Garbin 1965).

Studies using the 1970 census data revealed high levels of black segregation and little change from 1960 situation (Sorensen et al. 1975; Van Valey et al. 1977). It should be noted that fair housing laws had little time to affect residential distribution by that time, let alone to reshape it completely.
A change in racial attitudes among whites had been found over the course of the two decades; a steady decline in the percentage of whites opposed to residential integration has been found (Greeley and Sheatsley 1974; Taylor et al. 1978). It has also been detected that, to a great extent, discrimination based on pure racial prejudice gave way to the discrimination based on social and economic status considerations. A study on this issue showed that 85 percent of the whites agreed that it would make no difference to them "if a Negro with just as much income and education" moved into their neighborhood (Pettigrew 1973,1979).

A number of interpretations of the causes of residential segregation has been found among the relevant studies in the 1970s. Understandably, more explanatory importance has been attributed to the historical factors and their influences. Historic patterns of housing have been a major source of the formation of then present residential segregation. Early as it was, some theoretical models have been developed by a group of social scientists. Namely, they are: Marshall and Jiobu (1975), W.C. Roof (1972; 1976), Sorenson (1974), Taeuber and Taeuber (1965).

Residential segregation and racial inequality in Southern cities were carefully studied in a causal model which
estimated the effects of socioeconomic factors (Roof 1972). Using demographic and socioeconomic variables, a later publication of Roof developed a regional model of residential segregation in the South (Roof 1976). The study, based on an analysis of the age, size, percent black, and occupational and income differentials in 32 southern cities, found that

1). the age of the city was the strongest predictor of residential segregation;
2). the effect of socioeconomic factors on residential segregation varied in accordance with broader social context in southern cities;
3). occupational differences had more influence on the level of segregation than income; and
4). changes in socioeconomic status for blacks was not accompanied by concomitant changes in residential segregation in the South (Roof et al. 1976).

The results of path analysis implicated that residential integration would not necessarily be the natural consequence of minority socioeconomic achievements (Roof et al. 1976). Among the socioeconomic variables, job-related factors bore more influence than income. Finally, the authors suggested further research in the following directions:

(1) longitudinal analysis of segregation and its socioeconomic correlates;
(2) suburbanization of blacks, and segregation by race and class within suburbs;
(3) the effects of annexation upon segregation and socioeconomic status trends;
(4) development of alternative measures of segregation as a means of distinguishing between ghettos and other forms of segregated residence (Roof et al. 1976).

The impact of occupational prestige on residential segregation was reported by Simkus (1978). Using the U.S. Census Population Summary Tapes for 1960 and 1970, the study was a partial replication of previous research conducted by Duncan and Duncan (1955), Wilkins (1956), and Uyeki (1964). Changes in residential segregation in a total of ten U.S. urbanized areas during the 1950s and 1960s were measured. So were changes in the relationship between racial segregation and occupational residential segregation (Simkus 1978).

Using the index of dissimilarity (Taeuber's D), the degree of occupational residential segregation was measured over census tracts by computing the residential distribution of employed males in each of eight major occupational categories (Simkus 1978).
Using census tracts as the areal units of analyses, Simkus (1978) remarked that the magnitude of the index of dissimilarity was dependent upon the size of the geographic unit employed for calculation. Although Simkus stated that it would be "interesting" to use smaller areal units such as blocks to examine indexes, "tracts are the smallest units for which census tabulations of occupation by residential location are available" (Simkus 1978).

The main findings of the study (Simkus 1978) held that,
1. During the 1950s, gross occupational residential segregation in these urbanized areas increased slightly for most occupational categories.
2. As much as one quarter of the gross occupational residential segregation in 1960 and 1970 could be attributed to racial segregation in both the occupational and residential distribution.
3. The 1960-1970 changes in gross occupational residential segregation were due to changes in the distribution of whites.
4. In both 1960 and 1970, the degree of racial residential segregation was quite high, regardless of the respective occupational categories of the whites and nonwhites compared; yet there was a small but consistent pattern of variation in these indexes (Simkus 1978).
More methodological efforts were made and more models were developed as well in the early 1980s in studies of residential segregation. With an ecological approach, voluntary and involuntary causes of residential segregation were studied (Lieberson and Carter 1982). The authors (Lieberson and Carter 1982) asserted that both voluntary and involuntary forces normally contribute to racial residential segregation. In previous studies, black-white segregation was assumed to be imposed by whites, while blacks were regarded to be completely indifferent to the racial structure of the residential areas (Lieberson and Carter 1982).

The study (Lieberson and Carter 1982) aimed to generate a model which would enable researchers to determine the voluntary dimension of isolation or contact between racial groups. The common asymmetrical P* measure was revised and further elaborated to gauge the voluntary and involuntary nature of the forces generating segregation. Using 1970 Census data, the study generated "reasonably satisfactory" results. The concluding remark of the paper claimed that the model pointed in the "right" direction for future research, which must and should take this direction to achieve greater
understanding of the forces underlying the observed levels of residential segregation (Lieberson and Carter 1982).

A cross-sectional model was specified to estimate the links between housing discrimination, interracial occupational dissimilarities, interracial income differentials and residential segregation (Galster and Keeney 1988). The parameters of this simultaneous model were estimated at metropolitan level, using 1980 U.S. Census data for a nationwide sample of 40 standard metropolitan areas (SMSAs). A series of simulations were proposed to measure the effects of changes in housing discrimination, racial and housing price segregation, and interracial differences in incomes, education, and occupations (Galster and Keeney 1988).

The Galster-Keeney (1988) cross-SMSA tests of the simultaneous model support the following hypotheses:

(1) Housing discrimination causes greater residential segregation (up to a point);
(2) Segregation causes greater interracial occupational disparity (up to a point) and lower relative black income;
(3) Occupational disparity causes lower relative black income;
(4) Lower relative black income causes both higher discrimination and segregation (Galster and Keeney 1988).

Since the 1970s, a number of economists have constructed causal models with socioeconomic economic variables, which usually included education, occupation, and income (Clark 1986). The essence of income in these models rests with its direct effect on housing affordability. The geographic location of employment also has some observed influence on distribution of residence, given that most people are averse to commuting a great distance to work (Clark 1986).

Clark (1986) reported that job location and economic status differentials together could explain more than half the segregation by race (1986:105-107). Upon reviewing two studies by Pascal (1965, 1978), in which a regression analysis was first utilized to explain the inter-tract variation in percentage black in Detroit (1950) and Chicago (1960), Clark noted that 33% and 46% of the inter-tract variation in percent black of the two cities could be explained by housing affordability and job accessibility. He concluded that "economic factors (income, wealth or other measures of purchasing power for housing) and job location in association
with interracial difference in housing preferences and elements of urban structure bore much of the explanatory weight for present residential patterns in American cities" (Clark 1986:55).

Clark continued the research on the role of personal racial preference in explaining residential segregation (Clark 1991). Using individual behavioral data from a 1987 telephone survey in the Los Angeles metropolitan area, the paper examined racial preferences and their effects on residential choices and behavior. The investigation is generalized in a multi-ethnic context for four major racial/ethnic groups, whites, blacks, Hispanics, and Asians in the Los Angeles metropolitan area. For all the racial and ethnic groups studied, strong expressed residential preferences for own-race combination in the ethnicity of neighborhoods were detected (Clark 1991).

Using 1970 and 1980 U.S. census data, trends in residential segregation between 1970 and 1980 were examined in a nationwide analysis of 60 standard metropolitan statistical areas (SMSAs) (Massey and Denton 1987a). Degrees of black segregation were measured over two dimensions, evenness and exposure. A set of indices, including "Dissimilarity Index (Taeuber's D), Interaction and Isolation Indexes" were
employed. According to the findings, black segregation declined in some small SMSA's in the south and west while little change had been detected in the large urban areas in the northeastern and central states. In these cities, blacks still remained highly isolated and segregated (Massey and Denton 1987a). The degree of black-white segregation was not related strongly to the socioeconomic status or level of suburbanization. Hispanics, who were initially less segregated than blacks, became more segregated. The study also indicated that Hispanic segregation was highly related to socioeconomic indicators. A low level of segregation was found for Asian immigrants everywhere (Massey and Denton 1987a).

The study indicated that the spatial isolation of Asians increased slightly over the decade. A possible interpretation provided by the authors held that Asian enclaves were beginning to form in many SMSAs around 1980 (Massey and Denton 1987a).

Using path analyses, a paper by Massey, Gross and Eggers (Massey et al. 1991) reported findings highly consistent with those of the earlier Galster-Keeney study (1988). The paper revealed that metropolitan forces, such as the poverty rate of the population, the degree of residential segregation and its
representation in public housing acted to concentrate poverty at the neighborhood level. Neighborhood poverty, in turn, would promote male joblessness, teenage motherhood and single motherhood. At metropolitan level, a group's overall poverty level interacted with its level of segregation. As a result of the interaction, the concentration of poverty would increase within neighborhoods where the group members live (Massey et al. 1991).

The information on residential segregation was updated in a study on recent trends of minority segregation, using the 1980 and 1990 Census Data (Harrison and Weinberg 1992). The paper measured residential segregation for four different racial and ethnic groups to examine changes in segregation for U.S. metropolitan areas between 1980 and 1990. According to the findings, blacks showed the greatest decline in segregation, although the changes were described as modest (Harrison and Weinberg, 1992:15). Minor increases in segregation were found for Asians and Hispanics, which the authors described as "small and evolutionary rather than substantial" (Harrison and Weinberg 1992:1). Similar changes were found for the city of Richmond and Norfolk. Using the dissimilarity index, the overall level of segregation for Richmond was .693 in 1970, .678 in 1980 (Clark 1986) and .635

II. Spatial Assimilation

For several decades, sociologists have largely accepted the human ecology conception of racial or ethnic residential segregation as an aspect of status differences among groups which would disappear with social mobility (Burgess 1923; Park 1926; 1967), which is best known as the theory of assimilation.

Assimilation is the process by which a group comes to resemble, on a variety of dimensions, the larger society of which it is a part (Gordon 1964; Park 1967). According to Gordon,

The process is divided into seven distinct phases. The first is acculturation. During this phase a group acquires the language and cultural practices of the host society. The second step is structural assimilation, the large entrance of a group into primary relationships with members of the host society. It may occur concurrently with acculturation, subsequent to it, or not at all. This is the crucial step in the process. Once structural assimilation has occurred, all other phases of assimilation (marital, identificational, behavioral receptional, attitudinal receptional, and civic) follow automatically (Gordon 1964:141).
The Gordon scheme, however, does not consider spatial elements in the assimilation process, though assimilation does not occur in a vacuum, as groups and individuals interact in a physical world. Structural assimilation and consequently other stages of assimilation will be exceedingly difficult without physical integration with the society. Hence, it follows that spatial assimilation is a necessary intermediate step between acculturation and other phases of assimilation (Massey and Mullan 1984).

According to theorists of human ecology, differences in the levels of residential segregation between racial groups are the result of differences in socioeconomic variables such as income, occupation, and education (Burgess 1923; Park 1926). This ecological hypothesis received support from studies of residential segregation between racial groups. A number of sociologists have reported significant correlations between racial segregation and indicators of socioeconomic status (Duncan and Lieberson 1959; Lieberson 1961; 1963; Guest and Weed 1971; Simkus 1978; Massey 1979; Massey and Mullan 1984; Massey and Denton 1985), a study of the relationship between socioeconomic attainment and spatial assimilation of foreign-born Egyptians in the United States (Poston 1990) found that such an association was not significant.
Spatial assimilation is an ecological conceptualization of the counter-process of segregation. The theory of spatial assimilation combines the status attainment perspective with an ecological model (Massey and Blakeslee 1983; Massey and Mullan 1984; Massey and Bitterman 1985; Massey and Denton 1985). The theory contends that,

first, an important outcome of socioeconomic advancement for minorities is residential integration within mainstream society.

second, a host of variables important to people's social and economic well-being are determined by residential location.

finally, as social status rises, minorities attempt to convert their socioeconomic achievements into an improved spatial position, which usually implies spatial integration with majority members. In the United States, such a process has generally involved the movement of minority groups out of established racial or ethnic neighborhoods into a large urban environment inhabited primarily by "nonethnic" native whites (Cressy 1938; Ford 1950; Kiang 1968; Massey and Blakeslee 1983; Massey and Mullan 1984; Massey and Bitterman 1985; Massey and Denton 1985).
The Duncan-Lieberson (1959) study examined the residential patterns of ethnic groups in Chicago between 1930 and 1950. Measures of residential distributions were based on statistics compiled for the seventy-five community areas of the city of Chicago. The index of dissimilarity was used to measure the level of residential segregation for a group. As a matter of fact, results of the study provided further evidence for Park’s contention that "social relations are frequently and inevitably correlated with spatial relations" (Park 1926). Findings of the study support that the degree of residential segregation of a minority group is inversely related to appropriate indicators of its socioeconomic status and degree of spatial assimilation (Duncan and Lieberson 1959).

In the early 1970s, further evidence was presented to support the hypothesis of spatial assimilation. The correlation between socioeconomic factors and minority segregation was tested to be significant at an aggregate-level in a study of segregation for cities across the southwestern United States, using 1960 census data (Grebler et al. 1970).

In the late 1970s and early 1980s, the study of residential segregation reached an apex due to contributions from a group of human ecology theorists. New theoretical
propositions of assimilation process marked the beginning of a new era for the theory of spatial assimilation. The work of Korbin and Goldscheider (1978) suggests that higher status categories are less segregated because of their higher residential mobility. According to their findings, individuals in the upper socioeconomic strata are progressively more likely to move out of areas of ethnic concentration than those in lower strata, with an ultimate result being a decline in segregation with increasing status. Spatial concentration and residential stability are crucial to the maintenance of patterns of ethnic socialization and interaction. Ethnic identification is progressively weakened in the upper socioeconomic class strata, and assimilation, in a Gordonian sense, occurs (Korbin and Goldscheider 1978).

A series of ecological studies were published in the late 1970s and early 1980s (Massey 1979; Massey and Blakeslee 1983; Massey and Mullan 1984; Massey and Denton 1985). With an ecological perspective, the effects of socioeconomic factors on the residential segregation of African Americans and Spanish Americans were systematically examined (Massey 1979). Following the tenets of human ecology, and in light of previous findings regarding minority segregation, the study hypothesized an inverse linear relationship between socioeconomic class and degree of minority segregation. The
census tract was introduced and used as the unit of analysis in explaining segregation. The degrees of residential segregation and socioeconomic characteristics were measured at the tract level. The effects of social class on segregation were assessed in two ways: first, indices of dissimilarity are computed within socioeconomic status categories, which are defined on the basis of variables such education, family income and occupation. Such indices measure the degree of segregation between racial or ethnic groups of the same socioeconomic class; second, the effect of socioeconomic factors on residential segregation are also assessed by examining the relationship, across urbanized areas, between minority segregation and various indicators of socioeconomic status.

Findings of this study demonstrated a clear pattern of decline in the level of Spanish-white segregation with increasing socioeconomic status. This pattern was reinforced and strengthened by examining interurban relationship between socioeconomic status and segregation. The author has also noted that, differentiated from Spanish-white segregation, the high degree of black-white segregation cannot be accounted for by socioeconomic factors alone (Massey 1979).
Usually, human ecology theorists hypothesized that racial segregation was a function of social status differences between racial groups (Massey 1979). The results of one study (Massey 1979) suggested that such differences might bear little operational importance in the model. The effects of minority socioeconomic achievements on desegregation were significant only among those in the upper socioeconomic status strata. Hispanics and whites within the lowest strata were segregated in spite of their equally low socioeconomic statuses. Based on this fact, the author concluded that it was the absolute, and not relative socioeconomic status that caused differences in degrees of segregation. This conclusion was, "a subtle departure from usual derivations from ecological theory" (Massey 1979).

The relationship between socioeconomic advancement and spatial mobility has been explored long before the above-mentioned Massey study (1979). According to Berry (1973), the relationship was created and reinforced through the process which was termed as acculturation. In American society, status and self-respect of an individual were measured upon and derived from materialistic achievements. The drive for achievement was a variable of such an essence in the mainstream of this culture. Links between spatial and social
mobility were reinforced by this peculiarly American social dynamic. Berry (1973) depicted that for most individuals, earnings were usually spent on the best possible homes and material possessions in the best possible neighborhoods. Any increase in job or financial status would be matched immediately by a move into a better neighborhood in which the new and higher-status life style could be pursued (Berry 1973).

Further research on the spatial aspect of assimilation and stratification was conducted by Massey and Mullan (1984). Using the 1960 and 1970 census data, the study examined the processes of Hispanic and black spatial assimilation in selected Standard Metropolitan Statistic Areas (SMSAs) in the southwestern United States. Acknowledging that sociologists have long recognized a relationship between social and spatial mobility, the Massey-Mullan paper (1984) stressed in particular the importance of spatial assimilation as an essential step in the assimilation process. The authors contended that spatial assimilation also had important auxiliary effects on socioeconomic stratification. Spatial location was a variable of key importance in understanding the socioeconomic position of any group in society (Massey and Mullan 1984).
The issue of racial residential succession was also addressed (Massey and Mullan 1984). According human ecologists, racial residential succession refers to the process in which white families would be inevitably replaced by black families in the entire residential area, when black population started moving into the area. This consequence was usually considered to be irreversible (Burgess 1928; Taeuber and Taeuber 1965; Massey 1983; Massey and Mullan 1984). In analysis of the stages of racial residential succession, a scheme was employed to specify the type of interethnic changes in each tract between the beginning and the ending year of the decade (Taeuber and Taeuber 1965; Massey 1983; Massey and Mullan 1984).

Classifications of tracts were applied in a hierarchical and sequential manner. Tracts with more than 60% minority members at both 1960 and 1970 were defined as established areas (of segregation). Tracts with fewer than 250 minority members in 1960 but more than 250 minority members in 1970 were classified as invasion tracts. Tracts that were not classifiable as invasion or established were categorized as one of the following four:

(1) succession, if minority population was growing while white population falling;
(2) growth, if both minority and majority population were growing;
(3) displacement, if minority population was falling while white population growing;
(4) decline, if both minority and majority population were falling (Massey and Mullan 1984).

The authors (Massey and Mullan 1984) concurred with Park's (1926) notion that the dynamic force behind the assimilation process was social mobility and contended that this association had grown stronger over time. This theoretical approach (Massey and Mullan 1984) suggested three specific hypotheses to be tested:

(1) The average socioeconomic status of minority members is higher in areas of recent entry composed primarily of majority members than in established racial or ethnic neighborhoods;
(2) The average socioeconomic status of minority members varies directly with distance from an established ethnic or racial neighborhood;
(3) The probability of contact with majority members is positively related to a minority's average socioeconomic status (Massey and Mullan 1984:846).

The theory of spatial assimilation was further elaborated by Massey and Denton (1985) with a new methodological approach which was different from that of the Massey-Mullan study (1984). It was declared that the theory of spatial assimilation was based, to some extent, on status attainment
theory, which was constructed at the individual level (Massey and Denton 1985). The paper contended that structural equation models could generate some conceptual problems if contradicting results were found at individual and aggregate levels. Moreover, the authors hypothesized that there might be some statistical problems if ecological data were used to estimate structural equation models. The arbitrary nature of the boundaries of areal units underlies the same characteristic for the parameters estimated from these units. Replacing census tracts with city blocks, or changing tract boundaries, could cause aggregation bias, when the size of correlations and structural coefficients might be affected by such changes. Furthermore, using ecological data might also cause bias in regression equations when an ordinary least square approach was adopted. This problem was named spatial autocorrelation (Massey and Denton 1985).

At the individual level, ecological factors should be incorporated into theory and research on stratification, if spatial assimilation was an important outcome of socioeconomic achievements by minority members. By the same token, human capital and status attainment models needed to be adjusted to the individual level to recapture the constraints on spatial and social mobility (Massey and Denton 1985). Structural models were estimated to discover if and how micro-level
socioeconomic advancements were converted in ecological outcomes of changes in spatial positions. Socioeconomic achievements were determined on the basis of individual measures of education, occupational prestige, and income. The ecological measure of spatial assimilation was based on the proportion of white or minority members within an individual's neighborhood (Massey and Denton 1985).

The results of the Massey-Denton study (1985) held that micro-level study findings strongly supported the model of spatial assimilation developed and estimated in the earlier research (Massey and Mullan 1984), in which aggregate-level data were used. Structural correlation between socioeconomic variables to spatial outcomes were found to be consistently significant and in the expected directions. Based on cross-sectional data, the findings demonstrated a clear pattern that as the social status of minority members rose, so did the possibility of residential contact with whites (Massey and Denton 1985).

As to the statistical problems of aggregation bias and spatial autocorrelation, the authors concluded that the problem could not be regarded as serious since the individual-level analyses generated similar findings and these results were reliable (Massey and Denton 1985).
Structural parameters estimated from census microdata are unbiased and fully efficient, and significance tests are accurate at stated alpha levels. The very close adherence of results to theoretical expectations and the nearly complete replication of prior findings greatly strengthen confidence in the theory of spatial assimilation derived in earlier work based on ecological regressions (Massey and Denton 1985:105).

The authors also conducted a systematic comparison between the results of micro- and macro-level analyses to evaluate the direction of ecological biases (Massey and Denton 1985). The general pattern of results indicated that biases were conservative.

The findings suggested that the macro-level models underestimated the strength of the rejections blacks encountered in trying to assimilate. A systematic comparison between racial and ethnic groups indicated that ecological biases were either conservative or negligible. The findings also supported that using ecological data in estimating ecological models would not cause any serious errors of theoretical explication or substantive interpretation. Thus, it was concluded that ecological models could be correctly estimated by using census tract data. The conclusion was important for further research because micro data at block level were not available from the 1980 census (Massey and Denton 1985).
Chapter III. Data and Measures

I. Sources of Data

The data used in this study were taken from the 1990 Census of Population and Housing Summary Tape File 3A. The census tape contains sample data of socioeconomic and housing characteristics obtained from the "long forms" of census questionnaire. Summary Tape File 3A provides tabulations of the population information to the tract level. Additional data is obtained from Summary Tape File 3A of the 1980 Census of Population and Housing to determine the changes in racial components for the tracts under study over the past decade.

II. Census Tract

Census Tracts are the smallest geographic units of which Summary Tape File 3A releases population characteristics information. Census Tracts are small, relatively permanent statistical subdivisions of a county. They are delineated for all Metropolitan Areas. Tracts usually have 2,500 to 8,000 persons with the average size around 4,000. Once delineated, Census Tracts are designed to be homogeneous with respect to population characteristics, economic status and living
conditions. Census Tract boundaries generally follow the existing physical entities, such as highways, rivers, railroads and streets (U.S. Department of Commerce, 1991). The census tract is the basic unit of analysis in this study.

There were methodological arguments about using census tracts as the areal unit. Specifications of areal units were of primary importance when different indexes were used to compute levels of segregation (Taeuber and Taeuber 1965).

Cowgill and Cowgill (1951) argued that the arbitrary and variable degree of racial homogeneity of census tracts would destroy their usefulness in studying residential segregation (Cowgill and Cowgill 1951). Using a sample of tracts from New York City, the study asserted that most tracts had never had any reference to boundaries of ethnic settlements. In many other cities, where tracts were delineated at a later date, either race or ethnicity was used as a criterion to determine tract boundaries. This fact would have influences on segregation indices in two ways:

(1) higher index scores would be computed for some tracts to the fact that race or ethnicity had been the determinant of the boundaries, even though there was no real difference in the degrees of segregation;
(2) cities tracted at a later date would have higher scores of segregation for the same reason stated above (Cowgill and Cowgill 1951).

An alternative areal unit, the city block, was proposed to be used in place of the census tract (Cowgill and Cowgill 1951). In the 1990 census, the city block is defined as,

"smaller areas (compared with census tracts) bounded on all sides by visible features such as streets, roads, streams, and road tracks, and by invisible boundaries such as city, town, township, and county limits, property lines, and short, imaginary extensions of streets and roads" (U.S. Department of Commerce, 1991: A-3).

In 1940 and 1950 there was no formal definition of city blocks in census publications. In 1960, a city block was defined as "a well-defined rectangular piece of land bounded by streets or roads. However, it might be irregular in shape or bounded by railroad tracks, streams, or other features" (Department of Commerce 1960). Average block populations varied from city to city and from zero to several thousand within cities. Most blocks consisted of less than one hundred households. City block were the smallest readily identifiable area units for which census data could be tabulated (Taeuber and Taeuber 1965).
Generally, block boundaries were arranged in a relatively regular gridwork pattern which was more stable over time than tract boundaries (Taeuber and Taeuber 1965). But city blocks were not necessarily preferable to census tracts as units of analysis.

The Duncans (1955) provided an empirical example of the influence of tract boundaries.

With strict confirmation of the general census procedure of delineating census tracts, two sets of quasi-tracts were determined for Augusta, Georgia, using the 1950 census data at the block level (Duncan and Duncan 1955). For the two quasi-tracts, the delineation was designed to maximize segregation in one case and to minimize it in the other. Using the Gini index, a score of .88 was calculated from the actual tract data, while the index value of .92 and .84 were computed for the two quasi-tracts. In addition, a similar manipulation of tracts in 60 cities reported that more than one-third of the cities for which Gini index was computed with tract data had a value interval between .84 and .92. Thus, the manipulation of tracts boundaries could affect the measured degrees of segregation only under extreme circumstances (Duncan and Duncan 1955).
The Taeubers (1965) contended that the assertions by Cowgill and Cowgill as to its empirical consequences must be treated as undemonstrated hypotheses rather than proven fact.

The Taeubers (1965) commented that it was possible that race was used as a criterion in delineating most tracts, but not to the overriding extent of the quasi-tracts delineated for Augusta (Duncan 1955). Most cities were experiencing rapid growth in black population. As a logical consequence, boundaries of black residential areas were changing continuously. Once delimited, tract boundaries were designed to remain relatively constant from census to census. Tract boundaries were delimited or revised some time prior to any given census, on the basis of preceding census and any subsequent information available to the tract committee. It seemed unlikely that the straightforward relationships postulated by Cowgill and Cowgill between the committee actions and measures of segregation from census tract data did obtain (Taeuber and Taeuber 1965).

Furthermore, there were some practical considerations respecting the types of data available for tracts and city blocks. Only a limited number of characteristics were released for the population of each block. Since census
tracts were much larger than blocks, a much wider and more
detailed range of tabulations of population characteristics
was available. This was very important for any particular
investigation (Taeuber and Taeuber 1965).

The advantage of using census tracts as units of analysis
was well defended by Massey and Mullan (1984) and supported by
Massey and Denton (1985). Census tracts were a better
representation of the real social environments in which people
lived. In fact, the explicit respect to demographic and
social homogeneity of tract boundaries made it more likely for
tracts to correspond to the real social areas within which
people imagined or conceived themselves to live. Meanwhile,
tract boundaries were more likely to overlap with other
geographic divisions--such as school districts, health
catchment areas, or housing submarkets--within which
discrimination and prejudice actually operated.

III. Metropolitan Areas Studied

Four Metropolitan Statistical Areas in the state of
Virginia are included in the study. The concept of a
Metropolitan Statistical Area (MSA) is defined as a relatively
freestanding Metropolitan Area which is not closely associated
with other Metropolitan Areas. Each Metropolitan Area must contain either a place with a minimum population of 50,000 or a Census Bureau-defined urbanized area and a total Metropolitan Area population of at least 100,000 (U.S. Department of Commerce, 1991).

The MSA’s included in the study are: Lynchburg, Norfolk, Richmond and Roanoke. First, these cities are selected because of the fact that all contain a relatively large proportion of black population and that the population of other minorities are small (Table 1). Second, they also represent a geographic distribution with Norfolk on the Southeastern shore and Roanoke as the major city in southwestern Virginia. Richmond is the capital city, located 100 miles north of Norfolk, while Lynchburg represent the Piedmont Region of the state. Finally, since some researchers have argued that factors such as the age and history of the city might have some possible influence on residential segregation (Roof et al., 1976), these cities are suitable for studying segregation with regard to these
Table 1

General Population Characteristics of the Four Virginia Cities

<table>
<thead>
<tr>
<th></th>
<th>Lynchburg</th>
<th>Roanoke</th>
<th>Norfolk</th>
<th>Richmond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population</td>
<td>66,049</td>
<td>96,397</td>
<td>261,229</td>
<td>203,056</td>
</tr>
<tr>
<td>White Population</td>
<td>47,898</td>
<td>71,982</td>
<td>148,132</td>
<td>87,928</td>
</tr>
<tr>
<td>Black Population</td>
<td>17,518</td>
<td>23,286</td>
<td>102,135</td>
<td>112,406</td>
</tr>
<tr>
<td>Other Races</td>
<td>633</td>
<td>1,129</td>
<td>10,962</td>
<td>2,722</td>
</tr>
<tr>
<td>Percent White</td>
<td>72.52</td>
<td>74.67</td>
<td>56.71</td>
<td>43.30</td>
</tr>
<tr>
<td>Percent Black</td>
<td>26.52</td>
<td>24.16</td>
<td>39.10</td>
<td>55.36</td>
</tr>
<tr>
<td>Percent of Other Races</td>
<td>0.96</td>
<td>1.17</td>
<td>4.19</td>
<td>1.36</td>
</tr>
</tbody>
</table>

Among the four cities, Richmond and Norfolk shared the longest history dated back to the early part of the eighteenth century (Rachleff 1984; Wertenbaker 1962).

By the early 1850s, Richmond represented the most advanced economic development in the antebellum South (Rachleff 1984). The Reconstruction of Norfolk after the Civil War was almost completed by the early 1870s and the city of Norfolk became an important seaport of merchandise (Wertenbaker 1962). In 1852, the Norfolk and Western Railway connected the then small town of Big Lick in southwestern Virginia, which was renamed later, as Roanoke (White 1982). In the 1880s, Roanoke grew into an important city in southwestern Virginia (Kaegey 1988). The city of Lynchburg started to prosper in the early 1860s with the growth of its iron mines and tobacco industry (Helper 1986).

Moreover, these cities had very similar recent histories concerning the desegregation of blacks in the urban centers of these cities (Yinger 1958; White 1982; Rachleff 1984; Gavins 1977). After the Supreme Court’s decision in 1954 that outlawed racial segregation in public schools, the desegregation in public schools started in all four cities in
the late 1950s and was completed in the early 1960s (Rachleff 1984; White 1982; Gavins 1977). All four cities had their own urban redevelopment programs starting in the mid-1950s. In these programs, the ragged housing of blacks in downtown slums were torn down and replaced by public housing (White 1982; Rachleff 1984; Gavins 1977).

IV. Racial Categories

The 1990 census provide five racial categories which are mutually exclusive from each other. The respondents were asked to choose the answer to the question about race from only one of the following five categories,

(1) white,
(2) black,
(3) American Indian, Eskimo, or Aleut,
(4) Asian or Pacific Islander

According to the census documentation, the racial category of "white" is defined as following,

"white--includes persons who indicate their race as "White" or reported entries such as Canadian, German, Italian, Lebanese, Near Easterner, Arab, or Polish" (U.S. Department of Commerce 1991: B-30).

The category of "black" is defined as,
"black" includes persons who indicated their race as "Black or Negro" or reported entries such as African American, Afro-American, Black Puerto Rican, Jamaican, Nigerian, West Indian, or Haitian" (U.S. Department of Commerce 1991: B-30).

The racial categories of "white" and "black" used in this study refer to the definition stated above.
Chapter IV. Methodology

I. Measures of Residential Segregation

There was argument over the measurement of residential segregation. Due to contributions by a group of sociologists represented by Taeuber and Taeuber (1965), Sorensen (1975), Massey and Denton (1987a, 1987b), some agreement has been achieved as to the particular techniques employed in measuring the degree of segregation.

In a methodological effort, an exhaustive survey of the methodology literature was undertaken (Massey and Denton 1987b). All the then existing indices of segregation were examined and evaluated by intercorrelating and factor analyzing their results (Massey and Denton, 1987b). This unpublished manuscript (Massey and Denton, 1987b) was the preparatory work for another publication by the same authors (Massey and Denton, 1987a), in which residential segregation was measured over two dimensions: "evenness" and "exposure" (Massey and Denton, 1987a, 1987b, 1988; Harrison and Weinberg 1992).
Evenness

Evenness is the term used to describe differential distribution of minority and majority members across census tracts within an MSA (Massey and Denton 1987a). The index employed to measure evenness is the index of dissimilarity (Taeuber and Taeuber 1965). The underlying rationale of the dissimilarity index as a measure of residential segregation is simple: Suppose that whether a person is black or white makes no difference in his or her choice of residence and that his or her race has no influence on the factors affecting residential location. Then each race will be represented in each neighborhood in the same proportion as in the city as a whole (Taeuber and Taeuber 1965). Otherwise, a minority group is described as being segregated when its members are unevenly distributed in different neighborhoods. Evenness is maximized and segregation minimized when all neighborhoods have the same proportion of minority members as that of the entire MSA. Typically, residential evenness is measured in census tracts:

\[ D_{xy} = 0.5 \times \text{SIGMA} \cdot |(x_i/X) - (y_i/Y)| \]

where \( x_i \) and \( y_i \) are the numbers of \( X \) and \( Y \) members in tract \( i \), and \( X \) and \( Y \) are their totals in the whole MSA. The aforesaid index is employed in this study because other measures of evenness advocated and devised by different researchers have been found to be highly interrelated to each
other with the value of R squared ranging from .92 to .98 (Massey and Denton, 1987a).

A minor revision is necessary to make the index ready for the statistical analysis at the tract level. For tract i:

$$D_{xyi} = \frac{x_i}{X} - \frac{y_i}{Y}$$

It is decided not to use the absolute positive value in order to make $D_{xyi}$ an asymmetric measure. The new index assigns the highest value 1.0 to the highest degree of concentration for $X$ (minority) group members and lowest value -1.0 to the highest degree of dispersion of $X$ group members. Thus the differences between concentration and distinction of minority members in census tracts can be distinguished clearly. More importantly, the index provides a compatible measure to the disparity measures of socioeconomic characteristics, which will be introduced later.

**Exposure**

The next dimension is exposure, which refers to the degree of potential contact between members of minority and majority groups in census tracts in MSAs. The asymmetrical P* measure was first proposed by Bell (1954) and adopted or reinvented later by a number of researchers (Burstein, 1976; Coleman et al., 1975; Erbe, 1975). Unlike the dissimilarity
index, the P* index describes the isolation of a racial group and its potential interaction with another group "in a manner which takes into account both the spatial dissimilarity and their relative numbers in the city" (Lieberson and Carter 1982). The degree of potential contact is interpreted as the minimum extent to which majority and minority members sharing the same tract will inevitably confront one another physically. For a minority group, the degree of exposure is defined as the likelihood of sharing a common neighborhood with majority group members (Massey and Denton, 1987a). The P* index is the most widely accepted measure of exposure. For group X (blacks) and group Y (whites), the residential contact between their members is estimated as

\[ \text{xP*y} = \text{SIGMA} \left( \frac{x_i}{X} \right) \left( \frac{y_i}{t_i} \right) \]

where \( t_i \) stands for the total population of the tract \( i \) and all other variables are the same as we have denoted before. The value of P* is dependent on the relative number of X and Y members in MSA's. Therefore, the value of xP*y won't equal yP*x except when X equals Y. Otherwise the P* measure is asymmetric in general. Hence for any two groups (X and Y), two types and four formulae of indices are possible:

First, isolation indices, measuring the degree of contact between members of the same group in the tract: xP*x or yP*y, in which,

\[ \text{xP*x} = \text{SIGMA} \left( \frac{x_i}{X} \right) \left( \frac{x_i}{t_i} \right) \text{ or} \]

\[ \text{yP*y} = \text{SIGMA} \left( \frac{y_i}{Y} \right) \left( \frac{y_i}{t_i} \right) \text{ or} \]

\[ \text{xP*y} = \text{SIGMA} \left( \frac{x_i}{X} \right) \left( \frac{y_i}{t_i} \right) \text{ or} \]

\[ \text{yP*x} = \text{SIGMA} \left( \frac{y_i}{Y} \right) \left( \frac{x_i}{t_i} \right) \text{ or} \]
\[ yP*y = \text{SIGMA} \ (y_i/Y)^*(y_i/ti). \]

Second, interaction indices, measuring the degree of contact between members of the two different groups in the tract, for group X: \( xP*y \), and for group Y: \( yP*x \). (Massey and Denton, 1987a)

For tract \( i \), the interaction index value

\[ xiP*yi = (xi/X) / (yi/ti) \]

and the isolation index is revised as

\[ xiP*xi = (xi/X) / (xi/ti) \]

where index values are negated to range from 0 to 1.0 with higher scores indicating higher degrees of isolation. The \( P^* \) measures, when adopted to measure either isolation or interaction at the tract level, is very efficient and powerful.

II. Measures for Socioeconomic Disparities

Socioeconomic disparities for the population are measured both within and between racial groups over two dimensions at the tract level. These dimensions are: income and educational attainment.
Income

The 1990 Census of Population and Housing Summary Tape File 3A (Virginia) contains data on income in 1989. The income of households is used in this study, which includes the income of the householder and all other persons 15 years old and over in the household, whether related to the householder or not (U.S. Department of Commerce, 1991). The intra-tract income disparity is calculated for each tract between the minority and the majority members, also using the dissimilarity formula:

\[ D_{x_i y_i} = \frac{x_{1i}}{X_1} - \frac{y_{1i}}{Y_1} \]

where \( x_{1i} \) and \( y_{1i} \) are the mean income for group \( X \) and \( Y \) in tract \( i \) and \( X_1 \) and \( Y_1 \) are their citywide mean. The inter-tract differences between minority members are calculated as,

\[ E_{1x_i} = \frac{(x_{1i} - X_1)}{X_1} \]

where everything is the same as denoted before.¹

¹. Both indexes are based on the conventional dissimilarity index (Taeuber's D) (Taeuber and Taeuber 1965). Revision are made through the combination of the two distinct measures of economic disparities (Galster and Keeney 1988). First, the black-white dissimilarity index of occupational categories (BWOC):

\[ BWOC = \text{SIGMA } |b_i - w_i| \]

where \( b_i \) and \( w_i \) are the proportions of black and white workers, respectively, in a particular occupational category (i). The second is the ratio of black/white mean incomes (B/WINC):

\[ B/WINC = \text{SIMGA } (b_i/w_i) \]

where \( b_i \) and \( w_i \) are the mean incomes of black and white people, respectively, in tract (i) (Galster and Keeney 1988). With
Educational attainment

Data on educational attainment are tabulated as attainment for persons 15 years old and over. Education is classified according to the highest level of school completed or highest degree received for those currently enrolled in schools (U.S. Department of Commerce, 1991). Educational attainment is a categorical variable which lists levels of educational attainment from less than 9th grade up to graduate or professional degree. To make it fit into the statistic model, a minor revision is needed. The original seven categories are divided into two: 1). High school graduate or less; 2). At least some college (Galster and Keeney, 1988). By doing this, it is possible to calculate the proportion of population with the second type of educational attainment at tract level. To compute educational disparities between minority and majority members at tract level, the index goes:

\[ D2xiyi = x2i/X2 - y2i/Y2 \]

where \( x2i \) and \( y2i \) are the percentages for group \( X \) and \( Y \) with the second type of educational attainment in tract \( i \) and \( X2 \)

---

regard to the fact that there might be interracial as well as regional differences in socioeconomic statuses (Pettigrew 1979; Clark 1986; Galster and Keeney 1988; Massey et al. 1991), the citywide mean of blacks (\( X1 \)) and whites (\( Y1 \)) are also employed in the index (D1xiyi). The index is a measure of relative instead of absolute socioeconomic differences.
and Y2 are their citywide counterparts and similarly, the inter-tract disparity is computed as:

\[ E_{2x_i} = \frac{(x_{2i} - X_2)}{X_2} \]

where everything is the same as denoted before.²

². the idea of using the percentage of population with at least some college or more education derives from previous measures of interracial differences in educational credentials (Galster and Keeney 1988). The proportions of the population with at least some college education or more are compared between blacks and whites (Galster and Keeney 1988).
Chapter V. Theoretical Approach and Conceptual Model

The essential theoretical approach of this study is an ecological one. But before the ecological model can be estimated, some theoretical clarifications must be made.

I. Residential Segregation as an Existing Pattern

For the purposes of analyses, residential segregation is viewed as an existing pattern, static and observable at the point of time when the 1990 Census was conducted. This perspective is consistent with that of the Taeuber-Taeuber study (1965) of racial segregation. The perspective must be clearly distinguished from other theoretical approaches that regard residential segregation as behavior, although many types of these behaviors are involved and combined in the process to produce the segregation pattern between racial groups. It is of primary importance that residential segregation should be understood as an existing pattern or an end result, produced by the success or failure of the assimilation process. Thus the ecological model can be estimated with cross-sectional data to isolate effects of socioeconomic variables.
II. Residential Pattern as an End Result of Assimilation Process

Residential segregation is studied as a pattern or an end result of the spatial assimilation process. This approach per se, however, does not contradict the theoretical perspective that the spatial assimilation process needs to be specified while examining this pattern (Taeuber and Taeuber 1965; Massey and Mullan 1984; Massey and Denton 1985). On the contrary, the differences in degrees of segregation are determined, to a great extent, by the different stages of the spatial assimilation process that populations undergo (Taeuber and Taeuber 1965; Massey and Mullan 1984).

A scheme (Table 2) of stages of spatial assimilation is employed to classify the type of racial changes that tracts have been subject to in the past decade (Taeuber and Taeuber 1965; Massey and Mullan 1984).³

³. Most of the thresholds used in the scheme were copied from those of the Taeuber-Taeuber scheme (1965) to classify the type of racial changes. Same thresholds were used in a similar scheme to classify the type of racial changes for blacks and Hispanics in another study of residential segregation (Massey and Mullan 1984).
Table 2

APPROACH USED TO CLASSIFY CENSUS TRACTS ACCORDING TO THE INCIDENCE OF RESIDENTIAL SUCCESSION BETWEEN BLACK AND WHITE POPULATIONS

<table>
<thead>
<tr>
<th>Tracts</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Established</td>
<td>Blacks exceed 60% of population in both 1980 and 1990</td>
</tr>
<tr>
<td>Invasion</td>
<td>Blacks fewer than 250 of population in 1980 and more than 250 in 1990</td>
</tr>
<tr>
<td>Succession</td>
<td>Black Population growing, white population falling</td>
</tr>
<tr>
<td></td>
<td>1. Early                      Percentage black less than 20%</td>
</tr>
<tr>
<td></td>
<td>2. Middle                     Percentage black between 20% and 40%</td>
</tr>
<tr>
<td></td>
<td>3. Late                       Percentage black more than 40%</td>
</tr>
<tr>
<td>Growth</td>
<td>Black population growing; white population growing</td>
</tr>
<tr>
<td>Displacement</td>
<td>Black population falling; white population growing</td>
</tr>
<tr>
<td>Decline</td>
<td>Black population falling; white population falling</td>
</tr>
</tbody>
</table>
The scheme is applied in a sequential and hierarchical manner to classify tracts. First, according to the criterialist in Table 2, all classifiable tracts are entered into the two categories: invasion or established segregation. If not classifiable as invasion or established segregation, tracts were entered into one of the four remaining categories: succession, growth, decline, displacement (Table 2) (Massey and Mullan 1984).

Tracts of decline and displacement are not studied in the paper because these types of racial changes are not relevant to the study of residential segregation (Massey and Mullan 1984).

Using the scheme, tracts from seven cities in the southwestern United States were classified and regressed together to estimate the parameters of the structural model for spatial assimilation, while tracts in different SMSAs were also examined separately to assess regional differences (Massey and Mullan 1984). The same method is used in this paper to study assimilation for blacks in four Virginia cities.
III. Socioeconomic Status

Traditionally, three variables are used together to measure socioeconomic status. These variables are: education attainment, occupational prestige, and income (Duncan and Duncan 1955). In this study, socioeconomic status is measured over two dimensions: education and income. The reasons that occupational prestige is not listed as an indicator of socioeconomic status are the following:

1. A high linear correlation between occupational prestige and educational attainment has been found repeatedly in a great number of previous studies (Taeuber and Taeuber 1965; Roof et al. 1976; Massey and Mullan 1984). Other studies have found that there is an identical simplex structure between individual occupational prestige and educational attainment (Duncan and Duncan 1955);

2. Among the three traditional indicators of socioeconomic status, occupation could be viewed as an intermediate position, that converts education into income (Ganzeboom et al. 1992);

3. The existing theories of occupational prestige also holds that prestige is awarded on the basis of power resources, of which education (cultural resources) and income (economic resources) are the two main forms in modern societies (Treiman, 1977; Ganzeboom et al. 1992);
4. Compared with the measurements of the other two indicators of socioeconomic status, existing measures for occupational prestige are too arbitrary (Duncan and Duncan 1955; Massey and Mullan 1984).

IV. Conceptual Model

This study tests the long-standing ecological thesis that spatial assimilation is an ecological outcome of socioeconomic achievements. In other words, a logical consequence of minority socioeconomic achievements is the progressive spatial integration with the mainstream society, with the degree and type of integration being determined by the objective socioeconomic characteristics that minority group has achieved (Timms 1971).

This theoretical perspective suggests four primary hypotheses to be tested in the study, using tract data for selected cities in Virginia. It is hypothesized that, as a consequence of the spatial assimilation process,

H1: Socioeconomic differentials among blacks and differences in levels of residential segregation are substantially correlated. At the tract level, black populations with higher average socioeconomic statuses are
less segregated than those with lower average socioeconomic statuses.

There are two specific sub-hypotheses:

(A) The link between socioeconomic status and levels of segregation is negative for blacks in the tracts undergoing these types of racial changes: invasion, succession, and growth.

(B) For blacks in the tracts of established racial segregation, the link between socioeconomic status and levels of segregation is negative, but not as strong as that of the tracts of invasion, succession, and growth.

H2: At the tract level, the probability of black contact with whites increases when the socioeconomic status of the black population rises. As the average socioeconomic status of blacks approaches the higher end, so does their probability of residential contact with whites. One sub-hypotheses is derived from H2:

(A) The link between socioeconomic status and the probability of residential contact is stronger for the blacks in tracts of invasion, succession, and growth, than for those in the tracts of established segregation.
H3: The probability of blacks being isolated from whites decreases when the socioeconomic status of blacks rises.

(A) The link between socioeconomic status and the probability of black isolation is stronger for blacks in the tracts of invasion, succession, and growth, than for those in the tracts of established segregation.

H4: Within census tracts, interracial socioeconomic differences generally do not affect the variation in degrees of segregation in a linear fashion. Three sub-hypotheses need to be tested:

(A) The correlation between residential segregation of blacks (measured by $D_{xy}$) and the interracial socioeconomic disparities varies in strength across tracts of different types of racial changes. None of these correlation coefficients is expected to be statistically significant.

(B) The correlation between black-white residential contact (measured by $x_{i}P_{y}$) and interracial socioeconomic disparities varies in strength across tracts of different types of racial changes. None of these correlation coefficients is expected to be statistically significant.
The correlation between residential isolation of blacks (measured by \( x_iP^*x_i \)) and interracial socioeconomic disparities varies in strength across tracts of different types of racial changes. None of these correlation coefficients is expected to be statistically significant.

H1 to H3 are expressed in a series of structural equations and path models:

For H1, H1A, and H1B: 
\[
D_{x_iy_i} = f_1 (E_{1x_i}, E_{2x_i})
\]

For H2 and H2A: 
\[
x_iP^*y_i = f_2 (E_{1x_i}, E_{2x_i})
\]

For H3 and H3A: 
\[
x_iP^*x_i = f_3 (E_{1x_i}, E_{2x_i})
\]

H4 and its sub-hypotheses are also tested with a series of equations, but these equations are not linear functions:

H4A: 
\[
D_{x_iy_i} = f_4 (D_{1x_iy_i}, D_{2x_iy_i})
\]

H4B: 
\[
x_iP^*y_i = f_5 (D_{1x_iy_i}, D_{2x_iy_i})
\]

H4C: 
\[
x_iP^*x_i = f_6 (D_{1x_iy_i}, D_{2x_iy_i})
\]

where \( D_{x_iy_i}, x_iP^*y_i, ixP^*x_i, D_{1x_iy_i}, D_{2x_iy_i}, E_{1x_i} \) and \( E_{2x_i} \) are respectively their index values for tract i.
Chapter VI. Findings and Conclusions

I. Degrees of Segregation and Socioeconomic Status

The leading hypothesis of this study is that differences in degrees of residential segregation of blacks are a consequence of the differences in their socioeconomic statuses. The summary data listed in Table 3 support this hypothesis (H1). Compared with blacks in established segregation tracts, in the tracts of lower degrees of segregation, the average socioeconomic statuses of blacks are higher as indicated by average household income and average educational attainment. These tracts are the ones undergoing the following types of racial changes: invasion, early and middle stages of succession, and growth.

For blacks in tracts of established segregation, the household incomes range from $5,765 to $27,030. The median household income is $16,672. (Table 3.1). The Elxi index values for the segregated tracts range from -.687, meaning lower than the overall average household income of blacks in the city by 68.7%, to .008, meaning higher than the city average of blacks by .8%. The median value is -.380. On average, the mean household income for blacks in these
Table 3.1
Socioeconomic Differentials between Black Populations in Different Types of Tracts

<table>
<thead>
<tr>
<th>Type of Tracts</th>
<th>Mean Household Income of Blacks</th>
<th>Elxi</th>
<th>Median</th>
<th>Range</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range</td>
<td>Median</td>
<td>Range</td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td>Invasion (N=46)</td>
<td>$27,899--$45,412</td>
<td>$36,053</td>
<td>0.068--1.260</td>
<td>0.507</td>
<td></td>
</tr>
<tr>
<td>Succession (N=34)</td>
<td>$22,021--$37,235</td>
<td>$31,023</td>
<td>-0.0003--1.126</td>
<td>0.436</td>
<td></td>
</tr>
<tr>
<td>Growth (N=14)</td>
<td>$24,975--$78,956</td>
<td>$39,877</td>
<td>0.002--2.247</td>
<td>0.630</td>
<td></td>
</tr>
<tr>
<td>Established Segregation (N=52)</td>
<td>$5,765--$27,030</td>
<td>$16,672</td>
<td>-0.6817--0.0084</td>
<td>-0.3798</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.2
Socioeconomic Differentials between Black Populations
in Different Types of Tracts

**Education**

<table>
<thead>
<tr>
<th>Type of Tracts</th>
<th>Educational Attainment of Blacks</th>
<th>E2xi</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range</td>
<td>Median</td>
</tr>
<tr>
<td>Invasion (N=46)</td>
<td>39.5%--78.6%</td>
<td>51.5%</td>
</tr>
<tr>
<td>Succession (N=34)</td>
<td>28.8%--75.6%</td>
<td>47.8%</td>
</tr>
<tr>
<td>Growth (N=14)</td>
<td>33.3%--87.4%</td>
<td>59.0%</td>
</tr>
<tr>
<td>Established Segregation (N=52)</td>
<td>0.00%--33.9%</td>
<td>17.6%</td>
</tr>
</tbody>
</table>
segregated is lower than the mean household income for the
total black population in the metropolitan area by 38%.

The educational attainment levels of blacks in these
segregated tracts are very low compared with the overall level
of education attainment for blacks in the city (Table 3.2).
Computed on the basis of the proportion of people with at
least some education at the college level, the percentages of
educational attainment for blacks in segregated tracts varies
from 0.00% to 33.9%, with the median being 17.6%. For these
segregated tracts, the index values of E2xi range from -1.000,
indicating minimum college level educational attainment, to
.093, indicating that in the tract, the black educational
attainment is higher than the overall educational attainment
level of blacks in the city by 9.32%. For these tracts, the
median value is -.284, which is lower than the overall
education level for black in the city by 28.4 percent.

Since a negative E2xi value suggests a below average
educational attainment level, for most of the segregated
tracts (90%), the index values are negative and the education
attainment levels are below the city average. In contrast,
the medians of mean household income for blacks in tracts of
invasion, succession and growth are higher (43.6% to 63.0%)
than the overall mean income for the total black population in
the city. In tracts of invasion, succession, and growth, the black household income ranges from $22,021 to $78,956. For blacks in such tracts, the E1xi index values range from -.0003 to 2.247, meaning that the average income of blacks in these tracts range from slightly lower (.03%) than the city average to over twice as high (224.7%) as the overall average black income in the city.

Similar differences are found in educational attainment between tracts of established segregation and tracts of invasion, succession, and growth. In tracts of established segregation, the index values of E2xi range from -1.000 (minimum education attainment) to .093 (higher than the overall education attainment level of blacks in the city by 9.32%). The median value is -.284, suggesting a level of education attainment lower than the overall level in the city by 28.4%. As shown in Table 3.2, in tracts of invasion, the median educational attainment levels of blacks are higher than the overall levels for blacks in the city by 89.2% and 49.4% respectively. Most blacks in tracts of succession have higher levels of education than the city overall for blacks. For tracts of succession, the median value of Ex2xi index indicates an educational level higher than the city overall for blacks by 36.2%.
An examination of the standardized regression coefficients (Table 4.1.) supports the hypothesis (H1) that the education and income differentials of blacks have significant effects on segregation, which is measured by the dissimilarity index. The standardized regression coefficients for income (.202) and education (.401) both indicate a strong association between socioeconomic variables and degrees of segregation, which are measured by Dixyi. Lower degrees of segregation are observed for blacks with higher levels of income and educational attainment.

In tracts of established segregation, the correlations between socioeconomic variables and degrees of segregation are strong but not statistically significant. The standardized regression coefficient is -.382 for education and -.304 for income. In these segregated tracts, the equation, f1, explains only very little variance (6.22%) in degrees of segregation.

In tracts of invasion, education has a strong effect (-.349) on degrees of segregation, whereas the effect of income (-.097) is not strong or statistically significant. The socioeconomic variables explain 12.5% of the variance in degrees of segregation among tracts of invasion.
Table 4.1.
Analysis of Residential Dissimilarity

With Standardized Regression Coefficients (Dependent Variable = Dissimilarity)

<table>
<thead>
<tr>
<th>Type of Tracts</th>
<th>Income</th>
<th>Education</th>
<th></th>
<th></th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>Standard Error</td>
<td>Beta</td>
<td>Standard Error</td>
<td>Coef. of Determination</td>
</tr>
<tr>
<td>Invasion (N=46)</td>
<td>-.097*</td>
<td>.024</td>
<td>-.349</td>
<td>.022</td>
<td>.125</td>
</tr>
<tr>
<td>Succession (N=34)</td>
<td>-.331</td>
<td>.045</td>
<td>-.315</td>
<td>.033</td>
<td>.394</td>
</tr>
<tr>
<td>Growth (N=14)</td>
<td>-.220*</td>
<td>.011</td>
<td>-.756</td>
<td>.013</td>
<td>.433</td>
</tr>
<tr>
<td>Established Segregation (N=52)</td>
<td>-.304*</td>
<td>.010</td>
<td>-.382*</td>
<td>.008</td>
<td>.062</td>
</tr>
<tr>
<td>All Tracts (N=163)</td>
<td>-.202</td>
<td>.009</td>
<td>-.401</td>
<td>.007</td>
<td>.105</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
Table 4.2.
Analysis of Residential Dissimilarity
With Unstandardized Regression Coefficients (Dependent Variable=Disimilarity)

<table>
<thead>
<tr>
<th>Type of Tracts</th>
<th>Income</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>Standard Error</td>
</tr>
<tr>
<td>Invasion</td>
<td>-.017*</td>
<td>.024</td>
</tr>
<tr>
<td>(N=46)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Succession</td>
<td>-.136</td>
<td>.045</td>
</tr>
<tr>
<td>(N=34)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth</td>
<td>-.009*</td>
<td>.011</td>
</tr>
<tr>
<td>(N=14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Established Segregation</td>
<td>-.014*</td>
<td>.010</td>
</tr>
<tr>
<td>(N=52)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Tracts</td>
<td>-.019</td>
<td>.009</td>
</tr>
<tr>
<td>(N=163)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
Education and income differentials both have strong and statistically significant effects on residential segregation in tracts of succession. The standardized regression coefficients for education and income in these succession tracts are -.315 and -.331 respectively. Education and income differentials together explain 39.4% of the variance in levels of segregation in these succession tracts. The effect of education on segregation is stronger than income in tracts of growth. The standardized regression coefficient for education is -.756. But the standardized regression coefficient of income, while substantial at -.220, is not statistically significant. In tracts of growth, 43.3% of the variance in degrees of segregation are explained by the equation, f1.

The findings indicate that the standardized regression coefficients of income are relatively strong but not statistically significant in some types of tracts (Table 4.1.). This might suggest that there could be a problem of multicollinearity between the two independent variables in the equation (f1).

With the help of the classification scheme, the relationship between socioeconomic status and degrees of black segregation is compared across census tracts with reference to the type of racial changes that tracts are undergoing. The
regression results are consistent with the sub-hypotheses (H1A and H1B) that for blacks in all types of tracts, the effects of socioeconomic variables on degrees of segregation are in the same direction as predicted. But the effects are not statistically significant in most of the tracts except in tracts of succession (Table 4.2.).

An examination of the unstandardized regression coefficients for income and education (Table 4.2.) indicates that the effect of income (−.014) in tracts of established segregation is weaker than those in tracts of invasion (−.017) and tracts of succession (−.136), but stronger than that in tracts of growth (−.009). Great differences have been found in the effects of education between tracts of established segregation (.014) and tracts of invasion (−.053), succession (−.105), and growth (−.035). This finding conforms to the sub-hypotheses (H1A and H1B) that the effects of income and education are negative and statistically significant and that these effects are stronger in tracts of invasion, succession, and growth, than in tracts of established segregation.

Since some standardized regression coefficients are strong but not statistically significant (Table 4.1), there might be a problem of multicollinearity between education and income. A single regression was performed for all tracts
Table 5

Effects of Education on Income
With Unstandardized Regression Coefficients (Dependent Variable=Income)

<table>
<thead>
<tr>
<th>Education</th>
<th>b</th>
<th>Standard Error</th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Tracts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invasion (N=46)</td>
<td>.078*</td>
<td>.135</td>
<td>.007</td>
</tr>
<tr>
<td>Succession (N=34)</td>
<td>.640</td>
<td>.091</td>
<td>.746</td>
</tr>
<tr>
<td>Growth (N=14)</td>
<td>.626</td>
<td>.265</td>
<td>.317</td>
</tr>
<tr>
<td>Established Segregation (N=52)</td>
<td>.586</td>
<td>.071</td>
<td>.575</td>
</tr>
<tr>
<td>All Tracts (N=163)</td>
<td>.595</td>
<td>.049</td>
<td>.354</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
under study to estimate the effect of education on income. The findings implicate that education attainment bears a strong linear effect (.454) on income (Table 5). Education differentials account for 35.4% of the variance in income. Such effect is strong and statistically significant in tracts of succession (.640), growth (.626), and established segregation (.586). But the effect of education on income is neither strong or statistically significant for tracts of invasion (.078) (Table 5). The high levels of collinearity between education and income might be responsible for the unexpected finding that some standardized regression coefficients are relatively strong but not statistically significant (i.e., the effect of income in tracts of succession, income and education in tracts of growth) (Table 4.1.).

The effects of income and education on degrees of segregation are also estimated across the four metropolitan areas (Table 6.1. & 6.2.). The analysis of the standardized regression coefficients (Betas) indicates that the effects of education are stable and stronger than the effects of income in all four metropolitan areas studied. For Norfolk, education and income account for 32.3% of the variance in degrees of segregation. The percentages are smaller for the
Table 6.1.

Analysis of Residential Dissimilarity Across Metropolitan Areas

With Standardized Regression Coefficients (Dependent Variable = Dissimilarity)

<table>
<thead>
<tr>
<th>Metropolitan Areas</th>
<th>Income</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>Standard Error</td>
</tr>
<tr>
<td>Lynchburg (N=22)</td>
<td>.172*</td>
<td>.038</td>
</tr>
<tr>
<td>Roanoke (N=23)</td>
<td>.027*</td>
<td>.403</td>
</tr>
<tr>
<td>Richmond (N=44)</td>
<td>.169*</td>
<td>.009</td>
</tr>
<tr>
<td>Norfolk (N=74)</td>
<td>.183*</td>
<td>.005</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPH$A = .05$ level.
Table 6.2.

Analysis of Residential Dissimilarity Across Metropolitan Areas

With Unstandardized Regression Coefficients (Dependent Variable = Dissimilarity)

<table>
<thead>
<tr>
<th>Metropolitan Areas</th>
<th>Income</th>
<th>Education</th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>Standard Error</td>
<td>b</td>
</tr>
<tr>
<td>Lynchburg (N=22)</td>
<td>.028*</td>
<td>.038</td>
<td>-.048</td>
</tr>
<tr>
<td>Roanoke (N=23)</td>
<td>.037*</td>
<td>.403</td>
<td>-.227*</td>
</tr>
<tr>
<td>Richmond (N=44)</td>
<td>.007*</td>
<td>.009</td>
<td>-.020</td>
</tr>
<tr>
<td>Norfolk (N=74)</td>
<td>.008*</td>
<td>.005</td>
<td>-.020</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
Table 7

Analysis of The Effect of Education on Income

With Unstandardized Regression Coefficients (Dependent Variable=Income)

<table>
<thead>
<tr>
<th>Metropolitan Areas</th>
<th>Education b</th>
<th>Standard Error</th>
<th>Coefficient of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lynchburg</td>
<td>.242*</td>
<td>.159</td>
<td>.103</td>
</tr>
<tr>
<td>Roanoke</td>
<td>.417</td>
<td>.103</td>
<td>.452</td>
</tr>
<tr>
<td>Richmond</td>
<td>.656</td>
<td>.089</td>
<td>.562</td>
</tr>
<tr>
<td>Norfolk</td>
<td>.403</td>
<td>.070</td>
<td>.317</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
other three cities: 19.4 for Richmond, 13.6 for Lynchburg and 6.5 for Roanoke.

What is unexpected is that the effects of income are not statistically significant in all four cities (Table 6.1.), when they are estimated for an individual metropolitan area.

The cross-metropolitan comparison of unstandardized regression coefficients suggests that education has stronger effects on segregation in Roanoke and Lynchburg, the two cities of younger ages and with smaller black populations (Table 1 & 6.2).

While the difference in unstandardized regression coefficients might possibly be a function of the smaller sample size of these two cities, or a reflection of the difference in the size of black populations between these two groups of cities, it supports to some extent the assertion that the age of the city is an important factor in studying residential segregation (Roof et al. 1976).

The possible problem of multicollinearity is also tested through a single regression equation model between education and income for the tracts of the four cities separately (Table 7). Findings indicate that the unstandardized regression
coefficients of education are strong and statistically significant in Richmond (.656), Roanoke (.417), and Norfolk (.403). The effect of education is weak and not statistically significant in Lynchburg (.242). The high collinearity between education and income provides a possible explanation for the finding that in all the cities, the regression coefficients for income (Table 6.2.) are not statistically significant. The opposing effects between income and education, which did not occur previously, might be a consequence of the multicollinearity and small sample size when the cities are studied separately.

II. Socioeconomic Status and the Probability of Residential Contact

Using the index of interaction \( (xiP*yi) \) to measure the probability of black-white residential contact, the correlation between socioeconomic differentials of blacks and the probability of black-white residential contact is tested in the equation, \( f2 \). The regression results do not confirm the hypothesis (H2) that the probability of black contact with whites increases as the socioeconomic status of blacks increases (Table 8.1.). The standardized regression coefficients are not statistically significant for either
### Table 8.1.

**Analysis of Racial Interaction**

*With Standardized Regression Coefficients (Dependent Variable=Interaction)*

<table>
<thead>
<tr>
<th>Type of Tracts</th>
<th>Income</th>
<th></th>
<th>Education</th>
<th></th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>Standard Error</td>
<td>Beta</td>
<td>Standard Error</td>
<td></td>
</tr>
<tr>
<td>Invasion (N=46)</td>
<td>.031*</td>
<td>.005</td>
<td>.089</td>
<td>.005</td>
<td>.009</td>
</tr>
<tr>
<td>Succession (N=34)</td>
<td>.332*</td>
<td>.001</td>
<td>.303*</td>
<td>.000</td>
<td>.377</td>
</tr>
<tr>
<td>Growth (N=14)</td>
<td>.673</td>
<td>.000</td>
<td>-.524*</td>
<td>.000</td>
<td>.331</td>
</tr>
<tr>
<td>Established Segregation (N=52)</td>
<td>.590</td>
<td>.000</td>
<td>-.242*</td>
<td>.000</td>
<td>.190</td>
</tr>
<tr>
<td>All Tracts (N=163)</td>
<td>.055*</td>
<td>.002</td>
<td>.150*</td>
<td>.002</td>
<td>.016</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
### Table 8.2

**Analysis of Racial Interaction**

With Unstandardized Regression Coefficients (Dependent Variable = Interaction)

<table>
<thead>
<tr>
<th>Type of Tracts</th>
<th>Income</th>
<th>Education</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>Standard Error</td>
<td>b</td>
<td>Standard Error</td>
<td>Coef. of Determination</td>
</tr>
<tr>
<td>Invasion (N=46)</td>
<td>.001*</td>
<td>.005</td>
<td>.053</td>
<td>.005</td>
<td>.009</td>
</tr>
<tr>
<td>Succession (N=34)</td>
<td>.0004*</td>
<td>.001</td>
<td>.0002*</td>
<td>.000</td>
<td>.377</td>
</tr>
<tr>
<td>Growth (N=14)</td>
<td>.0005</td>
<td>.000</td>
<td>-.0005*</td>
<td>.000</td>
<td>.331</td>
</tr>
<tr>
<td>Established Segregation (N=52)</td>
<td>.0007</td>
<td>.000</td>
<td>-.0002*</td>
<td>.000</td>
<td>.190</td>
</tr>
<tr>
<td>All Tracts (N=163)</td>
<td>.001*</td>
<td>.002</td>
<td>.002*</td>
<td>.002</td>
<td>.016</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHΑ = .05 level.*

---

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income (.055) or education (.150), although both effects are in the same direction as hypothesized. Income and educational differentials together explain only 1.56% of the variance in the levels of probability of interracial contact.

After classifying the tracts according to the type of racial changes, the regression results (Table 8.2) are not concordant with the prediction (H2A). Generally, the strength of the unstandardized regression coefficients of income and education do not vary in the expected manner. The effect of income (.001) is stronger in tracts of invasion than in other types of tracts. But this effect is not statistically significant. The effects of income in tracts of succession (.0004), growth (.0005), and established segregation (.0007) are close to each other. The effects of income in tracts of invasion or succession are not statistically significant (Table 8.2).

The strongest effect of education (.053) is found in tracts of invasion. The effects of education in other types of tracts are not statistically significant. The effects of education are found in the opposite direction than expected in tracts of growth (-.0005) and established segregation (-.0002) (Table 8.2.).
Table 9.1

Analysis of Racial Interaction Across Metropolitan Areas

With Standardized Regression Coefficients (Dependent Variable=Interaction)

<table>
<thead>
<tr>
<th></th>
<th>Income</th>
<th></th>
<th>Education</th>
<th></th>
<th></th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>Standard Error</td>
<td>Beta</td>
<td>Standard Error</td>
<td>Coef. of</td>
<td></td>
</tr>
<tr>
<td>Metropolitan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

|           |   |  |   |  |   |           |
| Lynchburg | .311* | .007 | -.176* | .005 |  .092 |          |
| (N=22)    |        |      |        |      |      |           |

| Roanoke   | -.749 | .048 | .261* | .030 |  .366 |          |
| (N=23)    |        |      |        |      |      |           |

| Richmond  | -.252* | .002 | .593  | .002 |  .191 |          |
| (N=44)    |        |      |        |      |      |           |

| Norfolk   | -.310 | .002 | .370  | .001 |  .104 |          |
| (N=74)    |        |      |        |      |      |           |

* T-test result is not significant at ALPHA = .05 level.
Table 9.2

Analysis of Racial Interaction Across Metropolitan Areas

With Unstandardized Regression Coefficients (Dependent Variable=Interaction)

<table>
<thead>
<tr>
<th>Metropolitan Areas</th>
<th>Income b</th>
<th>Standard Error</th>
<th>Education b</th>
<th>Standard Error</th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lynchburg (N=22)</td>
<td>.010*</td>
<td>.007</td>
<td>-.004*</td>
<td>.005</td>
<td>.092</td>
</tr>
<tr>
<td>Roanoke (N=23)</td>
<td>-.148</td>
<td>.048</td>
<td>.032*</td>
<td>.030</td>
<td>.366</td>
</tr>
<tr>
<td>Richmond (N=44)</td>
<td>-.002*</td>
<td>.002</td>
<td>.005</td>
<td>.002</td>
<td>.191</td>
</tr>
<tr>
<td>Norfolk (N=74)</td>
<td>-.004</td>
<td>.002</td>
<td>.004</td>
<td>.001</td>
<td>.104</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
A cross-metropolitan analysis (Table 9.1, 9.2) reveals more unexpected findings. For Norfolk, the effects of income (-.310) and education (.370) are both strong and statistically significant. For Richmond, the effect of education (.593) is statistically significant and stronger than the effect of income (-.252), which is not statistically significant. For Roanoke, the effect of income (-.749) is statistically significant and stronger than the effect of education (.261), which is in the expected direction, but not statistically significant. For Lynchburg, neither of the effects are statistically significant (Table 9.1).

A comparison of unstandardized regression coefficients concludes that the variation in strength and directions for the effects of income and education are chaotic (Table 9.2). No clear pattern has been found in the variation. The finding suggests that, besides the possible disturbances from the small sample size and the problem of multicollinearity, there might be disturbances from the index of interaction itself.
III. Socioeconomic Status and Residential Isolation of Blacks

Using the index of isolation to measure the degrees of black residential isolation, the association between socioeconomic differentials of blacks and the probability of blacks being isolated to themselves is tested in the equation (f3).

The results of regression (f3) support the hypothesis (H3) that the probability of blacks being isolated from whites decreases when the socioeconomic status of blacks increases (Table 10.1 & 10.2). In general, educational attainment functions as an important "de-isolation" factor. The effect of education (−.281) is strong. Compared with education, the effect of income (+.075) is weak and not statistically significant. The effect of income is in a direction other than expected. The coefficient of determination for this equation (f3) is .059.

With the help of the classification scheme, the correlations between socioeconomic differentials of blacks and the probability of isolation from whites is specified for different types of tracts (Table 10.1.).
<table>
<thead>
<tr>
<th>Type of Tracts</th>
<th>Income</th>
<th></th>
<th>Education</th>
<th></th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>Standard Error</td>
<td>Beta</td>
<td>Standard Error</td>
<td></td>
</tr>
<tr>
<td>Invasion (N=46)</td>
<td>-.001*</td>
<td>.016</td>
<td>-.300</td>
<td>.014</td>
<td>.090</td>
</tr>
<tr>
<td>Succession (N=34)</td>
<td>-.467</td>
<td>.032</td>
<td>-.387</td>
<td>.024</td>
<td>.295</td>
</tr>
<tr>
<td>Growth (N=14)</td>
<td>.251*</td>
<td>.005</td>
<td>-.566*</td>
<td>.006</td>
<td>.223</td>
</tr>
<tr>
<td>Established Segregation (N=52)</td>
<td>.068*</td>
<td>.006</td>
<td>-.429</td>
<td>.004</td>
<td>.066</td>
</tr>
<tr>
<td>All Tracts (N=163)</td>
<td>.075*</td>
<td>.006</td>
<td>-.280</td>
<td>.004</td>
<td>.059</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
### Table 10.2
Analysis of Racial Isolation

With Unstandardized Regression Coefficients (Dependent Variable=Isolation)

<table>
<thead>
<tr>
<th>Type of Tracts</th>
<th>Income</th>
<th>Education</th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>Standard Error</td>
<td>b</td>
</tr>
<tr>
<td>Invasion (N=46)</td>
<td>-.0001*</td>
<td>.016</td>
<td>-.029</td>
</tr>
<tr>
<td>Succession (N=34)</td>
<td>-.069</td>
<td>.032</td>
<td>-.061</td>
</tr>
<tr>
<td>Growth (N=14)</td>
<td>.004*</td>
<td>.055</td>
<td>-.010*</td>
</tr>
<tr>
<td>Established Segregation (N=52)</td>
<td>.002*</td>
<td>.006</td>
<td>-.007*</td>
</tr>
<tr>
<td>All Tracts (N=163)</td>
<td>.005*</td>
<td>.006</td>
<td>-.013</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
Regression results indicate that for most types of tracts, education has stronger effects in reducing the probability of isolation than income (Table 10.1).

In tracts of established segregation, education has a statistically significant and strong effect (-.429) on isolation. The effect of income (.067) is neither statistically significant nor strong. Income and education differentials together account for 16.4% of the variance in the probability of black isolation. In tracts of invasion, education also has a statistically significant and strong negative effect (-.300) on the probability of isolation. The effect of income (-.001) is neither strong nor statistically significant. The coefficient of determination is .090.

The effects of income (-.467) and education (-.387) are both strong and statistically significant among tracts of succession. The equation (f3) accounts for 29.5% of the variance in the probability of isolation.

The effects of education (-.566) and income (.251) are both strong but not statistically significant in tracts of growth. The effect of income is in a direction other than expected (Table 10.1).
An examination of the unstandardized regression coefficients generates some findings that are consistent with the hypothesis (H3A) (Table 10.2). The effects of education in tracts of invasion (-.029), succession (-.061), and growth (-.010) are all in the hypothesized direction and stronger than the effect of education in tracts of established segregation (-.007).

The effect of income in tracts of established segregation (.002) is stronger than in tracts of invasion (-.0001). Compared with tracts of established segregation, the effects of income are stronger in tracts of succession (-.069) and growth (.004). Some of these effects are in the direction other than expected (Table 10.2).

The findings of the cross-metropolitan study of the effects of income and education on isolation generally support the hypothesized (H3) correlation between socioeconomic variables and the probability of isolation (Table 11.1 & 11.2).

For Norfolk, the standardized regression coefficients for income (-.054) and education (-.399) are in the hypothesized (H3) direction and statistically significant. The coefficient of determination is .187. For Richmond, the standardized
Table 11.1

Analysis of Racial Isolation Across Metropolitan Areas

With Standardized Regression Coefficients (Dependent Variable=Isolation)

<table>
<thead>
<tr>
<th>Metropolitan Areas</th>
<th>Income (Beta)</th>
<th>Standard Error</th>
<th>Education (Beta)</th>
<th>Standard Error</th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lynchburg (N=22)</td>
<td>0.132*</td>
<td>0.024</td>
<td>-0.370*</td>
<td>0.018</td>
<td>0.123</td>
</tr>
<tr>
<td>Roanoke (N=23)</td>
<td>-0.321</td>
<td>0.011</td>
<td>-0.152*</td>
<td>0.007</td>
<td>0.191</td>
</tr>
<tr>
<td>Richmond (N=44)</td>
<td>-0.036*</td>
<td>0.005</td>
<td>-0.248</td>
<td>0.004</td>
<td>0.076</td>
</tr>
<tr>
<td>Norfolk (N=74)</td>
<td>-0.054</td>
<td>0.004</td>
<td>-0.399</td>
<td>0.003</td>
<td>0.187</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
Table 11.2

Analysis of Racial Isolation Across Metropolitan Areas

With Unstandardized Regression Coefficients (Dependent Variable=Isolation)

<table>
<thead>
<tr>
<th>Metropolitan Areas</th>
<th>Income</th>
<th></th>
<th>Education</th>
<th></th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>Standard Error</td>
<td>b</td>
<td>Standard Error</td>
<td>Coef. of Determination</td>
</tr>
<tr>
<td>Lynchburg (N=22)</td>
<td>.014*</td>
<td>.024</td>
<td>-.029*</td>
<td>.018</td>
<td>.123</td>
</tr>
<tr>
<td>Roanoke (N=23)</td>
<td>-.014</td>
<td>.011</td>
<td>-.004*</td>
<td>.007</td>
<td>.191</td>
</tr>
<tr>
<td>Richmond (N=44)</td>
<td>-.0008*</td>
<td>.005</td>
<td>-.005</td>
<td>.004</td>
<td>.076</td>
</tr>
<tr>
<td>Norfolk (N=74)</td>
<td>-.002</td>
<td>.004</td>
<td>-.008</td>
<td>.003</td>
<td>.187</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
regression coefficients for income (-.036) and education (-.248) are in the hypothesized (H3) direction. The effect of income is not statistically significant. The coefficient of determination is .076.

For Roanoke, income (-.321) bears stronger effects on the probability than education (-.152). The effect of education is not statistically significant. This finding in part conforms to the fact that, during the past few decades, 5 out of Roanoke's 23 census tracts have been undergoing the process of suburbanization (White 1982; Kaegey 1988), in which the spatial mobility of people depends more directly upon immediate resources such as income or housing affordability (Clark 1986).

For Lynchburg, the effects of income (.132) and education (-.370) are in opposite directions. Neither are statistically significant (Table 11.1). This might be a consequence of the limitation of the sample size.

A cross-metropolitan comparison with unstandardized regression coefficients (Table 11.2) indicates that the effect of income for Roanoke (-.014) is statistically significant. The effects of income for Richmond (-.0008), Norfolk (-.002) and Lynchburg (.014) are not statistically significant.
The statistically significant effects of education are found for Richmond (−.005) and Norfolk (−.008) (Table 11.2). The effects of education are in the same direction as hypothesized (H3).

IV. Interracial Socioeconomic Disparities and Degrees of Segregation

Using the dissimilarity index (Dxiyi) to measure degrees of residential segregation, the relationship between interracial socioeconomic disparities and degrees of segregation is tested in the equation (f4). The findings firmly support the hypothesis (H4A) that there is no statistically significant linear association between interracial socioeconomic disparities and degrees of segregation (Table 12).

Since the major focus of studying interracial socioeconomic disparities is on the statistic significance of these effects, it will not necessary to compare the strength of these effects across different types of tracts. Thus the unstandardized regression coefficients are not included in the table or discussion.
<table>
<thead>
<tr>
<th>Type of Tracts</th>
<th>Income</th>
<th>Education</th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasion (N=46)</td>
<td>-.431*</td>
<td>.022</td>
<td>.164</td>
</tr>
<tr>
<td>Succession (N=34)</td>
<td>-.826*</td>
<td>.056</td>
<td>.206</td>
</tr>
<tr>
<td>Growth (N=14)</td>
<td>-.094*</td>
<td>.015</td>
<td>.266</td>
</tr>
<tr>
<td>Established Segregation (N=52)</td>
<td>-.536</td>
<td>.005</td>
<td>.205</td>
</tr>
<tr>
<td>All Tracts (N=163)</td>
<td>-.368*</td>
<td>.007</td>
<td>.099</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
Most of the standardized regression coefficients are not statistically significant. The coefficient of determination is .099 for the equation (f4). The strength of these correlations varies across different types of tracts. The strongest effects of education, though not statistically significant, are found in tracts of growth (.530) and tracts of succession (.549) (Table 12).

In tracts of established segregation, the effect of income (-.536) is negative and statistically significant, while the effect of education (.147) is positive but not statistically significant. The coefficient of determination for the equation (f5) is .205 (Table 12). This finding remains unexplained.

The test findings of the relationship between interracial socioeconomic disparities and the probability of black-white residential contact generally support the hypothesis (H4B) (Table 13). Most of the standardized regression coefficients are not statistically significant. The equation account for 1.75% of the variance in segregation measured by the interaction index. In tracts of growth, the standardized regression coefficient for income (.664) is statistically significant. The effect of education (-.091) is not statistically significant and in opposite direction from the
Table 13

Analysis of Interracial Socioeconomic Disparities and Racial Interaction
with Standardized Regression Coefficients (Dependent Variable=Interaction)

<table>
<thead>
<tr>
<th>Type of Tracts</th>
<th>Income</th>
<th>Education</th>
<th></th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>Standard Error</td>
<td>Beta</td>
<td>Standard Error</td>
</tr>
<tr>
<td>Invasion (N=46)</td>
<td>-.001*</td>
<td>.005</td>
<td>.154*</td>
<td>.004</td>
</tr>
<tr>
<td>Succession (N=34)</td>
<td>-.175*</td>
<td>.0005</td>
<td>.752*</td>
<td>.0005</td>
</tr>
<tr>
<td>Growth (N=14)</td>
<td>.664</td>
<td>.0002</td>
<td>-.091*</td>
<td>.0002</td>
</tr>
<tr>
<td>Established Segregation (N=52)</td>
<td>.285*</td>
<td>.0001</td>
<td>-.208*</td>
<td>.0002</td>
</tr>
<tr>
<td>All Tracts (N=163)</td>
<td>-.070*</td>
<td>.002</td>
<td>.154*</td>
<td>.002</td>
</tr>
</tbody>
</table>

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Table 14

Analysis of Interracial Socioeconomic Disparities and Residential Isolation

With Standardized Regression Coefficients (Dependent Variable=Isolation)

<table>
<thead>
<tr>
<th>Type of Tracts</th>
<th>Income Beta</th>
<th>Income Standard Error</th>
<th>Education Beta</th>
<th>Education Standard Error</th>
<th>Coef. of Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasion (N=46)</td>
<td>.211*</td>
<td>.015</td>
<td>-.104*</td>
<td>.013</td>
<td>.040</td>
</tr>
<tr>
<td>Succession (N=34)</td>
<td>.704*</td>
<td>.039</td>
<td>-.493*</td>
<td>.041</td>
<td>.144</td>
</tr>
<tr>
<td>Growth (N=14)</td>
<td>.197*</td>
<td>.006</td>
<td>-.328*</td>
<td>.005</td>
<td>.117</td>
</tr>
<tr>
<td>Established Segregation (N=52)</td>
<td>.465</td>
<td>.003</td>
<td>-.204*</td>
<td>.004</td>
<td>.132</td>
</tr>
<tr>
<td>All Tracts (N=163)</td>
<td>.219*</td>
<td>.004</td>
<td>-.104*</td>
<td>.004</td>
<td>.035</td>
</tr>
</tbody>
</table>

* T-test result is not significant at ALPHA = .05 level.
effect of the income. The coefficient of determination is .421 (Table 13).

The sub-hypothesis (H4C) about the relationship between interracial socioeconomic disparities and the probability of residential isolation is supported by the findings (Table 14).

The findings indicate that most of the standardized regression coefficients generated in the equation (f6) are not statistically significant (Table 14). The coefficient of determination for the equation (f6) is .035. In tract of established segregation, the effect of income (.465) is statistically significant and positive. The effect of education(-.147) is negative but not statistically significant. The coefficient of determination is .132 (Table 14).

It has been repeatedly implied by the regression results that the effects of income (Dlxiyi) are sometimes unexpected either in direction or in statistic significance. Since these unexpected effects occur across different equations, in different cities, and in different types of tracts, it is more possible that biases come from the index (Dlxiyi) itself rather than from outside sources.
Chapter VII. Discussion

I. Spatial Assimilation As A Socioeconomic Outcome

The results of this study support the ecological theory of spatial assimilation. The spatial integration of blacks to attain proportional distribution in a metropolitan area appears to relate to the socioeconomic advancement of blacks. The models for estimating black assimilation suggest that increases in income and education lead to decreases in the degree of segregation for blacks. The conclusion confirms the long-standing results of the ecological studies of segregation (Park 1926; Duncan and Lieberson 1959; Lieberson 1961; 1963; Duncan and Duncan 1967; Guest and Weed 1971; Simkus 1979; Massey 1979; Massey and Mullan 1984; Massey and Denton 1985).

Two hypotheses (H1 and H3) of the association between socioeconomic statuses and the dimensions of residential segregation are supported. The findings indicate that the higher socioeconomic status is concordantly associated with the lower degree of dissimilarity of residential distribution, the higher probability of residential contact with whites, and lower probability of residential isolation for the black population in the four Virginia cities studied. The
conclusions are consistent with the previous ecological studies of segregation (Duncan and Lieberson 1959; Lieberson 1961; 1963; Duncan and Duncan 1967; Guest and Weed 1971; Simkus 1979; Massey 1979; Massey and Mullan 1984; Massey and Denton 1985).

The results also support the hypotheses (H4, H4A, H4B, and H4C) that the interracial socioeconomic disparities within the census tract do not produce statistically significant effects on the degree of segregation. This conclusion suggests a minor departure from the traditional ecological theory that racial segregation is a function of socioeconomic differences between racial groups. The result confirms the findings of the previous ecological study, in which little operational importance was found for the interracial socioeconomic differences (Massey 1979).

II. Measures of Socioeconomic Differentials

The findings suggest that the effects of education on segregation are generally more consistent than those of income when the degree of segregation is measured with different indexes. The effects of education on segregation are also more consistent than those income when the degree of
segregation is measured for different cities or types of tracts.

The differences between the formulae of the measure of education (E2xi) and the formula of the measure of income (E1xi) may explain the finding partially. The index value of the educational attainment measure (E2xi) is the proportion of the population with at least a college level education. Theoretically, the index (E2xi) itself can hardly cause any measurement errors. The index value of income measure (E1xi) is the unweighted statistical mean of the income of all households in a tract. The formula may generate two types of potential problems: first, the index based on the household income might not be an accurate measure to reflect the economic condition of an individual since there is no control over the size of the household. For two households of different sizes, the same amount of income may indicate very different economic conditions. Second, the unweighted mean income might be biased since it could be affected by extreme outliers. When the population is small in size, the index value is very likely to be affected by the extremely low or high income of some households, which usually take up only a small proportion of the tract population. Thus the measure of income (E1xi) might be biases and less reliable for the tracts where the population or the concerned part of the population
are small in size. Usually, such biases could be found for the effects of income in the tracts of invasion (where black population is small) or in tracts of established segregation (where white population is small). A comparison between the standardized regression coefficients for income in the tracts of invasion and established segregation (Table 4.1., 8.1. and 9.1.) supports this view.

The indexes for interracial income differentials may have the same kind of biases. The index value of interracial income differentials is determined by the mean household incomes of blacks and whites. For the same reason, biases may occur when the black population in the tract is small or when the white population is small. This might partially explain the fact that in the tracts of some types of racial changes, statistically significant correlations are estimated between the interracial socioeconomic differences and levels of segregation. (Table 11, 12, 13).

These findings suggest that for further research, better measure for inter-tract and interracial income differences and interracial education differences need to be developed.
III. Residential Segregation and Types of Racial Change

The scheme of classification (Taeuber and Taeuber 1965; Massey and Mullan 1984) is employed to specify the association between the socioeconomic differentials and the degree of segregation. The sizes of the correlations between socioeconomic variables and degrees of segregation vary across tracts with different types of racial changes. When the degree of residential segregation was measured by interaction and isolation indexes, the strength of the standardized regression coefficients did not vary in the hypothesized pattern (H2A and H3A). This could be a consequence of statistical biases in the measures, limitations of the small sample size as well as other circumstantial factors, such as the presence of other minority groups in the tracts.

It is indicated in Table 1 that for all the four cities under study, the black and white population together constitute more than 95% of the total population. The population of other minorities in these cities is small yet not completely absent. There might be problems of inaccuracy in classifying the type of racial changes when the attention was paid only to the variation of black-white proportions. Such errors might be found for the tracts of established segregation or invasion. For instance, some tracts are not
classified as the tracts of "established segregation" because the percentage of blacks in these tracts are lower than 60%. But with the possible presence of other minorities, the actual proportion of the minority composition and the degree of segregation from majority members should be higher than what is shown by the percent black.

The presence of other minority groups might also cause racial succession by their own entry into white neighborhoods. The possible situation may lead to an underestimation of the levels of succession, since only the entry of blacks into such areas were recorded and studied in this paper. But such errors will not be very serious. The previous studies (Massey and Mullan 1984) found that other minorities were far less likely to cause residential succession because the resistance that other minorities encountered in trying to assimilate was much weaker than what blacks were against (Massey and Mullan 1984; Massey and Denton 1985; Massey and Denton 1987a).

With reference to the census maps, it is found that each of the four cities has at least one segregated area, where the tracts of established segregation are clustered together. Most of these segregated areas are located in the central city and usually neighbored by the tracts of succession or
invasion. The tracts of growth usually distribute in outskirts.

As stated in Chapter VI, for black residents in the tracts of growth, the median household income is higher than the overall mean income of the total black population in the city by 63%. The median educational attainment level is higher than the overall city level by 49.4%. The regression results indicate that 43.3% of the variance in the degree of residential dissimilarity is explained by socioeconomic differentials in these tracts. The statistical facts and characteristics of the geographic locations of these tracts together suggest that these tracts are undergoing the process of suburbanization.

IV. The Indexes of Interaction and Isolation

It has been repeatedly reported in the previous chapter that the effects of socioeconomic variables were more often in directions other than hypothesized (H2, H3) when the degree of segregation was measured by either interaction of isolation indexes. A close examination of the indexes of interaction (x₁P*Y₁) and isolation (x₁P*x₁) implies that the disturbances might come from the indexes themselves.
According to the previous studies (Taeuber and Taeuber 1965; Massey and Denton 1987a), an important criterion for evaluating the accuracy of segregation indexes held that tracts with similar racial or ethnic compositions should be scored close to each other by the index (Taeuber and Taeuber 1965). If this criterion is applied to evaluate the indexes of interaction and isolation, it can be found that two tracts with the same number of blacks, whites and total persons may attain very different index values when the sizes of the total black population are different. The problem can be specified more clearly by a cross-metropolitan study with a large sample of census tracts from a number of metropolitan areas with different sizes of black population.

V. Suggestions and Conclusion

Using aggregate data from the 1990 census, this study generates the findings and conclusions consistent with the previous studies, in which micro-level or multi-level data were used (Massey and Mullan 1984; Massey and Denton 1985; Massey and Denton 1987a). The results reinforce the validity of the methodological approach of using aggregate-level data to analyze segregation (Massey and Mullan 1984; Massey and Denton 1985). But the conclusion does not disprove the
advantage of using micro-level or multi-level data, in which the magnitude and direction of possible biases can be estimated through comparisons.

For further research, it is necessary to compare the strength of the relationship between socioeconomic differentials and the degree of segregation across the different type of tracts. Such a comparison needs to be done with a larger sample size. A categorization of metropolitan areas with regard to the sizes of black populations might be helpful for detecting possible biases when the indexes of interaction or isolation are used to measure degrees of residential segregation.

With regard to the possible biases in the income measures, new tract-level measures for income should cope with the problem of aggregation biases produced by using the unweighted statistical mean.

In conclusion, using cross-sectional data and viewing segregation as a pattern, the study reassured that, despite the differences in methodological approach, levels of data, variables in the model, the theory of spatial assimilation will not generate serious fallacies in studying residential segregation (Massey and Denton 1985).
Reference


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PROFESSIONAL MEETINGS: