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SPATIAL AND TEMPORAL INTERRELATIONSHIPS OF LAND USE, RACE AND PROPERTY VALUES: DETROIT, MICHIGAN, A CASE STUDY

by
Lester Lee Jones

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Urban and Regional Planning)
in The University of Michigan
1976

Doctoral Committee:

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Professor Thomas J. Anton
Professor Allan G. Feldt

DEDICATION

To my parents, Leola and Ernest Jones, who shared with me their dream for the world.

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Many persons have contributed generally and specifically to this study. The following is merely a partial listing of those who have been helpful. Many thanks to my thesis committee of Professors Allan G. Feldt, Donald R. Deskins, Jr., John D. Nystuen and Thomas J. Anton for their valuable comments, criticism and support through preliminary drafts of the manuscript. Co-Chairmen, Professors John D. Nystuen and Donald R. Deskins, Jr., for their willingness in spending many valuable hours helping me from beginning to end, and for their timely encouragement and many helpful suggestions deserve a special note of gratitude.

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In spite of the help of the many people who made this study possible, its flaws reflect my own limitations. However, whatever are its virtues must be shared.

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CHAPTER ONE

INTRODUCTION

The Property Value Myth

The expressions "urban crises" and "urban blight" have become synonymous with the take over of many central cities by an ever increasing black population. This take over, or potential take over, has been viewed by a significant proportion of the white population as being positively correlated with the decaying and faltering of urban centers across the country. This attitude of whites toward blacks is a reaction produced by a society not only based on mythical beliefs which dictate actions and reactions among its citizenry but also thrives on them. (Parker, 1972.) In relation to minorities, particularly black minorities, there exists an extensive series of myths ranging from their supposedly intrinsic inferiority to the impact of that inferiority on the white society and its possessions. Most of these myths, although still institutionalized, have been exposed for what they really are. One, however, remains a very potent force in determining the ethnic ecology of our cities -- the property value myth. In fact, no other reason is more frequently and strongly urged in support of racially separate residence patterns than that black entry depresses property values.

Racial change in urban neighborhoods has often been attributed to the growth of the black population to a critical "tipping-point" beyond which racially integrated housing situations cannot be sustain-

ed. Traditional accounts of this process have stressed the low socio-economic status of the black population entering a new neighborhood. However, these traditional accounts have been called "outdated oversimplifications" by Karl and Alma Taeuber. They have found that the expansion of black residential areas in recent years has been led by a black population of high socio-economic status -- not only higher than the rest of the black population, but often higher than the white residents of the invaded neighborhood. But even with a sizeable portion of the black population able to afford decent housing in decent surroundings, as a result of their lack of housing alternatives they are often found residing in areas with marginal or substandard housing stock. (Taeuber and Taeuber, 1969.)

This association of the black community with substandard housing, and the supposedly intrinsic inferiority of its people, has caused a myth to be perpetuated that black occupancy will cause a decline in property values and result in the overcrowding and deterioration of the residential neighborhood. Although this myth was and continues to be circulated by an uninformed public, it places the black community and its people in the position of being stereotyped as undesirable neighbors. Robert Weaver, in The Negro Ghetto, reports that the following reasons have been given as justification for opposing black neighbors:

> [1] fear on the part of many white people that the presence of any colored people in a neighborhood will cause serious depreciation of existing property values;
>
> [2] reluctance of some whites to share public and community facilities with Negroes;
>
> [3] fear of losing social caste by living in a neighborhood with

Negroes;

[4] opposition of owners of property occupied by colored people to expansion in the supply of such housing;

[5] apprehension lest change in racial composition of a community will upset existing political balance;

[6] vested interests in maintaining existing homogeneity of nationality-religious neighborhoods;

[7] resentment against alleged efforts of Federal officials to superimpose social change upon a local community; and

[8] entrenched racial prejudice. (Weaver, 1948, p. 214.)

Consequently, within white residential communities there are a tremendous number of white Americans that fear the arrival of black homeowners into their neighborhoods. This fear is generated through primitive beliefs[1] that not only perceive black people as inferior but that, fundamentally, assume a positive correlation between the arrival of black homeowners and the lowering of property values.

Two arguments are used to uphold these primitive beliefs. The first argument asserts that black entry depresses values because of panic selling. According to this view, as soon as a black person buys a home in an all white neighborhood many white homeowners become frightened and try to sell their homes immediately. This causes a flooding of the housing market and results in a sharp fall in property values. The second argument declares that black entry converts neighborhoods from low density and high quality maintenance to high density and low quality maintenance, resulting in rapid physical deterioration and a depreciation of even those homes that have been well maintained.

---

[1]Primitive beliefs are those beliefs which demand no independent formal or empirical confirmation and which require no justification beyond a brief citation of direct experience.

In responce to these arguments, Jack Rothman (1973) maintains that unethical real estate brokers instigate the situation which gives these arguments credence. By deliberately enticing black people who cannot afford payment for homes into their offices, real estate brokers assist in making loans to these individuals through funding companies associated with them -- utilizing devious and highly questionable financing methods. As a result, the uninformed purchasers are led into debt over their heads and then encouraged to overcrowd their homes (by using the attic and basement to take in roomers, boarders, foster children, etc., often in direct violation of existing housing ordinances) for extra income. These unethical practices tend to attract to a middle class area large numbers of working class families which in turn causes a stampede of the remaining middle class white families from the area. (Rothman, 1973.)

However, no matter what external factor(s) give credence to the two arguments used by the white community to uphold their primitive beliefs, the acceptance of one or both of them as true remains a powerful force in keeping the number of integrated middle-income neighborhoods still relatively small. (Comarow, 1973.) Therefore, an important question must be addressed before any real understanding of the situation can be achieved: why do the white middle-income communities cling so strongly to this primitive belief?

Over the years many theories have been advanced to account for segregated racial patterns and overt anti-black sentiment expressed by many white Americans. Two theories that are representative of the scope of the research in this area are the "authoritarian personality"

theory (Adorno, Frenkel-Brunswick, Levinson and Sanford, 1950) and the more accepted "conformity to social norms" theory (Pettigrew, 1959).

The "authoritarian personality" theory holds that some individuals are racially prejudiced for unconscious reasons and that such an individual holds certain beliefs and attitudes primarily to fulfill his own unconscious values, to satisfy his own unconscious needs, or to protect himself against unconscious threats to his own self-esteem. They perceive minority groups as threatening, and yet weak, aggressive, and immoral; and they use them as scapegoats, blaming frustrating circumstances of their life upon them.

The "conformity to social norms" theory holds that segregation and prejudice are sustained primarily by simple conformity to the prevailing social norms of that community. It contends that there are sociological, economic, historical, and psychological causes which brought these racial norms into being but it is simple conformity which is primarily responsible for their continued existence.

A key element in the social norms theory is the role of community opinion leaders. It should be remembered that opinion leaders do more than transmit information to the general population. They also help create and perpetuate the social norms of the community by serving as models who demonstrate "appropriate" behaviors and "correct" attitudes. Hence, in relation to the property value myth, the process of bringing about social change in a community is dependent upon the opinion leader acting as a mediator between an external force for change and a modification of the behaviors and attitudes of the community at large.

Neighborhood Change

Structural change within a neighborhood usually takes place in sequence. (McKenzie, 1925.) Generally these sequential processes can be classified into two groups: 1) those resulting in change in land use, and 2) those resulting in change in the character of the occupants. Researchers of the property value myth have failed to either understand or acknowledge the interrelationship between these two processes. As a result, research in relation to the property value myth has been based on numerous two-variable studies (i.e., race and property values) which fail to take into account the full dynamics of the phenomena taking place.

According to McKenzie there are several conditions which tend to initiate the processes of neighborhood change:

> (1) Changes in forms and routes of transportation;
>
> (2) obsolescence resulting from physical deterioration or from changes in use or fashion;
>
> (3) the erection of important public or private structures, buildings, bridges, institutions, which have either attractive or repellent significance;
>
> (4) the introduction of new types of industry, or even a change in the organization of existing industries;
>
> (5) changes in the economic base which make for redistribution of income, thus necessitating change of residence; [and]
>
> (6) real estate promotion creating sudden demands for special location sities. (McKenzie, 1967, p. 75.)

McKenzie's second condition, representative of the need for better housing, has been labeled as the basic incentive for the changing of neighborhoods by the black population. This condition has been so deeply embedded into the thinking of American society that it has pre-

cluded the understanding of not only other reasons for neighborhood change by the black population but also other structural changes that occur within a neighborhood under transition. Consequently, in those neighborhoods that are experiencing racial transition very little, if any, attention is given to the impact of concurring changes in non-residential land uses within the area upon residential property values. Instead, all property value fluctuations are injudiciously attributed to the change in character of the occupants.

Although more current researchers (Laurenti, 1960, and Schietinger, 1964) have presented new theories, the scholarly world must accept a portion of the blame for perpetuating the property value myth. Authors of standard real estate and economic texts (McMichael and Bingham, 1923; Babcock, 1932; and Hoyt, 1939) pronounced, straightforwardly and with few qualifications, a common judgment -- accepted apparently without dissent -- which asserted that black occupancy had adverse affects on property values. In addition, those scholars whose research (i.e., two-variable studies: race and property values) has shown that black entry does not depress property values must also share a portion of the blame. They have biased their research by excluding in their studies an investigation of the non-residential land use processes during transition and the effect of these processes on property value fluctuations, thereby presenting half truths which serve no basic purpose other than to mask the whole truth through benign neglect.

Although the belief that black entry into an area causes property values to fall is neither so firmly nor so widely held as it once was

(Laurenti, 1960), it has traversed racial lines and now finds various degrees of mental acceptance within the middle class black community. Consequently, the only way of undoing the damage caused to the black community's self-esteem, by those who initiated and prepetuated the property value myth, is to obtain definitive insights into the processes occuring during racial transition. This can only be accomplished by the examination of the causal relationship between structural and property value changes within a racially transitional area over time. It is anticipated that through this form of analysis the whole truth of the phenomena will emerge and once and for all the property value myth will be laid to rest.

CHAPTER TWO

RACE, PROPERTY VALUES AND LAND USES

Introduction

The focus of this research is on the changes in the spatial distributions of race, property values and land uses. In the following analysis, we will seek to examine the role of changing racial composition as a factor in the fluctuation of residential property values and non-residential land uses. This chapter will also review the significant contributions of previous analyses which furnish insight and facilitate examination of the relationship between fluctuations in residential property values and changes in racial composition and non-residential land uses.

Theories of Race and Property Values

Upon examining the literature, four basic theories of the impact of race on property values became apparent. Each theory projected a different attitude in regard to black entry into previously all white neighborhoods:

(1) black entry irrefutably depresses property values;

(2) the depressing influence of black entry can be qualified by the recognition of other factors such as physical condition of neighborhood before entry, price ranges of homes in the area, and socioeconomic levels;

(3) black entry only threaten property values and the depressing influence (if any) is only temporary, eventually the neighborhood will stabilize and move prices up again; and

(4) black entry does not depress property values but may even elevate them.

The bulk of the literature on these theories come from the 1923-1948 professional writings of land use economists, and real estate and finance spokesmen. Although most of the conclusions drawn in the writings are unaccompanied by supporting evidence, it is assumed that such evidence did exist in some form that may have been observed by the writers.

The first theory which views black entry as detrimental to property values was pronounced by the writings of real estate experts. Although these writings are based on primitive beliefs and consequently represent much more unqualified predictions than those that followed, they represent the beginning of a quarter century of literature on the theories of race and property values.

Stanley L. McMichael and Robert F. Bingham (1923) were among the initial real estate experts to announce that white neighborhoods had been invaded by black families and that property values in those neighborhoods had suffered tremendously:

> With the increase in colored people coming to many Northern cities they have overrun their old districts and swept into adjoining ones or passed to other sections and formed new ones. This naturally has had a decidedly detrimental effect on land values for few white people, however inclined to be sympathetic with the problem of the colored race, care to live near them. Property values have been sadly depreciated by having a single colored family settle down on a street occupied exclusively by white residents. (McMichael and Bingham, 1923, p. 181).

The adverse effect of black entry on property values was also observed and reported by Ernest M. Fisher (1923) who stated:

> It is a matter of common observation that the purchase of property by certain racial types [non-whites] is very likely to diminish the value of other property in the section. (Fisher, 1923, p. 116).

The real estate experts quoted above and their contemporaries uniformly pronounced the detrimental effect of black entry on property values. The pronouncement remained unchallenged for almost ten years and then a second theory emerged based on a slightly more critical examination of the situation.

The second theory continued to assert that black entry had a depressing influence on property values but qualified that assertion with the recognition of other factors. Frederick M. Babcock (1932) led the way to recognizing these other factors by pointing out that families in any class that rise in economic status and move to a better neighborhood can damage that community, displace the occupying class, and lower property values if they have a degree of "inferiorty." But, he goes on and asserts that racial difference is the greatest accepted indication of "inferiorty" and consequently can result in a more rapid decline in property values than other differences between people. Others that followed Babcock's lead recognized socioeconomic levels, physical condition of neighborhood before entry, and price ranges of homes in the area as additional factors in qualifying the impact of black entry on property values:

> Certain racial and national groups, because of their lower economic status and their lower standards of living, pay less rent themselves and cause a greater physical deterioration of property than groups higher in the social and economic scale. . . . Land values in areas occupied by such classes are therefore inevitably low. Part of the attitude reflected in lower land values is due entirely to racial prejudice, which may have no reasonable basis. Nevertheless, if the entrance of a colored family into a white neighborhood causes a general exodus of the white people, such dislikes are reflected in property values. (Hoyt, 1933, p. 314)

> It cannot be denied that his [Negroes] presence in large groups has the effect of blight upon the surrounding property. The first blight which we must mention is the mental blight

> or the depreciation in psychological worth. Some Negroes may have an equal education, they may in fact be just as fine citizens as their white neighbors, but we all know countless neighborhoods and communities where the presence of one Negro family will cause many white families to move out. There is an immediate falling off in rentals of surrounding property and a corresponding depreciation in value, more Negro families move in and then the returns are greater and the color line blight moves to the next block. . . . In fairness, we must admit it is not always the Negro occupancy alone which causes blight; the contributing factor may be the age and condition of buildings in which these people are housed that causes the trouble. (Parker, 1943, p. 233-234)

> Racial encroachment has less effect on high-grade property than upper-medium, medium, or lower-medium grades. Perhaps the reason for this is that only the select representatives of the encroaching race come into high-grade property. (Ross, 1955, p. 203)

The third theory, which views black entry as only threatening property values and which views the entered neighborhoods as eventually stabilizing and values moving up again, presents the first semi-positive view of black entry in the literature. This change in attitude by the real estate experts is not only significant in that it marks a turning point in the literature, but it also marks the first change in attitude announced by Stanley L. McMichael, one of the initiators of the first theory on race and property values:

> Whether rightly or wrongly, some families avoid or leave a neighborhood of mixed race or national origin. This reduces the market for homes in the area and consequently may at first affect values adversely. As the neighborhood takes on its new character, and assuming equal maintenance of all property, value trends may reverse. (McMichael, 1951, p. 169)

George A. Phillips (1950), a real estate expert and one of many subscribers to this theory, has described the dynamics he has observed in neighborhoods experiencing a racial change in occupants:

> Should a shift to a buyers' market start in any neighborhood, prices of less attractive houses are the first and most detrimentally affected. This has been markedly true where the shift is from white to Negro population, and the first two or three

> houses are usually sold to Negroes at a few hundred dollars above the market. In a few months sales prices drop below prices for comparable houses on white-owned and occupied streets. After the change is past the halfway mark, prices stabilize at an average price of perhaps 10 per cent below prices of comparable houses in white neighborhoods. . . . Rentals are about the same in like quarters, whether rented by whites or Negroes. (Phillips, 1950, p. 8)

The fourth, and final, theory is that black entry does not depress property values but may even elevate them. This theory not only challenged the theories on race and property values that preceded it, but turned upside down the whole mythical basis on which they were established. The best known statement supporting this view came from George W. Beehler, Jr., (1945) in an article that appeared in The Review of the Society of Residential Appraisers. In the editoral introduction, the editor remarked that "his reasoning and factual support for it establish a new concept for appraising areas under transition of occupancy." In the article, Beehler states:

> . . . to show that values have increased, we can cite sections newly occupied by colored during the past two or three years that have increased in value from 60% to 100% on the average. This is due, primarily, to the fact that values in these sections, occupied by white and subject to colored encroachment around the edges, have remained static, while the colored section surrounding has felt the usual increase in values due to the so-called housing shortage and the changing economic value of the dollar as represented by its purchasing power. Then, within a six-month period, when colored occupancy enters a new block it picks up as much as the surrounding sections already occupied by colored people in a much shorter period of time. From that point on the values continue to increase along with other areas. (Beehler, 1945, p. 3-4)

According to Beehler's analysis, the properties in an area experiencing racial transition moves through three stages of price behavior: (1) an initial static period, (2) a continuation of the static period or a period of slight retrogression, and (3) a period of rising prices. The price level attained in the third stage, Beehler contends, holds

up firmly and future increases are more or less dependent on city-wide trends, although he states that the increase is slightly higher in better newly established black sections than in similarly occupied white areas.

Beehler's pronouncement is challenged by Oscar I. Stern (1946) four months later in an article published in the same professional appraiser's journal. Stern agrees that whereas colored occupancy will probably maintain the general level of values, it cannot raise value. He states that the pent-up housing demand of the black population resulted in premium prices and defines the premium as exploitation rather than an addition to value. However, Stern closes with the view that "it is a fact, the axiom that colored infiltration collapses the market is no longer true."

Stern's challenge to Beehler's article basically questions the ability of a racial change in occupancy (i.e., from black to white) to add value to property. But, in a general analysis of the market significance of declining neighborhoods, Thurston Ross (1955) holds that it is possible, under certain conditions, for nonwhites to stabilize and/or possibly enhance values:

> In poor and slum sections racial encroachment sometimes raises the economic standards of the neighborhood. There are instances where obsolescence has been arrested and a number of additional years of useful life given a neighborhood by racial encroachment, particularly when older people are displaced by younger groups of the encroaching race. Furthermore, a sufficient identity must be given the neighborhood so that the market is stimulated to encourage additional members of the encroaching race to come into the area, thus keeping the market active, rather than by being depressed by the loss of a favorable identity because of the encroachment of only a few members into the neighborhood. (Ross, 1955, p. 205)

The almost quarter century of theoretical literature on race and

property values, succinctly outlined above, has furnished the initial insight necessary for a more practical examination of their interrelationship. Therefore, we now turn from the broadly worded theories and generalizations in the literature to its more specifically worded counterparts in the field of practice.

Property Values in Racially Changing Neighborhoods

Shortly after the professional real estate literature announced that black entry depresses property values, the National Association of Real Estate Boards (NAREB) announced its position on the situation in its national code of ethics. But before its position is presented here, it should be clear in the reader's mind that NAREB is made up of the brokers and salesmen belonging to the local real estate boards and that, as members, they are bound to operate their businesses in accordance with the national code. Thereby, NAREB through its code of ethics is able to institute national real estate norms. Thus in 1924, in response to black entry into previously all white neighborhoods, article thirty-four of the NAREB code of ethics stated: "A realtor should never be instrumental in introducing into a neighborhood a character of property or occupancy, members of any race or nationality, or any individual whose presence will clearly be detrimental to property values in the neighborhood."

The National Association of Real Estate Boards was not the only national organization to take steps towards preventing black entry. In 1938, the Federal Housing Administration, which insures mortgage lenders against losses, urged the use of restrictive covenants to keep out "inharmonious racial groups" and stated so in its underwriting

manual issued to lenders as a guide: "If a neighborhood is to retain stability, it is necessary that properties shall continue to be occupied by the same social and racial group." This practice was continued by the FHA until 1949.[1]

According to Robert C. Weaver (1948), the actions of NAREB and FHA were only two of many devices, used to restrict black and other minority populations to small designated areas within the cities. Weaver lists the principal instruments as:

> Community, neighborhood, and individual opposition to colored neighbors.
> Race restrictive housing covenants.
> Agreements, practices, and codes of ethics among real estate boards and operators.
> FHA acceptance and perpetuation of real estate practice.
> Neglect of Negro market by private builder and sources of finance.
> Local government's fear that adequate or more housing will encourage Negro migration.
> Local political action to restrict Negroes to given areas.
> Development of exclusive one-class neighborhoods.
> (Weaver, 1948, p. 211)

Thus by restricting black and other minorities to certain sections of the cities and making it difficult for them to secure financing for new housing outside their area, the white community was protected from "invasion by inharmonious racial groups."

In 1950, NAREB revised article thirty-four of its national code to read: "A realtor should never be instrumental in introducing into a neighborhood a character of property or use which will clearly be detrimental to property values in that neighborhood." Although this revision eliminated all reference to race and nationality, most

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[1] See Robert C. Weaver's The Negro Ghetto (1948), page 217, for a more detailed analysis of FHA support of residential segregation through race restrictive covenants and its amendment.

realtors appeared to understand the article in the same sense as before and continued to act accordingly. Consequently, not until the Fair Housing Act of 1968 prohibiting real estate agents from discriminating against prospective house buyers did realtors change their stance. However, old habits are hard to change because there is evidence (Hawley and Rock, 1973) that the brokers have continued their screening practices but with greater care in order not to be caught.

In light of the NAREB and FHA actions, and the views expressed in the professional real estate literature, Robert C. Weaver (1948) undertook a comprehensive survey of facts and theories about the race and property value question and devoted a chapter of his book, The Negro Ghetto, to the topic. In that chapter, based on a review of the available evidence, Weaver suggested some general theories about the possible economic consequences of black entry:

> The effect of Negro occupancy upon property values varies from one section of the city to another and from one time to another. Within a given area, the initial result of the arrival of a few colored people may be imperceptible or it may lead to panic among white occupants; the arrival of a few Negroes may be the signal for a great decline in selling prices or it may lead to an appreciable increase. Much depends upon the state of the total housing market and the manner in which colored people enter an area. Or, again, prices may fall with large-scale Negro introduction only to recover again as the transition is completed. Out of all of these possibilities . . . a separate and obviously incomplete theory of the relationship between racial occupancy and property values could be formulated. No such theory would be sound. There is no one universal effect of Negro occupancy upon property values. (Weaver, 1948, p. 293)

Charles Abrams (1955) agrees with Weaver in suggesting that there is no fixed effect of black occupancy upon property values:

> The statement that one race or group inevitably affects prices favorably and another unfavorably disregards the complex of factors which play a part, such as the social and economic

> status of a particular minority at a particular time; its numbers in relation to the numbers in the majority group; the latter's social and cultural level; the minority's capacity for social improvement and assimilation; the size of the city and the physical condition of its neighborhoods; the particular pattern of minority distribution; the nature of the then current minority sterotype; the type of social and educational leadership and maturity in the community; the social and economic role of the minority in the community; the relationship between the groups in employment, and a host of other factors. . . . There are no fixed rules as to when minority neighbors raise or lower values; examples may be cited both ways and much study is still needed. (Abrams, 1955, p. 286, 292)

The theories of Weaver and Abrams point out that the factor of race is only one of many that affect property values, and that quite often it may not be the most important one. As a result, this type of scrutiny opens the door to a range of factual inquiries, in search of some concrete answers about the interrelationship between race and property values.

Studies on Race and Property Values

Focusing on Detroit, two studies of the impact of racial change on property values exist. The first study was conducted by the staff of the City of Detroit Mayor's Interracial Committee for the period 1946-1950 (Marks, 1950). During this four year study period, observations were made of selling prices in a selected test area, which had a high level of Jewish occupancy and experiencing black entry, and compared with those in an all white control area of comparable properties. The study's principal finding was that the test area, experiencing racial transition, displayed consistently higher selling prices than did the all white control area.

The second study is a master's thesis by Richard Wander (1953) for the 1940-1950 time period. Wander compared selling prices and

assessed valuations in a test area that reached thirty percent black occupancy during 1948-1950 with those in two comparable but all white control areas. The comparisons were carried through the entire 1940-1950 period. He also compared test area prices between blocks with and without black residents. The study's findings indicated that properties in the test area had been declining in value relative to the two all white areas up to 1948, but that the entry of black families first checked then reversed this trend. However, up to the end of 1950 when the study period ended, the reversal had not been sufficiently strong enough to bring the average test area price level up to that of the two control areas. For selling prices within the test area alone, values for integrated blocks reached higher levels than those for all white blocks.

There are many other empirical studies of the above type not focusing on Detroit. To date, all of them have one thing in common -- they all disprove the "property value myth" associated with the entry of black households into previously all white neighborhoods. In fact, most of them have very similar methodologies and conclusions, consequently, it would only be redundant to review them. Therefore, a synopsis of only the most comprehensive study of this type (which includes a review of the other analogous empirical studies on race and property values) will be presented here -- Luigi Laurenti's Property Values and Race (1960). Although the subtitle of Laurenti's work is "Studies in Seven Cities," its real essence is an analysis of neighborhoods in San Francisco, Oakland, and Philadelphia. In order to isolate the influence of black entry upon prices of property, he chose test neighborhoods in which entry had occurred at some time

during the past fifteen years and compared price movements in each one with price movements in one or more similar control neighborhoods which had remained all white. In each comparison the two areas being compared were similar, hence the only major difference between them was the entry of black families into the test neighborhood.

Two significant limitations of the study should be mentioned before continuing. One, nearly all of the neighborhoods selected consisted primarily of single family residences occupied solely by their owners. This was true both before and after black entry. Two, most of the test neighborhoods were not contiguous to other areas of black population.

The study's major conclusion is that when black families enter a previously all white neighborhood consisting primarily of single-family residences, and no other changes in neighborhood character occur, then prices of residential property in the area will probably not decline and may very well rise in comparison with prices in similar neighborhoods that have remained all white. In short, black entry alone rarely causes residential property to fall in price, and quite often causes it to rise.

Although the above mentioned studies on property values in racially changing neighborhoods have produced some concrete answers about the impact of race on property values, based on factual inquiries, they have failed to acknowledge or examine the true dynamics taking place. By limiting themselves to two variable studies (i.e., race and property value) they have chosen to either disregard, discount or deny the view that the factor of race is only one of many that affect property values, and that quite often it may not be the most important

one.

Trends in Urban Land Use Changes

One of the most basic models concerning change is rooted in plant and animal ecology. In this model the process begins with a given space or territory being occupied by a particular plant or animal. An invasion then occurs with the entry of a species foreign to the area; and if the invasion is successful, the newly entered species will eventually dominate.

This ecological process is used by McKenzie (1925) to draw an analogy between plant and animal ecology, and human ecology. As a result, in describing the structural changes that occur within communities in our cities, he views successions as the product of invasions and points out that invasions can be grouped into two main classes: those involving land use changes, and those involving changes in types of occupant. He goes on to stress that the two classifications of invasion can be further classified according to their stages of development: (a) initial, (b) secondary or developmental, and (c) climax. According to McKenzie, the impact of both classes of invasion upon property values should be observed at each stage of development. This is necessary because the impact depends on the resistance or inducement offered the invader at each stage.

The type of land use changes McKenzie is referring to above is usually allowed only through rezoning; specifically, land use changes

which involve the transference of general uses, such as the replacement of a residential area by an industrial or business use (or vice versa). But the operative point here is that the invasion occurs in stages. Hence, the rezoning which would allow this transference of general uses can be viewed as an action occuring in the climax stage of development. Consequently, this action was preceded by a considerable amount of change activity in the first two stages which led to it, and impacted significantly upon property values. To illustrate the type of land use change activity that can precede the rezoning which occurs in McKenzie's climax stage of development, a land utilization study will be presented. But prior to its presentation, it should be clear in the reader's mind that although the present study is examining both classes of invasion at the same time, there is no stipulation that their stages of development must also take place simultaneously. The City of Detroit's Commercial Land Utilization Study (1974) provides an excellent, as well as pertinent, example of such differences in the stages of development between the two classes of invasion, and of a real world situation in which changes in land use -- in the first two stages of development -- has unquestionably impacted upon property values.

The City of Detroit's land utilization study (also called the B2/B4 Study) Centers on a twelve square mile section of Northwest Detroit (bounded by Parkside on the east, Lyndon on the south, Greenfield on the west, and Eight Mile on the north) in which a substantial racial

change in occupants took place between 1960 and 1970.[1] During that ten year period, the more than 140,000 residents in the area changed from eleven percent black in 1960 to sixty-three percent black in 1970. The study resulted from the interests of Northwest Detroit and other communities being affected by changes in business facilities adjacent to residential areas which were experiencing various degress of racial transition. Vacancies, boarded-up stores and the undesirable turnover of business locations presented immediate blighting challenges to the residents of these areas. Consequently, through the combined efforts of city agencies, community organizations, and local business associations the study was undertaken. The major objectives of the study were to:

> (1) evaluate the impact of a B4-to-B2 zoning change and (2) develop recommendations which would: establish sound land use in commercial strips of Northwest Detroit; encourage and result in commercial facilities which enhance residential areas in accord with resident needs and preferences; reduce visual and other blight along commercial strips; provide direction for commercial rezoning decisions in other parts of the City; and improve codes and code enforcement as well as other City administrative controls and operations.
> (Commercial Land Utilization Study, 1974, p. 1)

In brief, the findings of the study revealed that there is an

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[1] B2 -- Local Business District: The B2 Local Business District provides for the day-to-day consumer services and goods that are necessary to serve a small residential area. High-traffic-generating and traffic oriented uses are restricted because of their obvious undesirable influence on adjacent residential areas. From: The Detroit Zoning Ordinance 390-G. Sec. 92.0000.

B4 -- General Business District: The B4 General Business District provides for business and commercial uses of a thoroughfare-oriented nature. In addition to these uses other businesses which may benefit by drawing part of their clientele from passing traffic are permitted. Additional uses which may be successfully blended with those uses permitted as a matter of right are permitted with approval. From: The Detroit Zoning Ordinance 390-G. Sec. 94.0000.

excess of retail space in the study area (both vacant facilities and commercially zoned property which might be developed) but also a severe deficiency in the kind of retail development which residents prefer. In addition, the strip stores in the area are at a severe disadvantage in competing with nearby shopping centers offering easily accessible free parking, greater selection and a more attractive development. Therefore, in an effort to slow down detrimental trends and provide time for more basic projects to get underway before irreparable commercial blight occurs, the City of Detroit Common Council rezoned most commercial frontage in the test area from B4 to B2 (effective November 25, 1971) and made additional recommendations in relation to code enforcement, land utilization, and retail development.

Undoubtedly, the zoning changes in Northwest Detroit will not create the transference of general uses which McKenzie is referring to in his land use change classification. But it does relate to his secondary stage of invasion in relation to land use changes, and it will unquestionably impact upon the residential property values in the area. In retrospect, Northwest Detroit was rapidly approaching a climax stage in its change in type of occupants before there was a significant reaction to the initial stage of land use changes. Consequently, in a residential area experiencing a racial change in occupants, McKenzie's stages of invasion in relation to land use change can best be viewed as:

(a) initial stage - the exodus of businesses in the area for either economic or racial reasons, thus creating a state of commercial blight in which it is not uncommon for vacant properties to be utilized by activities for which they were never originally designed: low-grade eating places, store-front churches, store-front residences, and etc.;

(b) secondary or developmental stage - mass efforts at creating a viable residential/commercial environment amidst the boarded-up, dilapidated, and vacant business establishments; and

(c) climax stage - the establishment of a new and viable residential/commercial environment able to withstand the intrusions of other forms of invasion.

At present, the distribution of land uses in Northwest Detroit is only a stage, not even a stable one, in an evolution whose progress we cannot completely understand. Some of its causes for change are permanent, some no longer active, others are just beginning to function. Therefore, in order to furnish some insight we will now concentrate on the general trends of non-residential land use changes in urban areas. These trends may be observed in two ways: as changes taking place over a wide area (i.e., regional or highly intricate CBD's) and as changes taking place at a given location (i.e., a particular block or residential area). The latter form of observation will be used herein.

All residential areas have a certain set of non-residential requirements. These include employment, goods and services, the satisfaction of social and spiritual needs, and amenities. In order to service residential populations as efficiently as possible, commercial activities are spatially distributed within cities in general agreement with the distribution of populations.

During the early part of this century, the general features of this commercial structure were laid down in most cities. Up to that point, most of the commercial activity within cities was concentrated in the central business district which, as a result, dominated the urban commercial pattern. But in conjunction with rapid urban growth considerable expansion of commercial activities took place in most cities outside this central area after the turn of the century. Most

of the growth of commercial land use at this time was, however, unplanned; and in the absence of strong influences of the automobile, it was conditioned largely by the disposition of the then existing surface transit network.

Since World War II, the earlier developed commercial structure has been intensified and added to in part. These more recent developments have resulted directly from increased consumer mobility associated with the influence of the automobile. In addition, stemming from increased mobility, the growth of suburban residential areas has brought about peripheral expansion of commercial land use. However, at the same time the post-war period was also one of emerging problems and strains on the existing structure. This has been associated in part with the continued outward growth of many urban areas, and in part with the accompanying decline of the older inner parts of cities. But up to this point, the basic elements of the urban commercial structure have been modified little by this, although pressures for change are undoubtedly building up (Yeates and Garner, 1971).

Focusing specifically on the commercial structure of residential areas in the inner city, ribbons of commercial activities are perhaps the most noticeable since they form the backdrop to most well traveled routes through residential areas. These business types need a certain minimum degree of accessibility to the market served. As a result, they do not require sites of maximum centrality within urban areas and consequently can survive at locations along major and minor arteries. As such, they can be thought of as concentrations of commercial activities at common locations, but between which there is little if any functional interlinkage (Berry, 1959).

This lack of functional interlinkage has placed the ribbons of commercial activities in a constant state of flux -- a state which has been temporally responsive to changing racial compositions, transport technology, and residential structuring. But now we find new trends in commercial activities emerging, due in part to increased mobility, which provide little room for "ma-and-pa" type neighborhood establishments. For example, the findings of the City of Detroit's land utilization study revealed:

> The more than 140,000 residents, with median household incomes of close to $12,000 per year, generate sales adequate to support 10-12 small-to-moderate-size shopping centers, including allowance for existing competition. . .
>
> Shopping centers are the preferred type of commercial development by more than 50% of all residents.
>
> Large numbers of the study areas' mobile population (more than 90% do all shopping by car) drive to such centers which results in a substantial volume of residents purchases outside the Northwest Detroit area.
> (Commercial Land Utilization Study, 1974, p. 12)

However, since cities are such dynamic entities, change is a vital part of their survival and, accordingly, has brought about the new trends in urban land uses. Recent apparent trends include: (1) clustering of retail facilities in shopping centers, of industry or offices in parks, of resident-dwelling units, and even of single interests, such as entertainment and furniture districts; (2) the migration of certain types of business, such as gas stations and restaurants, to the sides of highways; (3) the decline of central business districts and the parallel suburbanization of industry, offices, and people; and (4) the dispersal of major regional headquarters across the country due to rapid air transport (Berry, 1959 and 1963).

These new trends in urban land uses have placed the old ribbon type commercial structure in the residential areas of the inner cities in a very precarious position -- competitively (Hume, 1974). This position, coupled with a racial change in their clientele, has caused a significant number of these commercial activities to relocate, leaving behind vacant buildings and lightly populated business thoroughfares, thus, creating what McKenzie has referred to as the initial stage of land use change.

Now that we have reviewed the broadly worded theories and generalizations in relation to changes in the spatial distributions of race, property values and land uses -- and their more specifically worded counterparts in the field of practice -- let us take a look at the specifics of what is going on in Detroit, Michigan.

Blockbusting: U.S. District Court Case of Zuch vs Hussey

The persistent myth that black occupancy depresses property values in a neighborhood has merit only in that it is the result of a "self-fulfilling prophecy." As Robert K. Merton (1946) puts it: "The self-fulfilling prophecy is, in the beginning, a false definition of the situation evoking a new behavior which makes the originally false conception come true." Thus, the beliefs held by white homeowners, mortgage lenders, and realtors have influenced them to act in ways -- based on racial prejudice and/or profit -- that bring about the results they have predicted. Consequently, by restricting black and other minorities to certain sections of the cities and making it difficult for them to secure financing for new housing outside their

area, the practices of these individuals and institutions operate to magnify and reinforce the barriers affecting black entry. For example, the results of their practices have been labelled as a chief cause of the 1967 Detroit riot. Based on 1967 and 1968 surveys (Meyer, 1968), six leading causes of the 1967 riot were cited by Detroit's black population. Police brutality, as might be expected, leads the list in both surveys. But three of the six perceived chief causes of the riots related directly to housing: poor housing, overcrowded living conditions, and dirty neighborhoods. Clearly, in the minds of Detroit's black population, housing needs have a high priority in assessing the conditions underlying the type of riot they witnessed.

In addition to assisting in the creation of this situation, realtors are profiting from "blockbusting" practices that are based on its existence. It is widely acknowledged that "blockbusters" and others in the real estate business are profiting from the willingness of black people to pay prices above fair market value for housing outside of predominantly black neighborhoods. Blockbusters are able to sell to black families at prices above fair market value, and induce sufficient panic or fear of falling prices among the white residents that they are able to buy from them at prices below fair market value. The fact that a neighborhood turns from white to black occupancy is thus often a result of deliberate machinations which will be examined in more detail in the following review of the United States District Court case of Zuch vs Hussey.

On March 14, 1975, U.S. District Judge Damon J. Keith found eleven Detroit area real estate firms guilty of "blockbusting" on the

city's northwest side, in violation of the federal Fair Housing Act of 1968. The hearings, which lasted approximately ten weeks, ended with Judge Keith granting the plaintiffs' Motion for Preliminary Injunction, thus ordering the firms to stop:

(a) telling home owners that members of a minority group are moving into their community, in an effort to solicit new sales listings;

(b) steering prospective home buyers to a particular neighborhood or house because of their minority status; and

(c) real estate advertising that shows preference or limitation because of race, color or national origin, including ethnic references implied by the use of photographs of real estate salesmen in advertising.[1]

This action involves an area of Northwest Detroit which lies west of predominantly black neighborhoods and east and south of predominantly white neighborhoods. It is bounded on the east by Southfield Freeway (a geographical barrier which has impeded racial transition for a number of years), on the north by Seven Mile Road, and on the west by Heyden Street between Seven Mile Road and Six Mile Road (McNichols Road) and thereafter by Evergreen Road. The southern boundary is a line running through Acacia Street (a street approximately 1.7 miles south of Six Mile Road/McNichols Road). Approximately six thousand five hundred (6,500) people live in the area.

Within this area, there are several sub-communities. Perhaps the most important, to this action, is the Emerson Community (comprised of research quadrats 33, 34, 37, and 38) whose residents are principally responsible for the law suit. Also included in this area are North

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[1] The review of the U.S. District Court case of Zuch vs Hussey is based on personal interviews with Judge Damon J. Keith's legal staff, October, 1975, and the newspaper article: "11 Real Estate Firms Guilty of Blockbusting and Bias," The Detroit Free Press, March, 18, 1975.

Rosedale and South Rosedale (adjacent to but not a part of the research study site).

The plaintiffs are a multi-racial group of homeowners, overwhelmingly white, who live in one of the three sub-communities which constitute the area in question. The white plaintiffs have lived in their respective communities for varying lengths of time while the black plaintiffs are persons who have recently moved into the area.

The defendants are a group of incorporated and unincorporated real estate agencies and a number of individual real estate salespersons. All of the defendants operate in the Detroit Metropolitan area (Wayne, Oakland and Macomb Counties), and all operate or have operated in the area in question.

Specifically, the plaintiffs in the law suit brought action against the named defendants themselves and as representatives of persons engaged in the real estate business in racially transitional areas in Metropolitan Detroit who, for profit: (1) make unrequested solicitations of real estate listings, (2) attempt to obtain real estate listings by making representations as to the entry or prospective entry of black persons in a neighborhood, (3) steer persons, on the basis of race, in the purchase of homes in said area, and (4) refuse to deal with persons seeking to purchase dwellings because of the race of said persons. Throughout the ten weeks of testimony, the defendants made several allegations about the plaintiffs' motives in bringing this action. One charge was that the plaintiffs were seeking to prevent further entry of black families into their neighborhood. Another was that they were seeking to put certain real estate agencies out of business because they were dealing with black

people. The defendants sought earnestly to elicit testimony from the plaintiffs' witnesses and from their own witnesses to support these allegations. While the Court was of the opinion that violations of the Fair Housing Act were shown by the plaintiffs, it also believed that there was some evidence which supported the allegations of the defendants.

Witnesses testified that if their communities became significantly black, they would move. There was testimony about the initial reaction of residents to the entry of the first black family into the Emerson Community. Frantic meetings were described in which racial hatred was vented and schemes were suggested to physically remove the black family from the community. There was also evidence that the officers of the Emerson Community Homeowners Association (ECHO)[1] used their organization's newspaper to recommend certain favorite real estate agencies to their readers. There was also an admission by Vencent Zuch, one of the most active plaintiffs, that he was "at war with the real estate industry." This is mentioned here only to show the complexity of the issues involved.

The Court also observed that many of the witnesses had little or no day to day interpersonal contact with their black neighbors. As a result, some of them exaggerated the significance of certain activities which they observed. For example, one witness testified during the hearing that he was motivated to participate in this action when he heard rumors of real estate salesmen bringing black families out to

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[1] ECHO is a community group which was formed in 1971 to deal with the problems of racial transition in Northwest Detroit. Most recently, it has concentrated on exposing the activities of the real estate industry associated with this transition.

view houses at night. On these visits, according to the rumors, the salespeople would put lights on in order that the neighbors could see that the prospective buyers were black. The Court acknowledged the fact that under certain circumstances this may have been done with that purpose in mind. But the witness also testified that under the same conditions, he would not have been concerned if the buyers had been white. The Court concluded that there are perhaps ways to show a house to a black family at night without the aid of lights, but that it is unable to think of any that would be either practical or effective. As a result, the Court recognized the possibility that some of the plaintiffs may have been motivated to bring this legal action because they desired to keep black families out of their neighborhood. Nevertheless, the overwhelming weight of the evidence produced at the hearing supported the granting of the relief sought in the plaintiffs' motion for an injunction preventing the defendants from using "blockbusting" tactics -- pending a trial on the merits of the case.

It is important to point out at this time that prior to 1971 there were no minority families living in the Emerson Community and no more than three lived in the Rosedale Communities. The first black family moved into Emerson in 1971, purchasing a house on Edinborough Road. The present racial composition of the area is estimated to be between ten and twenty percent black. The other two communities have also experienced an influx of black families, although somewhat less dramatically than what has occurred in the Emerson Community. While the total number has decreased, there has continued to be some movement of white families into the neighborhoods. Consequently, there is no questioning the contention that Northwest Detroit has undergone a

shift in its racial composition between 1971 and 1975.

Patricia Becker, an expert for the plaintiffs, described the manner in which the black population has spread toward the Detroit City limits.[1] She testified that the black population has been contained until recently; that black neighborhoods have spread block-by-block; that there has been virtually no permanent integration in Detroit; and that the current rate of movement of the black population is about one mile every three years.

The issue which arises at this point, therefore, is not whether the process by which white families are replaced by black families is either irrational or inevitable, as well it might be. The real issue in this litigation is whether the real estate industry should be allowed to enter into the process and, for commercial advantage, artificially hasten or at least accelerate the rate of population turnover and the pace of racial change. The Court was of the opinion that:

if the real estate industry is allowed to operate unchecked,

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[1] A comparison of the 1960 and 1970 population figures for the City of Detroit shows that during the decade in between, the overall population of the city decreased from 1,670,144 in 1960 to 1,511,482 in 1970. The number of white residents decreased from 1,182,223 in 1960 to 838,877 in 1970. At the same time, the number of black residents increased from 482,233 in 1960 to 660,428 in 1970.

During the same decade, however, the total population for the Standard Metropolitan Statistical Area (SMSA), which included those cities and towns of Macomb, Oakland, and Wayne Counties which are socially and economically integrated with Detroit, increased from 3,762,360 in 1960 to 4,199,931 in 1970. The number of whites increased from 3,195,372 to 3,419,720 and the number of blacks increased from 558,870 to 757,083. A simple analysis of these figures shows that during the period from 1960 to 1970, the population shift of whites has been away from Detroit and into the surrounding suburbs. There is nothing to suggest that this trend has not continued since 1970 nor does anything suggest that it will not continue unless something affirmative is done to halt it.

Population figures taken from U.S. Bureau of the Census, Census of Population and Housing: 1960 and 1970, Census Tracts, Detroit, Michigan, SMSA.

> the pace of racial transition will be manipulated in a way that will irreparably destroy any chance for normal and stable racial change. (The Detroit Free Press, 1975, p. 2A)

On their cross-examination of the plaintiffs' witnesses, the defendants attempted to elicit the admission that, ultimately, the defendants offered to show plaintiffs houses in any part of the city or state in which they had listings. From this, the Court was asked to conclude that the defendants did not make "unavailable dwellings to the plaintiffs because of their race." This conclusion did not follow. The Court stated that what the defendants were asking it to find, in effect, was that because of the insistence of the plaintiffs, and the reluctant submission of the defendants, there was no steering because the initial efforts of the defendants failed. Such a conclusion was found illogical. The fact that the defendants did not succeed in steering the plaintiffs away from the transitional neighborhoods of Detroit was not relevant, the law makes it unlawful even to attempt.

The defendants also sought to argue that the plaintiffs failed to prove that the areas into which the real estate salespeople attempted to steer them were "all white." The Court found no merit in this argument. The operative factor which makes the defendants' conduct unlawful was their trying to influence the "buyer's" decision by the use of race. Whether the area to which they attempted to steer the plaintiffs was all white was, therefore, not relevant.

The defendants, throughout the ten weeks of hearings and in their post-hearing briefs, also emphasized that all of the witnesses, with the exception of one, were testers. This was found irrelevant. The Court pointed out that there is no requirement in the Fair Housing Act that the prospective buyer, except in the case of a refusal to deal,

be the only competent evidence available to prove that the defendant has engaged in unlawful conduct.

Finally, the defendants raised objections to the testimony of several witnesses because the witnesses initiated either the contact with the realtor or the discussion of race. The Court also found this irrelevant. Whether race can ever be discussed in a real estate transaction was not decided in this case. But, the Court contended that the testimony of the plaintiffs' witnesses showed conclusively that the defendants clearly went beyond any reasonable discussion of race which might be lawfully permissible.

In his ruling on the case, Judge Keith made a special effort to bring out an element of this suit that has, heretofore, gone unmentioned:

> One of the ironies of this suit is that among the defendants are several black real estate agencies that will now be enjoined from providing a service which in the past their clients were unable to obtain from white real estate agencies. The Court notes that until 1950, the National Association of Real Estate Boards (NAREB) counseled its members to maintain segregated neighborhoods in the interest of maintaining property values. . . . While the Code [the 1924 NAREB Code of Ethics] no longer contains a reference to race or nationality, the testimony in this case indicates that white realtors still will not consistently introduce black families into predominately white communities unless they perceive that the neighborhoods are "changing."
>
> Compounding this situation is the fact that because white homeowners do not generally patronize black realtors, the black realtor is limited in his operations to either predominantly black communities or transitional communities. In attempting to generate business, therefore, he must rely a great deal on the white realtors to initiate the blockbusting process. He then follows into the area, and, even when his conduct is within the limits of the law, the effect of his presence, many times, is to speed the racial transition of the area. In a sense, therefore, this preliminary injunction, while necessary is also somewhat unfair to these defendants. Its effect will be to limit again the areas in which they can operate with any hope of being successful. (The Detroit Free Press, 1975, p. 2A)

Consequently, the black real estate agencies are the only defendants, at present, appealing the preliminary injunction.

In the preliminary injunction, Judge Keith also ordered the seven white-owned firms, of the eleven involved, to adopt programs to ensure that all houses they sell or obtain for listing are available to black and other non-white families as well as to whites. Such a program must include an educational program for real estate salesmen and other staff members informing them of their duties under the Fair Housing Act. Judge Keith also ordered the seven firms to tell clients of their non-discriminatory policies by:

(1) displaying a fair housing sign in all their offices;

(2) including a fair housing statement in all written and verbal advertising;

(3) advertising the full range of property locations available in their listings; and

(4) developing written non-racial standards for receiving, processing and selling houses.

He also ruled that the eleven companies could not solicit sales listings by phone, mail or in person in the area involved in the case. The companies are permitted to advertise on television and radio, on billboards, in phone directories and in regularly published newspapers.

Therefore, based on the findings of the Zuch vs Hussey case, it can be concluded that if Northwest Detroit deteriorates, it may be the continuation of a trend that began prior to black occupancy, or it may result from the real estate industry's lack of concern with good real estate practices.

The subsequent analysis is intended to empirically explore the validity of the argument that black people do not depress property

values but that this condition is brought about, in part, by racism and by the deterioration of the area's non-residential infrastructure. A case study approach will be utilized to test this argument by examining a middle income residential neighborhood in Northwest Detroit, Michigan, that experienced racial transition between 1960 and 1972. The changing spatial patterns of race, non-residential land uses, and property values will be measured at three year intervals and analyzed to determine their temporal interrelationships. In addition, residential sales data will be examined for 1969 and 1972 to determine the racial housing preferences of the dwelling units being sold in the study area. These composite data sets will then be used to test the following hypotheses:

(1) The entry of black homeowners into a white middle-income residential neighborhood causes a decline in property values;

(2) In a white residential neighborhood experiencing racial transition, change in character of the occupants is more causally related to fluctuations in residential property values than changes in non-residential land uses within the neighborhood.

In Chapter III the study methodology will be introduced. Chapter IV will then report the results of the empirical analysis and Chapter V will evaluate the policy implications of these results.

CHAPTER THREE

STUDY METHODOLOGY

Introduction

The formulation of a study which would make possible the empirical testing of the arguments presented in the preceding chapter is complicated by the need for more than just accurate chronicle information on residential property values, and changes in the racial and non-residential land use distributions. A measure of the property value behavior in a racially mixed area (test area) must be compared to some standard (control area) that is free from the racial influence being analyzed. Furthermore, to facilitate the comparison of this value behavior in the two areas, it is essential that the areas resemble each other. This permits a more distinct isolation of race as an influence on property values and addresses the research ideal of holding other factors constant. Otherwise, the study methodology would tell us little or nothing if we knew whether property values fluctuate, or remain stable in areas experiencing racial change. Consequently, the selection of comparable test and control areas is a critical phase in the design of this study.

There are two feasible methods of approaching the problem of selecting comparable test and control areas:

(1) select two residential areas with comparable housing types that duplicate each other in every significant respect, except that one remains all white and the other experiences racial transition during the period of analysis; and

(2) select one residential area with homogeneous housing types such that a significant portion of the area experiences

racial transition--leaving a sizable portion all white to function as a control area.

Although most researchers in this area have preferred to utilize the first method in the designing of their studies, the second method will be used herein. There are several reasons for not selecting the first method, the most important reason being the matching of control and test areas. Under laboratory conditions this would not present too serious a problem, but under real world conditions the true comparability of the two areas become very susceptible to criticism. This criticism originates from the knowledge that there is a degree of error incurred in attempting to match two geographical areas relative to a given variable. This error monotonically increases with the addition of each variable used in matching the two areas. Under the research design of the first method, comparable all white control areas are matched with test areas on the basis of the following criteria:

> Relationship to central city, shopping areas, and transportation facilities;
> Age, type, and market value of dwelling units;
> Pattern of land use;
> Income class of occupants;
> Social status class of occupants; and
> Pattern of neighborhood development.
> (Laurenti, 1961, p. 43)

One can only begin to imagine the total amount of error that must exist in the matching of the test and control areas under this method. Hence, it is clear why the phrase "resemble each other as closely as possible" is used in relation to describing the comparability of the two areas when using the first method.

Since there is only one general area to be identified, the second method eliminates all of the matching problems and the error incurred in that process. In addition, with one area for which data must be

gathered, compared to two for the first method, the probability of error in data collection is reduced. Clearly, there are decisive advantages in using the second method although it, too, has its problems.

The most critical problem of the second method is that of identifying an all white residential area with homogeneous housing types which has experienced a significant, but partial, racial transition leaving a sizable portion of all white to function as a control area. It is also important that the area be of manageable size so that the data gathering process will not present an unreasonable problem. Although critical, this is not a serious problem because within each major city in this country, with a sizable black population, such an area can be identified--at some point in time. These areas tend to be located toward the city's edge and may even be outside the city limits. Characteristically, they are single family residential areas consisting of a middle-income population of owner occupants. These areas have experienced and are continuing to experience black transition because many black people now have both the motivation and the means to obtain better housing outside the crowded urban centers.

The City of Detroit, Michigan, provides an excellent example of a major city with a sizable black population. Therefore, due to the accessibility to this author, and the availability of the necessary residential property value information, it was chosen as the city in which this indepth case study would be undertaken.

The period of analysis for this study was contingent on a number of qualifications:

(a) the period in which an observable racial transition took place;

(b) the period in which there was available accurate residential property value information;

(c) the interval in which changes in non-residential land uses could best be observed; and

(d) the period in which there was available accurate information giving the racial composition of an area between census years.

Based on these qualifications the period from 1960 to 1972 was chosen, which observations at three year intervals consisting of years 1963, 1966, and 1969. Three year increments were judged the minimum amount of time over which significant changes in the spatial distributions of non-residential land uses would be detectable.

Figures 3.1, 3.2 and 3.3 illustrate the geographical location of Detroit's black population in relation to the study site during, respectively, 1950, 1960 and 1970. The study site is a fifteen square mile area located in the Northwest section of the City of Detroit. It is bounded on the north by West Eight Mile Road (a Detroit city limit), on the south by West McNichols, on the east by Livernois and on the west by Five Points (a Detroit city limit). Customarily referred to as Northwest Detroit, this area is predominately single family residential and consists of a middle-income population of owner occupants.

A one-half mile square grid system was superimposed over the complete area, for analytical purposes, which resulted in a total of sixty quadrats. (See Appendix A.) The racial composition, property value, residential sales, and non-residential land use data were then coded by relevant quadrat.[1]

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[1]Due to one quadrat's area being completely covered by a cemetery, the racial composition, property value, and residential sales data was only coded for fifty-nine (59) quadrats.

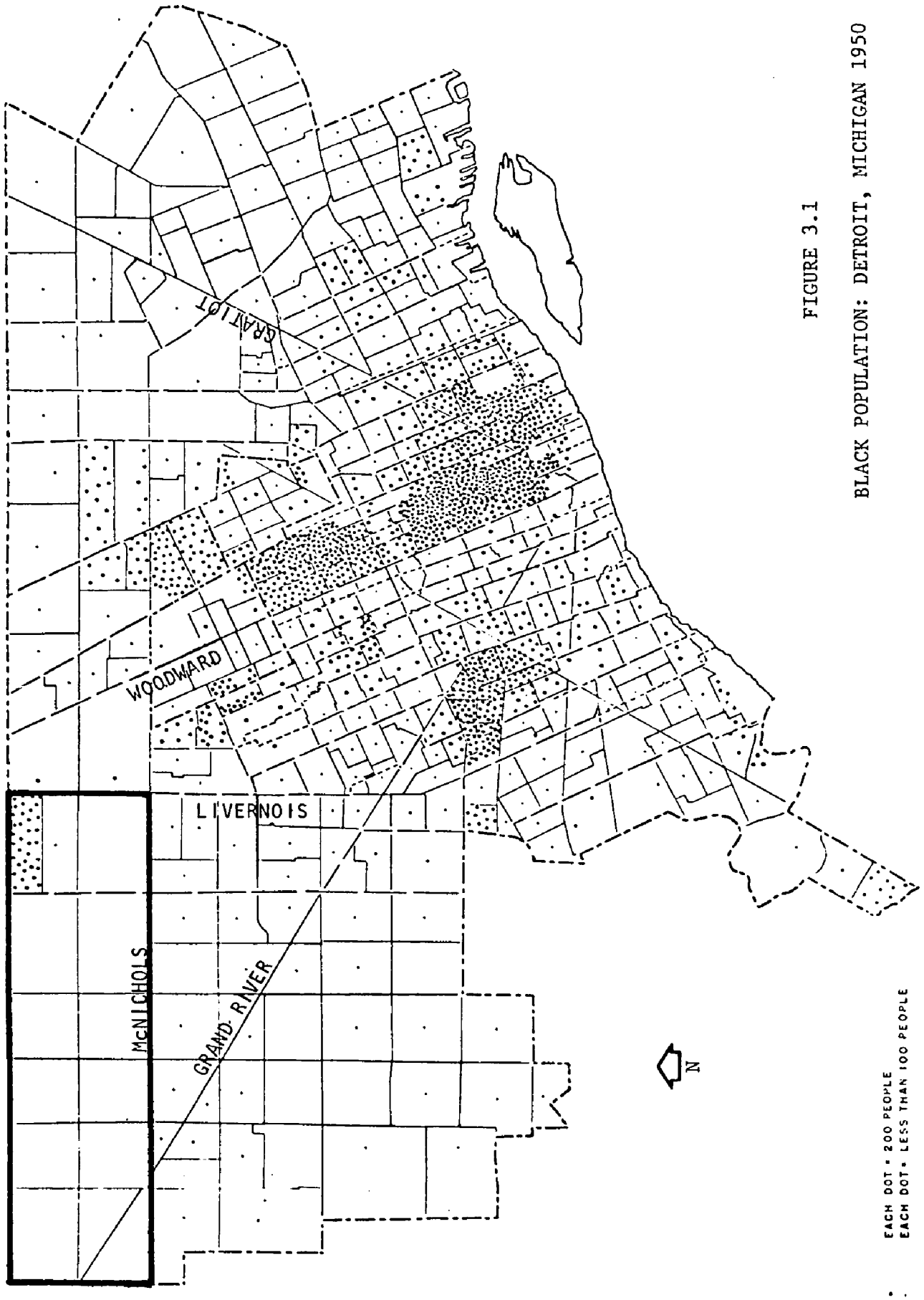


FIGURE 3.1

BLACK POPULATION: DETROIT, MICHIGAN 1950

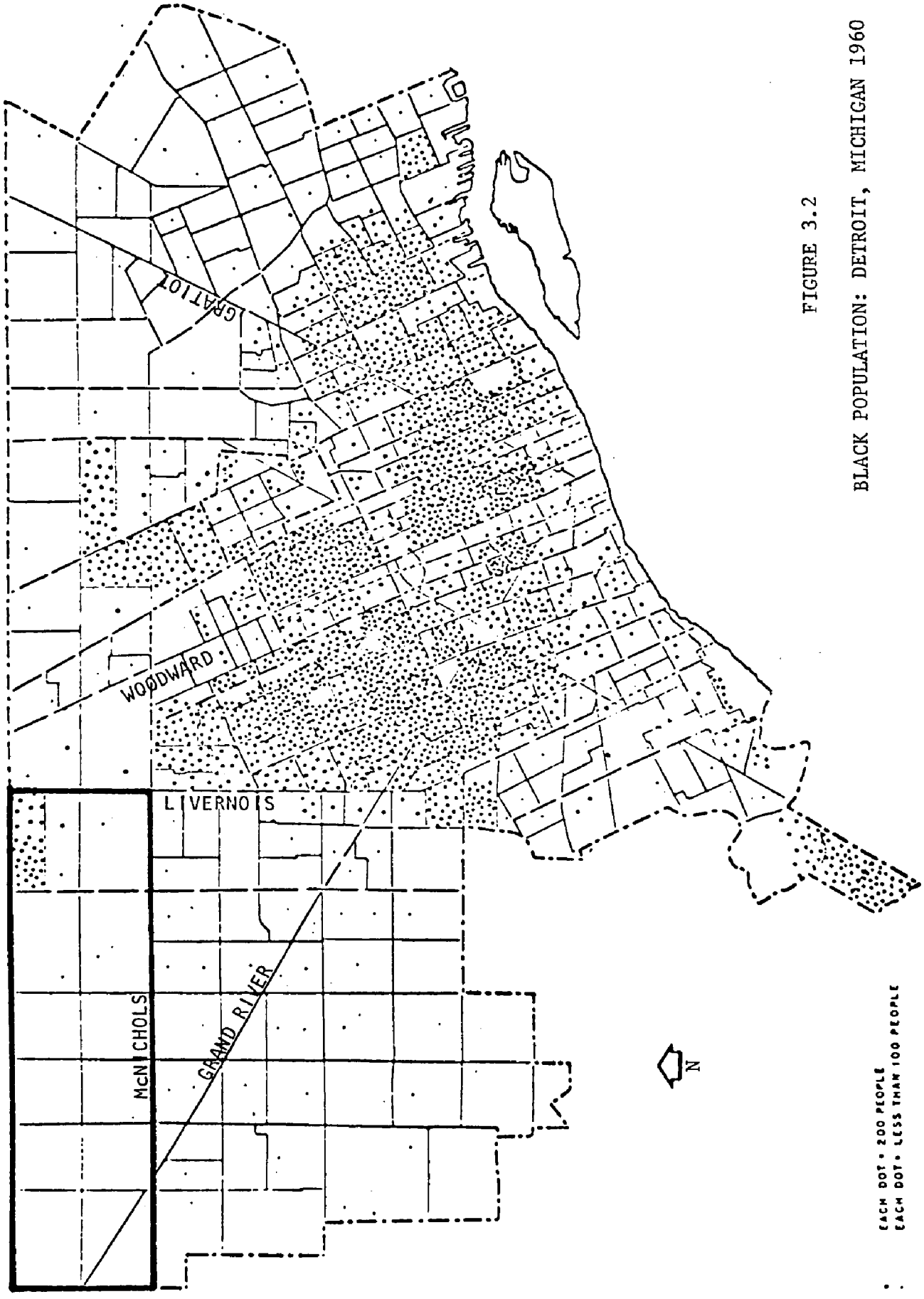


FIGURE 3.2

BLACK POPULATION: DETROIT, MICHIGAN 1960

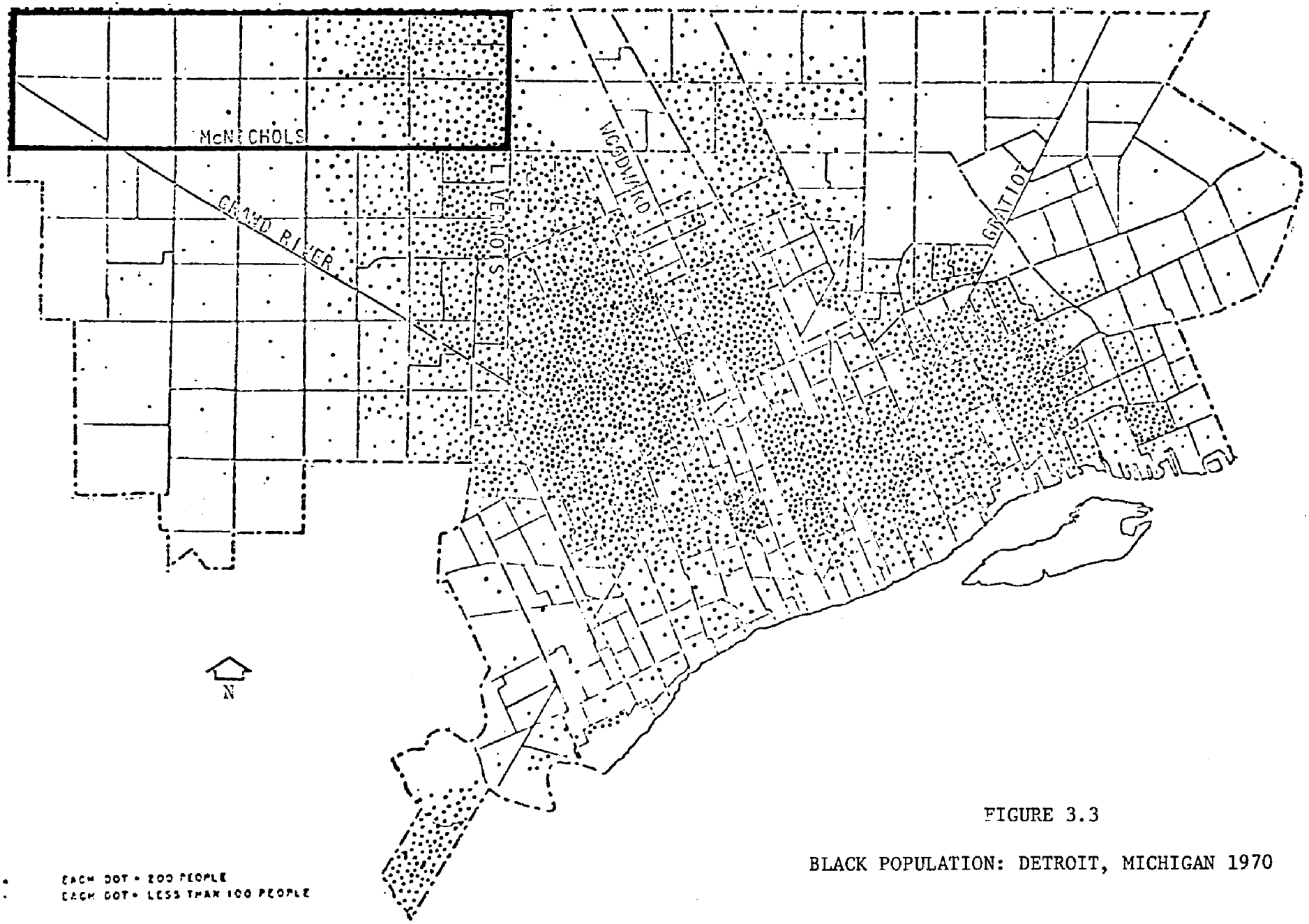


FIGURE 3.3

BLACK POPULATION: DETROIT, MICHIGAN 1970

Northwest Detroit Black Population Distribution, 1960-1972

Census of Population and Housing

The decennial Census of Population and Housing is available for most major urban areas beginning with the 1940 census. This comprehensive source of information, which is published at ten year intervals by the U.S. Bureau of Census, provided the 1960 and 1970 figures for the percent black and total population for each census tract comprising the study area. From this source the spatial distributions of the black population were determined for the respective years. However, since this information is solely available at ten year intervals and observations at three year intervals beginning with 1960 are required for this study, a surrogate measure of black population intensity had to be developed for those missing observation points.

Racial-Ethnic Distribution of Public School Students

The only accurate surrogate of population intensity between census years with which the author is familiar is the racial distribution of public school students. Since 1961, the Detroit Public Schools have conducted an annual racial census of pupils and staff for the purpose of evaluating progress toward equal educational opportunities and equal employment practices. This information source provided the basis for determining the 1963, 1966, 1969, and 1972 spatial distributions of the black population within the study area.

The annual racial census conducted by the Detroit Public Schools lists each public school along with a racial-ethnic breakdown of its students, instructional personnel, and non-instructional personnel. From these listings the black student body percentage for 1961, 1963,

1966, 1969, 1970, and 1972 were determined for each elementary school in the study area. Using this course as a surrogate of population intensity, the spatial distributions of the black population were determined for the respective years. Figures 3.4 to 3.8 illustrate the racial transition of the study area, at three year intervals, between 1960 and 1972.

Compared to the intermediate or high schools in the study area, the black student body percentages of the twenty-nine elementary schools were preferably used as the surrogate of population intensity because they represent more accurately the racial composition of the areas in which the schools are located. This accuracy is due to the general design requirement for elementary schools which states that elementary schools should be accessible to its pupils by foot without crossing any major streets. To statistically check the accuracy of this surrogate a correlation matrix was computed to examine the strength of the relationships between the 1960 census data and 1961 school data, and the 1970 census data and 1970 school data, Table 3.1. The results revealed a strong positive correlation ($r=.78$) between the 1960 and 1961 data in spite of the fact that there is a year difference in measurement time, and an even stronger correlation ($r=.97$) between the 1970 data. Each of these relationships is statistically significant at $\alpha = .05$.

Stages of Racial Transition

The impact of numbers upon the maintenance of integration in urban neighborhoods have for some time interested researchers of racial transition. Specific numbers have not only been ascribed to the hypo-

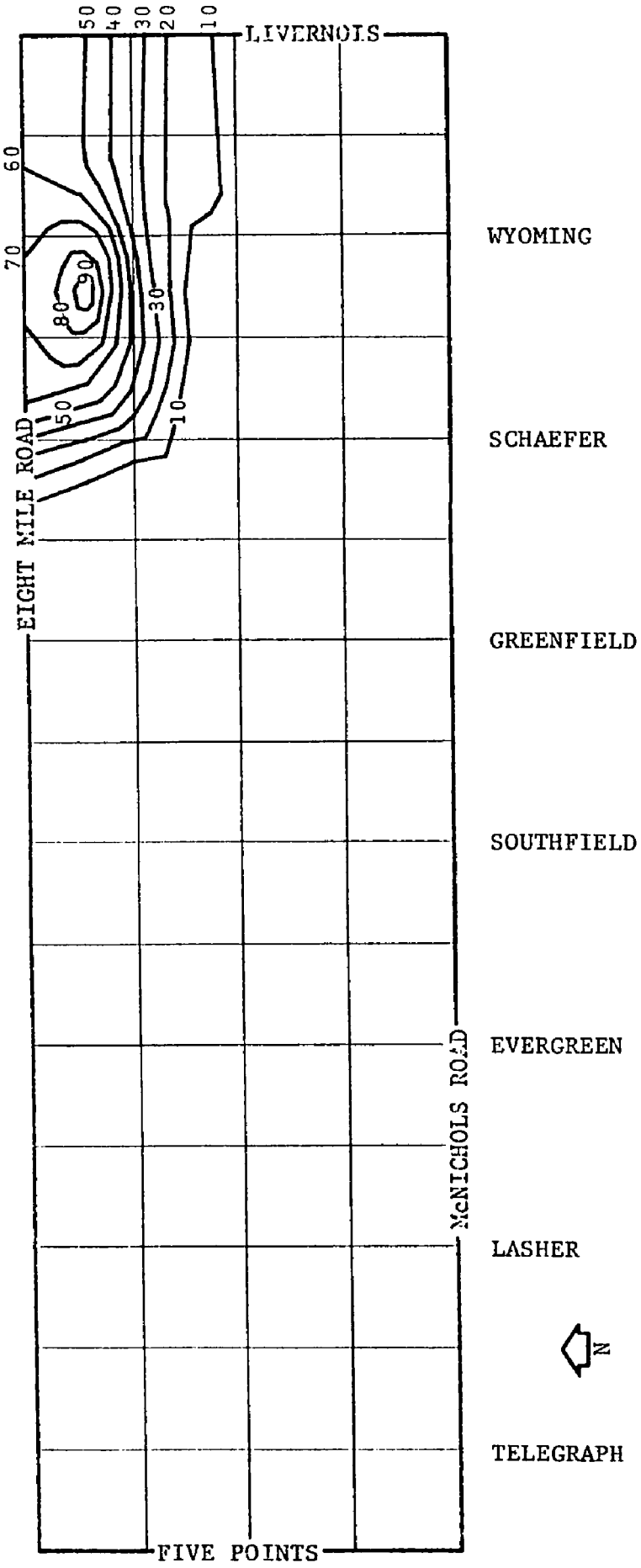


FIGURE 3.4

1960 RACIAL TRANSITION: PERCENT BLACK POPULATION

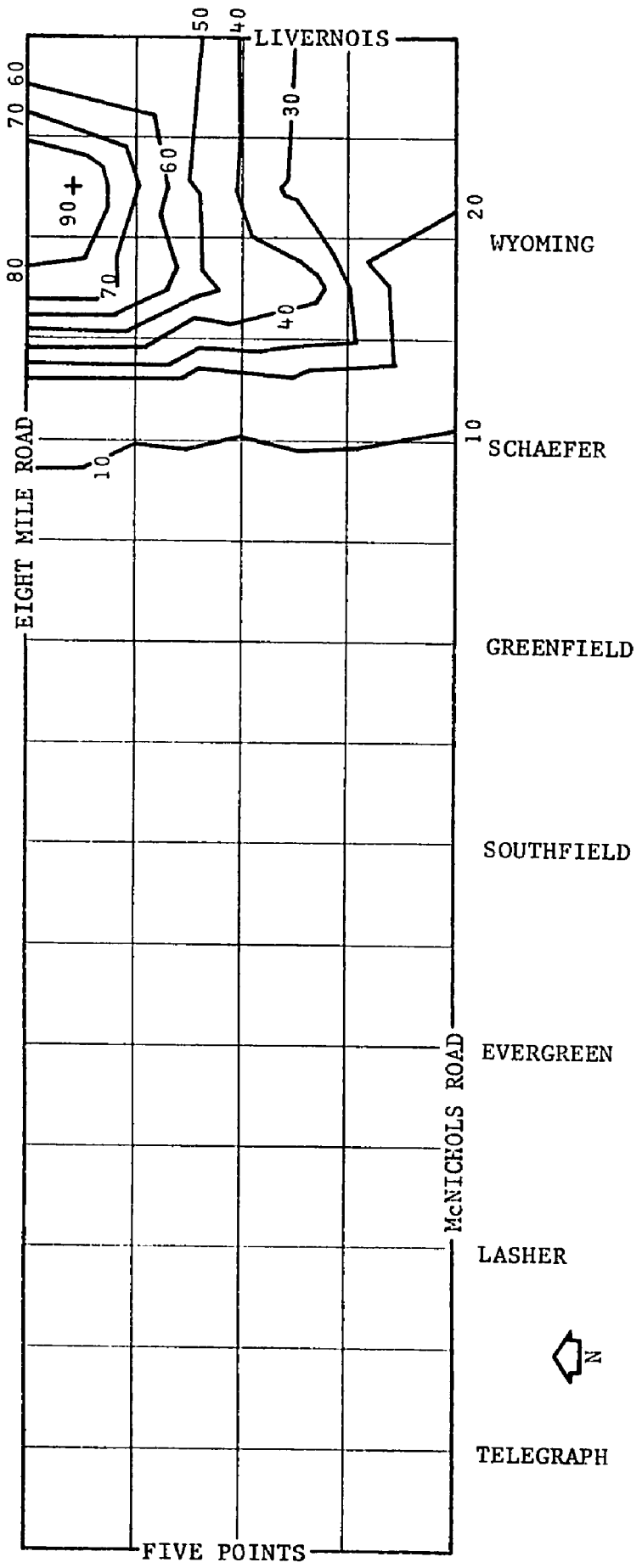


FIGURE 3.5

1963 RACIAL TRANSITION: PERCENT BLACK POPULATION

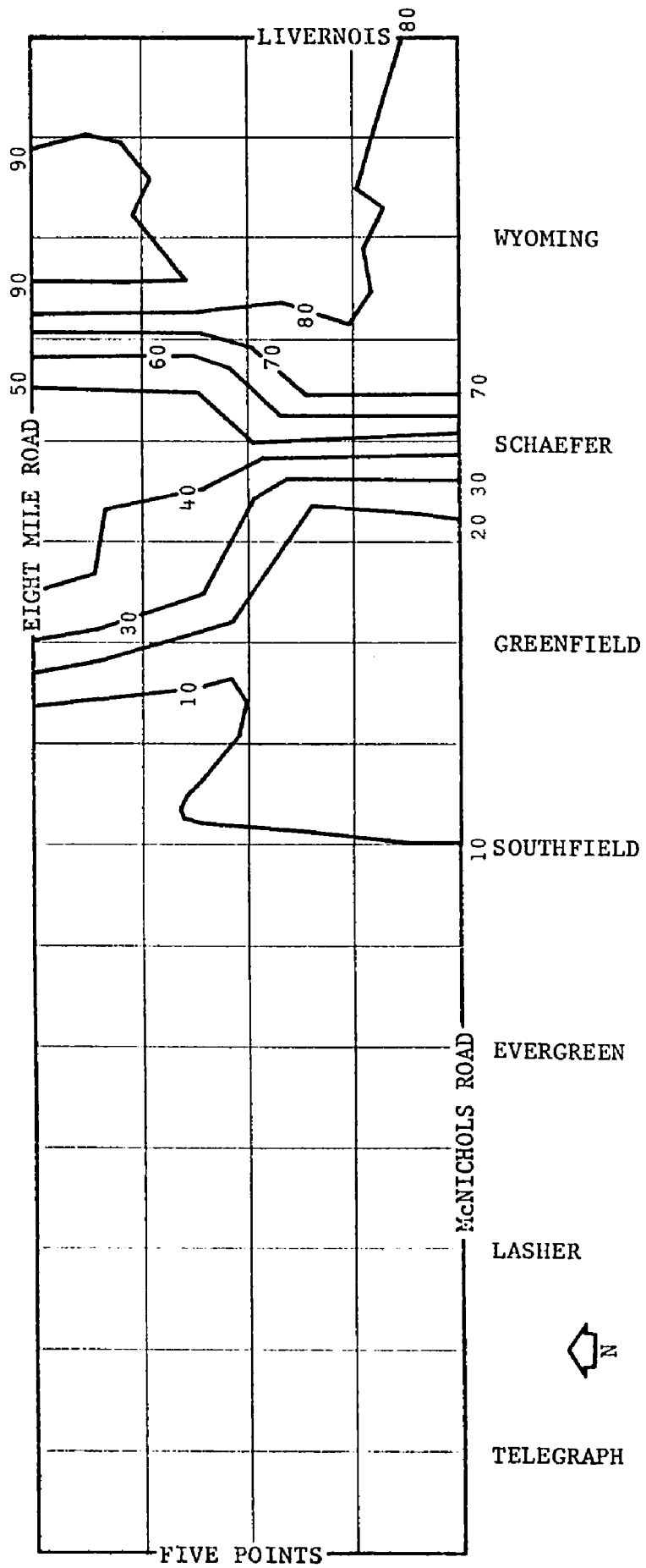


FIGURE 3.6

1966 RACIAL TRANSITION: PERCENT BLACK POPULATION

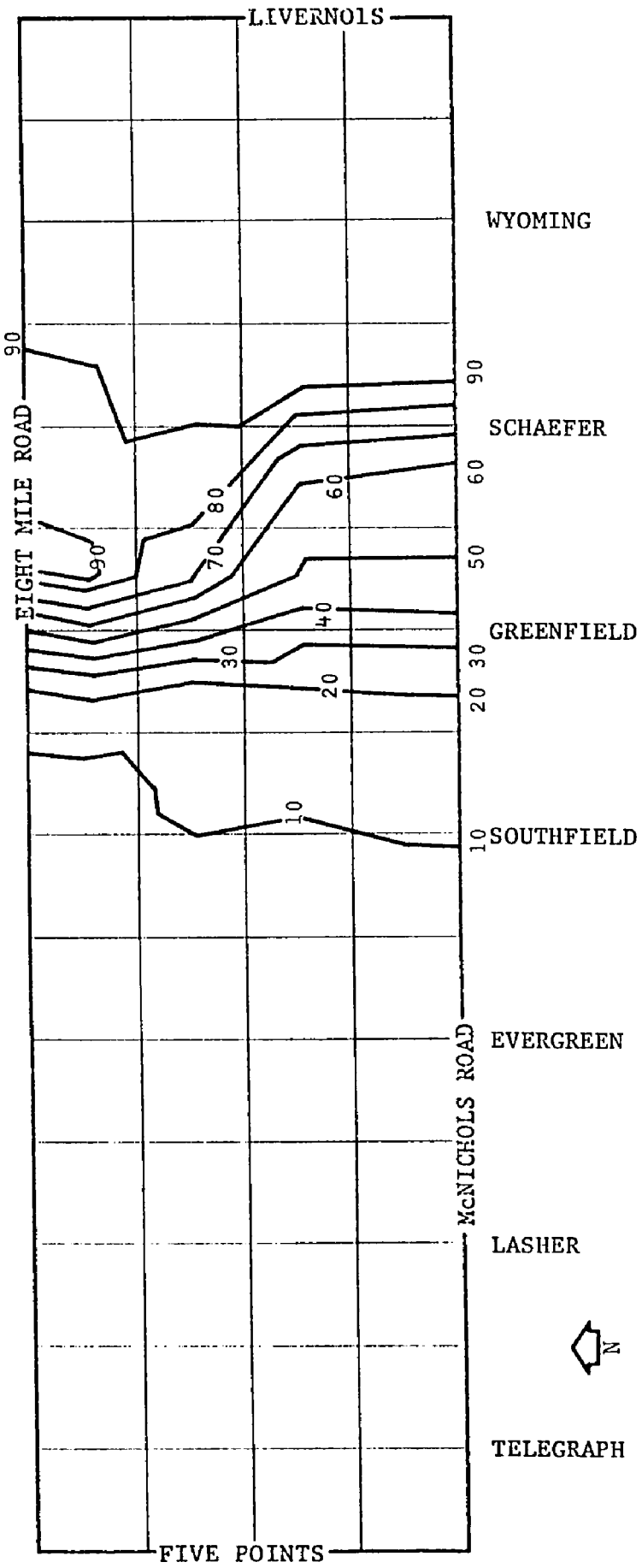


FIGURE 3.7

1969 RACIAL TRANSITION: PERCENT BLACK POPULATION

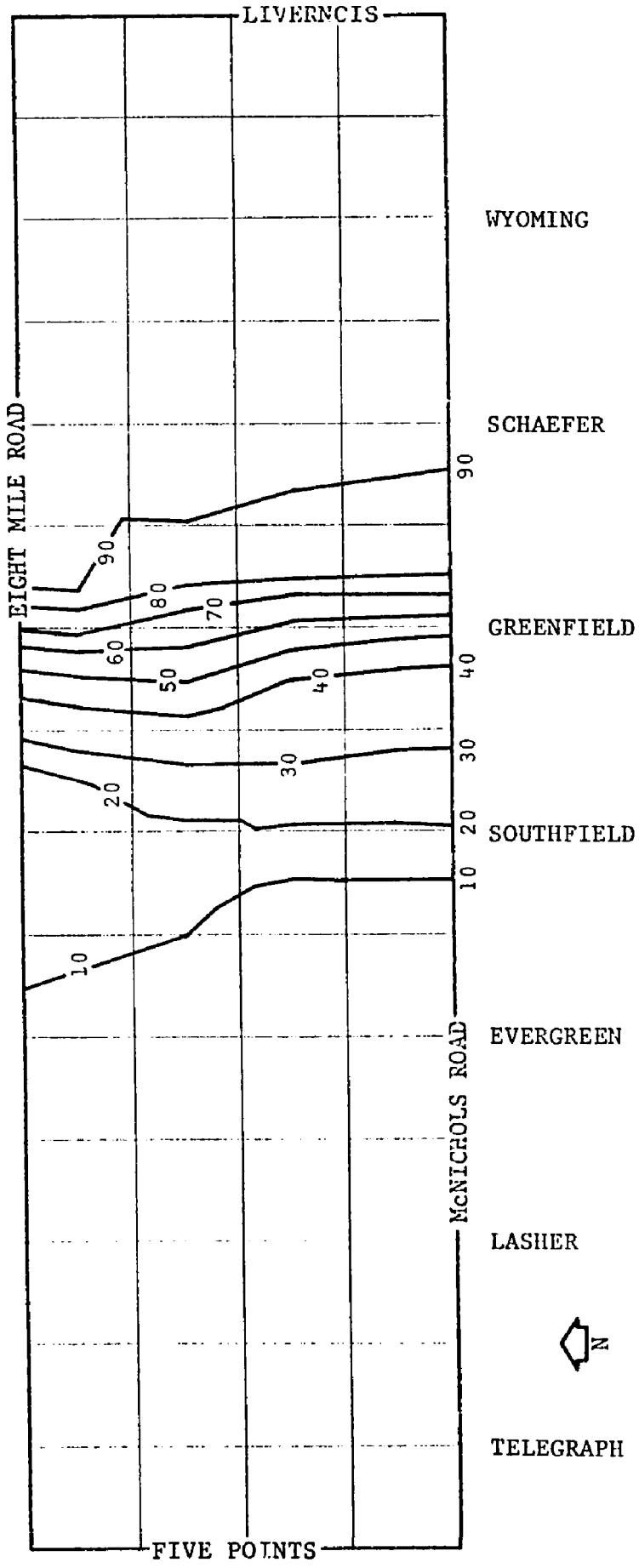


FIGURE 3.8

1972 RACIAL TRANSITION: PERCENT BLACK POPULATION

TABLE 3.1

CORRELATIONS BETWEEN CENSUS DATA AND ELEMENTARY SCHOOL SURROGATE DATA FOR 1960, 1961 AND 1970

	1960 %Black Census Data	1970 %Black Census Data	1970 %Black School Data	1961 %Black School Data
1960 %Black Census Data	1.000			
1970 %Black Census Data	.536	1.000		
1970 %Black School Data	.397	.967	1.000	
1961 %Black School Data	.782	.672	.566	1.000

$N = 60$
$\alpha = .05$
$r_{.95} = .254$

thetical "tipping point" beyond which racially integrated housing situations supposedly cannot be sustained but also to preference points, leaving points, and willingness-to-enter points. Although these numbers and concepts vary from study to study there is an overall consensus which views all neighborhoods that have experienced racial transition as evolving through a sequence of stages over time. Whatever names these stages are given they all relate to some number or percentage of minority group members in the neighborhoods. Consequently, to provide order to the phenomenon being observed and an analogous frame of reference with past research efforts in the area of racial transition, the spatial distributions of the black population within this study were classified into stages of racial transition.

To the question of how many stages should be specified and what should be the stage limits requires a close examination of the transi-

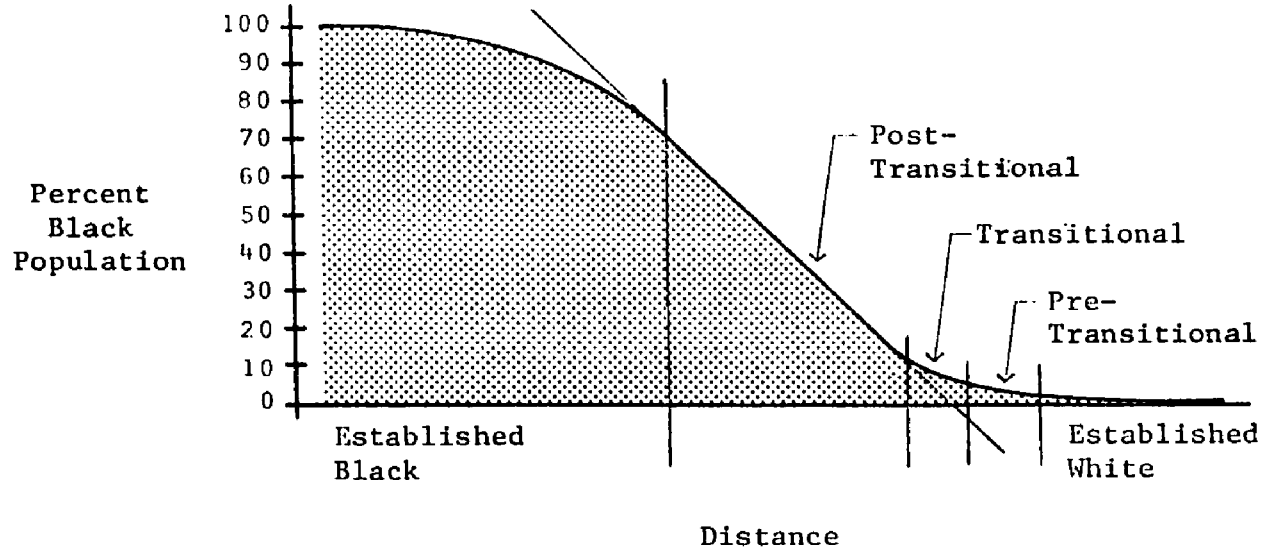
tional movement of the black population across the study area. Initially, the transition mounted in the Northeast corner of the study area and moved south along Livernois, the eastern boundary. After this initial directional move, it changed direction and rapidly developed into a well defined wave pattern moving from east to west over the length of the study area. Upon observing this distinct wave pattern, it was decided that the wave's form best exemplified the process taking place and thus formed the basis of classifying the stages of racial transition, Figure 3.9. The resultant stages obtained from analyzing the form of the transitional wave are:

(1) Established Black -- over 70% black households -- an area that has experienced a racial change in occupants and is now identified as an established black neighborhood (test area);

(2) Post-transitional -- 10-69.9% black households -- an area experiencing a rapid rate of racial change but not yet identified as an established black neighborhood;

FIGURE 3.9

TRANSITION WAVE ANALYSIS: STAGES OF RACIAL TRANSITION



(3) Transitional -- 5-9.9% black households -- an area experiencing a moderate to slow rate of racial change that is identified as an area under transition;

(4) Pre-transitional -- 2-4.9% black households -- an area with a small number of black households but aware of the probability of that number increasing; and

(5) Established White -- 0-1.9% black households[1] -- an area that has not experienced a racial change in occupants and is identified as an established white neighborhood (control area).

The Use of Assessed Property Value Data as a Source of Existing Property Values, 1960-1972

The intrinsic objective of this study is to determine the causal relationship between fluctuations in the residential property values of a single family residential area and changes in the racial composition of its occupants. To accomplish this it is necessary that the existing property values for a random sample of homes in the study area be obtained for given points in time, thus, leading to the necessity of addressing the question: what is the value of a home?

The courts have accepted a definition of value as the price that a fully informed buyer, who is not compelled to buy, will pay and that a fully informed seller, who is not compelled to sell, will accept. However, buyers and sellers are not usually fully informed and are generally under some compulsion to act, which points out the mythical essence of the assumptions implicit in the court's definition. Consequently, the price that satisfied both the buyer and seller will only by chance be equal to the value defined by the court's definition.

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[1] A considerable portion of the 1.9% of black households under this classification can be attributed to mathematical error incurred in transforming the elementary school data to spatial distributions.

Hence, a more reliable means of determining the value of a piece of property in a given area must be obtained.

Based on a statement by Luigi Laurenti (1960) in a special research report on the Commission on Race and Housing:

> ...to rely on any value data other than market price in this study would be hazardous...But in looking for 'the facts' of a situation it is important to bear in mind that a selling price is a fact while value is an estimate of what the price ought to be. (Laurenti, 1961, p. 34)

This author's first inclination was to take the actual selling prices at which homes change hands in the housing market as the basic data source for this study--which is affirmed by other researchers as the best indicator available of a property's value. But, it is here maintained that a total reliance upon such a data set presents senseless research limitations and problems. Not only is the sample size limited in using such data but it can also vary drastically between observations which influences the probable size of random error. In addition, the sample itself--the homes that changed hands--may or may not be representative of the housing quality in the area. This is supported by the observation that the homes in residential areas which most frequently change hands are not the higher quality ones but tend to be just the opposite (Phillips, 1950). Undoubtedly the actual selling price is the best indicator of a property's value and any other method of determining such a value that did not utilize this indicator would be open to serious criticism. But, a total reliance upon selling prices for a study of this nature leaves a lot to be desired.

The most comprehensive source of existing property values based, in part, on the actual selling prices of homes in an area is the assessed property value records of a city. The residential appraising

departments of most cities recognizes three basic approaches to estimating the true cash value of a residential property: 1) sales of comparable properties, 2) capitalization of the property's income stream, and 3) the reproduction costs corrected for depreciation. No matter which approach a city uses to assess properties which depends upon the functioning of the existing housing market, it can maintain a check on the accuracy of its assessments by calculating assessment/sales ratios for diverse neighborhoods in the city. For example, the usual criterion for judging the effectiveness of a city's assessment procedures is the dispersion[1] of its assessment/sales ratios:

Equation 3.1

$$Q = \frac{\text{Assessment/Sales Ratio in Test Neighborhoods}}{\text{Assessment/Sales Ratio in Control Neighborhoods}}$$

A value of Q in excess of 1.0 indicates that properties in the Test Neighborhoods bear a greater tax burden than properties in Control Neighborhoods. A value of Q below 1.0 indicates that the Test Neighborhoods bear a lesser burden. For a city to have a low dispersion measure signifies that when properties in different locations come on the market, they sell at approximately the same multiple of their assessed valuation.

> The most cost-effective means of reducing the dispersion of assessment/sales ratios seems to be a continued checking of neighborhood ratios, followed by neighborhood-wide reassessment whenever a neighborhood ratio gets out of line with the target level. (U.S. Department of Housing and Urban Development, 1973, p. 152)

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[1] From a public policy point of view, it is important to determine whether there is a systematic variation in assessment/sales ratios; whether certain neighborhoods or types of property are discriminated against in the assessment procedure.

The City of Detroit offers a good example of an assessment system which operates efficiently, yet inexpensively, utilizing the three basic approaches of estimating the true cash value of residential property mentioned above. In 1966, the Detroit Assessor's Office divided the city into 613 neighborhoods. Records are kept of all sales, and median assessment/sales ratios are calculated annually for each neighborhood. If in a given year a neighborhood ratio exceeds the fifty percent level stipulated by law, assessments in the next year are lowered in that neighborhood. If the assessment/sales ratio falls below fifty percent, assessments are raised. Detroit's system has significantly reduced the neighborhood spread in assessment/sales ratios which makes the use of its assessed property value data a good source of existing property values.

The use of assessed property values, as opposed to actual selling prices, enabled this study to utilize a stratified random sampling procedure to provide greater precision in estimating the true residential property values for the grided subareas. Based on a total of 50,842[1] platted lots in the entire study area, the relative proportion of lots in each subarea was determined. This proportion functioned as a weighing factor in obtaining the number of observations to be made in each subarea, based on the total sample drawn. A sample size of 596 is required for ninety percent confidence of containing the true resi-

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[1]This total changed to 50,763 in 1970 when the Eight Mile-Wyoming Urban Renewal Plat was developed which created larger lot sizes for the new homes being built in the area. This was accomplished by combining a number of small lots. Consequently, since the total number of platted lots was used as the basis for determining the sample size, the larger number was used throughout the study to increase the accuracy of the sample estimate.

dential property value cumulative distribution within an interval of ten percentage points in width. But due to an a priori restriction of having a minimum of five observations in each subarea, the sample size of 596 was increased to 608. Using a random number table and plat maps of the study area, the observations were drawn. Once identified, the value of each observed residential property was able to be traced over time. The five temporal observation points produced a grand total of 3,040 observations for the complete study period, 1960-1972. It is apparent that the use of assessment records do have definite advantages in research efforts of this nature because such a sample size and sampling procedure would not have been possible using actual selling price data.

The data obtained from the assessment records is presented in Table 3.2. From this table not only can it be observed how property values changed between years by racial classification, but also how

TABLE 3.2

1960-1972 RESIDENTIAL ASSESSED PROPERTY VALUES BY RACIAL CLASSIFICATION AND YEAR

Racial Classifications	1960	1963	1966	1969	1972
1 Established Black	1 3,770	2 3,715	12 11,344	19 10,152	24 11,135
2 Post-Transitional	7 11,040	14 9,725	16 8,000	12 8,844	10 10,174
3 Transitional	2 7,523	4 7,499	3 10,446	8 6,840	8 9,176
4 Pre-Transitional	3 8,033	5 7,820	9 6,287	8 6,913	9 9,338
5 Established White	46 6,947	34 7,106	19 7,307	12 9,093	8 11,146
Grand Mean	59 7,453	59 7,700	59 8,320	59 8,782	59 10,434

Note: The large figure is the mean residential assessed property value, and the smaller figure above is the number of study area quadrats associated with the given racial classification and year.

the number of study area quadrats associated with each racial classification varied temporally. It is also important to note that the effects of inflation (see Appendix B, Table B.1), although removed from the assessed property value data in all of the subsequent analyses in which it appears, has not been removed from the figures which appear in Table 3.2. The figures are presented here in their unadjusted form to afford the reader an opportunity to obtain a visual sense of the fluctuations that racially and temporally occured in the data in their observed form. When these data are pooled and analyzed, Table 3.3, it shows--contrary to popular beliefs--that as the percent of black population increases residential property values increases. In addition,

TABLE 3.3

ANALYSIS OF VARIANCE TABLE FOR THE 1960-1972 POOLED ASSESSED PROPERTY VALUES STRATIFIED BY RACIAL CLASSIFICATIONS (ASSESSED PROPERTY VALUE/10)

N = 295

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif
Between	4	.40063 +7	.10016 +7	4.8534	.0008
Within	290	.59846 +8	.20637 +6		
Total	294	.63852 +8			

Strata	N	Mean	Variance	Std. Dev.
1	58	1047.3	.54986 +6	741.53
2	59	931.02	.16109 +6	401.36
3	25	818.05	66500.	257.88
4	34	762.15	62963.	250.92
5	119	754.85	.13124 +6	362.28

Scheffe Pairwise Comparison Results (α = .05):

Strata	Diff.	Signif.
1>3	229.25	.0358
1>4	285.15	.0039
1>5	292.46	.0001
2>5	176.18	.0155

based on Scheffe's pairwise comparisons,[1] over the 1960-1972 time period the property values in established black and post-transitional areas were significantly greater than those in the control area. Specifically, the residential property values in the established black area were found to be 30.37 percent greater than those in the transitional area, 37.78 percent greater than those in the pre-transitional area, and 38.74 percent greater than those in the established white (control) area. Furthermore, the residential property values in the post-transitional area were found to be 23.34 percent greater than those in the established white (control) area. Based on these initial findings, it appears that the "property value myth" associated with black entry is working in reverse. But all conclusions on this topic will be reserved until further analyses can be performed on the data to determine the true interrelationship between changes in race and residential property values.

Assessment records also functioned as a source of information on change of ownership patterns. During each time period, by recording the name of the owner of each property that served as an observation, a record of ownership turnovers was compiled. (See Appendix B.) Based on this data and the racial distribution information obtained from the United States decennial census of population and the Detroit Public School annual racial census, the percent of sample dwelling unit turnovers by racial classification was examined using analysis of variance techniques, Tables 3.4 to 3.6. The analysis revealed that in 1966, prior to Detroit's "civil disturbance," the study area was in

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[1]See Scheffe (1959) for a discussion of pairwise comparisons.

a general state of racial transition with the majority of the dwelling unit turnovers occuring in the transitional area (Strata 3). But, in 1969, after Detroit's "civil disturbance," the trend changed with the majority of dwelling unit turnovers now occuring in the established black area (Strata 1). This change in trend is undoubtedly due to the increased housing demand generated by the black population displaced by the civil disturbance or those seeking to get away from it, and their desire to locate in an area of least racial resistance. The observed trend in 1972 was the same as in 1969 with one basic difference. The dwelling unit turnovers in the established white area (Strata 5) increased significantly which could be interpreted as a

TABLE 3.4

ANALYSIS OF VARIANCE TABLE FOR THE PERCENT OF DWELLING UNIT TURNOVERS IN 1966, STRATIFIED BY RACIAL CLASSIFICATIONS (BASED ON ASSESSED PROPERTY VALUE SAMPLE)

N = 59

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif
Between	4	2250.4	562.59	2.7980	.0349
Within	54	10858.	201.07		
Total	58	13108.			

ω^2 = 17.17%

Strata	N	Mean	Variance	Std. Dev.
1	12	29.903	286.08	16.914
2	16	17.032	146.88	12.119
3	3	41.709	107.91	10.388
4	9	26.829	217.29	14.741
5	19	22.481	197.43	14.051

Scheffe Pairwise Comparison Results (α = .05):

Strata	Diff.	Signif.
1>2	12.871	.0210
2<3	-24.678	.0077
3>5	19.229	.0334

TABLE 3.5

ANALYSIS OF VARIANCE TABLE FOR THE PERCENT OF DWELLING UNIT TURNOVERS IN 1969, STRATIFIED BY RACIAL CLASSIFICATIONS (BASED ON ASSESSED PROPERTY VALUE SAMPLE)

N = 59

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif
Between	4	4610.9	1152.7	5.7000	.0007
Within	54	10921.	202.23		
Total	58	15532.			

ω^2 = 29.69%

Strata	N	Mean	Variance	Std. Dev.
1	19	37.097	200.35	14.154
2	12	22.664	298.48	17.277
3	8	19.635	51.980	7.2097
4	8	16.047	71.266	8.4419
5	12	16.349	288.04	16.972

Scheffe Pairwise Comparison Results (α = .05):

Strata	Diff.	Signif.
1>2	14.433	.0080
1>3	17.462	.0052
1>4	21.050	.0009
1>5	20.748	.0002

TABLE 3.6

ANALYSIS OF VARIANCE TABLE FOR THE PERCENT OF DWELLING UNIT TURNOVERS IN 1972, STRATIFIED BY RACIAL CLASSIFICATIONS (BASED ON ASSESSED PROPERTY VALUE SAMPLE)

N = 59

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif
Between	4	3781.0	945.24	3.6983	.0099
Within	54	13802.	255.59		
Total	58	17583.			

ω^2 = 21.50%

Strata	N	Mean	Variance	Std. Dev.
1	24	37.853	310.25	17.614
2	10	21.563	218.07	14.767
3	8	18.932	178.94	13.377
4	9	21.264	227.64	15.088
5	8	28.690	232.77	15.257

TABLE 3.6, continued.

Scheffe Pairwise Comparison Results (α = .05):

Strata	Diff.	Signif.
1>2	16.290	.0091
1>3	18.922	.0054
1>4	16.589	.0104

sign of entering white households from the inner city that could not afford moving to the suburbs or of real estate speculation.

Transition Matrix Development: Race and Property Value

Introduction

A transition matrix is defined as an array of numbers ordered in rows and columns to describe a passage from one state to another. From this definition there are two general types of transition matrices, associated with change in states, that can be identified: probabilistic and non-probabilistic. An excellent example of probabilistic transition matrix's utility is in a searching and learning process in which spatial decisions and movements are examined (Abler, Adams and Gould, 1971, p. 506). But the change in states that occur in this study are actual changes and, consequently, the non-probabilistic type of transition matrix is used herein.

Matrices can often provide useful insights in examining changes in comparative relationships. Although they are not suitable for presenting all changing conditions, they are efficient ways of presenting complex networks of changing states and, as such, are constantly being used in various research efforts relating to change. In this particular study, transition matrices are used to illustrate and

examine, respectively, the theoretical and existing temporal relationships between race and property value.

Theoretical Relationship

In theory, it is hypothesized that the arrival of black homeowners into previously all white neighborhoods causes a decline in residential property values. When this change in the racial character of occupants occurs to any significant extent, it is further hypothesized that the results are ultimately a rapid physical deterioration of the area and a depreciation of even those homes that have been well maintained. The contention here is that if the growth of the black population reaches the critical "tipping-point" beyond which racially integrated housing situations cannot be sustained, it is anticipated that a recovery of the area's property value will not take place.

Figure 3.10 establishes the framework for illustrating the theoretical relationship between race and property values described above. The rows and columns of the transition matrix represent the five classifications of racial subareas that make-up the study site during the first and second observed time periods. Each cell of the matrix represents a different passage between the two periods. The first and second subscript of each cell, respectively, gives the position of that cell during the first and second time periods. For example, $C_{4,2}$ represents the portion of subarea four (pre-transition) in the first time period that changed to subarea two (post-transition) in the second time period. The portion of the subareas that remained stable between the observed time periods are the cells on the diagonal (i.e., $C_{1,1}$, $C_{2,2}$, $C_{3,3}$, $C_{4,4}$, and $C_{5,5}$) which represents no change. The

FIGURE 3.10

TRANSITION MATRIX

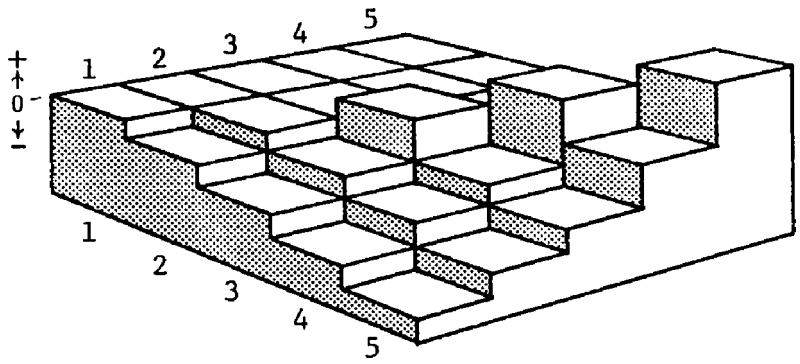
STATE AT THE FIRST TIME PERIOD	STATE AT THE SECOND TIME PERIOD				
	1	2	3	4	5
1	$C_{1,1}$				
2	$C_{2,1}$	$C_{2,2}$			
3	$C_{3,1}$	$C_{3,2}$	$C_{3,3}$		
4	$C_{4,1}$	$C_{4,2}$	$C_{4,3}$	$C_{4,4}$	
5	$C_{5,1}$	$C_{5,2}$	$C_{5,3}$	$C_{5,4}$	$C_{5,5}$

cells on the right side of the diagonal represent those areas that changed from black to white of which there were no cases in this study. Those to the left of the diagonal represent just the opposite--white areas that turned black which was the general trend. The further a cell is located to the left of the diagonal the more rapid its rate of racial transition.

Once values representing the mean change in residential property values are placed in the appropriate cells, adding a third dimension to the transition matrix, the relationship between race and property values becomes clearly illustrated. Hence, for the theoretical relationship to hold true the three dimensional matrix should show a significant trend in the cells that correlate negatively with increased distance to the left of the matrix's diagonal. (See Figure 3.11.)

FIGURE 3.11

THREE-DIMENSIONAL TRANSITION MATRIX: THEORETICAL RELATIONSHIP BETWEEN RACE AND PROPERTY VALUES



Existing Relationship

For all possible intervals of the observed time periods (i.e., three, six, nine, and twelve year intervals), analysis of variance techniques were used to test the hypothesis that the transitional cell classifications, pertinent to a given interval (Table 3.7), do not differ significantly in changes in residential property values. From this analysis it was concluded that there were no significant differences, at the $\alpha = .05$ level, for any of the temporal intervals. Although this proves that the theoretical relationship does not hold up under an analysis of actual changes in race and property values, a visual analysis of the transition matrices provided additional insight toward understanding changes in their comparative relationship over time.

TABLE 3.7

TEMPORAL CHANGES IN ASSESSED PROPERTY VALUES BY TRANSITION MATRIX CELL CLASSIFICATIONS

Transition Matrix Cell Classification	3 Yr. Intervals				6 Yr. Intervals			9 Yr. Intervals		12 Yr. Interval
	1960-63	1963-66	1966-69	1969-72	1960-66	1966-72	1963-69	1960-69	1963-72	1960-72
$C_{1,1}$	-38.00^{1}	-16.28^{2}	-387.61^{12}	1532.60^{19}	-71.33^{1}	1136.60^{12}	1034.20^{2}	867.33^{1}	4563.50^{2}	4156.70^{1}
$C_{2,1}$	-56.15^{1}	2954.20^{10}	280.98^{7}	1140.80^{5}	6037.10^{5}	1759.40^{12}	1633.70^{14}	2986.50^{7}	2918.50^{14}	4580.70^{7}
$C_{2,2}$	-165.80^{6}	-359.88^{4}	612.90^{9}	1794.40^{7}	-1133.6^{2}	2424.30^{4}	NA	NA	NA	NA
$C_{3,1}$	NA	NA	NA	NA	NA	NA	68.97^{2}	-3.37^{2}	1517.20^{4}	1296.10^{2}
$C_{3,2}$	NA	-69.98^{4}	241.35^{3}	1623.00^{3}	-129.10^{2}	2163.40^{3}	433.40^{2}	NA	NA	NA
$C_{3,3}$	-72.34^{2}	NA	NA	1865.30^{4}	NA	NA	NA	NA	NA	NA
$C_{4,1}$	NA	NA	NA	NA	-117.12^{3}	NA	NA	330.92^{3}	1442.00^{1}	1462.50^{3}
$C_{4,2}$	-7.55^{3}	-167.37^{5}	NA	NA	NA	2241.80^{3}	492.69^{5}	NA	2232.60^{4}	NA
$C_{4,3}$	NA	NA	692.52^{7}	1727.00^{3}	NA	2632.10^{5}	NA	NA	NA	NA
$C_{4,4}$	NA	NA	801.26^{2}	1596.10^{5}	NA	2100.00^{1}	NA	NA	NA	NA
$C_{5,1}$	NA	NA	NA	NA	-508.86^{3}	NA	139.00^{1}	28.52^{6}	1536.60^{3}	1492.30^{11}
$C_{5,2}$	-111.51^{5}	-122.24^{3}	NA	NA	-219.06^{12}	NA	2787.80^{5}	1278.90^{12}	4258.60^{6}	3244.10^{10}
$C_{5,3}$	94.39^{2}	4114.70^{3}	883.33^{1}	1875.00^{1}	3879.50^{3}	2500.60^{3}	681.00^{8}	553.72^{8}	2534.30^{8}	2414.20^{8}
$C_{5,4}$	-231.05^{5}	-32.89^{9}	669.51^{6}	2006.80^{4}	-132.29^{9}	2800.50^{8}	665.77^{8}	584.89^{8}	2676.10^{9}	2685.40^{9}
$C_{5,5}$	509.07^{34}	-107.34^{19}	1032.20^{12}	1832.70^{8}	925.95^{19}	2736.40^{8}	885.62^{12}	2585.90^{12}	2546.30^{8}	5038.20^{6}

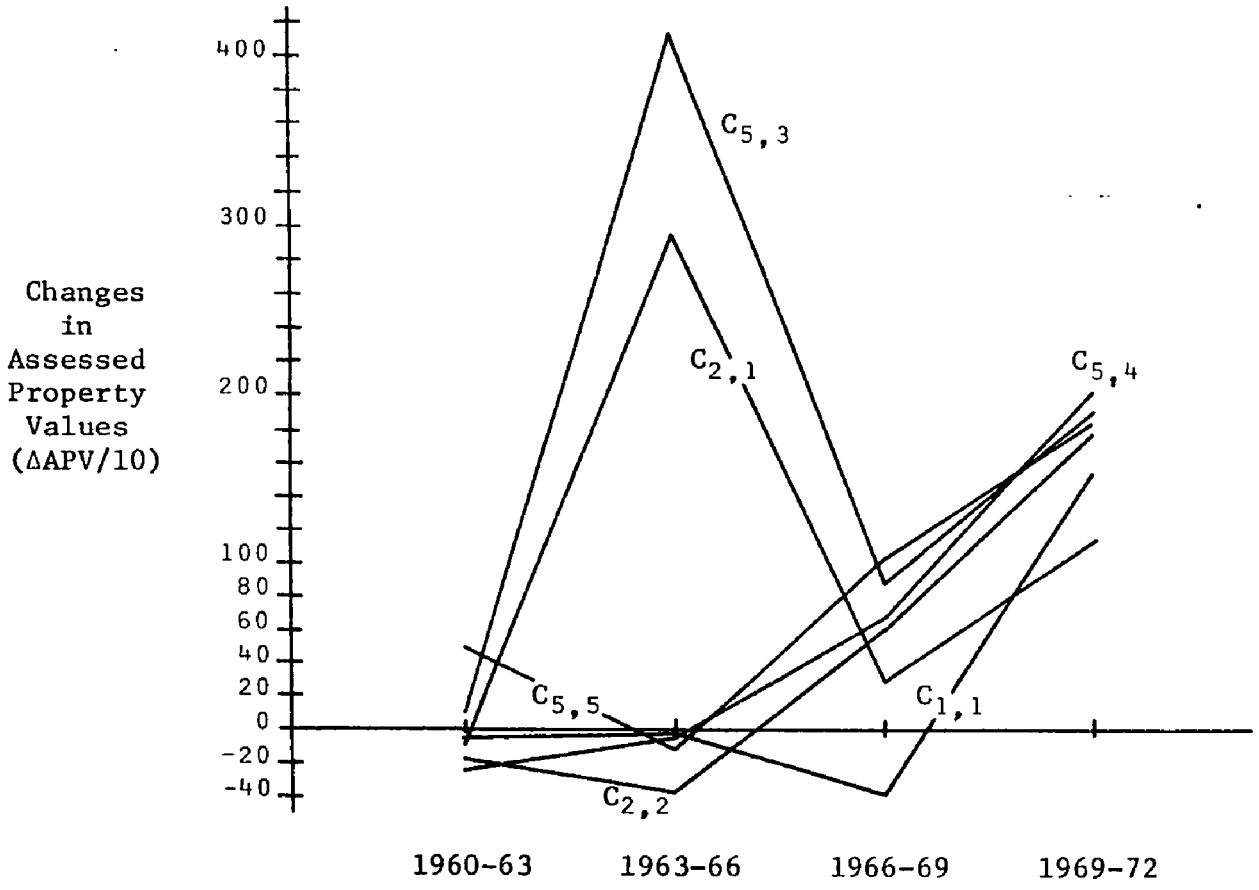
NA - Not Applicable

$\boxed{1000.00^{12}}$ - Twelve study quadrats experienced a mean change in assessed property value of $1,000.00.

Focusing on those observed time intervals that provide an incrementally continuous temporal frame of reference (e.g., three and six year intervals), selected transitional cell classifications were plotted over time.[1] The resultant three year interval graph, Figure 3.12, revealed that during the 1963-66 period those subareas that passed

FIGURE 3.12

SELECTED TRANSITION MATRIX CELL CLASSIFICATION CURVES (THREE YEAR INTERVALS)



[1]Three year interval transitional cell classifications which were active over the complete twelve year study period were selected for plotting (i.e., $C_{1,1}$, $C_{2,1}$, $C_{2,2}$, $C_{5,3}$, $C_{5,4}$, and $C_{5,5}$). Although the six year interval cell classifications were also examined they are not presented here because they replicated the three year interval findings but without its detail.

from established white to transitional ($C_{5,3}$) and from post-transitional to established black ($C_{2,1}$) experienced an unusually large positive change in property values. While both were substantial, the established white to transitional change -- which represents the more rapid rate of transition of the two subareas -- experienced more than 1.33 times as much positive increase over the other variant classification in this period. It should be noted that the 1963-66 period represents a point in time prior to Detroit's "civil disturbance" when the study area was in a state of general racial transition. Consequently, it is understandable why so many study area quadrats experienced transition during this period. But at first glance, it is not totally understandable why only two out of the six observed transitional cell classification areas experienced an average property value increase of $3,534.45 while the remaining four experienced an average decrease of $98.12. Upon an examination of the actual geographical location of the observed study area quadrats, it was found that the two classification areas that experienced an increase were adjacent to major service and commercial centers. Such a finding supports the importance of non-residential land uses in relation to fluctuations in residential property values -- a central argument in this study. In addition, the importance of changes in non-residential land uses is further realized in the following three year period, 1966-69, when the variant classifications return to a posture more in line with the other cell classifications. In this interval one of the above mentioned service and commercial centers was declining. This caused the property values in the variant cell classification area ($C_{2,1}$) adjacent to it to

decrease to a point 3.14 times as low as the other variant cell classification area ($C_{5,1}$) whose service and commercial center remained stable. Hence, it becomes apparent that changes in non-residential land uses do impact significantly upon residential property values, but the extent of this impact will be reserved for later analysis.

Residential Sales Data as an Indicator of Housing Preferences

In 1967, the Detroit Assessor's Office divided the city into 613 neighborhoods (eighty-four of which make-up the study area site). Since that point in time, records are kept on all the residential property sales in each neighborhood on an annual basis. These sales records are further partitioned by dwelling unit types:

> Single family -- a detached house completely independent of any other structure. The garage for this type of dwelling is located within the main building or in a separate structure. Generally, the unit is from one to two stories high.
>
> Duplex -- semi-attached, side by side, housing units utilizing a common wall between houses for economy. Separate and independent entrances are maintained for each unit. This type of dwelling is from one to two stories high.
>
> Small flats -- two self contained living units, one on top of the other, with equal floor areas. The combined units must be less than 28,000 cubic feet in total area.
>
> Income bungalow -- two self contained living units, one on top of the other, with the upper unit having considerably less floor area than the main lower unit.[1]

By compiling a complete listing of the residential sales in the study area for 1969 and 1972 the spatial distributions of sales by dwelling unit type were determined for the respective years. (See Appendix D.)

---

[1]Definitions for the dwelling unit types were obtained in a personal interview with Renald Lulek, director of research for the City of Detroit Assessor's Office.

As a result, these spatial distributions served as the bases for determining housing preferences in areas of varying racial compositions.

Utilizing the 1969 and 1972 spatial distributions of sales by dwelling unit type, analysis of variance techniques were used to test the hypothesis that the sale of dwelling units, by type, do not differ significantly with changes in racial composition. This hypothesis was tested with two variations of the dependent variable and two different models. First, the number of dwelling units sold, by type, was analyzed using a fixed-constant model with race as the single variable of classification having five levels (i.e., established black, Strata 1; post-transitional, Strata 2; transitional, Strata 3; pre-transitional, Strata 4; and established white, Strata 5). Second, the percent of dwelling units sold (based on the total number of all units sold in the given year), by type, was analyzed in the more complex model taking race and sales value into consideration. (See Appendix C):

Equation 3.2

$$(\%\ \text{Dwelling Units Sold})_{ijk} = [\mu + Yr_i + Class_j + \beta(\text{Sales Value})_{ij} + \epsilon_{ij}]_k$$

where:

Yr_i - is the observed year i, i=1-5

$Class_j$ - is the racial classification j, j=1-5

Sales Value_{ij} - is the sales value covariate for year i, and racial classification j

k - is the dwelling unit types, k=1-4

Single family and duplex dwelling units were the only units, out of the four analyzed, that significantly differed in sales with changes in racial composition. This holds true for both the first and second model described above. Focusing on the first model, in 1969 (Table 3.8)

over twice as many single family dwelling units sold in both the established black and post-transitional areas as compared to sales in the established white control area. This condition changed in 1972 (Table 3.9) with nearly twice as many single family dwelling units being sold in each of the three transitional areas as compared to the sales in the two established areas. This change in the spatial location of predominant single family dwelling unit sales, over the three year period, can be attributed to the strong desire of black households to locate in areas of least racial resistance. But when the supply of single family units, the first choice of the transitional group, cannot meet the demands of the newly entering black households, their only alternative is to enter areas where resistance may be higher than what they would desire.

Continuing to focus on the first model, due to the assumption of homogeneous variance not being met, nothing can be said at this point with any confidence about the sale of duplex units during 1969. But the 1972 model, Table 3.10, which is significant and meets all model assumptions, illustrates the same strong trend in sales apparent in the 1969 model. In 1972, nearly twice as many duplex dwelling units were sold in the established black area as compared to any of the remaining areas. This pattern of sales is understandable when one focuses on the economic benefits of this unit and the unfulfilled housing demand of the black population. Due to the larger capital investment required for the units when they are purchased for income property (i.e., living in one unit and renting the other or renting both) it is highly desirable to acquire them in areas where there is a viable renters market. Unfortunately, the racial tensions and transi-

TABLE 3.8

ANALYSIS OF VARIANCE TABLE FOR THE NUMBER OF SINGLE FAMILY UNITS SOLD IN 1969, STRATIFIED BY RACIAL CLASSIFICATIONS

N = 59

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif
Between	4	6605.9	1651.5	4.9250	.0019
Within	54	18107.	335.32		
Total	58	24713.			

ω^2 = 26.73%

Strata	N	Mean	Variance	Std. Dev.
1	19	41.680	416.11	20.399
2	12	47.560	435.95	20.879
3	8	30.279	347.97	18.654
4	8	41.959	222.48	14.916
5	12	18.060	166.27	12.894

Scheffe Pairwise Comparison Results (α = .05):

Strata	Diff.	Signif.
1>5	23.620	.0009
2>3	17.281	.0435
2>5	29.500	.0002
4>5	23.899	.0060

TABLE 3.9

ANALYSIS OF VARIANCE TABLE FOR THE NUMBER OF SINGLE FAMILY UNITS SOLD IN 1972, STRATIFIED BY RACIAL CLASSIFICATIONS

N = 59

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif
Between	4	4634.0	1158.5	3.8645	.0078
Within	54	16188.	299.78		
Total	58	20822.			

ω^2 = 22.26%

Strata	N	Mean	Variance	Std. Dev.
1	24	24.142	136.90	11.700
2	10	43.180	574.67	23.972
3	8	40.190	402.80	20.070
4	9	40.337	593.55	24.363
5	8	22.364	42.737	6.5373

TABLE 3.9, continued.

Scheffe Pairwise Comparison Results (α = .05):

Strata	Diff.	Signif.
1<2	-19.038	.0051
1<3	-16.049	.0272
1<4	-16.195	.0202
2>5	20.816	.0142
3>5	17.826	.0443
4>5	17.973	.0372

TABLE 3.10

ANALYSIS OF VARIANCE TABLE FOR THE NUMBER OF DUPLEX UNITS SOLD IN 1972 STRATIFIED BY RACIAL CLASSIFICATIONS

N = 59

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif
Between	4	24.233	6.0583	5.9603	.0005
Within	54	54.887	1.0164		
Total	58	79.120			

ω^2

Strata	N	Mean	Variance	Std. Dev.
1	24	2.5491	2.2720	1.5073
2	10	1.4356	.13573	.36842
3	8	1.1259	.03843	.19604
4	9	1.1169	.04492	.21194
5	8	1.3509	.11175	.33429

Scheffe Pairwise Comparison Results (α = .05):

Strata	Diff.	Signif.
1>2	1.1135	.0049
1>3	1.4232	.0011
1>4	1.4322	.0006
1>5	1.1982	.0052

tional pressures that exist in non-established black areas presents an environment that is not completely conducive to the black renters market. Consequently, the entering black households that can be categorized as part of the renters market and those individuals seeking profitable income property to meet their house demands have definite preference for an established black area.

In addition to the two models described above, using the percent of dwelling units sold as the dependent variable, a third model was designed to examine the directional effect of dwelling unit sales when racial composition and sales value are taken into consideration. (See Appendix D.) In this model, with the percent of black population being significant, it was found that the sale of these units are significant only in the X-direction (north, south) over time which is orthogonal to the direction of racial transition (east, west). Therefore, the results of this analysis support the general reasoning given for the sales pattern of duplex dwelling units over time.

Figures 3.13 to 3.16 provide a visual framework for interpreting residential sale trends by dwelling unit type. By plotting the mean values, for each racial classification, of the number of units sold in 1969 and 1972, and the given unit's percent of the total units sold in the combined two years, the housing preferences of the transitional group are more discernible. In Figures 3.13 and 3.14, respectively, the sales trends of single family and duplex dwelling units can be visually seen as qualitatively and quantitatively supporting the conclusions drawn from earlier analysis in relation to the transitional group's housing preferences. In addition, Figure 3.15 for small flat units and Figure 3.16 for income bungalow units provides a heretofore

FIGURE 3.13

SINGLE FAMILY DWELLING UNITS SOLD BY RACIAL CLASSIFICATIONS

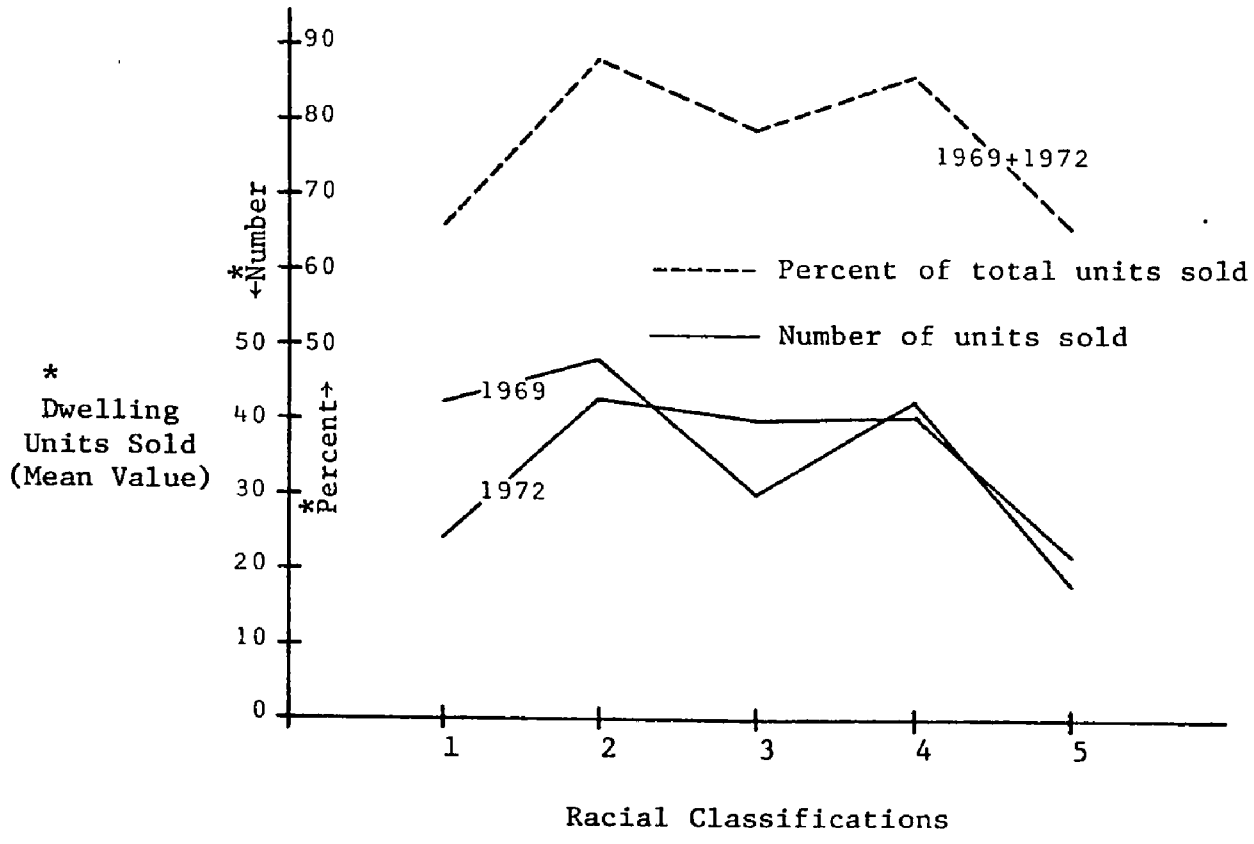


FIGURE 3.14

DUPLEX DWELLING UNITS SOLD BY RACIAL CLASSIFICATIONS

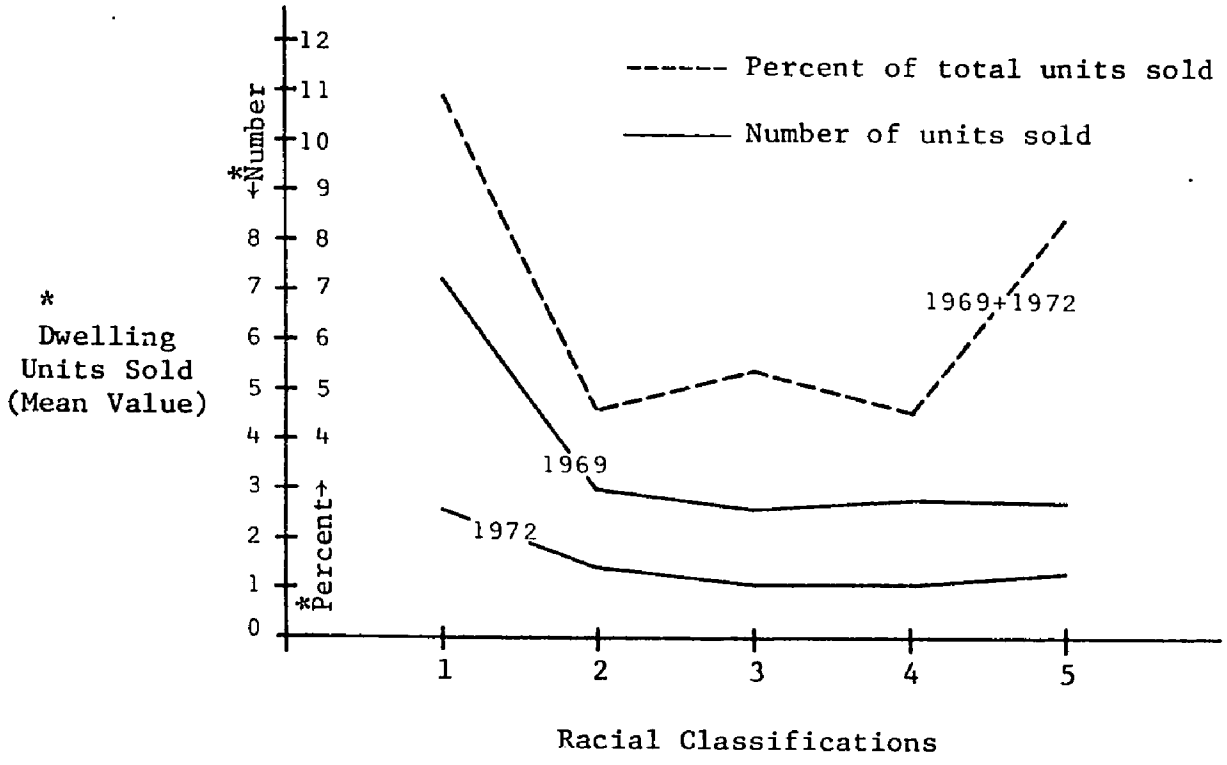


FIGURE 3.15

SMALL FLAT DWELLING UNITS SOLD BY RACIAL CLASSIFICATIONS

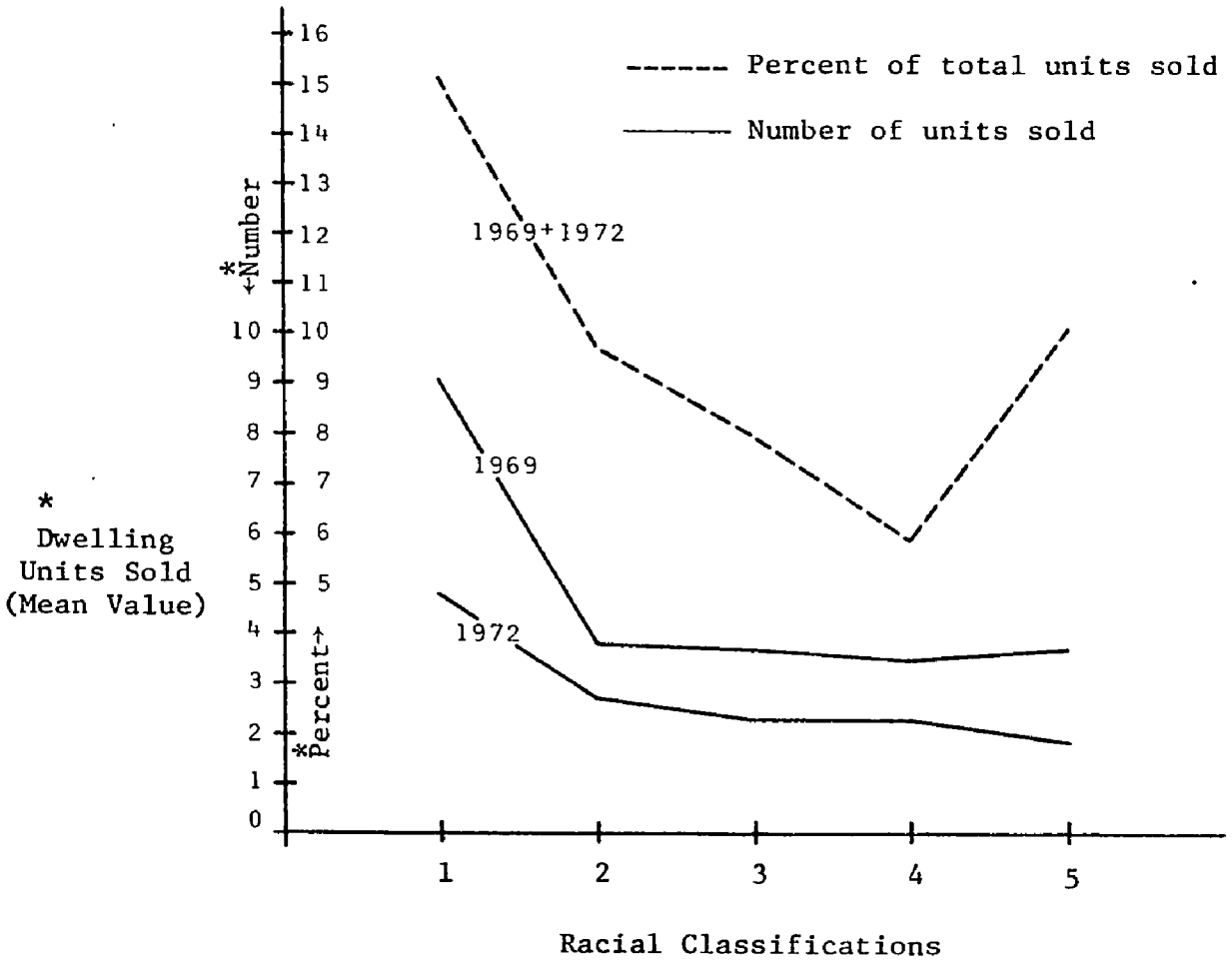
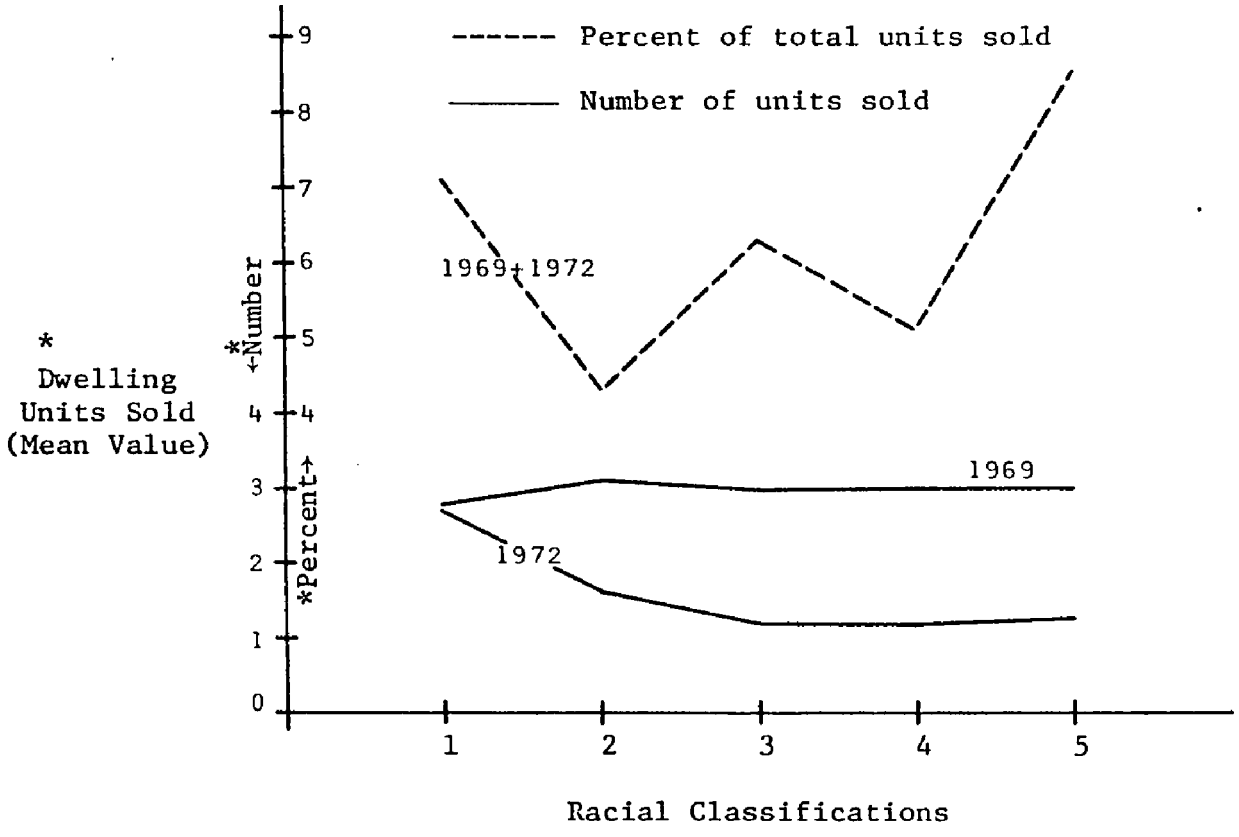


FIGURE 3.16

INCOME BUNGALOW DWELLING UNITS SOLD BY RACIAL CLASSIFICATIONS



unavailable means of interpreting the sales trends of these units as an indication of their desirability.

Due to the heterogeneity of the spatial distribution of small flat dwelling units, nothing can be stated with any confidence about its sales trend by racial classifications. But, since this unit type existed in proportionately large numbers in the established black and post-transitional areas in 1969 and 1972, with only a small number of unit turnovers during the observed time periods, it can be concluded that this unit type (although it is constructively obsolete) is very desirable as income property.

Based on Figure 3.16 and the non-significant results obtained in earlier analysis, the sales trend of income bungalow units is not significant in relation to the racial composition of a neighborhood. Looking further into the situation of what has produced these non-significant results, a random sample of personal interviews with income bungalow homeowners in the study area revealed that: 1) income bungalow units are generally owned by middle aged or elderly white couples whose mental attitudes and/or financial lack of housing alternatives make the selling of their homes unthinkable in the face of any degree of racial transition; 2) the units provide a supplement to the owners income with a minimal maintenance output; and 3) the tenants are usually married couples with no children or single people who present no great disturbance or inconvenience to the owners. Consequently, the desirability of income bungalow units is apparent explaining why there is such a small number of ownership turnovers considering the large number of units that exist in the study area.

Non-Residential Land Use Changes and Classifications 1960-1972

The most comprehensive listing of non-residential land uses in the study area was found to be in the Bresser Cross-Index Directory for the City of Detroit. The directory, which is published on an annual basis, listed the non-residential concerns by name with their addresses. Thus, by organizing and summing the land uses obtained from the directory, by study area quadrat, the spatial distributions of the non-residential land uses were determined for 1960, 1963, 1966, 1969, and 1972. From this point, all possible three, six, nine, and twelve year interval changes in the five spatial distributions were calculated. These intervals changes then served as the dependent variable in testing the hypothesis that changes in non-residential land uses do not differ significantly with changes in racial composition.

Tables 3.11 to 3.14 present those intervals of change in non-residential land uses that differed significantly, at the $\alpha = .05$ level, with changes in racial composition. In addition, where there were significant differences among the stratum means, comparisons of the means were made using Scheffe type multiple comparisons to test for the equality of the pairwise stratum means. Estimates of the amount of variance in each dependent variable explained by the stratification, ω^2, were also made and included in each table where:

Equation 3.3

$$\omega^2 = \frac{SSA}{SST}$$

where: SSA - is the between group sum of squares from the Anova table
SST - is the total sum of squares from the Anova table.

TABLE 3.11

ANALYSIS OF VARIANCE TABLE FOR THE 1960-1972 AGGREGATE NON-RESIDENTIAL LAND USE CHANGES STRATIFIED BY STATIC AND NON-STATIC RACIAL CLASSIFICATIONS

N = 59

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif.
Between	8	3824.6	478.07	3.1870	.0053
Within	50	7500.4	150.01		
Total	58	11325.			

ω^2 = 33.77%

Strata	N	Mean	Variance	Std. Dev.
1	19	-17.632	261.69	16.177
2	7	-11.143	102.14	10.107
3	5	3.4000	67.800	8.2341
4	5	.40000	2.3000	1.5166
5	8	-.37500	5.4107	2.3261
2→1	5	-17.400	264.80	16.273
3→2	3	-7.0000	0.0000	0.0000
4→3	3	-3.6667	14.333	3.7859
5→4	4	-3.5000	257.00	16.031

Scheffe Pairwise Comparison Results (α = .05):

Strata	Diff.	Signif.
1>3	-21.032	.0013
1>4	-18.032	.0051
1>5	-17.257	.0016
1>5→4	-14.132	.0410
2>3	-14.543	.0479
3<2→1	20.800	.0098
4<2→1	17.800	.0258
5<2→1	17.025	.0184

Note: The expression "2→1" represents a non-static racial classification whose respective quadrats were observed in the second racial classification (post-transitional) at the beginning of the given time period but changed to the first racial classification (established black) by the end of that time period. Thus, the arrow (→) indicates the direction of transition within non-static racial classifications during a given time period.

TABLE 3.12

ANALYSIS OF VARIANCE TABLE FOR THE 1966-1972 AGGREGATE NON-RESIDENTIAL LAND USE CHANGES STRATIFIED BY STATIC AND NON-STATIC RACIAL CLASSIFICATIONS

N = 59

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif.
Between	9	8945.1	993.90	2.9777	.0066
Within	49	16355.	333.78		
Total	58	25301.			

ω^2 = 35.36%

Strata	N	Mean	Variance	Std. Dev.
1	12	-28.500	907.36	30.122
2	4	-10.750	126.25	11.236
4	1	0.0000	0.0000	0.0000
5	8	1.2500	11.643	3.4122
2→1	12	-22.167	277.97	16.672
3→2	3	-13.667	766.33	27.683
4→3	5	-2.6000	129.30	11.371
5→4	8	1.0000	9.7143	3.1168
4→2	3	-3.3333	2.3333	1.5275
5→3	3	5.0000	367.00	19.157

Scheffe Pairwise Comparison Results (α = .05):

Strata	Diff.	Signif.
1>5	-29.750	.0008
1>4→3	-25.900	.0104
1>5→4	-29.500	.0009
1>4→2	-25.167	.0379
1>5→3	-33.500	.0065
5<2→1	23.417	.0071
2→1>4→3	-19.567	.0497
2→1>5→4	-23.167	.0077
2→1>5→3	-27.167	.0255

TABLE 3.13

ANALYSIS OF VARIANCE TABLE FOR THE 1963-1972 AGGREGATE NON-RESIDENTIAL LAND USE CHANGES STRATIFIED BY STATIC AND NON-STATIC RACIAL CLASSIFICATIONS

N = 59

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif.
Between	9	13129.	1458.8	3.9425	.0008
Within	49	18130.	370.00		
Total	58	31259.			

ω^2 = 42.0%

Strata	N	Mean	Variance	Std. Dev.
1	2	-1.5000	4.5000	2.1213
5	8	3.1250	35.268	5.9387
2→1	14	-30.071	680.07	26.078
5→4	9	4.0000	75.500	8.6891
4→2	4	-7.5000	169.67	13.026
3→1	4	-20.250	167.58	12.945
5→3	8	-.62500	226.84	15.061
5→2	6	-1.5000	604.30	24.583
5→1	3	-37.667	1406.3	37.501
4→1	1	8.0000	0.0000	0.0000

Scheffe Pairwise Comparison Results (α = .05):

Strata	Diff.	Signif.
1<2→1	28.571	.0548
1<5→1	36.167	.0448
5<2→1	33.196	.0003
5<3→1	23.375	.0528
5<5→1	40.792	.0029
2→1>5→4	-34.071	.0001
2→1>4→2	-22.571	.0438
2→1>5→3	-29.446	.0011
2→1>5→2	-28.571	.0037
5→4<3→1	24.250	.0411
5→4<5→1	41.667	.0021
4→2<5→1	30.167	.0454
5→3<5→1	37.042	.0065
5→2<5→1	36.167	.0106
5→1>4→1	-45.667	.0451

TABLE 3.14

ANALYSIS OF VARIANCE TABLE FOR THE 1960-1972 AGGREGATE NON-RESIDENTIAL LAND USE CHANGES STRATIFIED BY STATIC AND NON-STATIC RACIAL CLASSIFICATIONS

N = 59

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif.
Between	8	12805.	1600.6	2.9373	.0090
Within	50	27246.	544.93		
Total	58	40051.			

ω^2 = 31.97%

Strata	N	Mean	Variance	Std. Dev.
1	1	-3.0000	0.0000	0.0000
5	8	4.5000	36.857	6.0710
2→1	7	-19.714	238.24	15.435
5→4	9	5.0000	115.75	10.759
3→1	2	-12.000	578.00	24.042
5→3	8	6.7500	323.07	17.974
5→2	10	6.0000	1092.7	33.056
5→1	11	-21.455	762.67	27.617
4→1	3	-29.333	2166.3	46.544

Scheffe Pairwise Comparison Results (α = .05):

Strata	Diff.	Signif.
5<2→1	24.214	.0505
5<5→1	31.955	.0049
5<4→1	33.833	.0372
2→1>5→4	-24.214	.0407
2→1>5→3	-26.464	.0332
2→1>5→2	-25.714	.0299
5→4<5→1	32.455	.0032
5→4<4→1	34.333	.0320
5→3<5→1	34.205	.0027
5→3<4→1	36.083	.0267
5→2<5→1	33.455	.0019
5→2<4→1	35.333	.0257

It should be noted that those intervals which were found to differ significantly with change in racial composition were successively three, six, nine, and twelve year intervals all terminating with the year 1972. In each interval the overwhelming trend was for the number of non-residential land uses to: 1) decline in transitional areas at a rate proportional to that of racial transition, and 2) continually decline in established black and post-transitional areas.

Although the results of this analysis supports the central argument that an area experiencing racial transition also experiences a decline in the number of non-residential land uses, proportional to the degree and/or rate of transition, important information is lost by grouping all non-residential land uses together in the analysis. Therefore, to obtain a more definitive picture of the changing non-residential quality of the study area on a temporal basis, the spatial distributions of eleven classifications of non-residential land uses were determined for 1960, 1963, 1966, 1969, and 1972. This was accomplished by using the land use classifications, definitions and codings established by the Tulsa Metropolitan Area Planning Commission as the framework for reorganizing the land use data collected from the Bresser Cross-Index Directories. (See Appendix E.)

Table 3.15 lists the eleven classifications and gives: 1) the number of land uses in the total study area under each of the given classifications, and 2) the percent that number of land uses represents in relation to the total number of non-residential land uses for each of the observed time periods. The miscellaneous land use classification represents those non-residential concerns listed in the cross-index directories by name only that could not be identified as belong-

TABLE 3.15

1960-1972 NON-RESIDENTIAL LAND USES: QUANTITIES AND PERCENTAGES

Non-Residential Land Use Classifications	1960		1963		1966		1969		1972	
	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial	833	19.89	856	19.34	820	18.21	786	18.01	751	19.57
Business	2005	47.86	2279	51.49	2386	53.00	2325	53.29	1896	49.41
Wholesale	61	1.46	74	1.67	73	1.62	67	1.54	62	1.62
Non-Durable Mftg.	95	2.27	94	2.13	96	2.13	83	1.90	75	1.96
Durable Mftg.	252	6.01	206	4.66	203	4.51	149	3.41	131	3.41
Non-Manufacturing	262	6.25	221	4.99	251	5.58	235	5.39	228	5.94
Communications & Transportation	5	0.12	4	0.09	1	0.02	0	0.00	2	0.05
Public & Quasi-Public	191	4.56	225	5.08	238	5.29	245	5.62	250	6.52
Recreation	5	0.12	5	0.11	5	0.11	6	0.14	6	0.16
Hotel	7	0.17	7	0.16	9	0.20	7	0.16	7	0.18
Miscellaneous	473	11.29	455	10.28	420	9.33	460	10.54	429	11.18
Total	4189	100.00	4426	100.00	4502	100.00	4363	100.00	3837	100.00

ing to any of the other ten classifications.

An overview of the changing non-residential quality of the total study area between the years 1960 and 1972, at three year intervals, is presented in Table 3.15. While this table illustrates the non-residential land use classification trends for the total study area, very little or nothing can be said about the significance of these trends or of the classifications since there is no basis for comparison. Therefore, using the five racial classifications as that basis, the following analysis of variance model was used to test the overall significance of partitioning the non-residential land uses into the ten classifications:[1]

Equation 3.4

$$(\text{Number of Land Uses})_{ijk} = [\mu + Yr_i + LUT_j + Class_k + LUT_j Class_k + Yr_i Class_k + \beta(APV)_{ijk} + \epsilon_{ijk}]$$

where:

Yr_i - is the observed year i, i=1-5

LUT_j - is the land use type j, j=1-10

$Class_k$ - is the racial classification k, k=1-5

APV_{ijk} - is the assessed property value covariate for year i, land use type j, and racial classification k.

The results of the analysis revealed information not obtainable from the data as presented in Table 3.15. While it is apparent from this table that there are substantial differences between the land use classifications for any given observation period, in relation to the total study area, this data is given more meaning and depth when stra-

[1]The communication and transportation classification was dropped from the analysis because of its small number of establishments in the study area.

tified by race and analyzed. From this form of analysis, the results of which are presented in Table 3.16, it is clear that there are significant interactions between land use and racial classifications, and that this significance exists both temporally and spatially.

TABLE 3.16

ANALYSIS OF VARIANCE TABLE FOR THE NUMBER OF NON-RESIDENTIAL LAND USE ESTABLISHMENTS STRATIFIED BY YEAR, LAND USE TYPE AND RACIAL CLASSIFICATION

$\alpha = .05$

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif
Classifications	3	7166.57920	2388.8597	12.5851	Yes
Land Use Types	8	258504.656	32313.082	170.233	Yes
Year	4	1946.41475	486.60369	2.56354	Yes
LUT-Class	35	29389.0217	839.68634	4.42366	Yes
Yr-Class	16	6289.87888	393.11743	2.07103	Yes
APV (covariate)	1	176.694884	176.69488	0.93087	No
Error	2505	475491.881	189.81712		

Based on the above findings it can be generally concluded that even after the aggregate non-residential land uses are partitioned, the extent of racial transition still appears to be an important variable in the changing non-residential infrastructure of residential areas. As a result, various processes are beginning to materialize which may explain the relationship between racial transition and the viability of a residential area's non-residential infrastructure. These processes will be examined and discussed in more detail in the following chapters.

CHAPTER FOUR

INTERRELATIONSHIP OF LAND USE, RACE AND PROPERTY VALUES: DETROIT, MICHIGAN 1960-1972

Spatial and Temporal Relationships of Selected Land Uses with Race

In Chapter II the argument that changes in non-residential land uses are related to fluctuations in residential property values was presented. Specifically, it is hypothesized that residential areas which are experiencing a racial change in occupants are simultaneously experiencing a significant change in non-residential land uses which is causing the transitional area's non-residential infrastructure to collapse. Therefore, in order to create a viable framework in which the above hypothesis can best be tested and to obtain a better picture of the processes taking place, six commercial activity centers in Northwest Detroit were identified and compared in relation to their changing racial compositions and non-residential land use patterns.

The six commercial activity centers are geographically located in Figure 4.1. In addition to their locations being readily accessible by major thoroughfares, all of the centers are within a four mile radius of Northland Shopping Center. Northland, located adjacent to the study site in Southfield, Michigan, is one of the nation's largest shopping centers and, as such, is an externality which has impacted significantly upon the non-residential structure of Northwest Detroit.

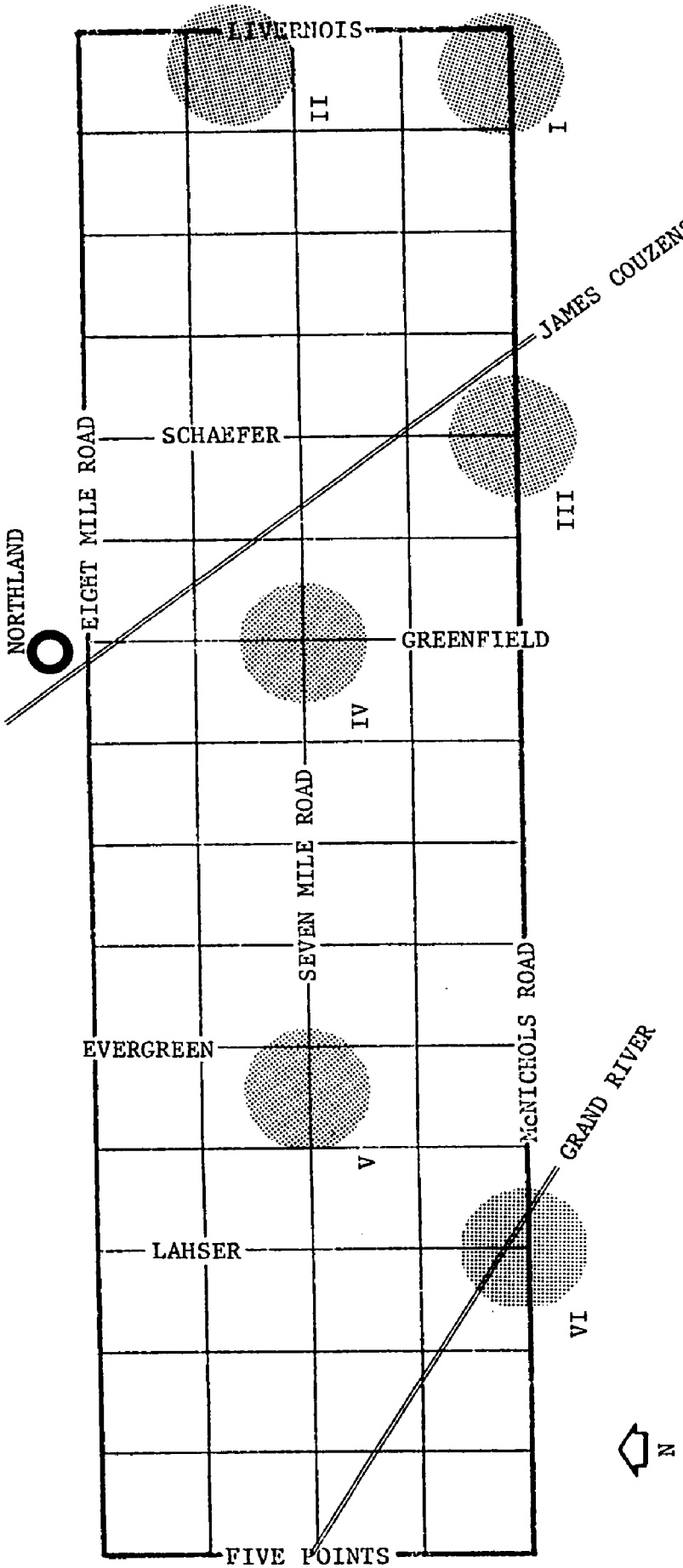


FIGURE 4.1

GEOGRAPHICAL LOCATION OF SELECTED COMMERCIAL ACTIVITY CENTERS
IN NORTHWEST DETROIT

From its beginning, Northland with its eighty-five acres of parking was a retailer's dream. In its first year, 1954, the center's ninety-five stores grossed seventy-million dollars. By 1973, with 138 stores, its volume had increased to a record $183 million. Beyond Northland's retail facilities, the land around its perimeters house highrise office buildings, apartments, theaters, churches, a hospital and even a funeral home; but most of all, there are offices. Southfield's office space increased from 230,000 square feet in 1955 to nearly 10.8 million in 1974. However, the full impact of Northland was not realized until 1970 when Southfield became the population center for metropolitan Detroit. (Hume, 1974)

Based on these facts, it is apparent that Northland is not only impacting upon the study area but the entire City of Detroit as well. Therefore, to more accurately depict the processes taking place, the changing non-residential land use patterns within the six commercial activity centers for the 1963-1966 time period were compared to similar changes in both the total study area and the City of Detroit. (See Table 4.1.) Unfortunately, due to the limited availability of information on the non-residential land uses for the City of Detroit, only three land use classifications were obtainable for comparing: commercial, business and manufacturers.[1] To these three classifications, the public and quasi-public land use classification was added. The decision to add this fourth classification was based on the statistical results obtained from the following model:

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[1]The manufacturers classification represents both the durable and non-durable manufacturers as presented in the present study. (See Appendix E.)

TABLE 4.1

SELECTED 1963-1966[1] NON-RESIDENTIAL LAND USE CHANGES (PERCENTAGES) FOR THE TOTAL STUDY AREA, SELECTED NORTHWEST DETROIT COMMERCIAL ACTIVITY CENTERS AND THE CITY OF DETROIT

	Racial Classif. 1963/ Racial Classif. 1966	Business	Commercial	Manufactures	Public
CENTER I McNichols-Livernois	Post-Transitional/ Established Black	+4.15	-13.10	+25.00	0.00
CENTER II Livernois-Seven Mile	Post-Transitional/ Established Black	+8.33	-4.76	0.00	+20.00
CENTER III McNichols-Schaefer	Post-Transitional/ Post-Transitional	+4.80	-4.69	-2.50	+27.78
CENTER IV Seven Mile-Greenfield	Established White/ Post-Transitional	+1.65	-10.14	-8.11	+16.67
CENTER V Seven Mile-Evergreen	Established White/ Established White	-9.80	0.00	0.00	+18.18
CENTER VI McNichols-Lahser	Established White/ Established White	+21.30	-9.09	+33.33	+7.69
STUDY AREA Northwest Detroit		+4.77	-4.21	-0.33	+5.78
CITY OF DETROIT		-15.27	-18.40	-12.55	NA

The sources for the City of Detroit data are the U.S. Bureau of the Census, Census of Business -- Retail Trade Area Statistics and Selected Services Area Statistics: 1963 and 1967; and the Census of Manufactures: 1963 and 1967. Although the observed time periods are not exactly the same between the

Equation 4.1

$$(\%\ \text{Land Use Types})_{ijk} = [\mu + Yr_i + Class_j + \beta(APV)_{ij} + \varepsilon_{ij}]_k$$

Yr_i - is the observed year i, i=1-5

$Class_j$ - is the racial classification j, j=1-5

$(APV)_{ij}$ - is the assessed property value covariate for year i, and racial classification j

k - is the land use type k, k=1-10

The principal purpose of the above model was to determine the sensitivity of the shifts occurring within the study quadrats -- in relation to the proportion of non-residential land use types found in one quadrat relative to another -- to racial and temporal changes. The results of the model (see Appendix F) revealed that of the ten land use types analyzed those which were found to be significant were more sensitive to racial rather than temporal changes. Hence, these findings support the argument that it is racial composition and not time which is accountable for the distribution of non-residential land use in Northwest Detroit. Furthermore, it was observed from the results of the model that of the three land use types found to be significant (i.e., business, manufactures, and public and quasi-public) the public and quasi-public land use type was the most sensitive to the area's changing racial composition. Given these findings, it was felt that the inclusion of this classification in the analysis would provide

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study area data and the City of Detroit data, the difference is perceived as small enough to be negligible.

The City of Detroit figure under the business classification includes the total number of gasoline service stations which is classified under retail trade in the census area statistics. This total number of establishments was subtracted from the retail trade census classification and added to the business services classification to adjust for the present study's non-residential land use classifications.

valuable insights even though the 1963 and 1966 public land use information for the City of Detroit, which would enable more definite comparisons to be made, was not obtainable.

Refocusing on the six commercial activity centers, it is important to note that each of the centers is what Berry (1959) describes as ribbons of commercial activities with little if any functional interlinkage. The only real thing that the centers have in common is the changing racial composition of the residential area in which they are located -- with the exception of commercial center VI (the control) whose surrounding residential area remains all white.

During the 1963-1966 time period, it is clearly visible in Table 4.1 that the City of Detroit was declining in business, commercial and manufacturing land uses. The city's decline in these three land uses was on the average 15.41 percent compared to average increases of 0.23 percent for the total study area and 15.18 percent for commercial activity center VI, the white control. While the white control area was found to be increasing at about the same rate the City of Detroit was decreasing, this was not the case in relation to any of the other observed commercial activity centers which averaged about the same level of change as the total study area. From these initial comparisons in which the three land use classifications (i.e., business, commercial and manufacturing) are grouped together, it is observable that the non-residential structure of white residential areas in Northwest Detroit are not only surviving but thriving in the face of substantial losses to the city.

To obtain a more detailed picture of the pattern of non-residential land use changes within the study area, the selected land use

classifications were examined individually and comparisons were made between the six observed commercial activity centers, the study area as a whole and the City of Detroit. Based on this analysis, it was found that the City of Detroit between 1963 and 1966 experienced a 15.27 percent decrease in business services as compared to a 4.77 percent increase for the study area and a 21.30 percent increase for the all white control (Center VI). Although the general trend for business services has been to move out of the cities and gravitate toward the suburbs and the city's edges, the present study exhibits some noteworthy variations of this trend. Specifically, although the study area is located on the city's edge and is undoubtedly receiving some of the city's existing business services, the white control commercial activity center is receiving a substantially larger percentage of these business services than the remaining centers. In addition, from Table 4.1 it can be seen that the only commercial activity center that experienced a decrease in business services was Center V (Seven Mile-Evergreen) whose residential area is adjacent to the white control area and, also, on the verge of experiencing a racial change in occupants. Although there is not factual evidence to support the following contention, the author believes that some of the business services that left Center V relocated in Center VI (the control) thus accounting for its substantial increase. This relocation of services is believed to have been caused by the businesses perceived unwanted racial change in clientele.

In relation to the commercial classification during the 1963-1966 time period, due to such externalities as Northland Shopping Center, all of the observed commercial centers (with the exception of Center V which experienced no change) and the City of Detroit are declining in

commercial establishments. But, it is important to note that the study area's level of decline (4.21 percent) was moderate compared to the city's (18.40 percent). This in itself points out the potential commercial viability of the study area in the face of such detrimental externalities as Northland.

The study area and the City of Detroit exhibit a considerable difference in the amount of change they experienced in relation to manufacturing establishments. Compared to the city's 12.55 percent decrease in manufacturers, the study area experienced less than a one percent decrease (0.33 percent). But when the focus is turned to the observed commercial activity centers within the study site, the fact that the established areas -- both black and white -- are the locations of sizable increases in manufacturing establishments becomes very noticeable. However, when public land use changes are compared to manufacturing land use changes we find just the opposite situation: while manufacturing establishments increase substantially in racially established areas and not in racially transitional areas, public land use establishments substantially increase in racially transitional areas and not in racially established areas. No conclusions will be drawn at this point in relation to this observed non-residential process until further comparisons are made. But, the author's first inclination is to interpret these findings as indicating that racially transitional areas tend to attract public and quasi-public land uses which function as a replacement for their declining manufacturing establishments.

Based on the assumption that the percent of land use changes observed in Table 4.1 for the 1963-1966 time period is representative of

TABLE 4.2

SELECTED 1960-1972 NON-RESIDENTIAL LAND USE CHANGES (PERCENTAGES) FOR THE TOTAL STUDY AREA AND SELECTED NORTHWEST DETROIT COMMERCIAL ACTIVITY CENTERS

	Racial Classif. 1960/ Racial Classif. 1972	Business	Commercial	Manufactures	Public
CENTER I McNichols-Livernois	Pre-Transitional/ Established Black	-27.23	-21.35	-81.25	+114.29
CENTER II Livernois-Seven Mile	Post-Transitional/ Established Black	-20.45	-22.43	-56.00	-10.00
CENTER III McNichols-Schaefer	Established White/ Established Black	-24.54	+9.26	-47.17	+230.00
CENTER IV Seven Mile-Greenfield	Established White/ Post-Transitional	-30.17	-42.42	-29.27	+30.00
CENTER V Seven Mile-Evergreen	Established White/ Transitional	+11.54	-12.33	+16.67	-9.09
CENTER VI McNichols-Lahser	Established White/ Established White	+27.27	-11.76	+54.55	+27.27
STUDY AREA Northwest Detroit		-5.44	-9.84	-40.63	+30.89

the land use trends for the City of Detroit over the 1960-1972 time period, Table 4.2 provides additional insights into the non-residential processes taking place. While the City of Detroit is still perceived as substantially declining in all three land use classifications (i.e., business, commercial and manufacturing) over the observed twelve year time period, Table 4.2 illustrates the same non-residential processes exhibited in the three year interval observation with two basic exceptions. First, instead of the study area increasing in business services as observed in the three year period, during the twelve year period there is an overall 5.44 percent decrease in business services for the study area as a whole. Although the residential areas with predominately white populations continued to increase during this period, the decrease in business services for the study area as a whole was created by the substantial decreases experienced in residential areas with sizable black populations. Second, during 1963 to 1966 it was observed that the established white and black residential areas were the only areas within the study site increasing in manufacturing establishments, but when viewed over the twelve year period (1960-1972) it appears that the increase in the established black residential area was only temporary. Based on these findings, contrary to those during the three year observation period, it is now concluded that the established white areas are the only residential areas within Northwest Detroit where manufacturing establishments are increasing.

Due to the comparisons made from Table 4.1 and 4.2, it can be seen that there are some very dynamic processes taking place in relation to changing non-residential land uses and racial composition.

But, it should be obvious to the reader at this point that two different methods of examining the interrelationship between these two variables have been employed in the present dtudy: the method which focused on the absolute number of establishments and the method which focused on the percent of establishments. Although each has its own shortcoming, both provided a valuable as well as different means of examining the changing state of non-residential land uses in Northwest Detroit. To illustrate the significance of both methods, in light of the present study, a hypothetical case is presented: if for a given time period and land use a significant change in the total number of business establishments occurred but the change, whether a decline or increase, was evenly distributed over the total study area resulting in the same percentage distribution in each study quadrat, then the percentage method would not indicate any change but a significant change would have occurred. Thus, when looking at the percentage only, one does not take into account any change in the level of businesses but rather a shift within the region of the proportion of establishments found in one location relative to another. However, when looking at the absolute numbers one is taking that kind of change into account. This explains why both methods should be used to obtain a total picture of the changing non-residential situation, which is the case in the following section where both methods are used to test the accuracy of the hypothesized causal relationships between race, land use and property values.

Changing Property Values and the Interrelationship of Race and Land Uses: Path Analysis

In Chapter III it was shown that the overall changes in the non-residential quality of the study area is significantly correlated with its changing racial composition. In addition, in the preceding analyses it was further shown that even after the land use data is partitioned there still exists significant relationships between selected land use classifications and changes in the temporal distribution of racial composition. While these results lend support to the hypothesized relationship between the two variables, nothing significant to this point has been established as to their direct and indirect effects in causing fluctuations in residential property values over time. Consequently, it remains to be seen if the pattern of correlations between the selected combination of land use classifications from the preceding analysis (i.e., commercial, business, manufacturers and public) and the study area's changing racial composition are consistent with the theory and hypotheses presented in the present study.

The theories on race and property values were presented in Chapter II. Briefly, the original theory viewed the entry of black households into previously all white residential areas as a detriment to the area's property values. Although the subsequent theories attempted to qualify or disprove this original view, the "property value myth" still persists. Consequently, it is the contention of this study that the longevity of the myth is due to the preoccupation of research efforts with examining the supposed relationship between the two variables (i.e., race and property values) rather than the dynamics of the

situation.

The dynamics referred to here relate to the other changes that occur in residential areas experiencing a racial change in occupants -- specifically, non-residential land use changes. This type of change takes the form of vacancies, boarded-up stores and the undesirable turnover of business locations which presents a blighting influence on the area. Therefore, the following theory on the processes occurring in racially transitional areas, in relation to residential and non-residential property values, is presented here in lieu of obsolete theories.

The initial entry of black households into previously all white residential areas in some cases cause panic to set in among the white occupants. Such panic when it occurs generally results in residential property values temporarily declining. Thus, panic and the principle cause of that panic, racism, are seen as the chief culprits of depressed property values in transitional areas. For a short period of time after panic sets in, the white homeowners compete with one another on arriving at selling prices in their desire to vacate. During this period selling prices tend to fluctuate between a normal and somewhat lower level for the area. However, when the panic ceases and most of the properties put up for sale during this initial entry period have been sold, then prices begin to increase until the property values reach a normal or substantially higher level than that prior to black entry. This new level then prevails and future increases are more or less dependent upon the general rise of prices in the rest of the city. It is important to note that when the above mentioned panic occurs, it transcends residential limits and significantly impacts

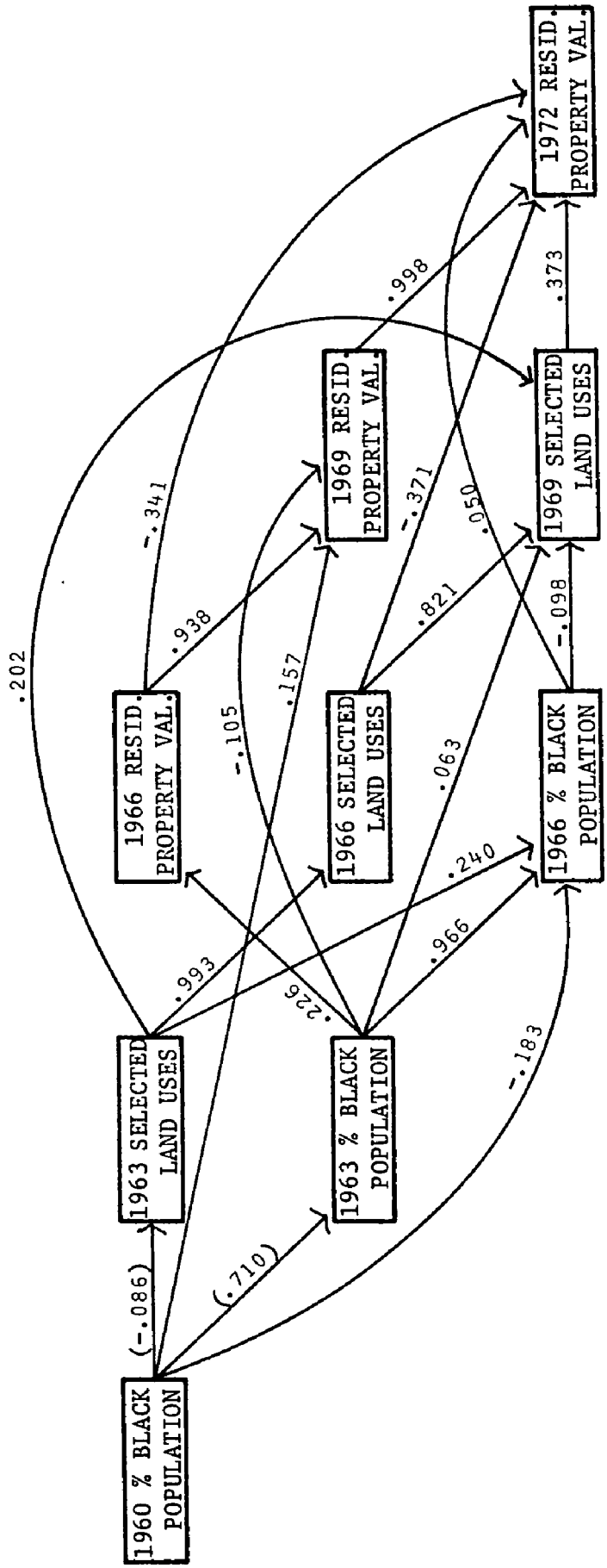
upon the non-residential land use structure of the transitional area.

Some of the specific processes that occur in relation to changes in non-residential land uses and racial composition have been discussed in Chapter III and the first section of the present chapter. Hence, it does not bear repeating at this point. The point to be made here is that changes in non-residential land uses respond considerably slower to racial change than do changes in residential occupancy. But when it does respond, the extent of its response relates directly to decreases in residential property values and the viability of the area's non-residential infrastructure. Unfortunately, the decay of the transitional area's non-residential infrastructure continues beyond the panic phase of black entry and can only be stopped when adequate business capital is put into the area to replace that which was lost due to: 1) the racist response of business establishments in leaving racially transitional areas, and 2) the response of business establishments to the automobile age which tend to make larger stores need big parking lots and which generally means they must abandon the cities for the suburbs to meet their needs.

Given these theoretical formulations and the previously discussed theories and hypotheses, we can now turn to the testing of the present study's theory on the interrelationship of race, land uses and property values. Path analysis, an important analytic tool for theory testing, will be used to determine whether or not the relations in the data are consistent with the theory presented in the present study.[1] Figure 4.2 presents the path diagram which displays graphically the pattern of

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[1]See Kerlinger and Pedhazur (1973), Land (1969) and Heise (1969) for a discussion of path analysis and path diagrams.



Numbers in parentheses indicate correlation coefficients.
Other numbers are path coefficients.

FIGURE 4.2

PATH DIAGRAM: RACE, SELECTED LAND USES AND RESIDENTIAL PROPERTY VALUES

causal relations among the study's variables after zero path correlations were deleted. In the figure, the pattern of correlations in the data is consistent with the more parsimonious model. The principle utility of path analysis is that it provides a means of working out certain implications of a hypothetical causal model within the constraints imposed by cross-sectional data. To be sure, it cannot be employed to either prove or disprove the validity of the causal model postulated, rather it is used to determine whether the causal structure specified is consistent with the data.

Initially, two causal models were constructed to test the present study's theory on the causal interrelationship of race, land uses and residential property values. Both models were graphically similar to the path diagram which appears in Figure 4.2. The difference in the two models was in the measurement of the selected land use variables which in one model presented the variable as the absolute number of establishments while in the other as the percent of establishments. As pointed out earlier, both measurments on the land use variables have provided different but equally valuable insights in previous analyses and consequently, to be consistent, both were analyzed using path analysis. However, as anticipated, the two models produced identical results which are therefore presented in one path diagram, Figure 4.2. Hence, the selected land use variables which appear in Figure 4.2 and which represent an aggregate of commercial, business, manufacturing and public land uses is representative of changes in both the absolute number and percent of establishments in Northwest Detroit.

The single-headed arrows in Figure 4.2 indicate hypothesized causal relationships between variables, also known as causal "paths."

Each variable in the system is viewed as being causally determined by each of the causally prior variables connected to it by a path arrow, and by other variables not specifically included in the model (e.g., income, effects of real estate promotion, obsolescence resulting from physical deterioration, and changes in routes and forms of transportation). The causal logic of the model starts with one variable or set of variables (termed "exogenous") whose determinants remain unanalyzed. All the remaining variables (termed "endogenous") are considered as being caused by the exogenous variables and/or by other variables in the system.

The path diagram displayed in Figure 4.2 postulates that the 1960 percent black population is causally prior to all other variables. Therefore, it operates as the catalyst to changes in non-residential land uses and residential property values. Next, the non-residential land use variable is considered to be causally prior to residential property values, thus creating a three variable chain. To this basic three variable causal chain, spanning a six year time period at three year intervals, two additional three variable chains were added. The subsequent temporal ordering of these chains (Figure 4.2) spanned the complete twelve year time period and provided a clear graphical representation of the causal structure being tested.

Table 4.3 provides a summary of the hypothesized and obtained causal relationships between the temporally ordered variables in the path diagram presented in Figure 4.2. The hypothesized direction of each causal relationship is indicated by a sign (+, 0, -). In some instances a compound sign (0/+ or 0/-) is given to represent the expectation of a weak relationship in the direction of the sign following

TABLE 4.3

SUMMARY OF HYPOTHESIZED AND OBTAINED RELATIONSHIPS (PATH COEFFICIENTS) AMONG TEMPORAL DISTRIBUTIONS OF RACE, LAND USES, AND RESIDENTIAL PROPERTY VALUES, BY NUMBER AND PERCENT OF LAND USES (STANDARIZED DATA)

Dependent Variable / Independent Var.	Number of Land Uses (Minimum N=59) / Percent of Land Uses (Minimum N=56) Hypoth.	Result
A. 1963 Land Uses with:		
1. 1960 Percent Black	-	-.09
Multiple R[a]	.09	
B. 1963 Percent Black with:		
2. 1960 Percent Black	+	.71*
Multiple R	.71	
C. 1966 Residential Property Values with:		
3. 1960 Percent Black	-	-.14
4. 1963 Land Uses	0/-	-.04
5. 1963 Percent Black	+	.33+
Multiple R	.25	
D. 1966 Land Uses with:		
6. 1960 Percent Black	0	.01
7. 1963 Land Uses	+	.99*
8. 1963 Percent Black	-	-.02
Multiple R	.99	
E. 1966 Percent Black with:		
9. 1960 Percent Black	-	-.18*
10. 1963 Land Uses	+	.24*
11. 1963 Percent Black	+	.97*
Multiple R	.92	

Those coefficients which violate the predication are underlined.

[a] Multiple R for regression equation of dependent variable on independent variable, presumed to be causally related to it.

TABLE 4.3 (continued)

Dependent Variable / Independent Var.	Number of Land Uses (Minimum N=59) / Percent of Land Uses (Minimum N=56) Hypoth.	Result
F. 1969 Residential Property Values with:		
12. 1960 Percent Black	+	.20*
13. 1963 Land Uses	-	-.28
14. 1963 Percent Black	-	-.21+
15. 1966 Resid. Prop. Val.	+	.93*
16. 1966 Land Uses	+	.37
17. 1966 Percent Black	+	.08
Multiple R		.94
G. 1969 Land Uses with:		
18. 1960 Percent Black	0	.01
19. 1963 Land Uses	+	.21+
20. 1963 Percent Black	0	.05+
21. 1966 Resid. Prop. Val.	0	.01
22. 1966 Land Uses	+	.81*
23. 1966 Percent Black	-	-.10*
Multiple R		.99
H. 1972 Residential Property Values with:		
24. 1960 Percent Black	0/+	.02
25. 1963 Land Uses	0/-	-.07
26. 1963 Percent Black	0/+	-.04
27. 1966 Resid. Prop. Val.	-	-.32*
28. 1966 Land Uses	-	-.32*
29. 1966 Percent Black	+	.07+
30. 1969 Resid. Prop. Val.	+	1.07*
31. 1969 Land Uses	+	.39*
Multiple R		.99

* Standardized regression coefficient twice its standard error.

+ Standardized regression coefficient greater than its standard error.

the slash. However, as can be seen in Table 4.3, while not all of the predictions were confirmed by the present study's data, the majority of them were. In addition, of the two predictions that were not confirmed, one was a very close decision and, nevertheless, turned out to be a zero-order correlation. Therefore, rather than review the predictions that were confirmed -- indicating overwhelmingly that the causal structure specified is consistent with the data -- we now turn to an examination of the two specific predictions which were not confirmed and the rationale for their obtained results.

First, the 1963 percent black population was predicted to be unrelated (0) to 1969 land uses. The rationale was that the number of non-residential land uses would not be affected by the early phases of black entry. But, the obtained result indicated that this rationale does not hold true with the present data and that a significant positive causal relationship does exist between the two variables. Based on this result, a close examination of the actual changes that occurred in non-residential land uses between 1963 and 1969 was made in relation to the study area's changing racial composition for the same period. From this examination it was observed that there were some increases in business services (e.g., retail trade -- eating and drinking places, and apparel and accessory sales) that related directly to changing racial composition. Therefore, a partial reformulation of the perceived relationship between changes in land uses and racial composition is warranted in light of these findings emerging from the data. It would now appear that the initial phase of black entry attracts various racially oriented non-residential land use establishments to meet the needs not fulfilled by the existing non-residential structure.

Second, the 1963 percent black population was expected to have a weak positive causal relationship (0/+) with 1972 residential property values. The rationale for this hypothesized result was: 1) that the nine year period between the two variables presented a time barrier too great to allow a strong causal relationship to exist, and 2) that the panic among the white residents of the 1963 transitional area would have subsided long before 1972 resulting in residential property values being on the increase. Although the obtained result supported the prediction of a weak causal relationship, the direction of the relationship was found to be negative rather than positive as predicted. This slight deviation from the expected result can be attributed to the fact that the initial dwelling units purchased by the first sizable wave of entering black household were probably of lesser quality as compared to the other units in the area, thus, accounting for the negative direction of the weak causal relationship.

We now turn to a notable advantage of path analysis as a tool for decomposing correlations. An important application of path analysis, in the interpretation of causal systems, is the analysis of a correlation into its components. Within a given causal model it is possible to determine what part of a correlation between two variables is due to the direct effect of a cause and what part is due to indirect effects. It is also at times useful to decompose a correlation into a direct effect and total indirect effects (TIE). From these decomposed effects, it is then possible to study the magnitude of each of the components and discern the roles they play in the system. Table 4.4 presents the decomposed correlations for the Path Diagram (Figure 4.2).

TABLE 4.4

DECOMPOSED CORRELATIONS OF TEMPORAL DISTRIBUTIONS OF RACE, LAND USES AND RESIDENTIAL PROPERTY VALUES, BY GIVEN VARIABLE FOR THE NUMBER AND PERCENT OF LAND USES (STANDARDIZED DATA)

Dependent Variable Effects	Variables (Minimum N=56)	
	1960	
1966 Percent Black	% Black	
Gross Correlation	.48	
Total Net Effect[a]	.49	
Direct Effect	-.18	
Indirect Effect Through:[b]		
1963 Percent Black	.69	
1963 Land Uses	-.02	
TIE[c]	.67	
	1963	1963
1969 Land Uses	% Black	Land Uses
Gross Correlation	.06	.99
Total Net Effect[a]	.04	.99
Direct Effect	.06	.20
Indirect Effect Through:[b]		
1966 Percent Black	-.02	-.02
1966 Land Uses	NA	.82
TIE[c]	-.02	.80
	1960	1963
1969 Resid. Property Values	% Black	% Black
Gross Correlation	.17	.21
Total Net Effect[a]	.24	.11
Direct Effect	.16	-.10
Indirect Effect Through:[b]		
1963 Percent Black	-.07	NA
1963 Percent Black & 1966 Resid. Property Values	.15	NA
1966 Resid. Property Values	NA	.21
TIE[c]	.08	.21

[a] The total net effect (direct plus indirect) does not equal the overall correlation due to the omission of effects through the other variables, and due to rounding errors.

[b] These are estimates of indirect effects of the given variable through each intervening variable as it acts on each dependent variable (three and four variable chains).

TABLE 4.4 (continued)

Dependent Variable Effects	Variable (Minimum N=56)		
1972 Resid. Property Values	1966 % Black	1966 Land Uses	1966 Prop. Val.
Gross Correlation	.27	.10	.87
Total Net Effect[a]	.01	-.06	.60
Direct Effect	.05	-.37	-.34
Indirect Effects Through:[b]			
1969 Land Uses	-.04	.31	NA
1969 Resid. Property Values	NA	NA	.94
TIE[c]	-.04	.31	.94

[c] TIE = Total indirect effects through the intervening variables.

NA - Not applicable

While the decomposed correlations in Table 4.4 can provide insights into causal relationships that may have been masked to this point, in the present case they only serve to confirm the theory specified in relation to changes in race, land uses and residential property values as consistent with the present study's data. Specifically, it is observable that the long range (three or more years) direct effect of black entry has a positive influence on residential property values and that the only deviation from this predicted causal relationship occurred between 1963 and 1969. The positive direct effect detween the 1963 percent black population and the 1966 residential property values (see Table 4.3) indicate that the black entry that occurred in 1963 caused property values to increase rather than decrease. Consequently, the cause of the observed negative direct effect between the 1963 percent black population and the 1969 residential property values (see Table 4.4) must have occurred between 1966 and 1969 -- the time of the Detroit civil disturbance. Based on this observation, it is believed by the author that during or after the Detroit civil disturbance some of the white homeowners that remained in the residential area(s) entered by black households in 1963 panicked and sold their homes in a desire to vacate -- resulting in a decline in property values for the area.

The impact of Detroit's civil disturbance can also be seen in the decomposed correlations between non-residential land uses and residential property values. Although there is a strong negative direct effect between the 1966 non-residential land uses and the 1972 residential property values, the positive indirect effect of the intermediate 1969 non-residential land uses almost offsets the negative causal re-

lation between the two variables. The indirect effect is undoubtedly due, in part, to the establishments that moved out of the civil disturbance area and relocated in Northwest Detroit. But it is important to note that although the non-residential structure of Northwest Detroit did receive some positive reinforcement during this period (1966-1972) it was not enough to alter the negative causal relation between changes in non-residential land uses and residential property values. Therefore, based on the decomposed correlations of Table 4.4 and the minor deviations which occurred as a result of the Detroit civil disturbance of the mid-sixties (which was not fully taken into account in the present study), it is concluded that the pattern of correlations between the selected combination of land use classifications and the study area's changing racial composition are consistent with the theory and hypotheses presented in the present study in relation to fluctuations in residential property values.

Summary of Analysis

In the preceding analysis the changes in selected non-residential land uses (i.e., commercial, business, manufacturing and public) and the percent of black population were examined in relation to their direct and indirect causal effects on changes in residential property values. Based on the present study's theory on the interrelationship of these three variables, path analysis was used to determine whether or not the relations in the data are consistent with the theory. The analysis was initially performed with two causal models representing different variations on the non-residential land use variable: absolute number of establishments and percent of establishments. However,

the two causal models produced identical results and therefore these results are presented in one path diagram which is sensitive to changes in both the absolute number and percent of business establishments in Northwest Detroit.

The results of the path analysis supports the present study's theory on the interrelationship of race, land uses and residential property values in racially transitional residential/commercial areas. In addition, the earlier analysis in this chapter revealed that declines in non-residential land uses are due predominately to two types of responses: a response to the automobile age and a racist response. And, that while both responses were found to be very important in accounting for non-residential land use declines, the racist response was observed as having more significance in the present study. Therefore, it is concluded that racism is the principle cause of the observed interrelationship between changes in race, non-residential land uses and residential property values in the present study.

CHAPTER FIVE

CONCLUSIONS

Summary of Findings

The statistical findings in this study revealed that black entry into previously all white neighborhoods is more often associated with an elevation or stabilization of residential property values than with decreases. These findings are in accord with present day theories on race and property values (Laurenti, 1960; and Schietinger, 1964) and, as such, do not represent a new found addition to the existing literature. But, it is important to note that the bulk of the research efforts which form the basis of present day theories on the interrelationship of race and property values are statistically weak. However, the present study's data are sufficient enough to statistically support their conclusions (see Chapter III). Thus, the results of this study places what these researchers have expressed in the literature on a much firmer basis. But, in the author's opinion, this support in itself is not sufficient enough to warrant a research effort of this type.

The true value of the present study lies in the acknowledgement of the fact that the factor of race is only one of many that affect residential property values, and that quite often it may not be the most important one. Hence, as the present study has shown, the more significant finding is that changes in the non-residential structure of a residential area experiencing a racial change in occupants is

more causally related with declines in residential property values than changes in its racial composition. Consequently, when the process of succession is examined in relation to changes in non-residential land uses in racially transitional areas, it appears to be an abandonment rather than a succession. This can be seen in the total number of business establishments that decreased in the study area, resulting in empty and boarded-up stores.

Initially, Northwest Detroit was an area that was well equipped with a non-residential infrastructure of necessary activities, but now that these activities are declining, the transitional group (i.e., black people) has to go further for services, clothing and groceries than the white people that originally lived in the area or people living in any area with a viable non-residential infrastructure. This means that the money which is being spent by the black residents of Northwest Detroit -- which is adequate to support ten to twelve small to moderate size shopping centers, including allowance for existing competition (Commercial Land Utilization Study, 1974) -- is flowing out of the area, to its own detriment.

Observers of this process may say that this is part of the change that is occuring in all urban cities and that it is not racial factors causing these new non-residential trends of locating the larger businesses (i.e., supermarkets, shopping centers, etc.) outside of the cities. Take, for example, what is happening to the supermarkets which are closing up and reopening in remote areas, placing a greater burden on the consumer to travel longer distances to get commodities. This is a loss of quality in community life style that is not necessarily associated with race. However, the present study has shown

that the relocation of these establishments is highly correlated with race (see Chapter IV). The white residential areas within the study site are benefitting substantially from the relocation of commercial and service establishments compared to black residential areas within the site. Specifically, while white residential areas are experiencing absolute increases in their number of non-residential establishments, the overwhelming trend is for the number of non-residential establishments to decline in transitional areas at a rate proportional to that of racial transition. Once the area reaches the established black stage of racial transition, the rate of decline decreased but at this point the area is already identified as having a non-viable commercial structure, thus, lowering the residential desirability of the area.

Therefore, in evaluating these findings, it would seem sufficient to conclude that: 1) they are at variance with the "primitive" belief that black entry causes a decline in residential property values and, consequently, disproves the property value myth; and 2) they present a new area of interest for urban planners and economists concerned with residential property values in racially transitional areas -- the viability of the transitional area's non-residential infrastructure.

Recommendations and Planning Implications

For urban planners and economists, the viability of the different areas within the urban complex presents an unavoidable challenge. While the larger areas (e.g., central business districts have received a great deal of attention and assistance in establishing a viable state, the smaller areas within the urban mass (e.g., ghettos) have

suffered tremendously -- as the findings in the present study demonstrates. Therefore, if the total urban complex is to survive, additional consideration and assistance must be given to these smaller areas. It is doubtful, however, that an adequate solution to the overall problem of creating a viable state within the racially transitional residential/commercial areas of the urban mass can be attained unless a shift of emphasis, from a planning point of view, is made. Specifically, planners must cease worrying about fluctuations in property values in racially transitional residential areas and begin worrying and doing something about maintaining the transitional area's non-residential infrastructure.

The present study's data suggest to the author that one of the problems in the black ghetto is that its non-residential infrastructure has collapsed -- as Watts, Detroit and other such places indicate -- and that this is what makes these kinds of communities, in part, such dismal places to live. It is the unwillingness of the white businesses to stay and continue the area's non-residential activity in the face of racial residential succession that has contributed to the collapse of the area's infrastructure. This unwillingness can also be attributed, to a significant degree, to racism. Therefore, while the planners have been examining and reexamining the impact that a racial change in residential occupancy might have on property values, the real problem has been the unsuccessful non-residential transition from white to black owned establishments, resulting in the collapse of the area's non-residential infrastructure. Hence, the resultant massive numbers of empty store fronts tend to not only overwhelm the residents, but act as an albatross hanging around the community's

neck, symbolic of its progressive state of decay. Some people may feel that this is the nature of the ghetto, but the author refuses to accept this sentiment for there are viable ghettos.

Viable ghettos are communities that have successfully made the transition, not only in residential occupancy but non-residential establishments. These ghettos have many successful businesses, in good shape, physically and financially. For example, the Italian district of Boston, Massachusetts, provides an excellent case in point of a viable ghetto that has successfully made the transition in the residential and non-residential segments of the area. To a large extent the area's overall viability is due to its non-residential structure which affords its residents an area in which they can not only enjoy the ethnic flavor of their community but find locally those business and commercial establishments which meet their individual needs. Although empty store fronts may be observed, the areas overall vitality is not diminished by them.

Consequently, if urban planners and economists are going to effectively address the real problems which cause and result from racial transition, detailed consideration must be given to economic and local government policies. In an economic sense, as segregation barriers in housing continue to weaken, local and private financial institutions can do much to alleviate the problem. The decisions on the part of banks and mortgage institutions to finance residential and non-residential new construction and rehabilitative activity liberally for white individuals and communities, but not for their black counterparts, are critical judgments which determine what is or is not done. For instance, the mortgage policy known as "red lining,"

in which some banks refuse loans to home buyers in neighborhoods that appear to be deteriorating, provides a good example of what is not being done to provide housing for the black population. In addition, no longer can the argument that the suburbs are white because of economics and not racism be used by these institutions. Based on a careful analysis of the 1970 Census of Population and Housing for the City of Detroit (Polich, 1975), it was revealed that if income was the only factor that determined where metropolitan Detroit residents lived, sixteen percent of the houses and apartments throughout the suburbs would be occupied by black families. Clearly, the successful implementation of any development or plan to provide assistance to transitional areas or decent housing for black families depends on its financing. Consequently, the policies and decisions of these institutions have a great impact upon transitional areas and the housing alternatives available to the black population.

The local government's policies and decisions can also do much to determine the future viability of urban areas through the use of their regulatory policies, zoning authority and urban renewal programs. In the case of Northwest Detroit, the local government took steps to slow down the detrimental trends in the area to provide time for more basic projects to get underway before irreparable commercial blight occurred. This was accomplished through zoning changes, code enforcement, and land utilization studies (which led to recommendations concerning land acquisition, removal of obsolete facilities, development of parking and development of new facilities). Hopefully, Detroit will serve as a model case in addressing the problem of commercial blight in racially transitional areas that will be followed by other cities with the

same problem.

A local government's urban renewal programs are also critical government tools which can determine what is or is not done in relation to major rehabilitative activity. Although poorly planned urban renewal programs have been blamed in part for the acceleration of racial transition, these programs have the potential of providing the strongest catalyst toward revitalizing not only the urban cores but the racially transitional areas whose viability is rapidly deteriorating.

Summary and Implications for Future Research

Past studies on the property value myth have produced some concrete answers about the impact of race upon residential property values. Although these studies were based on factual inquiries, they have failed to acknowledge or examine the true dynamics taking place. By limiting themselves to two variable studies (i.e., race and property value) they have chosen to either disregard, discount or deny the view that the factor of race is only one of many that affect property values, and that quite often it may not be the most important one. To these observers, researchers and students of racial transition the statistical findings in this study adds a new dimension to their discussions and speculations concerning the impact of race upon property values.

Besides providing empirical documentation which disproves the property value myth associated with black entry into previously all white neighborhoods, the findings in the present study have substantiated the argument that changes in non-residential land uses are more

causally related to declines in residential property values than changes in racial composition. These findings present serious challenges to urban planners and economists who, up to this point, have not effectively addressed themselves to resolving the problems of commercial blight in racially transitional residential/commercial areas.

The present study also shows very strong evidence of a steep gradient of racial transition between white and black residential areas within Northwest Detroit. The process by which this front, which exists within a two mile area, moves forward is highly dependent upon real estate practices. These practices have the advantage of maintaining a high density wave of transition, a tipping process, by which white people are induced to sell their property due to scare tactics (i.e., the threat of black entry). Although these real estate practices are illegal and unethical, the opportunity for monetary gain has apparently outweighed the possible consequences of their actions (i.e., the U.S. District Court case of Zuch vs Hussey). The monetary gains to the realtors are realized by not only creating but maintaining situations which accelerate dwelling unit turnovers, thus providing them with commissions that would not ordinarily be available and an arena for speculative ventures.

Therefore, it goes without question that future research efforts must begin to focus on the problems that exist in the smaller areas of the urban mass. It is clearly apparent that these areas have suffered tremendously from neglect due to the preoccupation of urban planners and strategists with the revitalization of the larger urban centers. Focusing specifically on the findings in the present study, further research is needed to determine in more detail the pattern of non-

residential land use changes in racially transitional areas, and how these land use changes impact upon property values based on differing rates and types of transition. Hopefully, from research efforts directed towards these smaller areas, better insights can be obtained in relation to the urban problems that result from the pace of change outstripping resources and services, creating stresses in society.

APPENDIX A

BLACK POPULATION AND TOTAL POPULATION SPATIAL DISTRIBUTIONS

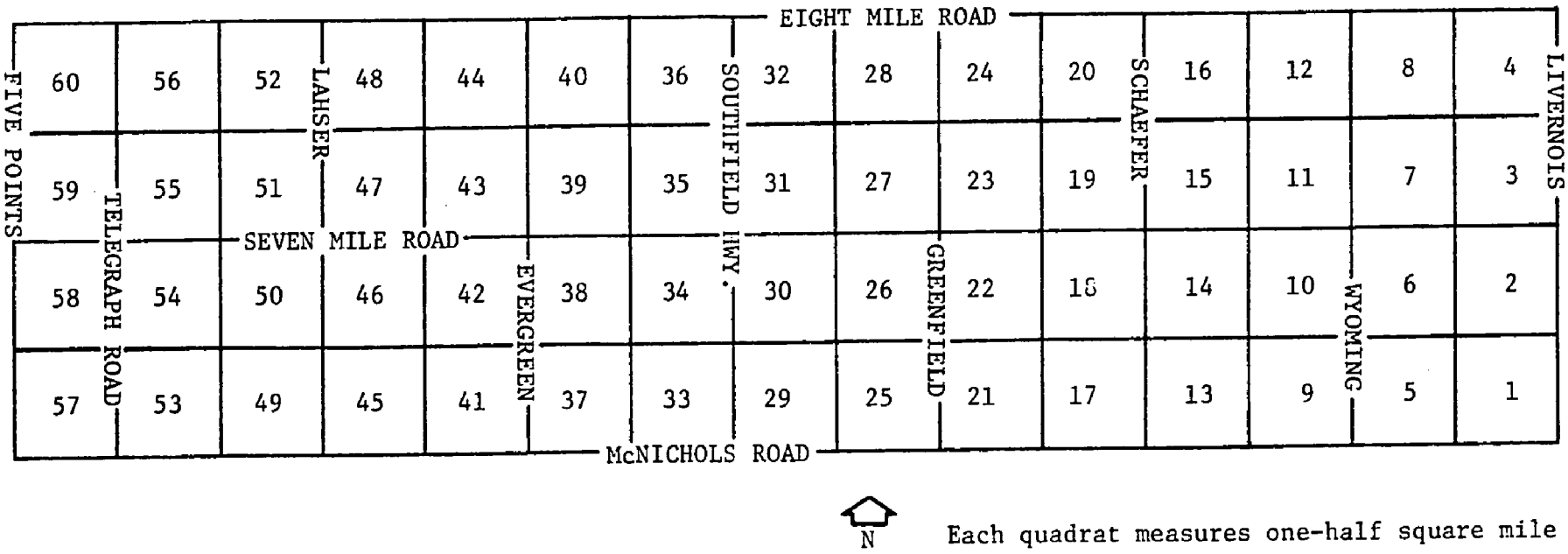


FIGURE A.1

NORTHWEST DETROIT GRID SYSTEM: QUADRAT CODING

EIGHT MILE ROAD

0.07 3512	0.08 3682	0.07 3467	0.08 2579	0.07 2565	0.02 1921	0.01 1925	0.09 2463	0.12 2449	0.21 2722	0.20 3329	56.56 1693	93.10 1575	55.29 2111	54.24 2235
0.07 3433	0.08 3560	0.07 3375	0.01 2653	0.01 2633	0.01 2503	0.01 2517	0.01 2745	0.06 2556	0.37 1202	0.30 1268	0.40 1451	0.40 1024	13.90 2007	13.37 2128
0.01 2091	0.01 1734	0.01 1840	0.01 1939	0.01 2778	0.07 2428	0.01 2422	0.00 2463	0.05 2308	0.13 1896	0.19 1797	0.30 2000	0.41 2016	3.51 2729	3.93 2781
0.01 2040	0.00 0	0.01 1940	0.01 1887	0.01 2771	0.07 2402	0.01 2413	0.01 2253	0.02 2219	0.24 1957	0.29 1929	0.28 1980	0.17 2185	0.52 3094	3.01 3151

FIVE POINTS

LIVERNOIS

McNICHOLS ROAD

N

The first number gives the quadrat's percent of black population. The second number is the total population of the quadrat.

FIGURE A.2

1960 PERCENT BLACK POPULATION AND TOTAL POPULATION SPATIAL DISTRIBUTIONS

EIGHT MILE ROAD

0.70 3304	0.12 3422	0.04 3233	0.00 2554	0.00 2540	0.00 1904	0.10 1909	0.11 2426	0.22 2412	0.00 2695	8.90 3289	14.99 1682	76.47 1559	89.04 2166	55.07 2300
0.83 3229	0.11 3311	0.06 3157	0.00 2600	0.00 2585	0.09 2485	0.11 2500	0.05 2709	0.25 2525	0.38 1212	5.66 1272	15.34 1450	52.90 1041	51.76 2080	52.69 2208
0.11 2086	0.04 1785	0.05 1875	0.00 1972	0.00 2746	0.06 2391	0.18 2400	1.38 2420	1.52 2271	0.33 1907	4.34 1811	19.24 2032	45.13 2082	27.41 2846	29.00 2901
0.02 2036	0.00 0	0.05 1957	0.00 1920	0.00 2740	0.13 2369	0.23 2391	1.47 2225	1.46 2194	0.87 1952	4.28 1929	16.71 2011	15.82 2257	24.76 3210	26.74 3270

FIVE POINTS

LIVERNOIS

McNICHOLS ROAD

N

The first number gives the quadrat's percent of black population. The second number is the total population of the quadrat.

FIGURE A.3

1963 PERCENT BLACK POPULATION AND TOTAL POPULATION SPATIAL DISTRIBUTIONS

EIGHT MILE ROAD

0.10 3096	0.28 3162	0.28 3000	0.26 2529	0.36 2515	2.16 1887	2.37 1893	1.52 2389	7.86 2376	39.50 2668	41.17 3249	46.08 1671	89.80 1542	96.02 2221	82.78 2364
0.08 3025	0.57 3062	0.27 2939	0.21 2547	0.75 2538	2.17 2467	3.64 2482	11.47 2672	6.12 2495	30.10 1222	39.84 1276	50.09 1448	90.40 1058	87.14 2153	82.30 2287
0.10 2081	0.07 1837	0.10 1909	0.14 2006	1.09 2714	2.18 2354	3.85 2378	13.73 2377	15.62 2234	10.31 1917	20.69 1825	71.90 2064	85.39 2147	80.26 2964	80.34 3021
0.02 2032	0.00 0	0.08 1974	0.14 1952	0.33 2709	2.93 2335	4.01 2369	14.28 2198	15.87 2169	11.72 1947	21.36 1928	72.62 2042	76.58 2330	79.76 3326	79.93 3390

FIVE POINTS

LIVERNOIS

McNICHOLS ROAD

N

The first number gives the quadrat's percent of black population. The second number is the total population of the quadrat.

FIGURE A.4

1966 PERCENT BLACK POPULATION AND TOTAL POPULATION SPATIAL DISTRIBUTIONS

EIGHT MILE ROAD

1.01 2888	0.93 2903	0.63 2766	3.85 2503	4.35 2490	5.84 1871	6.33 1877	2.94 2352	22.17 2339	91.40 2641	88.29 3209	89.47 1661	98.42 1526	99.22 2276	93.31 2429
0.75 2821	1.03 2813	0.77 2721	3.82 2495	4.86 2490	5.88 2449	7.16 2465	12.59 2636	19.31 2464	71.31 1233	87.17 1280	92.95 1447	98.40 1074	97.56 2226	93.25 2367
1.25 2077	0.84 1888	1.78 1944	1.74 2039	3.32 2682	4.16 2317	5.77 2356	12.30 2334	20.25 2197	48.13 1928	60.87 1839	93.02 2095	97.55 2213	96.23 3081	96.04 3141
6.23 2028	0.00 0	1.92 1990	1.68 1985	2.19 2678	4.75 2302	5.25 2347	15.28 2170	20.64 2144	47.88 1943	59.64 1928	93.06 2073	95.20 2402	96.20 3441	96.12 3509

FIVE POINTS

LIVERNOIS

McNICHOLS ROAD

N

The first number gives the quadrat's percent of black population. The second number is the total population of the quadrat.

FIGURE A.5

1969 PERCENT BLACK POPULATION AND TOTAL POPULATION SPATIAL DISTRIBUTIONS

EIGHT MILE ROAD

0.81 2680	1.17 2643	1.04 2532	4.77 2478	6.06 2465	9.59 1854	11.87 1861	19.82 2315	47.57 2303	97.90 2614	95.29 3169	95.87 1650	98.77 1509	99.05 2331	91.66 2493
0.47 2617	1.08 2564	1.27 2503	4.88 2442	5.92 2442	8.41 2431	11.58 2447	24.15 2600	50.18 2434	83.60 1243	95.13 1284	98.31 1445	98.90 1091	98.03 2299	91.69 2446
1.48 2072	0.92 1939	2.22 1978	2.53 2072	3.52 2650	4.58 2280	9.27 2334	27.32 2291	39.65 2160	82.35 1938	91.89 1853	98.37 2127	98.37 2279	97.72 3198	97.34 3261
6.53 2024	0.00 0	2.37 2007	2.44 2018	2.72 2647	5.72 2269	9.29 2325	27.75 2143	35.19 2119	85.70 1938	90.30 1928	98.38 2104	98.65 2474	97.81 3557	97.60 3629

FIVE POINTS

LIVERNOIS

McNICHOLS ROAD

N

The first number gives the quadrat's percent of black population. The second number is the total population of the quadrat.

FIGURE A.6

1972 PERCENT BLACK POPULATION AND TOTAL POPULATION SPATIAL DISTRIBUTIONS

APPENDIX B

SPATIAL DISTRIBUTIONS OF ASSESSED PROPERTY VALUES AND DWELLING UNIT TURNOVERS

TABLE B.1

1960-1975 INFLATION INDEXES

	*Annual Percent of Change	*Cumulative Percent of Change
May 1960	0.00	0.00
1961	-0.29	-0.29
1962	+2.10	+1.81
May 1963	+2.04	+3.85
1964	+2.63	+6.48
1965	+3.27	+9.75
May 1966	+4.62	+14.37
1967	+2.95	+17.32
1968	+7.53	+24.85
May 1969	+10.65	+35.50
1970	+3.07	+38.57
1971	+7.93	+46.50
May 1972	+9.43	+55.93
1973	+9.17	+65.10
1974	+7.95	+73.05
May 1975	+6.04	+79.09

* Figures presented with 1960 (May) as the base year.

Note: The inflation indexes were used to remove the effects of inflation from the assessed property value data.

Source: Marshal M. Swift, Valuation Service, 1645 Beverly Boulvard, Los Angeles, California. The information is supplied on a regional basis. The present information represents the central region in which Detroit, Michigan, is located.

EIGHT MILE ROAD

5 7348	5 8400	6 6373	10 7569	10 7584	5 8110	11 5885	12 5387	9 9097	10 9654	13 7234	11 14773	15 3770	13 3755	12 18173
5 4756	5 4336	6 7163	10 7248	10 5012	10 6709	10 4903	15 4667	13 5937	13 8437	12 7812	11 9539	8 7164	9 14928	11 8950
10 5497	7 4990	5 5620	6 4657	13 5103	11 5626	13 5763	12 6233	13 5403	12 7485	13 6952	13 6626	13 8142	13 8700	13 6989
9 5529	0 0	6 8393	7 10556	9 5103	13 7383	10 8007	12 4618	12 17171	5 6832	12 7953	13 6430	10 6286	14 12620	14 8411

FIVE POINTS

LIVERNOIS

McNICHOLS ROAD

N

The first number in each quadrat is the random sample size utilized to collect the assessed property value data. The second number is the mean value of the assessed property values for the quadrat.

FIGURE B.1

1960 ASSESSED PROPERTY VALUE AND SAMPLE SIZE SPATIAL DISTRIBUTIONS

EIGHT MILE ROAD

0|5 7148	0|5 8386	1|6 7530	2|10 7376	2|10 7471	0|5 7816	1|11 5787	1|12 5253	2|9 8571	1|10 9181	2|13 7070	1|11 14348	2|15 3732	0|13 3699	6|12 17558
2|5 24116	1|5 4272	1|6 6978	0|10 6991	0|10 4934	1|10 6577	0|10 4813	3|15 4587	3|13 5837	1|13 8227	3|12 7831	1|11 9608	3|8 7094	2|9 15169	3|11 8755
2|10 5464	3|7 4904	0|5 5586	1|6 4593	1|13 5060	0|11 5692	0|13 5692	3|12 6080	1|13 5366	2|12 7444	0|13 6867	2|13 6594	3|13 7915	0|13 8684	2|13 6988
2|9 5400	0|0 0	0|6 8332	3|7 11183	2|9 5146	1|13 7312	2|10 7935	2|12 4535	2|12 16428	0|5 6692	2|12 8227	1|13 6422	0|10 6194	1|14 12422	3|14 8405

FIVE POINTS

LIVERNOIS

McNICHOLS ROAD

N

Based on an initial observation in 1960 and a follow-up observation in 1963, the first number (A|B) in each quadrat gives the number of dwelling unit ownership turnovers (A) that occured within the random sample (B) of dwelling units observed. The second number is the mean value of the assessed property values for the quadrat based on a random sample of size B.

FIGURE B.2

1963 ASSESSED PROPERTY VALUE AND DWELLING UNIT TURNOVER SPATIAL DISTRIBUTIONS

EIGHT MILE ROAD

2|5 7018	0|5 8930	2|6 7405	2|10 7338	1|10 7395	0|5 7698	5|11 5719	5|12 5237	3|9 8438	2|10 9126	4|13 6992	5|11 12685	4|15 3699	5|13 3699	2|12 16584
1|5 21770	1|5 5084	3|6 6747	3|10 6927	3|10 4947	3|10 6562	4|10 4890	8|15 4539	5|13 18362	4|13 8028	3|12 7795	0|11 9359	4|8 7126	1|9 47326	4|11 8419
1|10 5457	2|7 4867	0|5 5562	2|6 4827	2|13 5027	2|11 5671	2|13 5680	1|12 6058	3|13 5319	2|12 7332	1|13 6764	1|13 7155	1|13 7542	0|13 8526	6|13 6903
4|9 5342	0|0 0	1|6 8378	1|7 10689	1|9 5121	4|13 7262	2|10 7863	1|12 4496	2|12 15771	0|5 6622	2|12 8163	2|13 6333	4|10 6148	6|14 11831	6|14 8319

FIVE POINTS

LIVERNOIS

McNICHOLS ROAD

N

Based on an initial observation in 1963 and a follow-up observation in 1966, the first number (A|B) in each quadrat gives the number of dwelling unit ownership turnovers (A) that occured within the random sample (B) of dwelling units observed. The second number is the mean value of the assessed property values for the quadrat based on a random sample of size B.

FIGURE B.3

1966 ASSESSED PROPERTY VALUE AND DWELLING UNIT TURNOVER SPATIAL DISTRIBUTIONS

EIGHT MILE ROAD

1|5 7242	3|5 10498	1|6 7815	2|10 8011	1|10 7811	1|5 7996	1|11 6365	3|12 5782	2|9 8868	4|10 9320	5|13 7015	2|11 13327	8|15 4637	4|13 4862	4|12 22965
1|5 23130	0|5 5784	0|6 7377	1|10 7587	2|10 5745	2|10 7386	1|10 5556	4|15 5218	3|13 17978	8|13 8667	3|12 8024	5|11 9586	2|8 7168	4|9 31496	4|11 8783
2|10 6942	2|7 5720	0|5 6968	1|6 5845	3|13 5659	0|11 6207	4|13 6856	1|12 6707	1|13 5861	3|12 7875	4|13 7485	9|13 7335	6|13 8002	8|13 8955	3|13 7582
2|9 6226	0|0 0	0|6 10085	1|7 11714	2|9 5959	3|13 8328	2|10 8556	0|12 5137	4|12 16840	0|5 7020	4|12 8475	3|13 6805	2|10 6633	6|14 11834	4|14 8555

FIVE POINTS

LIVERNOIS

McNICHOLS ROAD

N

Based on an initial observation in 1966 and a follow-up observation in 1969, the first number (A|B) in each quadrat gives the number of dwelling unit ownership turnovers (A) that occured within the random sample (B) of dwelling units observed. The second number is the mean value of the assessed property values for the quadrat based on a random sample of size B.

FIGURE B.4

1969 ASSESSED PROPERTY VALUE AND DWELLING UNIT TURNOVER SPATIAL DISTRIBUTIONS

EIGHT MILE ROAD

2|5 9564	2|5 12408	1|6 9177	4|10 9532	2|10 9768	1|5 9822	1|11 7906	5|12 7497	0|9 10676	6|10 10795	3|13 8337	6|11 14786	3|15 7927	8|13 8631	3|12 25029
1|5 25366	2|5 7534	0|6 9023	1|10 9293	0|10 7339	0|10 9290	2|10 7169	0|15 6874	4|13 20280	3|13 10226	5|12 9301	3|11 11087	1|8 8858	4|9 30323	1|11 10631
3|10 8740	3|7 7357	0|5 8926	2|6 7410	4|13 7222	3|11 7771	5|13 8592	2|12 8112	4|13 7351	7|12 8441	6|13 8545	5|13 8851	4|13 9193	4|13 10166	3|13 9079
2|9 8079	0|0 0	1|6 12113	0|7 14190	3|9 7587	4|13 9958	2|10 10563	4|12 6971	4|12 18906	4|5 8134	5|12 9880	5|13 9084	4|10 7881	3|14 12803	8|14 9242

FIVE POINTS

LIVERNOIS

McNICHOLS ROAD

N

Based on an initial observation in 1969 and a follow-up observation in 1972, the first number (A|B) in each quadrat gives the number of dwelling unit ownership turnovers (A) that occured within the random sample (B) of dwelling units observed. The second number is the mean value of the assessed property values for the quadrat based on a random sample of size B.

FIGURE B.5

1972 ASSESSED PROPERTY VALUE AND DWELLING UNIT TURNOVER SPATIAL DISTRIBUTIONS

APPENDIX C

ANALYSIS OF VARIANCE TABLE FOR THE PERCENT OF DWELLING UNITS

TABLE C.1

ANALYSIS OF VARIANCE TABLE FOR THE PERCENT OF DWELLING UNITS SOLD: YEAR AND RACIAL CLASSIFICATIONS

$$(\%\ \text{Dwelling Units})_{ijk} = [\mu + Yr_i + Class_j + \beta(\text{Sales Value})_{ij} + \varepsilon_{ij}]_k$$

where:
- Yr_i - is the observed year i, i=1-5
- $Class_j$ - is the racial classification j, j=1-5
- Sales Value_{ij} - is the sales value covariate for year i, and racial classification j
- k - is the dwelling unit types, k=1-4

Analysis of Variance Table: Single Family Dwelling Units

$\alpha = .05$

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif.
Year	1	3.32177492	3.3217749	0.3429	No
Classifications	4	470.513740	117.62844	12.1415	Yes
Value (covariate)	1	94.8731129	94.873113	9.7927	No
Error	3	29.0643115	9.6881038		

Analysis of Variance Table: Duplex Dwelling Units

$\alpha = .05$

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif.
Year	1	10.2076554	10.207655	6.0199	No
Classifications	4	64.6532114	16.163303	9.5322	Yes
Value (covariate)	1	0.01301478	0.0130147	0.0077	No
Error	3	5.08697976	1.6956599		

Analysis of Variance Table: Small Flat Dwelling Units

$\alpha = .05$

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif.
Year	1	1.43648518	1.4364852	0.2684	No
Classifications	4	85.1288071	21.282202	3.9757	No
Value (covariate)	1	6.19075571	6.1907557	1.1565	No
Error	3	16.0590708	5.3530236		

Analysis of Variance Table: Income Bungalow Dwelling Units

$\alpha = .05$

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif.
Year	1	8.69747790	8.6974780	0.9263	No
Classifications	4	20.5488295	5.1372073	0.5471	No
Value (covariate)	1	1.53534992	1.5353499	0.1635	No
Error	3	28.1682112	9.3894037		

TABLE C.2

ANALYSIS OF VARIANCE TABLE FOR THE PERCENT OF DWELLING UNITS SOLD: YEAR AND DIRECTION

$$(\%\ \text{Dwelling Units})_{ijkl} = [\mu + Yr_i + Y_j + X_k + Yr_iY_j + Yr_iX_k + Y_jX_k + \beta(\%\text{Black})_{ijk} + \gamma(\text{Sales Value})_{ijk} + \varepsilon_{ijk}]_l$$

where:
- Yr_i - is the observed year i, i=1-5
- Y_j - is the Y-direction (west) j, j=1-15
- X_k - is the X-direction (north) k, k=1-4
- $\%\text{Black}_{ijk}$ - is the %black covariate for year i, Y-direction j, and X-direction k
- Sales Value_{ijk} - is the sales value covariate for year i, Y-direction j, and X-direction k
- l - is the dwelling unit types, l=1-4

Analysis of Variance Table: Single Family Dwelling Units

$\alpha = .05$

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif.
Year	1	328.277438	328.27744	7.7957	Yes
Y (direction)	14	4861.96727	347.28338	8.2470	Yes
X (direction)	3	1952.04100	650.68033	15.4518	Yes
Yr-Y	14	2272.76619	162.34044	3.8551	Yes
Yr-X	3	711.495290	237.16510	5.6320	Yes
Y-X	42	6693.85627	159.37753	3.7848	Yes
%Black (covariate)	1	14.0185939	14.018594	0.3329	No
Value (covariate)	1	0.08878664	0.0887867	0.0021	No
Error	40	1684.41286	42.110322		

Analysis of Variance Table: Duplex Dwelling Units

$\alpha = .05$

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif.
Year	1	247.208039	247.20804	28.5898	Yes
Y (direction)	14	965.071733	68.933695	7.9722	Yes
X (direction)	3	402.634339	134.21145	15.5217	Yes
Yr-Y	14	165.867570	11.847684	1.3702	No
Yr-X	3	184.141964	61.380655	7.0987	Yes
Y-X	42	827.494822	19.702258	2.2786	Yes
%Black (covariate)	1	52.4887712	52.388742	6.0588	Yes
Value (covariate)	1	0.10790374	0.1079037	0.0125	No
Error	40	345.868319	8.6467080		

TABLE C.2, continued.

Analysis of Variance Table: Small Flat Dwelling Units

$\alpha = .05$

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif.
Year	1	0.07543718	0.0754372	0.0105	No
Y (direction)	14	1026.29500	73.306786	10.1603	Yes
X (direction)	3	857.835778	285.94526	39.6321	Yes
Yr-Y	14	365.107818	26.079130	3.6146	Yes
Yr-X	3	126.608420	42.202807	5.8493	Yes
Y-X	42	2957.67612	70.420860	9.7604	Yes
%Black (covariate)	1	3.41987183	3.4198718	0.4740	No
Value (covariate)	1	0.08284636	0.0828463	0.0115	No
Error	40	288.599639	7.2149910		

Analysis of Variance Table: Income Bungalow Dwelling Units

$\alpha = .05$

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif.
Year	1	31.5755667	31.575567	4.1183	Yes
Y (direction)	14	411.827251	29.416232	3.8367	Yes
X (direction)	3	99.6555034	33.218501	4.3326	Yes
Yr-Y	14	595.819671	42.558548	5.5508	Yes
Yr-X	3	53.6160270	17.872009	2.3310	No
Y-X	42	528.196871	12.576116	1.6403	No
%Black (covariate)	1	6.44387591	6.4438759	0.8405	No
Value (covariate)	1	6.52766891	6.5276689	0.8514	No
Error	40	306.685688	7.6671422		

APPENDIX D

RESIDENTIAL SALES DATA

TABLE D.1

Quadrat	1969 Residential Sales Data								
	Single Family		Duplex		Small Flat		Bungalow		Total No. of Housing Units
	No. Sold	Sales Value	No. Sold	Sales Value	No. Sold	Sales Value	No. Sold	Sales Value	
1	60.00	20819	5.00	17620	21.00	23274	5.00	19160	823
2	62.00	19159	5.36	15577	2.00	20325	2.15	20537	833
3	48.87	19910	5.47	15214	6.23	21354	2.48	19254	617
4	24.17	12459	7.82	12603	6.50	21594	2.28	14868	607
5	45.00	20785	3.96	13654	38.00	22071	3.16	15673	814
6	70.00	20806	5.72	13225	3.00	24150	2.61	19142	820
7	18.00	28281	5.94	12839	6.75	23715	2.51	16426	589
8	21.40	15838	8.27	12409	6.87	23837	2.79	17080	573
9	39.00	18216	3.00	13333	26.68	22788	3.19	20845	656
10	86.00	18458	6.00	12650	7.35	23516	2.90	19359	616
11	27.14	20134	6.51	12983	6.77	23575	2.89	17564	303
12	25.00	14025	7.00	12161	6.68	23646	2.87	17543	379
13	21.43	21504	4.43	13951	6.48	26699	2.41	21586	596
14	47.00	27241	6.96	13357	5.56	24629	2.38	21486	608
15	44.00	21416	13.0	12839	5.70	24616	3.13	19234	390
16	28.00	17286	21.0	12724	4.92	24742	2.86	19741	447
17	54.00	20571	4.00	13338	4.35	27544	4.24	25162	528
18	66.92	20089	4.00	13552	3.55	28056	2.34	21979	553
19	52.48	20625	5.54	13167	4.29	24432	2.36	21566	405
20	62.00	18540	12.0	14588	4.40	24862	2.91	19835	977
21	22.00	23187	3.79	13522	4.83	27303	3.68	23092	549
22	86.00	20722	2.93	13854	3.93	27646	2.45	21791	590
23	40.57	21310	3.36	13512	3.83	28238	2.41	21577	384
24	10.43	26779	4.07	14310	3.70	25018	2.41	21052	799
25	37.00	18237	2.59	13749	4.28	26874	3.54	23784	617
26	63.33	17600	2.23	13768	3.71	23195	3.51	23698	724
27	59.00	17647	3.05	14061	3.44	27309	2.49	21551	742
28	22.62	24435	2.56	13243	3.46	27543	2.48	21444	647
29	31.00	12279	2.40	13657	4.15	23086	4.02	22830	629
30	24.29	18113	2.23	13726	3.54	22697	3.51	23583	757
31	64.00	15914	2.88	13953	2.59	23468	2.50	21517	784
32	61.00	17315	2.70	13499	3.48	22918	2.49	21451	643
33	33.37	21087	2.32	13579	3.98	18696	3.02	20637	701
34	55.19	19002	2.26	13595	3.55	18446	3.01	20618	701
35	21.73	16415	2.27	13606	3.42	18352	3.01	20582	679
36	16.28	21000	2.83	13859	3.59	18576	3.00	20537	540
37	37.88	23146	2.79	13334	3.64	19481	3.02	20635	706
38	58.53	19019	2.78	13156	3.46	19515	3.01	20614	706
39	23.67	20036	2.75	13012	3.55	18342	3.01	20578	665
40	8.00	22094	2.78	12659	3.68	18514	3.00	20538	527
	1	2	3	4	5	6	7	8	9

TABLE D.1, continued.

Quadrat	1969 Residential Sales Data								
	1	2	3	4	5	6	7	8	9
41	59.49	17732	2.83	13345	2.83	18626	3.01	20703	811
42	58.00	17411	3.00	11800	1.19	19153	3.01	20639	806
43	23.18	18988	2.79	13204	3.52	19540	3.01	20583	651
44	28.00	21829	2.79	14084	3.71	19772	3.01	20541	679
45	53.60	17445	2.80	17712	2.78	18558	3.01	20704	528
46	28.00	17134	2.80	17442	3.51	19090	3.01	20638	531
47	29.60	18434	2.76	14023	3.53	19503	3.01	20580	631
48	41.00	20812	2.78	14133	3.74	19746	3.01	20539	665
49	12.94	17067	2.76	16803	3.51	19236	3.01	20617	517
50	19.87	21843	2.72	18455	3.44	19368	3.01	20597	500
51	6.00	22008	2.71	14060	3.64	19586	3.01	20563	623
52	16.29	23360	2.76	14226	3.81	19769	3.01	20531	632
53	0	0	0	0	0	0	0	0	0
54	18.33	17430	2.70	18168	3.69	19596	3.01	20561	477
55	15.00	20310	2.70	14549	3.79	19705	3.01	20541	646
56	8.00	21894	2.79	14398	3.90	19824	3.01	20519	667
57	23.00	18863	2.75	16469	4.12	19739	3.01	20542	552
58	8.68	18962	2.69	18069	3.87	19751	3.01	20535	555
59	21.00	16295	2.69	14618	3.93	19810	3.01	20522	648
60	9.01	20908	2.75	14491	3.99	19886	3.01	20506	664

Note: The fractions which appear in the number of dwelling units sold columns above resulted from interpolating the raw residential sales data reported by neighborhoods to the square lattice data format of the present study.

TABLE D.2

Quadrat	1972 Residential Sales Data								
	Single Family		Duplex		Small Flat		Bungalow		Total No. of Housing Units
	No. Sold	Sales Value	No. Sold	Sales Value	No. Sold	Sales Value	No. Sold	Sales Value	
1	20.00	21719	1.00	15500	13.00	23627	13.0	23627	839
2	36.00	21124	1.00	31000	1.00	21000	1.00	22500	853
3	19.26	22570	1.18	25087	3.57	23091	2.07	22649	628
4	13.51	17710	1.58	16092	3.75	23585	2.11	22618	632
5	20.00	22302	1.85	15528	22.00	23548	8.62	23298	829
6	37.00	23198	1.34	24851	1.00	26500	1.00	23400	840
7	13.00	27477	1.69	16198	3.57	26286	1.93	23098	600
8	10.57	20372	1.22	15092	3.66	26642	2.00	23348	597
9	15.00	18757	2.00	13750	15.65	25080	2.70	23208	670
10	27.00	19326	1.85	14640	4.12	26668	1.77	23014	630
11	13.91	22019	5.04	15921	3.67	26909	1.74	23015	323
12	17.00	20769	3.00	11942	2.70	31654	1.74	23048	382
13	15.98	22016	5.69	18917	5.50	33048	2.06	24260	607
14	30.00	26827	2.28	14701	4.57	33347	1.97	23213	619
15	19.00	21298	7.00	17257	2.63	32190	1.43	21776	401
16	15.00	19267	3.00	14483	2.28	32484	1.45	21940	459
17	49.00	21447	4.00	15113	4.00	36694	4.00	28825	635
18	19.39	22084	2.74	14953	4.18	34167	1.96	27320	563
19	39.47	21512	2.28	14999	2.21	32838	1.42	21864	414
20	33.00	20874	2.00	12250	1.00	34200	1.46	22017	1037
21	31.00	23184	2.55	15165	4.73	34474	3.16	27166	557
22	50.00	21159	2.07	14854	3.98	34186	2.05	27255	601
23	26.36	21814	2.75	14986	1.94	32377	1.99	26849	392
24	8.97	25426	2.07	15191	1.63	32532	1.48	21934	839
25	60.00	19880	2.07	14830	4.76	34089	2.05	26955	622
26	24.36	19734	1.36	14726	2.42	32135	2.01	26870	736
27	88.00	18843	1.00	16200	2.04	32268	1.98	26736	757
28	30.46	24518	1.94	15415	1.86	32322	1.90	26752	658
29	20.00	15898	1.32	14841	4.78	33928	1.40	22074	635
30	18.68	19104	1.23	14845	2.48	31979	1.36	21956	769
31	64.00	16554	1.28	15803	2.29	32044	1.35	21932	800
32	65.00	18889	1.83	15539	2.21	32047	1.35	22016	652
33	43.39	23138	1.07	17265	2.62	32113	1.29	21621	713
34	16.79	20229	1.05	16833	2.50	32157	1.18	21094	713
35	29.39	18064	1.12	15793	2.40	32183	1.25	21653	691
36	31.91	22311	1.22	15790	2.35	32182	1.28	24636	553
37	42.73	23972	1.05	18099	2.56	31967	1.25	21521	718
38	17.84	20225	1.00	17237	2.49	31999	1.15	21041	718
39	29.69	19913	1.00	17301	2.43	32021	1.20	21691	677
40	31.00	24073	1.08	17173	2.40	32028	1.20	24773	540
	1	2	3	4	5	6	7	8	9

TABLE D.2, continued.

Quadrat	1972 Residential Sales Data								
	1	2	3	4	5	6	7	8	9
41	59.87	19793	1.03	32389	2.47	29364	1.27	21762	832
42	40.00	18210	1.00	14250	2.42	29383	1.22	21735	827
43	32.92	19666	1.07	17604	2.39	29406	1.18	24733	663
44	85.00	23120	1.61	27521	2.39	29427	1.00	25400	691
45	57.65	19884	1.04	33056	2.34	29189	1.28	21930	550
46	31.00	18903	1.06	18504	2.30	29194	1.25	24659	551
47	31.87	20411	1.09	18742	2.29	29225	1.21	24803	637
48	89.00	23872	1.68	28442	2.32	29270	1.18	24956	674
49	14.23	20887	1.07	31204	2.14	28976	1.30	24722	533
50	21.58	23297	1.08	19327	2.09	28955	1.27	24745	510
51	20.00	26863	1.09	18345	2.13	29013	1.25	24807	561
52	28.29	25058	1.90	31579	2.21	29104	1.24	24868	566
53	0	0	0	0	0	0	0	0	0
54	24.53	20943	1.10	19525	1.73	28621	1.29	24787	487
55	19.00	21453	1.14	19634	1.89	28766	1.28	24816	577
56	10.00	28330	1.69	28750	2.08	28944	1.27	24848	596
57	40.00	21261	1.10	19623	1.61	28494	1.32	24805	567
58	20.40	21135	1.11	19601	1.13	28104	1.31	24813	569
59	31.00	20697	1.13	19680	1.69	28576	1.30	24829	589
60	25.69	25345	1.65	28330	1.99	28836	1.30	24847	605

Note: The fractions which appear in the number of dwelling units sold columns above resulted from interpolating the raw residential sales data reported by neighborhoods to the square lattice data format of the present study.

APPENDIX E

NON-RESIDENTIAL LAND USE CLASSIFICATIONS

Commercial

Designates establishments selling commodities in small quantities to the consumer.

Major Category 10: Retail Trade - Food

This major category includes retail stores primarily engaged in selling foods for home preparation and consumption.

Major Category 11: Retail Trade - Eating and Drinking Places

This major category includes retail establishments selling prepared foods and drinks for consumption on the premises including carry-out food establishments, lunch counters, and refreshment stands. Restaurants and lunch counters operated as a subordinate service facility are not included.

Major Category 12: Retail Trade - Apparel and Accessory Sales

This major category includes retail stores primarily engaged in the sale of clothing, shoes, hats, underwear, and related articles for personal wear.

Major Category 13: Retail Trade - General Merchandise

This major category includes retail stores which sell a number of lines of merchandise, such as dry goods, apparel and accessories, small wares, etc. The stores included in this category are known as department stores, variety stores, discount stores, general merchandise stores, etc.

Major Category 14: Retail Trade - Furniture, Home Furnishings, and Equipment

This major category includes the retail selling of goods used for furnishing the home, such as furniture, floor coverings, draperies,

refrigerators and other household applicances and home furnishings. (Also see Category 17)

Major Category 15: Retail Trade - Automotive, Aircraft, Farm and Marine Supply Sales

This major category includes retail sales of new and used automobiles, tractor and/or trailer units and trucks, boat and marine sales, and aircraft sales and accessories.

Major Category 16: Retail Trade - Hardware Sales

This category includes establishments primarily engaged in the retail sale of hardware, paint, wallpaper, glass and asbestos products.

Major Category 17: Retail Trade - Other Retail Trade

This major category includes retail stores not elsewhere classified.

171 Antique and Used Goods Stores

172 Newsstands, Office Supplies

173 Sporting Goods Stores

174 Farm and Garden Supply Stores

175 Jewelry, Gift, Novelty and Souvenir Stores

176 Fuel and Oil Sales

177 Package Liquor, Florist and Tobacco Sales

178 Optical Goods and Photographic Supply Stores

Major Category 18: Retail Trade - Miscellaneous Retail Stores

This major category includes miscellaneous retail stores primarily engaged in retail sale of merchandise lines not elsewhere classified.

181 Cosmetic Stores

182 Gun and Accessory Sales: Establishments primarily engaged in the retail sale and repair of guns and accessories.

183 Hearing Aids

184 Hobby and Toy Shops

185 Pet Shops

186 Monument and Casket Sales

187 Office Machine Sales and Service: Establishments primarily engaged in the retail sale and repair of office machines.

188 Art Supplies and Picture Frame Sales

189 Architectural and Engineering Supply Sales

Major Category 19: Retail Trade - Miscellaneous Specialized Retail Sales

This major category includes miscellaneous retail stores primarily engaged in the retail sale or exchange of specialized lines of merchandise not elsewhere classified.

Business Services

Major Category 20: Personal Services

This major category includes establishments primarily engaged in providing services for the care of a person and his apparel, such as laundries, cleaning and drying plants, beauty and barber shops, and photography studios.

Major Category 21: Indoor Commercial Amusement Services

This major category includes activities of amusement and entertainment performed within a structure such as motion picture theatres, bowling alleys, night clubs, skating rinks, ballrooms, billiard halls, etc.

Major Category 22: Outdoor Commercial Amusement Services

This major category includes activities of amusement and entertainment performed outdoors, included are baseball parks, golf courses, tennis courts, drive-in theatres, amusement parks, race tracks, swimming pools, etc.

Major Category 23: Business Services

This major category includes establishments primarily engaged in providing a wide variety of services to individuals and business establishments.

231 Advertising

232 Consumer Credit Reporting Agencies, Mercantile Reporting Agencies, and adjustment and collection agencies.

233 Duplicating, Addressing, Mailing, Mailing List and Stenographic Services

234 Services to Dwelling and other Buildings

235 Delivery Service: Establishments primarily engaged in delivering goods on a short haul basis.

236 Private Employment Agencies

237 Catering Service (including minor food preparation and hauling)

238 Offices, General Administrative

239 Miscellaneous Business Services

Major Category 24: Wholesaler's, Special Business Services, Factory Representative (Samples and Displays) Without Stocks

This major category includes establishments primarily engaged in

selling merchandise to such retailers; industrial; commercial, institutional, users; or other wholesalers or acting as agents in buying merchandise for or selling merchandise to such persons or companies.

241 Motor Vehicles and Equipment

242 Drugs, Chemicals, and Allied Products

243 Dry Goods, Riece Goods, and Notions

244 Groceries and Related Products

245 Electrical Goods

246 Hardware and Plumbing and Heating, and Air Conditioning and Refrigeration Equipment and Supplies

247 Machinery, Equipment, and Supplies

249 Miscellaneous Wholesalers

Major Category 25: Automobile Repair, Services, and Garages

This major category includes establishments primarily engaged in automobile repair, rental, and other related automobile services to the public.

Major Category 26: Miscellaneous Repair Services

This major category includes groups primarily engaged in miscellaneous repair services.

Major Category 27: Finance, Insurance, and Real Estate

This major category includes those establishments primarily engaged in finance, insurance, and real estate including credit agencies, banks, holding companies, insurance agents, brokers, title abstract companies, etc.

Major Category 28: Medical and Dental Services

This major category includes establishments primarily engaged in

furnishing medical, dental, surgical, and other health services to persons.

Major Category 29: Professional Services

This major category includes establishments engaged in performing professional services, such as engineers, legal, architects, accountants, interior decorating etc. Professional services are establishments of a business character which supply general needs of an intangible nature to private and public segments of the community.

Wholesaling, Warehousing and Open Storage

Establishments selling commodities in large quantities to retailers. The operation requires the storage of large quantities of goods and materials on the premises.

Major Category 30: Wholesalers with Stocks

This major category includes establishments primarily engaged in wholesaling activities with the product or stock inventoried on the premises.

Major Category 31: Warehousing and Storage

This major category includes establishments primarily engaged in warehousing and open storage including warehousing operated by business concerns for their own use.

Major Category 32: Open Storage

This major category includes establishments primarily engaged in open storage including activities requiring open storage as a major activity conduct of its operation, i.e., lumber yards, junk yards, new and used motor vehicle dead storage, etc.

Manufacturing (Non-Durable Goods)

The mechanical or chemical transformation of organic or inorganic substances into new products whether the products are sold back into the manufacturing process, or are sold at wholesale or retail. Non-durable goods manufacture refers to establishment manufacturing goods which will be consumed with one use or in a relatively short period of time.

Major Category 40: Food and Kindred Products

This major category includes establishments primarily engaged in manufacturing foods and beverages for human consumption, and certain related products.

Major Category 41: Tobacco Manufacturers

This major category includes establishments engaged in manufacturing cigarettes, cigars, smoking and chewing tobacco, and snuff, and in stemming and redrying tobacco.

Major Category 42: Textile Products

This major category includes establishments engaged in performing any of the following operations: (1) Preparation of fiber and subsequent manufacturing of yarn, thread, braids, etc. (2) Manufacturing woven or knit fabric and carpet and rugs from yarns. (3) Dyeing and finishing fiber, yarn fabric. (4) Coating, waterproofing or otherwise treating fabric.

Major Category 43: Apparel and Other Finished Products Made From Fabrics and Similar Materials

This major group consists of establishments producing clothing and fabricated products by cutting and sewing purchased woven or knit

textile fabrics and related materials such as leather, rubberized fabrics, plastics and furs.

Major Category 44: Paper and Allied Products

Manufacture of pulps from wood and other cellulose fibers and rags, paper, paperboard, paper boxes, etc.

Major Category 45: Printing, Publishing and Allied Industry

Establishments engaged in printing by one or more processes such as letterpress, lithography, screen and services such as book binding, photoengraving, and electrotyping.

Major Category 46: Chemicals and Allied Products

Establishments producing basic chemicals and manufacturing products by predominately chemical processes.

Major Category 47: Petroleum Refining and Related Industries

Establishments primarily engaged in the production of gasoline, fuel oils, lubricants and other products from crude petroleum and producing natural gasoline from natural gas.

Major Category 48: Rubber and Miscellaneous Plastics Products

Establishments manufacturing from natural, synthetic or reclaimed rubber, rubber products such as tires, rubber footwear, heels, flooring, etc.

Major Category 49: Leather and Leather Products

Establishments engaged in tanning, curing, and finishing hides and skins.

Manufacturing (Durable Goods)

The mechanical or chemical transformation of organic or inorganic substances into new products whether the products are sold back into

the manufacturing process, or are sold at wholesale or retail. Durable goods manufacture refers to establishments manufacturing goods likely to have utility for a long period of time.

Major Category 50: Lumber and Wood Products (Except Furniture)

Establishments engaged in cutting of timber and pulpwood and woodworking requiring the manufacture of prefabricated structural wood products such as plywood, wooden containers, etc.

Major Category 51: Furniture and Fixtures

Establishments engaged in the manufacturing of household, office, public building, and restaurant furniture and fixtures.

Major Category 52: Stone, Clay, and Glass Products

Establishments engaged in the manufacturing of flat glass and other glass products, cement pottery and abrasive products from materials taken principally from the earth in the form of stone, clay, and sand.

Major Category 53: Primary Metal Industries

Establishments engaged in smelting and refining of ferrous and nonferrous metals from ore, pig or scrap and the manufacture of castings, forgings, nails, spikes, insulated wire and cable, etc.

Major Category 54: Fabricated Metals Products, Except Ordnance, Machinery, and Transportation Equipment

Establishments engaged in fabricating ferrous and nonferrous metal products, such as metal cans, tinware, hand tools, cutlery, general hardware, and a variety of metal and wire products, etc.

Major Category 55: Machinery (Except Electrical)

Major Category 56: Electrical Machinery, Equipment, and Supplies

Major Category 57: Transportation Equipment

Establishments engaged in the manufacture of equipment for the transportation of passengers and cargo by land, water, and air.

Major Category 58: Professional, Scientific, and Controlling Instruments; Photographic and Optical Goods; Watches and Clocks

Major Category 59: Miscellaneous Manufacturing Industries

Non-Manufacturing, Extractive, and Agriculture

Non-manufacturing: Industries primarily engaged in services such as heavy construction, metal salvage, special trade contractors, etc., not involving the manufacturing process as defined in the manufacturing sections (4 and 5). Extractive: Operations primarily engaged in the extraction of minerals such as coal, ores, liquids, etc. Agriculture: Operations of five acres or more for the production of crops, plants, vines or trees and grazing and feeding, horticultural services, trapping, etc.

Major Category 60: Metal Salvage Operations

Major Category 61: Construction (General Contractors)

Major Category 62: Special Trade Contractors

Major Category 69: Other Industrial Non-Manufacturing (Extractive) and Agriculture Not Elsewhere Classified

Public and Quasi-Public Services

Establishments engaged in providing formal academic or technical, cultural, spiritual, and administrative services, generally on a non-profit basis for the promotion of the interest of individuals and the

community as a whole.

Major Category 80: Educational Uses

801 Elementary Schools

802 Junior High Schools

803 Elementary - Junior High Schools

804 Junior High - Senior High Schools

805 Senior High Schools

806 Junior Colleges

807 Colleges and Universities

808 Technical Trade and Business Schools and Colleges

809 Other educational facilities not elsewhere classified

Major Category 81: Institutional Uses

811 Hospitals and Clinics

812 Prisons, Reformitories or Detention Homes

813 Orphanages, Boy's Homes, and Girl's Homes

814 Mental Institutions

815 Sanatoriums

816 Convalescent Homes, Homes for the Aged, and Nursing Homes

817 Medical Research Institutions

819 Other institutional uses not elsewhere classified

Major Category 82: Cultural and Social Centers

821 Art Galleries

822 Museums

823 Libraries

824 Civic Assembly Center

829 Other cultural centers not elsewhere classified

Major Category 83: Governmental (Local)

831 Police Stations

832 Fire Stations

833 Municipal Offices

834 County Offices

839 Other governmental uses not elsewhere classified

Major Category 84: Governmental (Non-Local)

841 State Offices

843 Federal Offices

846 Federal Post Offices

849 Other governmental (non-local uses not elsewhere classified)

Major Category 85: Non-Profit Membership Organizations

851 Business Associations

852 Professional Membership Organizations

853 Civic, Social, and Fraternal

854 Labor Unions and related organizations

855 Political Organizations

856 Y. M. C. A.

857 Y. W. C. A.

858 Religious Organizations

859 Others not elsewhere classified

Major Category 86: Charitable Institutions

861 Salvation Army

863 Convalescent Homes, Homes for the Aged, and Nursing Homes

867 Good Will Organization (or such)

869 Others not elsewhere classified

Major Category 87: Churches and Cemeteries

871 Churches, Synogogues, and associated buildings

872 Convents and Monasteries

873 Cemeteries

Recreation

A major category designating large or small public or private, urban or rural, permanent or temporary land that serve recreation or conservation purposes. (Although there are many major categories under this classification, the following were the only ones used in this study.)

Major Category 90: Recreation, Outdoor, Public Land

901 Major park areas: An area designated to serve all age groups and normally serves a major section of the city.

906 Golf Courses

Major Category 92: Recreation, Indoor, Public

923 Skating Rinks

924 Community Recreation Centers

Major Category 95: Recreation, Private

954 Golf Courses, Country Clubs, etc.

Transportation and Communications

Enterprises engaged in passenger and freight transportation by railway, highway, water, air or furnishing related services. Establishments assigned this category are semi-public in nature and regulated by commissions or other public authorities. (Although there are many major categories under this classification, the

following category was the only one used in this study.)

Major Category 78: Utilities and Communication

781 Communication (radio broadcasting and television)

Housing

There are many major categories under this classification, but for this study the housing category includes only those structures classified as a hotel, motel, courts, or tourist home.

Major Category 06: Hotel(s) and Motel(s)

060 Hotel: Any building or portion thereof used as a temporary abiding place for remuneration, with or without meals, containing fifteen or more guest rooms or suites where no provision for cooking is made in any individual guest room or suite.

061 Motel: A series of attached sleeping or living units for the accommodations of automobile transient guests with units having convenient access to off-street parking spaces for the exclusive use of guests of occupants.

APPENDIX F

ANALYSIS OF VARIANCE TABLES FOR THE PERCENT OF NON-RESIDENTIAL LAND USE TYPES (BY STUDY QUADRAT) STRATIFIED BY YEAR AND RACE WITH ASSESSED PROPERTY VALUE AS A COVARIATE

TABLE F.1

ANALYSIS OF VARIANCE TABLES FOR THE PERCENT OF NON-RESIDENTIAL LAND USE TYPES (BY STUDY QUADRAT) STRATIFIED BY YEAR AND RACE WITH ASSESSED PROPERTY VALUE AS A COVARIATE

$$(\%\ \text{Land Use Types})_{ijk} = [\mu + Yr_i + Class_j + \beta(APV)_{ij} + \epsilon_{ij}]_k$$

Yr_i - is the observed year i, i=1-5
$Class_j$ - is the racial classification j, j=1-5
$(APV)_{ij}$ - is the assessed property value covariate for year i, and racial classification j
k - is the land use type k, k=1-10

Analysis of Variance Table: Business Land Use Types

$\alpha = .05$

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif
Year	4	87.1608367	21.790209	1.0740	No
Classifications	4	628.041184	157.01030	7.7385	Yes
APV (covariate)	1	1.64700680	1.6470068	0.0812	No
Error	15	304.344336	20.289622		

Analysis of Variance Table: Manufacturing (Non-Durable) Land Use Types

$\alpha = .05$

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif
Year	4	1.59631383	0.3990785	0.5960	No
Classifications	4	9.23965421	2.3099136	3.4500	Yes
APV (covariate)	1	0.82039814	0.8203981	1.2253	No
Error	15	10.0432008	0.6695467		

Analysis of Variance Table: Public & Quasi-Public Land Use Types

$\alpha = .05$

Source	DF	Sum of Sqrs.	Mean Sqr.	F-Statistic	Signif
Year	4	28.6055867	7.1513967	0.4103	No
Classifications	4	933.776140	233.44403	13.3938	Yes
APV (covariate)	1	4.80230378	4.8023038	0.2755	No
Error	15	261.439390	17.429293		

APPENDIX G

NON-RESIDENTIAL LAND USE DATA

TABLE G.1

Quadrat	1960 Non-Residential Land Uses																				
	Commercial	Business	Wholesale	Non-Durable Mftg.	Durable Mftg.	Non-Mftg.	Communications	Public	Recreation	Hotel & Motel	Miscellaneous	Educational	Institutional	Cultural & Social	Local Govt.	Non-Local Govt.	Non-Profit Org.	Charitable Inst.	Churches & Cem.	Military	Other Public
1	63	75	3	3	1	8	0	5	0	0	21	0	0	0	0	1	1	0	3	0	0
2	26	138	1	7	5	3	0	2	0	0	18	0	1	0	0	0	1	0	0	0	0
3	74	46	0	2	2	0	0	7	0	1	17	2	2	3	0	0	0	0	0	0	0
4	33	42	4	1	20	6	0	3	0	0	11	1	1	1	0	0	0	0	0	0	0
5	6	30	1	3	3	3	0	6	0	0	10	1	2	1	0	0	2	0	0	0	0
6	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
7	1	9	0	0	0	0	0	3	0	0	1	2	0	0	0	0	0	0	1	0	0
8	14	12	0	0	0	0	1	5	0	1	0	1	0	0	0	0	0	0	4	0	0
9	18	97	5	6	16	40	0	14	1	0	44	5	2	0	1	0	4	0	2	0	0
10	30	38	0	7	2	6	0	5	0	0	10	0	1	0	0	0	1	0	3	0	0
11	15	58	2	1	0	1	0	7	0	0	4	2	1	0	0	0	3	0	1	0	0
12	9	16	0	0	2	1	0	6	0	0	0	2	0	0	0	0	1	0	3	0	0
13	32	136	11	6	40	46	0	6	1	0	53	0	1	0	0	0	2	0	3	0	0
14	3	21	1	1	7	2	0	2	0	0	5	0	1	0	0	0	0	0	1	0	0
15	39	60	1	2	5	4	0	3	0	0	8	1	0	0	0	0	0	0	2	0	0
16	6	8	0	1	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
17	22	80	5	2	5	3	0	4	0	0	5	1	1	0	0	0	1	0	1	0	0
18	4	61	3	2	20	14	0	4	0	0	35	1	0	0	0	0	1	0	2	0	0
19	15	47	1	3	6	3	0	9	0	0	13	2	0	0	0	0	6	0	1	0	0
20	6	28	0	2	1	7	0	2	0	0	2	1	1	0	0	0	0	0	0	0	0
21	1	46	2	3	5	1	0	5	0	0	9	2	2	0	0	0	0	0	1	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	43	97	2	11	27	13	0	3	0	0	19	0	2	0	0	0	0	0	1	0	0
24	10	81	0	4	9	10	0	1	0	0	22	1	0	0	0	0	0	0	0	0	0
25	19	79	2	2	8	7	0	5	0	0	18	2	1	0	0	0	0	0	2	0	0
26	0	28	0	0	0	1	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0
27	23	82	2	2	1	4	0	7	0	0	13	2	2	0	0	0	2	0	1	0	0
28	9	19	1	0	2	5	0	4	0	2	7	1	0	0	0	0	1	0	2	0	0
29	20	64	5	0	9	6	0	5	0	0	12	2	2	0	0	1	0	0	0	0	0
30	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
31	18	35	1	1	4	0	0	5	0	0	8	2	0	1	0	1	0	0	1	0	0
32	5	18	0	2	14	5	0	2	0	0	11	1	1	0	0	0	0	0	0	0	0
33	7	69	2	1	9	7	0	5	0	0	11	1	1	1	0	0	1	0	1	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	21	29	0	0	3	3	0	4	0	0	5	2	1	0	0	0	0	1	0	0	0
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

TABLE G.1, continued.

	1960 Non-Residential Land Uses																				
Quadrat	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
36	2	19	0	2	2	6	1	2	0	0	8	0	0	0	0	0	1	0	1	0	0
37	17	48	1	5	2	3	0	3	0	0	6	0	0	0	0	0	2	0	1	0	0
38	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
39	26	40	0	1	0	4	0	6	0	0	10	1	3	0	0	0	0	0	2	0	0
40	4	5	0	0	1	3	1	2	0	0	1	2	0	0	0	0	0	0	0	0	0
41	5	10	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	47	38	0	1	4	3	0	5	0	0	14	1	1	0	0	0	0	0	3	0	0
44	8	17	0	0	1	9	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0
45	32	33	0	1	0	1	0	5	0	0	2	3	0	1	0	0	0	0	1	0	0
46	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
47	5	10	0	0	2	3	0	1	0	0	2	0	0	0	0	0	1	0	0	0	0
48	2	5	3	1	4	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
49	36	66	1	8	2	6	1	6	1	0	23	0	0	0	0	2	2	0	2	0	0
50	2	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
51	2	10	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
52	1	2	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	11	3	0	0	2	6	0	4	0	1	0	1	1	0	0	0	0	0	2	0	0
55	10	10	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
57	5	14	0	0	1	0	0	2	0	1	0	1	0	0	0	0	0	1	0	0	0
58	15	16	0	0	0	2	0	2	0	1	4	0	0	0	0	0	0	0	2	0	0
59	7	8	0	0	0	2	0	2	0	0	0	1	0	0	0	0	1	0	0	0	0
60	2	1	1	0	0	0	0	3	0	0	1	0	0	0	0	0	2	0	1	0	0

TABLE G.2

Quadrat	1963 Non-Residential Land Uses																			
	Commercial	Business	Wholesale	Non-Durable Mftg.	Durable Mftg.	Non-Mftg.	Communications	Public	Recreation	Hotel & Motel	Miscellaneous	Educational	Institutional	Cultural & Social	Local Govt.	Non-Local Govt.	Non-Profit Org.	Charitable Inst.	Churches & Cem.	Military	Other Public
1	58	101	5	5	1	17	0	6	0	0	36	1	0	1	0	1	0	0	3	0	0
2	26	140	1	5	5	5	0	2	0	0	14	0	1	0	0	0	1	0	0	0	0
3	79	50	0	2	2	0	0	5	0	1	8	2	0	3	0	0	0	0	0	0	0
4	26	34	6	1	11	3	0	5	0	0	8	1	1	3	0	0	0	0	0	0	0
5	7	33	1	4	4	1	0	6	0	0	8	1	2	1	0	0	2	0	0	0	0
6	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
7	1	9	0	0	0	1	0	3	0	0	1	2	0	0	0	0	0	0	1	0	0
8	9	13	1	0	0	0	0	8	0	0	0	1	0	0	0	0	2	0	4	0	1
9	20	149	5	3	16	37	0	17	1	0	59	6	1	0	1	0	6	0	2	1	0
10	27	40	0	6	1	3	0	5	0	0	8	0	1	0	0	0	1	0	3	0	0
11	15	60	2	1	0	0	0	8	0	0	2	2	2	0	0	0	2	0	2	0	0
12	12	15	1	0	1	0	0	5	0	0	0	2	0	0	0	0	0	0	3	0	0
13	43	143	12	5	31	42	0	11	1	0	48	0	1	2	0	0	2	0	6	0	0
14	4	17	1	2	5	2	0	4	0	0	8	0	1	0	0	0	1	0	2	0	0
15	41	67	0	2	2	4	0	3	0	0	8	1	0	0	0	0	0	0	2	0	0
16	6	8	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	21	86	4	0	4	2	0	7	0	0	5	1	1	0	0	0	4	0	1	0	0
18	3	45	4	2	11	8	0	5	0	0	13	1	1	0	0	0	1	0	2	0	0
19	13	40	4	4	13	4	0	9	0	0	6	1	0	0	0	0	7	0	1	0	0
20	9	32	0	2	1	5	0	3	0	0	2	1	1	0	0	0	1	0	0	0	0
21	2	47	2	1	5	2	0	5	0	0	8	2	2	0	0	0	0	0	1	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	45	85	4	9	22	12	0	4	0	0	33	0	2	0	0	0	1	0	1	0	0
24	7	108	2	3	7	7	1	1	0	0	16	1	0	0	0	0	0	0	0	0	0
25	19	104	2	2	7	7	0	5	0	0	20	2	1	0	0	0	0	0	2	0	0
26	0	37	0	0	0	1	0	2	0	0	1	0	1	0	0	1	0	0	0	0	0
27	24	97	1	3	3	4	0	8	0	0	5	2	2	0	0	0	2	0	2	0	0
28	12	67	1	2	0	6	1	5	0	2	4	1	0	0	0	0	2	0	2	0	0
29	23	54	3	1	6	2	0	6	0	0	11	2	1	0	0	1	2	0	0	0	0
30	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
31	19	37	1	2	4	1	0	5	0	0	7	2	0	1	0	1	0	0	1	0	0
32	4	26	0	0	12	0	0	3	0	0	4	1	1	0	0	0	1	0	0	0	0
33	10	82	3	3	8	5	0	5	0	0	20	1	1	1	0	0	1	0	1	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	22	30	1	2	4	3	0	4	0	0	6	2	1	0	0	0	0	1	0	0	0
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

TABLE G.2, continued.

Quadrat	1963 Non-Residential Land Uses																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
36	2	39	1	0	1	2	1	1	0	0	10	0	0	0	0	0	0	0	1	0	0
37	16	56	2	9	3	2	0	4	0	0	8	1	0	0	0	0	2	0	1	0	0
38	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
39	22	59	0	0	0	3	0	5	0	0	16	1	2	0	0	0	0	0	2	0	0
40	3	5	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
41	5	11	0	0	1	0	0	2	0	0	2	0	1	0	0	0	0	0	1	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	51	43	0	2	1	0	0	6	0	0	13	2	1	0	0	0	0	0	3	0	0
44	10	14	0	0	0	3	0	1	0	0	4	1	0	0	0	0	0	0	0	0	0
45	29	32	1	0	1	2	0	7	0	0	3	4	0	1	0	0	1	0	1	0	0
46	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
47	5	11	0	0	3	3	0	2	0	0	2	1	0	0	0	0	1	0	0	0	0
48	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	37	76	1	10	2	8	1	6	1	1	19	1	0	0	0	2	2	0	1	0	0
50	1	1	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0
51	3	9	0	0	1	0	0	2	0	0	1	1	0	0	0	0	0	1	0	0	0
52	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	12	4	0	0	3	6	0	4	0	1	0	1	1	0	0	0	0	0	2	0	0
55	10	9	0	0	0	2	0	4	0	0	2	3	0	0	0	0	0	0	1	0	0
56	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
57	7	17	1	0	1	3	0	3	0	1	2	1	0	1	0	0	0	1	0	0	0
58	12	18	0	0	1	2	0	3	0	1	3	0	0	0	0	1	1	0	1	0	0
59	9	9	0	0	0	0	0	2	0	0	1	1	0	0	0	0	1	0	0	0	0
60	3	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0

TABLE G.3

Quadrat	1966 Non-Residential Land Uses																				
	Commercial	Business	Wholesale	Non-Durable Mftg.	Durable Mftg.	Non-Mftg.	Communications	Public	Recreation	Hotel & Motel	Miscellaneous	Educational	Institutional	Cultural & Social	Local Govt.	Non-Local Govt.	Non-Profit Org.	Charitable Inst.	Churches & Cem.	Military	Other Public
1	50	103	5	6	3	20	0	6	1	0	27	0	0	2	0	1	0	0	3	0	0
2	23	148	1	7	4	4	0	2	0	0	10	0	1	0	0	0	1	0	0	0	0
3	75	51	0	1	2	0	0	7	0	1	7	2	0	3	0	0	1	0	0	0	1
4	25	40	5	1	12	3	0	5	0	0	8	0	1	3	0	0	1	0	0	0	0
5	5	34	3	3	3	1	0	6	0	0	7	1	2	1	0	0	2	0	0	0	0
6	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
7	1	7	0	0	0	1	0	2	0	0	2	1	0	0	0	0	0	0	1	0	0
8	12	14	0	0	0	0	0	8	0	0	0	1	0	0	0	0	1	0	5	0	1
9	20	160	9	8	17	36	0	17	0	0	46	5	2	0	0	0	6	0	3	1	0
10	28	35	1	7	1	4	0	5	0	0	10	0	1	0	0	0	2	0	2	0	0
11	3	63	1	1	0	2	0	9	0	0	0	2	2	0	0	0	2	0	3	0	0
12	12	10	0	0	2	1	0	4	0	0	0	1	0	0	0	0	0	0	3	0	0
13	36	155	8	5	30	50	0	15	1	0	43	1	2	2	0	0	5	0	5	0	0
14	3	17	1	1	5	0	0	2	0	1	8	0	1	0	0	0	0	0	1	0	0
15	37	59	0	0	0	2	0	4	0	0	9	1	0	0	0	0	1	0	2	0	0
16	6	11	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	25	85	4	0	4	4	0	8	0	0	8	1	1	0	0	0	5	0	1	0	0
18	6	47	3	0	11	6	0	6	0	0	15	1	1	0	0	0	3	0	1	0	0
19	15	47	3	1	10	5	0	11	0	0	5	2	0	0	0	1	7	0	1	0	0
20	11	37	1	3	5	3	0	3	0	0	1	1	0	0	0	0	2	0	0	0	0
21	2	55	0	1	5	2	0	5	0	0	10	2	2	0	0	0	0	0	1	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	38	81	3	7	19	8	0	5	0	0	23	0	2	0	0	0	2	0	1	0	0
24	11	107	3	2	12	12	0	1	0	0	10	1	0	0	0	0	0	0	0	0	0
25	21	108	1	3	11	8	0	4	0	0	21	1	1	0	0	0	0	0	2	0	0
26	0	30	0	0	0	1	0	2	0	0	1	0	1	0	0	1	0	0	0	0	0
27	24	104	0	3	5	3	0	9	0	0	8	3	2	0	0	0	1	0	3	0	0
28	13	85	2	3	0	5	1	6	0	3	4	1	0	0	0	0	3	0	2	0	0
29	23	65	4	0	4	4	0	4	0	0	11	2	1	0	0	0	1	0	0	0	0
30	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
31	20	41	1	2	5	3	0	4	0	0	4	1	0	1	0	1	0	0	1	0	0
32	4	15	0	0	5	0	0	3	0	0	4	1	1	0	0	0	1	0	0	0	0
33	10	73	4	2	7	5	0	6	0	0	20	2	0	2	0	0	1	0	1	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	19	34	0	1	2	5	0	4	0	0	10	2	1	0	0	0	0	1	0	0	0
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

TABLE G.3, continued.

Quadrat	1966 Non-Residential Land Uses																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
36	6	45	0	5	2	6	0	1	0	0	12	0	0	0	0	0	0	0	1	0	0
37	16	62	2	8	3	3	0	4	0	0	8	1	0	0	0	0	2	0	1	0	0
38	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
39	24	57	0	0	1	1	0	6	0	0	13	1	2	1	0	0	0	0	2	0	0
40	3	6	0	1	0	0	0	3	0	0	0	2	0	0	0	0	0	0	1	0	0
41	3	11	0	0	1	1	0	2	0	0	2	0	1	0	0	0	0	0	1	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	49	35	0	2	0	0	0	7	0	0	14	2	2	0	0	0	0	0	3	0	0
44	8	14	0	1	0	4	0	2	0	0	5	1	1	0	0	0	0	0	0	0	0
45	26	39	1	0	1	3	0	6	0	0	6	2	0	1	0	0	2	0	1	0	0
46	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
47	5	14	0	0	1	3	0	2	0	0	1	1	0	0	0	0	1	0	0	0	0
48	6	7	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
49	34	92	3	11	4	16	0	8	1	1	14	2	0	0	0	2	2	0	1	1	0
50	0	2	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0
51	2	12	0	0	1	0	0	2	0	0	0	1	0	0	0	0	0	1	0	0	0
52	4	9	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	10	4	0	0	1	7	0	4	0	1	0	1	1	0	0	0	0	0	2	0	0
55	10	9	1	0	0	3	0	3	0	0	4	3	0	0	0	0	0	0	0	0	0
56	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
57	8	19	1	0	1	2	0	3	0	1	3	1	0	1	0	0	0	1	0	0	0
58	15	18	1	0	2	3	0	1	0	1	4	0	0	0	0	0	0	0	1	0	0
59	8	9	0	0	0	1	0	4	0	0	0	1	0	0	0	1	1	0	1	0	0
60	3	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0

TABLE G.4

Quadrat	1969 Non-Residential Land Uses																				
	Commercial	Business	Wholesale	Non-Durable Mftg.	Durable Mftg.	Non-Mftg.	Communications	Public	Recreation	Hotel & Motel	Miscellaneous	Educational	Institutional	Cultural & Social	Local Govt.	Non-Local Govt.	Non-Profit Org.	Charitable Inst.	Churches & Cem.	Military	Other Public
1	46	97	5	5	3	15	0	6	0	0	27	0	0	1	0	1	1	0	3	0	0
2	25	138	3	0	0	4	0	3	0	0	10	0	1	0	0	0	2	0	0	0	0
3	68	50	0	1	3	1	0	10	0	0	5	4	0	2	0	1	2	0	0	0	1
4	20	37	3	2	8	8	0	4	0	0	6	1	0	2	0	0	1	0	0	0	0
5	4	32	2	2	1	1	0	5	0	0	4	1	1	1	0	0	2	0	0	0	0
6	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
7	2	5	0	0	0	1	0	4	0	0	2	1	0	0	0	0	1	0	2	0	0
8	14	14	0	0	0	0	0	8	1	0	0	1	0	0	0	0	1	0	5	0	1
9	18	141	2	9	17	17	0	11	0	0	44	3	2	0	0	0	5	0	1	0	0
10	31	28	1	5	0	6	0	3	0	0	7	0	1	0	0	0	0	0	2	0	0
11	11	49	1	1	0	1	0	9	0	0	3	2	2	0	0	0	2	0	3	0	0
12	12	13	0	0	1	4	0	6	0	0	0	1	0	0	0	0	0	0	5	0	0
13	32	143	9	3	22	48	0	18	1	0	56	3	1	3	0	0	6	0	5	0	0
14	2	22	0	0	0	1	0	2	0	0	7	1	1	0	0	0	0	0	0	0	0
15	38	57	0	0	0	1	0	8	0	0	6	1	1	0	0	2	2	0	2	0	0
16	6	10	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	24	71	5	0	1	6	0	8	0	0	6	1	1	0	0	0	5	0	1	0	0
18	4	42	4	0	7	4	0	6	0	0	8	1	1	0	0	0	2	0	2	0	0
19	13	38	2	3	6	4	0	15	0	0	7	4	0	1	0	0	9	0	1	0	0
20	8	41	3	1	3	5	0	3	0	0	4	1	0	0	0	0	2	0	0	0	0
21	2	61	1	0	4	2	0	8	0	0	14	2	2	0	0	0	3	0	1	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	35	79	6	7	16	8	0	3	0	0	29	0	1	0	0	0	1	0	1	0	0
24	9	102	1	5	8	9	0	1	0	0	15	1	0	0	0	0	0	0	0	0	0
25	19	111	1	3	5	7	0	5	0	0	22	1	1	0	0	0	1	0	2	0	0
26	0	26	0	0	0	0	0	2	0	0	4	0	1	0	0	1	0	0	0	0	0
27	20	91	0	2	5	4	0	11	0	0	7	3	2	0	0	0	3	0	3	0	0
28	11	84	6	3	0	4	0	5	0	3	21	1	0	0	0	0	2	0	2	0	0
29	20	64	4	0	3	6	0	6	0	0	11	2	2	0	0	1	1	0	0	0	0
30	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
31	20	37	2	7	2	2	0	5	0	0	7	1	0	1	0	1	0	1	1	0	0
32	5	19	0	0	3	0	0	3	0	0	3	1	1	0	0	0	1	0	0	0	0
33	11	83	2	2	8	5	0	5	0	0	17	2	0	1	0	0	1	0	1	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	19	38	0	0	2	4	0	4	0	0	13	2	1	0	0	0	0	1	0	0	0
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

TABLE G.4, continued.

Quadrat	1969 Non-Residential Land Uses																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
36	6	43	0	3	3	12	0	2	0	0	12	1	0	0	0	0	0	0	1	0	0
37	13	52	0	2	2	4	0	2	0	0	11	1	0	0	0	0	0	0	1	0	0
38	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
39	20	56	0	0	5	2	0	4	0	0	12	1	2	0	0	0	0	0	1	0	0
40	4	8	0	2	0	0	0	3	0	0	2	2	0	0	0	0	0	0	1	0	0
41	3	7	0	0	0	1	0	1	0	0	2	0	0	0	0	0	0	0	1	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	43	41	0	2	0	0	0	6	0	0	15	2	1	0	0	0	0	0	3	0	0
44	9	14	0	1	0	2	0	2	0	0	4	1	1	0	0	0	0	0	0	0	0
45	27	64	1	0	0	4	0	5	1	0	4	1	0	1	0	0	2	0	1	0	0
46	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
47	5	16	0	0	1	2	0	2	0	0	2	1	0	0	0	0	1	0	0	0	0
48	11	9	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
49	37	89	0	12	2	16	0	6	1	1	11	1	0	0	0	1	2	0	1	1	0
50	0	4	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0
51	2	14	0	0	1	0	0	2	0	0	2	1	0	0	0	0	0	1	0	0	0
52	3	12	0	0	1	0	0	2	0	0	0	0	1	0	0	0	0	0	1	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	8	7	0	0	1	4	0	3	0	1	2	1	0	0	0	0	0	0	2	0	0
55	8	16	1	0	2	3	0	2	0	0	5	2	0	0	0	0	0	0	0	0	0
56	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
57	8	23	1	0	0	3	0	3	0	1	8	1	0	1	0	0	0	1	0	0	0
58	17	19	0	0	1	3	0	2	0	1	3	1	0	0	0	0	0	0	1	0	0
59	8	7	0	0	0	1	0	4	0	0	0	1	0	0	0	1	1	0	1	0	0
60	3	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0

TABLE G.5

Quadrat	1972 Non-Residential Land Uses																				
	Commercial	Business	Wholesale	Non-Durable Mftg.	Durable Mftg.	Non-Mftg.	Communications	Public	Recreation	Hotel & Motel	Miscellaneous	Educational	Institutional	Cultural & Social	Local Govt.	Non-Local Govt.	Non-Profit Org.	Charitable Inst.	Churches & Cem.	Military	Other Public
1	49	76	5	3	0	14	0	10	0	0	17	1	3	0	0	1	2	0	3	0	0
2	21	79	1	0	0	5	0	5	0	0	6	2	1	0	1	0	1	0	0	0	0
3	60	31	0	0	2	0	0	8	0	0	6	3	0	2	0	1	0	0	1	0	1
4	23	39	2	2	7	6	0	1	0	0	9	0	0	1	0	0	0	0	0	0	0
5	5	24	2	0	0	0	0	5	0	0	4	1	1	2	0	0	1	0	0	0	0
6	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
7	2	4	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0	2	0	0
8	10	9	0	0	0	0	0	11	1	0	0	1	0	0	1	0	2	0	7	0	0
9	23	126	0	7	9	13	0	6	0	0	43	3	1	0	0	0	1	0	1	0	0
10	21	27	1	4	1	3	0	4	0	0	6	0	1	0	0	0	0	0	3	0	0
11	14	36	1	1	0	1	0	7	0	0	0	2	1	0	0	0	2	0	2	0	0
12	12	13	0	0	0	1	0	5	0	0	0	1	0	0	0	0	0	0	4	0	0
13	35	111	9	3	24	53	0	22	1	0	50	4	1	4	0	0	5	0	8	0	0
14	1	17	0	1	0	1	0	2	0	0	3	0	2	0	0	0	0	0	0	0	0
15	34	48	0	0	0	1	0	6	0	0	9	1	1	0	0	1	1	0	2	0	0
16	3	8	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	24	52	5	0	1	1	0	11	0	0	9	0	1	0	0	0	8	0	2	0	0
18	2	33	3	0	7	5	1	5	0	0	6	0	2	0	0	0	1	0	1	0	1
19	10	35	3	2	5	2	0	6	0	0	5	1	0	0	0	0	4	0	1	0	0
20	10	29	2	1	2	4	0	3	0	0	2	1	0	0	0	0	2	0	0	0	0
21	2	47	0	0	6	4	0	9	0	0	12	2	2	0	0	0	4	0	1	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	22	61	7	8	13	3	0	2	0	0	23	0	1	0	0	0	0	0	1	0	0
24	7	70	0	4	7	12	0	4	0	0	10	1	2	0	0	0	1	0	0	0	0
25	19	90	0	3	3	9	0	6	0	0	23	1	1	0	0	0	2	0	2	0	0
26	0	16	0	0	0	0	0	2	0	0	0	0	1	0	0	0	1	0	0	0	0
27	16	64	1	3	5	3	0	11	0	0	10	3	0	0	0	0	4	0	4	0	0
28	9	77	6	4	1	9	1	4	0	3	20	1	0	0	0	0	1	0	2	0	0
29	20	59	6	0	2	4	0	6	0	0	15	2	2	0	0	1	1	0	0	0	0
30	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
31	17	29	2	3	1	4	0	5	0	0	9	1	0	1	0	1	0	1	1	0	0
32	7	11	0	1	2	0	0	3	0	0	2	1	1	0	0	0	1	0	0	0	0
33	17	77	1	2	5	8	0	5	0	0	18	2	0	0	0	0	2	0	1	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	19	33	0	0	3	3	0	4	0	0	11	2	1	0	0	0	0	1	0	0	0
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

TABLE G.5, continued.

	1972 Non-Residential Land Uses																				
Quadrat	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
36	6	39	0	2	4	9	0	4	0	0	10	1	0	0	0	0	2	0	1	0	0
37	14	47	1	3	2	3	0	4	0	0	11	1	0	0	0	0	2	0	1	0	0
38	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
39	22	51	0	1	3	1	0	5	0	0	14	2	2	0	0	0	0	0	1	0	0
40	5	9	0	1	2	0	0	3	0	0	0	2	0	0	0	0	0	0	1	0	0
41	4	9	0	0	0	1	0	1	0	0	2	0	0	0	0	0	0	0	1	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	42	36	0	2	1	0	0	5	0	0	13	2	1	0	0	0	0	0	2	0	0
44	6	13	0	1	0	2	0	3	0	0	5	2	1	0	0	0	0	0	0	0	0
45	23	44	1	1	0	4	0	7	1	0	3	2	0	2	0	0	2	0	1	0	0
46	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
47	7	12	0	0	0	2	0	3	0	0	3	1	1	0	0	0	1	0	0	0	0
48	10	8	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0
49	37	86	1	12	4	20	0	7	1	1	18	1	0	0	0	2	2	0	1	1	0
50	0	4	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0
51	1	14	0	0	1	0	0	2	0	0	4	1	0	0	0	0	0	1	0	0	0
52	3	11	0	0	1	1	0	3	0	0	0	1	1	0	0	0	0	1	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	9	5	0	0	1	2	0	3	0	1	1	1	0	0	0	0	0	0	2	0	0
55	9	12	0	0	2	3	0	2	0	0	5	2	0	0	0	0	0	0	0	0	0
56	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
57	11	35	1	0	0	6	0	3	0	1	8	1	0	1	0	0	0	1	0	0	0
58	15	19	0	0	2	3	0	3	0	1	3	1	0	0	0	1	0	0	1	0	0
59	6	8	0	0	0	2	0	4	0	0	0	1	0	0	0	1	1	0	1	0	0
60	3	3	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0

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