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RESIDENTIAL MOBILITY OF SELECTED SCHOOL
FAMILIES IN PITTSBURGH, PENNSYLVANIA, 1966-1969.

University of Pittsburgh, Ph.D., 1971
Geography

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RESIDENTIAL MOBILITY OF SELECTED SCHOOL FAMILIES
IN PITTSBURGH, PENNSYLVANIA, 1966-1969

by

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

x

I. INTRODUCTION

We Americans live in a highly mobile society. In the last de-
cade, approximately nineteen percent of the population of the United
States changed residence annually.[1] This large volume of movement is a
function of a complex set of factors which vary in importance relative
to various types of movement. For example, intercity moves may reflect
in large measure a response to economic opportunity, while intracity
moves may reflect individual or family adjustments to housing, neighbor-
hood, or accessibility needs.

In an attempt to understand the processes and patterns of resi-
dential change, researchers have given a great amount of attention to
the migration phenomenon, i.e., the relatively long-distance moves be-
tween cities, regions, or countries.[2] These research efforts have pro-
duced an impressive body of empirical findings and a modest amount of
theoretical development. In contrast, much less attention has been giv-
en to residential mobility within urban areas, and consequently far less
is known concerning processes and patterns of residential change at this
level.[3] This neglect of residential mobility is not due to an unawareness

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[1]U. S. Bureau of the Census, _Current Population Reports_, Series
P-20, No. 193, "Mobility of the Population of the United States: March
1968 to March 1969," (Washington: U. S. Government Printing Office, 1969),
p. 7.

[2]The United States Bureau of the Census restricts the term "migra-
tion" to residential change that involves crossing county lines.

[3]The term "residential mobility" is defined here simply as house-
holds' semi-permanent or permanent changes of residence.

1

or disinterest on the part of researchers, but rather to the absence of
sufficiently detailed data on residential mobility for areas smaller
than counties. Beginning with the 1950 U. S. Census of Population, data
concerning residential movement between the central cities and suburban
rings of metropolitan areas have been provided in some detail, but at
the census tract level this only includes selected in-movement data.

Some progress has been made in understanding mobility processes
and patterns in spite of serious data limitations. Social scientists
generally recognize that intraurban mobility effects changes in the de-
mographic and socio-economic structures[1] of areas,[2] and conversely, that
these structural characteristics of areas tend to influence in- and out-
mobility. Thus, residential mobility modifies and is in turn influenced
by the structural fabric of urban areas. In this context, one of the
needs is for greater understanding of the types and relative importance
of structural factors that are associated with intraurban residential
change.

The major objective of this study is to identify the relation-
ships between mobility rates and the demographic, socio-economic, and
other characteristics of subareas in the city of Pittsburgh. Although
earlier studies have indicated the multivariate nature of the relation-
ships between residential movement and the structural characteristics of
areas, there have been relatively few attempts to explore these relations

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[1]The term "structure" is defined on page 13.

[2]The term "area" refers to subunits of any size within a city or
metropolitan center. The terms area and subarea are used interchange-
ably in this study.

in a multivariate framework at the scale of a large urban center.

As indicated, the study focuses on residential mobility in Pittsburgh, Pennsylvania, and it is limited in scope to intracity residential changes only. The basic areal units, representing the level of data aggregation, are Pittsburgh Public Elementary School Districts. The population of interest in the school districts is comprised of a subset of school families who were living in the city at both ends of the timeperiod of interest which began in September 1966 and ended in March, 1969.

A. Study Outline

In Chapter II, previous mobility research in the United States is reviewed. Attention is given to the findings and methodology of past studies, and the need for additional research is emphasized.

The first three sections of Chapter III involve a consideration of the conceptual framework which includes (1) the magnitude of mobility, (2) the focus on spatial structure, and (3) the statement of the research problem. Following this, the study area, the basic observational units, the population of interest, and the data are described.

Chapter IV focuses on the specification of the raw-data models, the derivation of hypotheses, and the selection of criteria for testing hypotheses.[1]

In Chapter V, the attention shifts to the overall intensity and

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[1]The term "raw-data" is used in this study to identify the models which are comprised of the original variables, and to distinguish them from the component models which are comprised of component variables.

variation of mobility as measured by six different indices.[1] Also, correlations between the mobility indices are discussed relative to similarities and differences in them. Finally, maps depicting the spatial pattern of each of the indices are compared to show spatial similarities and differences in the mobility patterns.

The verification of the raw-data models is considered in Chapter VI. Output for each model, derived from a stepwise multiple regression analysis, is analyzed.

In Chapter VII, a further step in the analyses is taken in the form of a modified approach. This approach, which involves the use of correlation, principal components, and Varimax rotation multivariate statistical techniques, derives from the original variables a new set of statistically independent variates which are then used as predictors of mobility. After hypotheses are formulated for the new variables, the component models are evaluated. A summary of findings concludes the chapter.

Chapter VIII presents the conclusions of the study and ends with suggestions for future research.

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[1]These indices are specified and defined on pages 29-31.

II. REVIEW OF THE LITERATURE

Previous mobility research in the United States may be divided into two periods, the pre-1950 and post-1950, because 1950 was the first time that the U. S. Census of Population provided data on intracounty moves.

A. Research Prior to 1950

Prior to the 1950 Census almost all research on intraurban residential change in the United States was concerned to some degree with the measurement of mobility rates.[1] This was necessitated by the absence of published mobility data which caused researchers to develop their own measures. Studies conducted at different times and for different places reported a wide range of mobility rates. These temporal and spatial rate differentials as well as differences in respect to other findings were due, at least in part, to the use of a large variety of data sources each of which contained some form of bias.[2] One point of significance is the fact that some of the studies reported marked areal variation of movement rates within cities. For example, in his study of selected tracts in Columbus, Ohio, McKenzie found that the mobility rates, which were based on the proportion of voters failing to re-register, varied between 22.0 and 69.0

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[1]For an excellent comprehensive review and analysis of mobility see: James W. Simmons, "Changing Residence in the City, a Review of Intraurban Mobility," *The Geographical Review,* 58, No. 4 (1968), 622-51.

[2]Sidney Goldstein, *Patterns of Mobility, 1910-1950: The Norristown Study* (Philadelphia: Univ. of Pennsylvania Press, 1958), pp. 3-5.

5

percent.[1] In respect to the actual spatial patterning of rates, he noted a concentration of high rates in the center of the city and lower rates in the outlying areas. Although this marked variation in intracity mobility rates was observed in several studies, very little research was undertaken concerning the factors which produced the distribution of such rates.[2]

In the 1920's and 1930's, sociologists, particularly those associated with the University of Chicago, accounted for a large part of the research on mobility.[3] In the main, they focused on the relationships between residential mobility and social and personal disorganization. In general, residential mobility was considered to be one of the causes of various social problems such as broken homes, delinquency, and other forms of deviant behavior. Of particular importance is the fact that these sociologically oriented studies all pointed to the multivariate nature of the relations between residential mobility on the one hand and various indices of the demographic and socio-economic structure of the cities on the other. Cowgill, for example, found negative associations between residential mobility and socio-economic status, an index of family life, the percentage of dwellings which were single-family structures, and with home

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[1]Roderick D. McKenzie, "The Neighborhood," American Journal of Sociology, 27 (1921), 162; see also, Earl T. Sullenger, "Intra-Urban Mobility," Sociology and Social Research, 17 (1932), 16.

[2]See for example, Howard Wipple Green, Movement of Families within the Cleveland Metropolitan District, Cleveland: Real Property Inventory, Reports Number 3 (1934), 5 (1935), 7 (1936), 9 (1937), and 11 (1938).

[3]Ernest W. Burgess and Robert E. Park, The City (Chicago: The Univ. of Chicago Press, 1925).

ownership; and he found a positive relationship with percent Negro.[1] Although evidence pointed to the complex nature of associations, the researchers were limited to deriving simple pairwise correlations due to computational constraints. This barrier was removed with the advent of the computer.

B. The Post-1950 Period

In the post-1950 period, Rossi's work on mobility in Philadelphia stands as a major contribution in the study of the mobility process, although his study lacks generality because of the rather limited population that was sampled.[2] His approach focused on individual households that were sampled from four relatively small areas in the city. In his conclusions he identifies several factors as being important in relation to the mobility behavior of individuals. These were the life cycle of the household (i.e., age, and family size), home ownership, and social and physical aspects of the neighborhood environment.[3] Rossi's main conclusion was, "Mobility is the mechanism by which a family's housing is brought into adjustment to its housing needs."[4] This emphasizes the importance of changing housing needs at different stages of the life cycle.

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[1]Donald O. Cowgill, "Residential Mobility of an Urban Population," Unpublished Master's Thesis, Washington University, St. Louis, 1935, p. 50.

[2]Peter H. Rossi, _Why Families Move_ (Glencoe, Illinois: The Free Press, 1955).

[3]Ibid., pp. 177-79.

[4]Ibid., p. 178.

A more recent study sponsored by the American Association of State Highway Officials in cooperation with the Bureau of Public Roads, confirms Rossi's findings and provides additional insights into the mobility behavior of metropolitan households.[1] They found no significant attitudinal differences between planned movers and stayers in regard to accessibility to services and amenities such as grocery facilities, a shopping center, an elementary school, and parks and playgrounds.[2] Another finding of interest was that, in the aggregate, metropolitan households tend to rank neighborhood quality over housing quality or accessibility.[3] Some neighborhood quality factors considered were the general appearance of the street, condition of dwelling units, noise level, traffic, and land use.[4] This study is similar to Rossi's in its concern with preferences and attitudes of individual decision makers, but it differs in the size of its sample, drawn from forty-three metropolitan areas across the United States. Both studies were essentially aspatial in approach with neither of them considering the intraurban spatial distribution of mobility rates.

Concern with the spatial pattern of mobility rates was paramount

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[1]Edgar W. Butler et al., _Moving Behavior and Residential Choice: A National Survey_, National Cooperative Highway Research Program Report 81 (Wash., D. C.: Highway Research Board, 1969).

[2]Ibid., p. 3.

[3]Ibid., p. 2.

[4]Ibid., p. 2.

in a recent study by Moore.[1] In using the ecological approach,[2] he studied the mobility pattern of a relatively large area in Brisbane, Australia. The basic thesis of his study was that the spatial pattern of residential mobility within the city is to be understood in terms of the total structure of the urban area, with particular emphasis being placed on the spatial component of that structure.[3] Moore used various indices of demographic and socio-economic characteristics of areas as independent variables in a linear regression model to predict area-specific mobility rates. His findings were consistent with those of previous researchers.

The ecological approach was also used in a very recent study by Brown and Longbrake of intraurban mobility in Cedar Rapids, Iowa.[4] Forty-eight socio-economic areal characteristics were factor analyzed and five significant socio-economic components were identified. Factor scores were then used as predictors in stepwise regression models. The reasons given for using this approach were that the forty-eight variables were neither statistically independent of one another nor did they comprise a data set of easily manageable proportions.

In sum, many research efforts before and after 1950 have been

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[1] Eric G. Moore, "Residential Mobility in an Urban Context: A Systems Approach," Unpublished Dissertation, University of Queensland, Australia, 1966.

[2] An ecological approach involves the study of group or areal characteristics by focusing on variation among units at some level of aggregation above the individual.

[3] Ibid., p. xiv.

[4] Lawrence A. Brown and David B. Longbrake, "Migration Flows in Intraurban Space: Place Utility Considerations," Annals of the Association of American Geographers, 60, No. 2 (June 1970) 368-84.

predominantly inductive and have produced a few generalizations. In contrast, the development of theories concerning the mobility phenomenon has been extremely limited. Although some relatively sophisticated rationales have been suggested, none has been tested empirically because of the unavailability of data and the difficulty in measuring and testing abstract concepts.[1] Wolpert's work on decision-making in residential mobility has not been tested empirically largely because of a lack of an operational definition of "place utility."[2] Thus, continued theoretical development and continued empirical investigation are greatly needed.

C. The Need for Additional Research

In brief, several points can be made concerning previous ecological studies of intraurban mobility which indicate the need for additional research.

(A) Studies have clearly indicated that different intensities of mobility are manifest within city and metropolitan areas. Yet, there has been little systematic study of this phenomenon.

(B) Although studies have clearly shown the multivariate nature of the relations between residential change and other environmental dimensions, there have been relatively few studies that have used multivariate techniques to analyze the complex set of relationships.

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[1] Julian Wolpert, "Behavioral Aspects of the Decision to Migrate," _Papers and Proceedings of the Regional Science Association_, 15 (1965), 159-69; see also, F. Stuart Chapin, Jr., "Activity Systems and Urban Structure: A Working Schema," _Journal of the American Institute of Planners_, 34, No. 1 (Jan. 1968), 11-18.

[2] Ibid., p. 161.

(C) In the past, attention has been focussed on only a limited number of mobility indices. Little or no attention has been given to intra-area movement rates, i.e., rates that reflect the residential change within subareas of an urban center over some given period of time.

(D) Relatively few studies which have used aggregated data have given attention to educational attainment, race, and quality of environment in studying intraurban mobility.

III. CONCEPTUAL FRAMEWORK AND EMPIRICAL SETTING

A. Magnitude of Mobility

One of the basic dimensions of mobility is magnitude.[1] It is
defined as the number of moves made by some specified population over
some given time interval. If the move is considered as an attribute of
an area, then the magnitude of movement may be considered in relation to
the two end-points of the move, the origin and the destination. Thus,
it is possible to measure the magnitudes of various types of movement
such as in-movement, out-movement, and within-area movement, or various
combinations of these such as the generation of movement which includes
both out- and within-area movement. Given the availability of data for
a collection of subareas within an urban center, it is then possible to
study a variety of spatial distributions, each of which reflects the mag-
nitude of a different index of movement.

Most previous research dealing with the magnitude of mobility
has been largely limited to in-, out-, and net-movement. Past emphasis
on these indices to the exclusion of others is mostly attributable to
data limitations. One problem inherent in the above indices is the fact
that area specific rates for these types of movement are partially a func-
tion of the size of area.[2] For example, the out-movement rate for a

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[1]Moore, _Residential Mobility in an Urban Context: A Systems
Approach_, p. 66.

[2]Gunnar Olsson, _Distance and Human Interaction: A Review and
Bibliography_, Bibliography Series Number Two (Philadelphia: Regional
Science Research Institute, 1965), pp. 28-29.

12

large areal unit is apt to be somewhat less than that of a small areal
unit because the moves from the former must cover a longer distance than
those from the latter.

This problem of an areal bias in certain measures of mobility is
generally recognized, although no solution to the problem has been found.
It may be seen, then, that a need exists to consider other measures of
mobility which do not reflect the bias of variation in areal size. To
this end, other measures of mobility, namely generation, attraction, and
turnover, are also examined in this study.

B. Focus on Spatial Structure

The study of the spatial pattern of intraurban mobility requires
the disaggregation of the total urban area into a set of areal sub-units.
In this context, moves may be considered as attributes of areas, and are
referred to as "area-specific" rates. The collection of area-specific
rates constitutes a spatial distribution or an element of total spatial
structure. The term "structure" denotes the totality of social and phys-
ical phenomena which are integrated in urban space at any given point in
time.[1] The basic components of structure are people, facilities, and

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[1]The following sources were helpful in formulating the definition
of structure: Melvin M. Webber et al., Explorations into Urban Structure
(Philadelphia: Univ. of Pennsylvania Press, 1964), pp. 21-108; F. Stuart
Chapin, Jr., Urban Land Use Planning (Urbana: Univ. of Illinois Press,
1965), pp. 75-90; Anne Buttimer, "Social Geography," International Ency-
clopedia of the Social Sciences, ed. David L. Sills, VI (1968), 134-45;
and Frank E. Horton and David R. Reynolds, "Effects of Urban Spatial Struc-
ture on Individual Behavior," Economic Geography, 47, No. 1 (January 1971)
pp. 36-37.

linkages. A concern with urban "spatial structure" may involve composition (types and quantities of components in space), form (pattern or arrangement of components in space), and integration (the functional interdependencies of components in space).

The analysis of the spatial distribution of moves may provide answers to the following questions. Do movement rates increase or decrease with increasing distance from the city center? Are areas of high, medium, or low movement intensity randomly dispersed throughout the urban area, or do areas with approximately the same movement intensity tend to cluster? Answers to questions such as these provide an initial step in the analysis of residential change.

At a higher level of complexity, the observed pattern of residential change may be analyzed in accordance with other components of urban structure such as housing, neighborhood, schools, and population. Thus, attention may be given to the collection of spatial distributions, which are comprised of the components of interest, and their relationship to the spatial distribution of movement rates. This approach to identifying the spatial correlates of residential change is based on the assumption that areal movement rates are dependent on both environmental conditions within areas and the socio-economic and demographic characteristics of areas' populations which react to those environments.[1]

1. Ecological Correlation

The structural approach of this study is based on aggregate data

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[1]Eric G. Moore, "Intraurban Residential Mobility and Urban Spatial Structure," Paper presented at the Annual Meeting of the Population Association of America in April, 1970, p. 10.

from which ecological correlations may be derived. It is generally recognized that one cannot infer individual behavior from ecological correlations. With but few exceptions, to make such an inference is to commit the ecological fallacy. This point was formally stated by Robinson in 1950, but it is now generally recognized that he overstated his case in suggesting that ecological correlations should be used only as substitutes for individual level correlations.[1] Menzel, in commenting on Robinson's paper, suggested that ecological correlations may provide information about areas or territories that may enhance the interpretation of the phenomenon being studied.[2] Many other scholars agree that the ecological approach is not just a substitute for individual-level analysis, but rather a valid approach in its own right.[3]

Although the focus on areal aggregates does not permit the direct study of individual behavior, it can be indirectly suggestive of movement propensities of variously defined sub-groups of the areal aggregates.

C. Statement of the Problem

In pursuing the structural approach as outlined above, the primary objective of this study is to identify the relationships between spatial

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[1] William S. Robinson, "Ecological Correlations and the Behavior of Individuals," American Sociological Review, 15 (1950), 351-57.

[2] Herbert Menzel, "Comment on Robinson's 'Ecological Correlations and the Behavior of Individuals'," American Sociological Review, 15 (1950), 674.

[3] For a comprehensive treatment of this issue see: Mattei Dogan and Stein Rokkan, eds., Quantitative Ecological Analysis in the Social Sciences (Massachusetts: The MIT Press, 1969).

distributions of area-specific mobility rates and spatial distributions

of selected environmental characteristics. In other words the research

problem is: To what extent is spatial variation of six mobility indices

a function of selected population, housing, and other environmental fac-

tors? The six mobility indices or dependent variables of interest are:

generation, out-movement, within-area movement, attraction, in-movement,

and turnover.[1] The explanatory variables or the three classes of areal

characteristics referred to in the problem statement consist of the fol-

lowing sets of variables:

(a) the population characteristics which include age of head of

household, family size, income of household, race, educational attain-

ment of head of household, and mother as head of household;

(b) the housing characteristics which include condition of hous-

ing, housing space, and tenure status;

(c) the other environmental characteristics which include age of

school buildings, teacher-pupil ratio, industrial acreage, and distance

which is used as a surrogate for outdoor space.

The research problem was formulated so that it would specifically

direct attention towards satisfying, at least partially, the research

needs specified in Chapter II. Underlying these needs, of course, are

the implicit objectives of strengthening the existing body of empirical

generalizations and of expanding this body of generalizations which re-

lates to the mobility phenomenon.

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[1]Definitions for these mobility terms are given in Section A,
Chapter IV.

D. The Study Area

The study area is the City of Pittsburgh (Figure 1).[1] Within

the city limits lies one independent political entity, the Borough of

Mt. Oliver, which is also included in the study. Three major rivers flow

within the incorporated limits of the city and trisect it into three ma-

jor areas: the North Side, which is the area that lies north of the Ohio

and Allegheny Rivers; the East Side, which is the area that lies between

the Allegheny and Monongahela Rivers; and the South Side, which is the

area that is south of the Ohio and Monongahela Rivers. From the Point,

where the Allegheny and Monongahela Rivers join, the city spreads out

in all directions.

Pittsburgh is not atypical in comparison to other major American

cities with its diversity of commercial, institutional, and industrial

functions, of demographic composition, and of socio-economic strata. Nor

is it atypical in respect to its problems of pollution, urban blight, pop-

ulation decline, and racial tensions. Given these commonalities and the

fact that most if not all of them are related to the mobility process in

one way or another, it is likely that the findings of this study will apply,

at least partially, to other major cities.

1. Basic Observational Units

Pittsburgh Elementary School Districts are the basic observational

units of the study (Figure 1, and Table 1). These eighty-eight districts,

major parks, cemeteries, and water works area account for the total area

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[1]Table 1 provides the names for the abbreviations used on the
map.

Figure 1

THE STUDY AREA
PITTSBURGH, PENNSYLVANIA
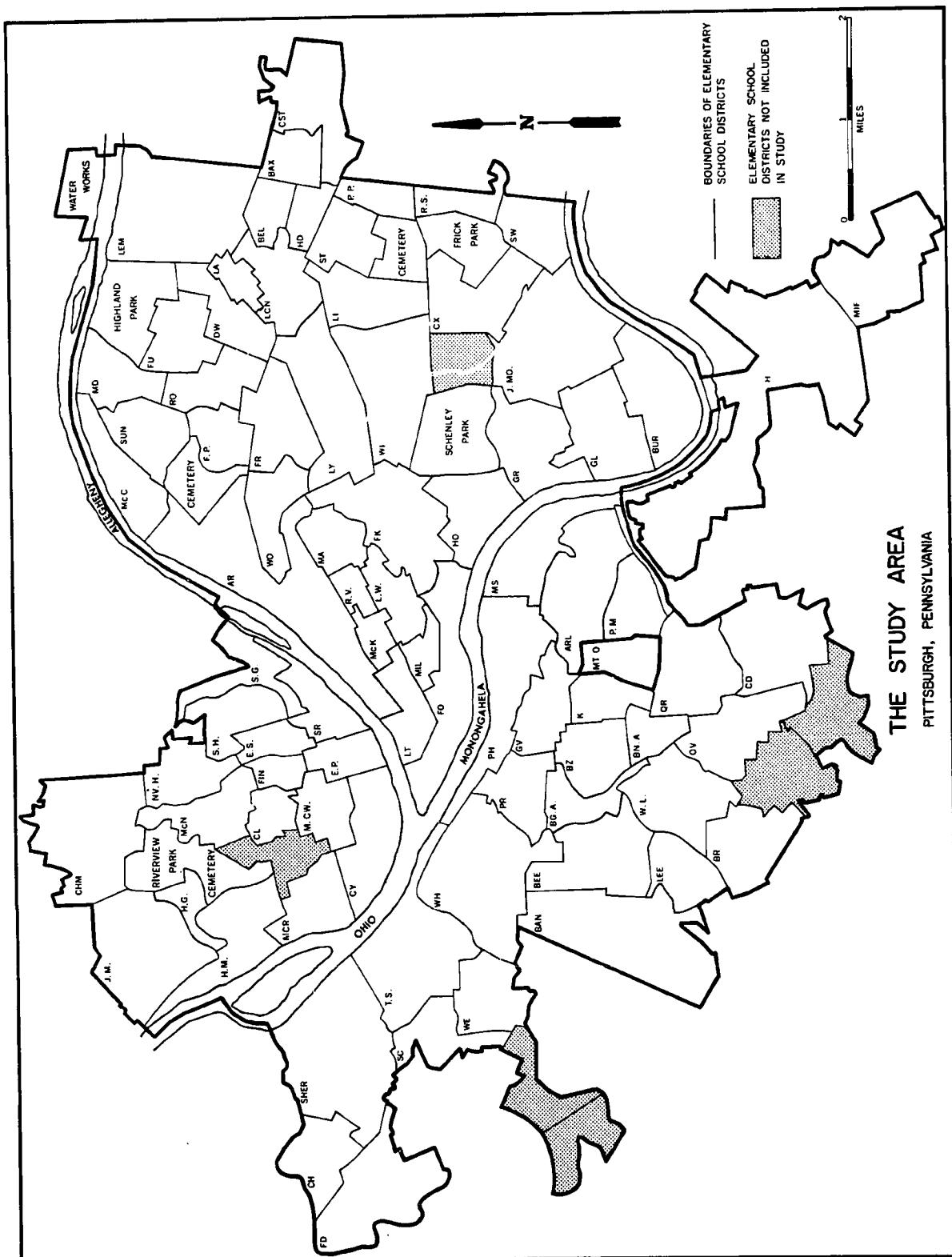
TABLE I

LIST OF ABBREVIATIONS USED IN FIGURE 1

Abbre- viation		Elem. School District	Abbre- viation		Elem. School District
AR	-	Arsenal	FD	-	Fairywood
ARL	-	Arlington	FIN	-	Fineview
BAN	-	Banksville	FK	-	Frick
BAX	-	Baxter	FO	-	Forbes
BEE	-	Beechwood	F. P.	-	Fort Pitt
BEL	-	Belmar	FR	-	Friendship
BG. A	-	Boggs Avenue	FU	-	Fulton
BN. A	-	Bon Air	GL	-	Gladstone
BR	-	Brookline	GR	-	Greenfield
BUR	-	Burgwin	GV	-	Grandview
BZ	-	Beltzhoover	H	-	Hays
CD	-	Concord	HD	-	Homewood
CH	-	Chartiers	H. G.	-	Halls Grove
CHM	-	Chatham	H. M.	-	Horace Mann
CL	-	Clayton	HO	-	Holmes
CST	-	Crescent	J. M.	-	John Morrow
CX	-	Colfax	J. MD.	-	John Minadeo
CY	-	Conroy	K	-	Knoxville
DW	-	Dilworth	LA	-	Larimer
E. P.	-	East Park	LCN	-	Lincoln
E. S.	-	East Street	LEE	-	Lee

TABLE 1

LIST OF ABBREVIATIONS USED IN FIGURE 1

Abbre-viation		Elem. School District	Abbre-viation		Elem. School District
LEM	-	Lemington	PR	-	Prospect
LI	-	Linden	QR	-	Quentin Roosevelt
LT	-	Letsche	RO	-	Rogers
LY	-	Liberty	R. S.	-	Regent Square
L. W.	-	L. Weil	R. V.	-	R. Vann
MA	-	Madison	SC	-	Schaeffer
MO	-	Morningside	S. G.	-	Spring Garden
McC	-	McCleary	S. H.	-	Spring Hill
McK	-	McKelvy	SHER	-	Sheraden
McN	-	McNaugher	SR	-	Schiller
McR	-	Manchester	ST	-	Sterrett
M. CW.	-	M. Cowley	SUN	-	Sunnyside
MIF	-	Mifflin	SW	-	Swisshelm
MIL	-	Miller	T. S.	-	T. Stevens
MS	-	Morse	WE	-	Westwood
MT. O.	-	Mt. Oliver	WH	-	Whittier
NV. H.	-	Northview Heights	WI	-	Wightman
OV	-	Overbrook	W. L.	-	West Liberty
PH	-	Phillips	WO	-	Woolslair
P. M.	-	P. Murray			
P. P.	-	Park Place			

of the city. In terms of areal size, the school districts are about twice the size of census tracts. Originally, it was intended to include all eighty-eight school districts in the study; however, five were deleted because it was impossible to delimit populations comparable to those of the other school districts, and one other because of excessive missing data.[1] It is assumed that the deletion of the six school districts, which left a remainder of eighty-two for analysis, has introduced no bias into the study.

A question naturally arises concerning the relevance of the size of the basic areal units in respect to this research. Previous research and methodological discussion have not resolved the problem concerning the optimal size of areal units for studies dealing with aggregated data. In the past, the size of areal units has generally been determined large-ly on the basis of data availability; this study is no exception. Al-though areal units smaller than the proposed school districts would have been preferable from an analytical standpoint, they could not be delimit-ed because of data constraints. On the other hand, although larger units could have been delimited consistent with the available data, they would have been much more heterogeneous in terms of population and other char-acteristics, and thus more difficult to analyze. It should be noted, that only subset populations, which are homogeneous in terms of life-cycle stage, of the elementary school districts are of basic interest to this study. Consequently, this tends to negate the adverse effects of the

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[1]The elementary school districts deleted from the study are: Carmalt, Columbus, Davis, E. Carnegie, Fairview, and Oakwood.

relatively large areal extent of the school districts. In addition, the
use of school districts as basic observational units is justified, in
part, in that the population of interest is comprised of only school fam-
ilies whose mobility behavior may be related to particular variables, such
as age of school or pupil-teacher ratio, that are relevant to these areal
units.

2. Population of Interest

The population of interest consists of a subset of the total pop-
ulation of school families who were residing in Pittsburgh at the end
points of the time period of interest, September 1966 to March 1969. The
composition of the subset differs slightly from 1966 to 1969.

The 1966 set of school families is comprised of 2973 households, ob-
tained by summing entries (a) and (b) of Table II. Thus, 2918 households
had their oldest child attending one of grades three through six of a pub-
lic elementary school in the 1968-69 school year,[1] and also had their old-
est child enrolled in a public elementary school in the 1966-67 school year.
The remaining 55 households had their oldest child attending one of grades
three through six of a Catholic elementary school in the 1968-69 school
year, after having been in a public elementary school in the 1966-67 school
year. All 2973 households, then, had their oldest child attending a pub-
lic elementary school in the 1966-67 school year, and were residing in
the City of Pittsburgh at the end of the time period of interest. These
2973 households were allocated to the 82 elementary school districts on

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[1]Households whose oldest child attended grades other than those
specified are not included because it was not possible to assign them to
elementary school districts on the basis of the available data.

the basis of the oldest child's school of attendance.[1]

The 1969 group of school families is comprised of 3008 households, obtained by summing entries (a) and (c) of Table II. Entry (a) is described above, whereas the 90 households of entry (c) were those households who had their oldest child attending one of grades three through six of a public elementary school in the 1968-69 school year, but who had their oldest child enrolled in a Catholic elementary school in the 1966-67 school year. Thus, all 3008 households had their oldest child attending a public elementary school in the 1968-69 school year, and were residing in the City of Pittsburgh at the beginning of the time period of interest. These 3008 households were allocated to the 82 school districts on the basis of the oldest child's school of attendance.

TABLE II.

SCHOOL TYPE AND YEAR OF ATTENDANCE OF
HOUSEHOLD'S OLDEST CHILD

| School Year, 1966-67 | School Year, 1968-69 (Grade Level: Three thru Six) | |
	Public Elem.	Catholic Elem.
Public Elem.	(a) 2918	(b) 55
Catholic Elem.	(c) 90	(d) n.a.

n.a. = not applicable

Thus, one can see that the 1966 and 1969 groups of households are essentially the same except for the households represented by entries (b) and

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[1]The validity of assigning households to school districts on the basis of oldest child's school of attendance is discussed in Appendix A.

(c) of Table II.

Households excluded from the study were those residing in the City of Pittsburgh at only one end-point of the time interval of interest, those whose oldest child attended a public school grade in the 1968-69 school year other than those specified above, those whose children attended Catholic or other private schools with the exceptions noted above, and all other non-school-related households in the areas of interest.

The distribution of households at the end points of the time-period by the 82 elementary school districts is given in Table III.

TABLE III

DISTRIBUTION OF NUMBER OF HOUSEHOLDS
BY ELEMENTARY SCHOOL DISTRICTS

Number of Households	Number of Elementary School Districts	
	September, 1966	April, 1969
Less than 15	7	11
15 to 29	31	23
30 to 44	21	24
45 and over	23	24
Total	82	82

The variation observed relative to the distribution of households among the school districts is due to variation in the total number of households in the elementary school districts, and also to variation in the response rates of the households in the school districts to the demographic survey which provided a major part of the data for this study.

Thus, two data sets, one for 1966 and one for 1969, are used for the population of interest.[1] These sets, which represent essentially the same households with the exceptions noted above, reflect different school district characteristics in 1966 and 1969 because of residential mobility among the districts within the time period of interest. These data sets permit a more meaningful analysis of mobility in that 1966 demographic and socio-economic characteristics of school districts are analyzed in relation to mobility indices, generation, out, and within-area, which are based on 1966 household totals of districts (Section A, Chapter IV). Similarly, 1969 school district characteristics are analyzed relative to attraction, in-movement, and turnover indices which are based on 1969 household totals.

E. Sources and Quality of the Data[2]

The major source of data for this study was the Demographic Survey conducted by the Research Office of the Pittsburgh Board of Public Education in April, 1969. The survey was designed to obtain comprehensive coverage of the city's Catholic, public, and private school families through the use of a questionnaire which was distributed and collected through the schools, and the response rate was approximately 60 percent.[3] The

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[1] The two data sets are derived from the 1969 Demographic Survey of the Pittsburgh Board of Public Education (Section E, Chapter III). The nature of the survey data made it possible to determine the school district of residence of all households in the population of interest for 1966 and 1969, and thus the characteristics of school districts for these time periods.

[2] The data for this study are given in Appendix D.

[3] Demographic Survey Report, 1969, Office of Research, Pittsburgh Public Schools, February, 1970, unpublished, p. 1.

questionnaire was given only to the oldest child of each school family, thus reducing considerably the possibility of double counting. The primary objective of the survey was to obtain information which would constitute a data bank of the characteristics of Pittsburgh school families.

To validate the 1969 survey data set, it was compared with another data set which was obtained in a 1966 demographic survey of all Pittsburgh school families by the Board of Public Education. Although the data sets of the two surveys were not identical, they were sufficiently similar to permit a comparison of various compositional features of the two populations. With but one exception, the two data sets were very similar. The one notable difference was that the response of the black population to the 1969 survey was 7.0 percent of the total response in comparison to 9.5 percent for the 1966 survey.[1] The reason for this lower response was not determined. In any event, comparison of the 1966 and 1969 data sets did not reveal any marked differences in various socio-economic characteristics.[2] Consequently, it is assumed that this lower response on the part of the black population has not introduced any bias into the population of interest in this study.

From the 1969 Demographic Survey, the various demographic, socio-economic, and mobility characteristics of the populations of interest were obtained.[3] Twenty-two of the total set of 29 characteristics included in

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[1]Ibid., p. 1.

[2]This was determined from discussions with various personnel in the Research Office of the Pittsburgh Board of Public Education, and from the author's personal study of the data during his employment with the Board of Education in 1969 and 1970.

[3]The processing of the data and problems relating to missing data are discussed in Appendix A.

this study were obtained from these data.

Information for two other variables was obtained from School Board sources. Data for age of school was derived from a developmental planning publication,[1] and data on the pupil-teacher ratio were obtained from the Office of the Associate Superintendent of Elementary Schools.

From the U. S. Census of Housing of 1960, data on home owner-ship, condition of housing, and housing space were derived by aggregating census block data within each elementary school district.[2] In this manner, over 7100 census blocks were assigned to the 82 school districts, and there was overlap on less than one percent of the blocks.[3]

Data on industrial acreage by school district were obtained from the City Planning Office of Pittsburgh.[4] Since a measure of total ac-reage was needed in order to calculate the percentage of total acreage in industrial land use, a planimeter was used to measure on a map the total area of each school district. Three planimeter readings were

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[1]A Long Range Developmental Program, Pittsburgh School District, Vol. 3 (Pittsburgh: Associated Educational Consultants, Inc., 1969).

[2]U. S. Bureau of the Census, U. S. Census of Housing: 1960. City Blocks, Pittsburgh, Pa., Series HC (3)-345 (Washington: U. S. Government Printing Office, 1961).

[3]These were assigned to school districts as follows: if 90 per-cent or more of the total area of a block was contained within a given school district, then it was completely assigned to that district. Other-wise, block characteristics were apportioned among contiguous school dis-tricts according to the amount of the block's area contained within them. Overall, this procedure of assigning the total set of blocks to the total set of school districts produced very little error because of the high degree of correspondence between them.

[4]Community Facilities and Public Service Study, CRP Community Renewal Program, Pittsburgh City Planning, Pittsburgh, Pa. (1964)

taken for each school district and an average value was computed to re-
duce measurement error.

Finally, the distance variable was obtained by measuring on a
map straightline distance from the center of each school district to the
intersection of Liberty and Stanwix streets in the Central Business Dis-
trict.

IV. SPECIFICATION OF MOBILITY MODELS AND
DERIVATION OF HYPOTHESES

A. Raw-Data Models

Six raw-data multivariate linear regression models are developed

and evaluated in this study. They differ from each other on the basis

of the mobility measure or dependent variable and have the following form:

$$Y = a + b_1 x_1 + b_2 x_2 + \ldots \ldots \ldots \ldots \ldots + b_n x_n + e$$

where:

Y = dependent variable (an area-specific mobility rate)

X_i = explanatory variables

e = residuals

a = intercept

b = regression coefficient

All variables not included in the model are assumed to operate randomly

on the variable set that is included.

1. Definition of Variables

The six mobility indices which comprise the dependent variables

of the raw-data models are defined as follows:

$$\text{(A)} \quad G_{i(t-t1)} = \frac{W_{i(t-t1)} + O_{i(t-t1)}}{P_{i(t)}}$$

where:

G_i = area-specific rate of the generation of moves in the ith area.

W_i = within-area moves in the ith area.

O_i = out-moves from the ith area.

29

P_i = total population of interest in the ith area.

t = beginning of time-period of interest.

t-t1 = the time interval of interest.

(B) $O_{i(t-t1)} = \dfrac{O_{i(t-t1)}}{P_{i(t)}}$

where:

O_i = area-specific rate of out-moves in the ith area.

(C) $C_{i(t-t1)} = \dfrac{W_{i(t-t1)}}{P_{i(t)}}$

where:

C_i = area-specific rate of within-area moves in the ith area.

(D) $A_{i(t-t1)} = \dfrac{W_{i(t-t1)} + I_{i(t-t1)}}{P_{i(t1)}}$

where:

A_i = area-specific rate of the attraction of moves to the ith area.

I_i = in-moves to the ith area.

t_1 = end of time period of interest.

(E) $B_{i(t-t1)} = \dfrac{I_{i(t-t1)}}{P_{i(t1)}}$

where:

B_i = area-specific rate of in-moves to i^{th} area.

(F) $T_{i(t-t1)} = \dfrac{O_{i(t-t1)} + W_{i(t-t1)}}{P_{i(t1)}}$ if $O_i < I_i$

or,

$$T_{i(t-t1)} = \frac{I_{i(t-t1)} + W_{i(t-t1)}}{P_{i(t1)}} \quad \text{if } I_i < O_i$$

where:

T_i = area-specific rate of turnover in i^{th} area.[1]

These mobility indices have been included to provide comprehensive coverage of the area-specific patterns of residential change. Of the six measures, in-movement, out-movement, and within-area movement are affected by variation in the size of areal units, whereas turnover, generation, and attraction measures are much less influenced by such variation.

Since mobility is determined by place of residence on two fixed dates, September 1966 and April 1969, the number of recorded moves is an underestimate of the total number during the period since only one move per household, regardless of how many may have been made, is counted. In other words, if a household were living at A in September 1966, and then moved to C and later to D by April 1969, only the out-move from A and the in-move to D are recorded. It is assumed that the number of multiple moves is probably relatively small since the time period of interest in this study is relatively short.

Twenty three independent variables with operational definitions are grouped below into three categories: population, housing, and other environmental characteristics.

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[1] Eric Moore has suggested that turnover is a relatively stable measure of mobility which reflects basic population-environment relations in given subareas of the city. Eric G. Moore, "Intraurban Residential Mobility and Urban Spatial Structure," p. 3.

(A) The population characteristics, measured as percentages, are:

<u>Income of Household</u>

    (1) Less than $5,000

    (2) $8,000 to $15,000

    (3) Over $15,000

<u>Occupation of Head of Household</u>

    (1) Professional

    (2) Blue collar

    (3) White collar

<u>Household Size</u>

    (1) With 2 children

    (2) With 3 children

    (3) With 4 or more children

<u>Age of Head of Household</u>

    (1) 20 to 29

    (2) 30 to 39

    (3) 40 to 49

    (4) 50 and over

<u>Education of Head of Household</u>

    (1) More than 12 years of school completed

<u>Head of Household</u>

    (1) Mother as head

(B) Housing characteristics, also measured as percentages, are:[1]

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[1] The definitions for the housing variables are those used in the 1960 United States Census of Housing.

     (1) Owner occupied.

     (2) Deteriorated and dilapidated.

     (3) With 1.01 or more persons per room.[1]

  (C) The other environmental characteristics are:

     (1) Age of elementary school: for the jth school, the age

       is calculated in years from the original date of con-

       struction through 1966.

     (2) Pupil-teacher (P-T) ratio: this ratio is an average of

       the P-T ratios for 1966, 1967, and 1968 for the jth school.

     (3) Industrial acreage: for the jth area, this is a ratio

       of the total acreage in industrial land use to the to-

       tal acreage and multiplied by 100.[2]

     (4) Distance: this is straight-line distance from the in-

       tersection of Liberty and Stanwix streets in the Central

       Business District (CBD) to the geographic center of the

       j^{th} area.

  With respect to this independent variable set, the inclusion of

several income, family size, and age variables provides an opportunity

for analysis in greater depth than would be possible if the more common

practice of using only one measure for each of these characteristics were

followed.

  One income and one family size category are missing from the

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[1]The U. S. Bureau of the Census uses the 1.01 persons per room
as the lower limit for overcrowding.

[2]Land Use Classification for Pittsburgh's Land Use Survey, 1958-
1960, Department of City Planning, Pittsburgh, Pennsylvania (April, 1962),
unpublished.

independent variables, namely the "$5,000 to $8,000 income group," and the "households with one child." These variables were deleted to reduce the high degree of multicollinearity among the twenty-five independent variables. They yielded such a small determinant that the inverse of the correlation matrix could not be found, preventing a factor solution. The problem was solved with the deletion of the two variables mentioned above.

B. Derivation of Hypotheses

The derivation of hypotheses is based on the assumption that variations in residential movement rates are a function of variation in the structure of the urban environment together with variation in the composition of the population which reacts to that environment. Although one cannot infer individual behavior from structural relationships, it is possible to consider aspects of individual behavior which may be suggestive of the types of conditions which stimulate or constrain mobility behavior in the aggregate. Each of the predictor variables is considered in this way and hypotheses are proposed. The hypotheses are discussed in the order of population, housing, and other environmental characteristics.

1. Population Characteristics

a. _Income of Household._ In the literature, a negative relationship has been found between mobility and income.[1] Two factors need to be considered in order to explain this finding. First, a smaller

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[1] Butler, et al., Moving Behavior and Residential Choice, p. 31.

proportion of low income households are homeowners compared to high income households largely due to the income constraint.[1] Since renters have generally been found to be more mobile than homeowners, it follows that low income households should tend to be more mobile than those of high income.[2] This is due in part to the fact that renters have less control over their dwelling units, and forced moves could raise the mobility levels of low income households. Second, most blighted or substandard housing in the cities is occupied by low income groups.[3] Assuming that these households desire sound housing as well as a neighborhood environment untarnished by blighted structures and related ills, one may expect these households to have a high propensity to move, given a more reasonable alternative and sufficient resources to respond to it. In view of these reasons, the hypotheses for the income series are as follows:[4]

(1) A positive relationship holds between mobility and percentage of households with income of $5000 or less.

(2) A negative relationship holds between mobility and percentage of households with income of $8000 to $15000.

(3) A negative relationship holds between mobility and percentage

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[1]Ibid., p. 16.

[2]Rossi, p. 69.

[3]The Report of the President's Committee on Urban Housing, A Decent Home (Washington: U. S. Government Printing Office, Dec. 1968), p. 44.

[4]Each hypothesis pertains to each of the six mobility indices unless exceptions are noted. If exceptions are noted and the reason(s) is not clearly evident from the preceding rationale, then a brief explanation is given.

of households with income of $15000 or more.

    b. <u>Age of Head of Household.</u> Numerous studies have used age
as a surrogate for the life-cycle concept which refers to various stages
through which an individual passes during the course of his life.[1] Exam-
ples of these stages are:

    (i) Unmarried under age 45;

    (ii) Young married with or without children (no children age 5
        or over);

    (iii) Married with school aged children;

    (iv) Older married with or without children (no school aged
        children);

    (v) Unmarried, age 45 and over (includes widowed, divorced, or
        separated).

Rossi and other investigators have found that variables closely related
to life-cycle are related to mobility.[2] Age is one of these variables
and it has often been used interchangeably with life cycle in discussing
migration differentials.[3] Although age and life-cycle stages are related,
they may not measure the same thing. Persons of the same age may be at
different life-cycle stages, and conversely, persons in the same life-

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[1]Simmons, p. 630; see also, Gerald R. Leslie and Arthur H. Richard-
son, "Life-Cycle, Career Pattern, and the Decision to Move," <u>American So-
ciological Review,</u> 26, No. 6 (Dec. 1961), 894-96.

[2]Rossi, p. 6.

[3]Karl E. Taeuber, Leonard Chiazze, Jr., and William Haenszel,
<u>Migration in the United States: An Analysis of Residence Histories.</u>
Public Health Monograph No. 77, U. S. Dept. of Health, Education, and
Welfare, 1968.

cycle stage may have widely differing ages.[1]

In this study, "married with school aged children" is the only life-cycle stage that is of interest. In this way, life-cycle stage is controlled and attention is focussed entirely on the age factor.

Younger heads of household will be more mobile than their older counterparts since a greater proportion of younger households will be increasing in family size in comparison to older households. Expanding families generate pressure on housing space which may lead to residential change. With respect to the four age variables being investigated, it is assumed that households in the age 20 to 29 and 30 to 39 groups are in the family expanding stage, whereas those in the age 40 to 49 and 50 and over groups have completed their family-building stage.

Another reason for differential mobility relative to age has been given by Glick, who suggests that, in general, the middle-aged years are stable insofar as occupations are concerned and that residential moves should be fewer than at younger years and possibly in the retired years.[2]

On the basis of these reasons, the hypotheses are:

(1) A positive relationship holds between mobility and the percentage of heads of household age 20 to 29.

(2) A positive relationship holds between mobility and the percentage of heads of household age 30 to 39.

(3) A negative relationship holds between mobility and the

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[1]Alden Speare, Jr., "Home Ownership, Life Cycle Stage, and Residential Mobility," Paper presented at Annual Meeting of the Population Association of America in Atlanta, April, 1970.

[2]P. C. Glick, "The Family Cycle," American Sociological Review, 12 (1947), 164-74.

percentage of heads of household age 40 to 49.

(4) A negative relationship holds between mobility and per-

centage of heads of household age 50 and over.

Exception:

(a) A positive relationship holds between within-area move-

ment and percentage of heads of household age 50 and

over.

The above exception is made because older heads of household will be less

likely than younger ones to break away from their social and psychologi-

cal ties to a given area. Given a change of residence for older house-

holds, it is expected that the propensity to remain within the immediate

area or neighborhood will be quite high. For aggregate data, then, the

larger the proportion of older heads of household (age 50 and over), the

greater the propensity for within-area movement.

    c. **Household Size.** Previous research findings appear to be

somewhat inconsistent with respect to the relationship between family size

and mobility.[1] On the one hand, Rossi[2] found household size to be rather

strongly related to mobility intentions; while on the other hand, Leslie

and Richardson[3] found the relationship to be extremely weak. Moore, in

an ecological approach to mobility in Brisbane, also found family size to

be insignificant.[4] Nature of the samples, types of analysis, and

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[1]The terms "household size" and "family size" are used inter-
changeably in this study.

[2]Rossi, p. 73.

[3]Leslie and Richardson, pp. 895-99.

[4]Eric G. Moore, "The Structure of Intraurban Movement Rates: An
Ecological Model," _Urban Studies_, 6, No. 1 (Feb. 1969), 23-32.

operational definitions of family size in the three studies cited above
suggest, however, that the findings are not necessarily contradictory.
In the Rossi and Leslie studies, for example, both of which used indi-
vidual-level analysis, the populations sampled are markedly different.
On the other hand, Moore used a measure of family size that differs from
those of the other two studies. Due to these inconsistencies the studies
are not comparable, and provide little, if any, definite indication of
the importance of family size in the mobility process.

Family size is related to life-cycle. Households increase in
size with the addition of children, stabilize upon completion of the child-
bearing period, and finally decrease in size as children mature and leave
home. As indicated earlier, the concern in this study is with but one
life cycle stage, the married with school age children, which leads to
the investigation of intra-stage family size variation relative to move-
ment.

Given a sample of households whose oldest child was in any of
grades one through four in September 1966, and assuming an average spac-
ing of children of two and one-third years for those households with two
or more children, then, other things being equal, one would expect that
larger households would have experienced family expansion more recently
than smaller households.[1] Expanding households should have a greater pro-
pensity to move in order to adjust for housing needs. In addition, one
may expect that, whether expanding or not, larger households would tend
to be out of balance with housing space needs to a greater extent than

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[1]U. S. Bureau of the Census, _Current Population Reports,_ Series
P-23, No. 36, "Fertility Indicators: 1970," (Washington: U. S. Govern-
ment Printing Office, 1971), p. 36.

smaller households. Therefore, a positive relationship should exist between family size and residential change.

In dealing with households of two, three, or four or more children, a perplexing question arises concerning identification of a family size threshold relative to stability versus mobility status. The percentage of households with two children should be negatively related to mobility, and the percentage with four or more positively related. But what of those households with three children? Attention is directed to the population of interest in this study in an attempt to answer this question. This population consists of school families whose oldest child in school was in any of grades one through four as of September, 1966, which marks the beginning of the mobility period of interest. If the assumption of a twenty-eight month spacing of children is valid, the youngest child of a household whose oldest child was in grade one would have been approximately one and one-third years of age. For a household whose oldest child was in grade four, the youngest child would have been approximately four and one-third years of age. This indicates an approximate range of one and one-third to four and one-third years between the birth of the last child and the beginning of the mobility period of interest, ample time for housing-space adjustments to have been completed. Thus, households with three children should be relatively stable.

Consequently, the hypotheses for family size are:

(1) A negative relationship holds between mobility and
    percent of households with two or three children.

(2) A positive relationship holds between mobility and
    percent of households with four or more children.

d. <u>Racial Composition.</u> Recent census surveys have shown that
nonwhites are more mobile than whites within metropolitan areas.[1] One
possible reason for this has been given by Shryock, who stated, "The
greater extent of short-distance mobility among nonwhites may reflect the
fact that a larger proportion of them than of whites live in rented homes
and that renters are more mobile than owners."[2] Income differences be-
tween whites and nonwhites are probably another important factor.[3] An
unpublished report by the Research Office of the Pittsburgh Public Schools,
based on a demographic survey of the school population in 1969, shows that
47.9 per cent of the black respondents had an income of less than $5,000,
in comparison to 14.1 per cent of white respondents.[4] Given the valid-
ity of the rationale presented earlier concerning the relationship be-
tween income and mobility, a higher incidence of mobility for nonwhites
is probably related to the disproportionate number of nonwhites of low
income. Still another factor is the quantity of housing stock available
to nonwhites. De facto housing segregation by whites[5] leads to increasing

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[1]U. S. Bureau of the Census, <u>Current Population Reports,</u> Series
P-20, No. 188, "Mobility of the Population of the United States, March
1967 to March 1968" (Washington, D. C.: U. S. Government Printing Office,
August 1969); see also, No. 193 (December 1969).

[2]Henry S. Shryock, Jr., <u>Population Mobility within the United
States</u> (Chicago: Community and Family Study Center, 1964), p. 335.

[3]In this study, 96.9 percent of the nonwhite total is Negro;
therefore, the terms "nonwhite," "black," or "Negro" are used inter-
changeably.

[4]Demographic Survey Report 1969, p. 46.

[5]Richard L. Morrill, "The Negro Ghetto: Problems and Alterna-
tives," <u>Geographical Review,</u> 55 (1965), 344-46.

pressure on housing stock or a "piling up" effect in the ghettos.[1] Be-
cause of the lack of adequate housing, non-whites may settle temporarily
in unsound or otherwise inadequate housing and move whenever they find
a better situation.[2]

For these reasons, it is hypothesized that:

(1) A negative relationship holds between mobility and percent

of households that are white.

e. Mother as Head of Household. No study has been found that has
explicitly investigated the relationship between this type of household and
residential mobility.

Households of this kind result either from the dissolution of two-
parent households through occurrences such as death, divorce, or separa-
tion, or from illegitimate childbearing. With respect to change from a
two-parent to a one-parent household headed by the mother, it seems rea-
sonable to expect that the family income level will decline with this type
of change in family structure. Thus, some sort of residential adjustment
may ensue in those cases in which the family can no longer maintain a resi-
dential situation established when income was higher. With respect to
households with illegitimate children, it is likely that low income levels
together with some degree of social rejection may induce a relatively high
propensity to move.

Finally, it is expected that this variable will be strongly related

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[1] Otis Dudley Duncan and Beverly Duncan, The Negro Population of
Chicago (Chicago: The University of Chicago Press, 1957), pp. 108-132.

[2] Bruce C. Straits, "Residential Movement Among Negroes and Whites
in Chicago," Social Science Quarterly, 49, No. 3 (Dec. 1968), p. 587.

to the racial variable because of the more transient character of Negro family relationships.[1] On the basis of the foregoing, the hypothesis is:

> (1) A positive relationship holds between mobility and percent
>
> of households with mother as the head of household.

f. Occupation of Head of Household. Occupation, income, and educational attainment are often used to derive a socio-economic-status index (SES). There has been some uncertainty over the relationship of the SES index to residential mobility. Some studies have found the relationship to be insignificant, while others have found it to be significant and negative.[2] Differences in populations sampled, in variables used for the SES index, and mobility measures used tend to restrict the comparability of these earlier efforts and may account for the different findings.

Of the three occupational variables of interest, professional and white collar occupations tend to be associated with higher income levels, and therefore, will have a negative relationship with mobility. For the blue collar workers, no association with mobility is anticipated because of the wide range of income levels that characterize this group.

The hypotheses for this series of variables are:

> (1) A negative relationship holds between mobility and percent
>
> of heads of household with a professional occupation.

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[1]Ibid., p. 588; see also, Morrill, p. 345; and, Office of Policy Planning and Research, U. S. Department of Labor, The Negro Family: The Case for National Action (Washington: U. S. Government Printing Office, 1965), pp. 5-14.

[2]Butler et al., Moving Behavior and Residential Choice, p. 51; see also, Moore, Residential Mobility in an Urban Context, pp. 248-49; and, C. W. Sherif, "Self Radius and Goals of Youth in Different Urban Areas," Sociological and Social Research, 38 (Feb. 1954), 145.

(2) A negative relationship holds between mobility and percent

of heads of household with a white collar occupation.

(3) No relationship holds between mobility and percent of heads

of household with a blue collar occupation.

g. Educational Attainment of the Head of Household. With the exception of its use in SES indices, little if any attention in the literature has been given to education. The demographic study of the Pittsburgh Public Schools, cited earlier, provides evidence of a marked relationship between educational attainment and occupation and income.[1] Thus, the higher the educational attainment, the greater the probability of a professional or white collar occupation and of a higher income. Hence, it is hypothesized that:

(1) A negative relationship holds between mobility and percent

of heads of household with an educational attainment greater

than 12 years.

2. Housing Characteristics

a. Tenure Status. Previous studies have consistently found that homeowners are less mobile than renters.[2] Heiges, in a study of residential mobility in Seattle, found a strong relationship between tenure status and mobility. He reported, "The turnover rate for rental housing is nearly ten times that of owned homes. For Seattle as a whole, one of

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[1]Demographic Survey Report, 1969, pp. 44-45.

[2]Rossi, pp. 69-72; see also, Butler et al., Moving Behavior and Residential Choice, pp. 50-52; and, Speare, pp. 7-9.

every two rented houses changes hands every year."[1]

A number of reasons can be suggested for the relationship between tenure status and mobility. On the one hand, renters are more restricted in their ability to modify their residence to fit their changing needs and may move to bring about such an adjustment. In addition, other problems facing the renter may be: house deterioration, rent increases, poor landlords, or eviction. On the other hand, owners can more easily adapt to changing needs by altering the residence, thus reducing or eliminating the need for a change. Other stability inducing factors associated with home ownership are the investment involved and costs associated with moving such as closing costs and real estate fees. These factors produce a higher mobility threshold for the homeowner.

The hypothesis is:

(1) A negative relationship holds between mobility and percent

of households that are home owners.

b. Deteriorated and Dilapidated Housing. A positive relationship has been found in the few studies that have explicitly examined the influence of substandard housing on residential change. Heiges, for example, observed, "The poorly kept houses in any area were most frequently the ones that have turned over rapidly."[2] Also, Butler and others found dissatisfaction with condition of housing and neighborhood to be significantly related to anticipated moves.[3] Given that housing quality

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[1] Harvey E. Heiges, "Intra-Urban Residential Movement in Seattle, 1962-67," Unpublished Dissertation, University of Washington, 1968, p. 66.

[2] Ibid., p. 182.

[3] Butler et al., Moving Behavior and Residential Choice, pp. 52-3.

is an important dimension of neighborhood quality, it can be seen that

substandard housing contributes to mobility through the neighborhood

effect. Thus, households living in substandard or even standard hous-

ing in a blighted neighborhood may be expected to have a higher propen-

sity to move.

Moreover substandard housing is occupied primarily by the eco-

nomically disadvantaged who, by virtue of their low economic status, are

more susceptible to forced moves resulting from eviction, urban renewal,

and other causes.[1]

On the basis of these reasons as well as previous research find-

ings it is hypothesized that:

(1) A positive relationship holds between mobility and percent

of total housing stock that is substandard.

Exceptions:

(a) A negative relationship holds between attraction and

percent of total housing stock that is substandard.

(b) A negative relationship holds between in-movement and

percent of total housing stock that is substandard.

(c) A negative relationship holds between within-area

movement and percent of total housing stock that is

substandard.

The above exceptions are made because mobile households will tend to

avoid those neighborhoods that have a large amount of blighted housing,

although it is recognized that some mobile families will be forced to

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[1]The Report of the President's Committee on Urban Housing, A
Decent Home, pp. 43-4.

move into substandard housing because of lack of supply and other con-
straints.

  c. <u>Housing Units with 1.01 or More Persons per Room</u>. Research
has shown that insufficient housing space is positively related to one's
propensity to move, illustrating that residential mobility cannot be as-
sessed solely by the physical condition of housing.[1]

  In attempting to devise an objective measure of overcrowding it
is necessary to consider family size relative to housing space. The
Bureau of the Census uses more than one person per room as an indicator
of overcrowded homes, and this criterion is used here. A recent study
provided some support for this assumption when it reported, "It seems,
for this sample at least, that there must be at least as many rooms in
the dwelling unit as there are persons in the household if the household
is to be satisfied."[2]

  The hypothesis is:

(1) A positive relationship holds between mobility and the

   percent of total housing stock that has 1.01 or more

   persons per room.

3. Other Environmental Characteristics

  a. <u>Age of School</u>. The investigation of the relationship between
residential change and age of school is possible since the population of
interest is comprised of only school families.

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  [1]Rossi, pp. 77-80; see also, Butler et al., <u>Moving Behavior and
Residential Choice</u>, pp. 52-53.

  [2]Butler et al., <u>Moving Behavior and Residential Choice</u>, p. 22.

One survey on school preferences, reported that a majority of respondents seem to favor better than average schools with higher taxes more than less desirable schools with lower taxes.[1] This finding implies that school quality is of major importance to school families.

It is assumed that high educational quality tends to be associated with newer school structures and low educational quality with older ones. Thus, old school buildings will act as a push factor in relation to household mobility.

The hypothesis is:

(1) A positive relationship holds between mobility and age of the school building.

Exceptions:

(a) A negative relationship holds between attraction and age of the school building.

(b) A negative relationship holds between in-movement and age of the school building.

(c) A negative relationship holds between within-area movement and age of the school building.

The reason for the indicated exceptions is that if school families are greatly concerned with school quality, then they will tend to avoid those schools where quality is perceived to be low.

b. Pupil-teacher Ratio (P-T). This variable is also assumed to be a measure of school quality with a low P-T ratio reflecting high educational quality and a high ratio representing low quality.

Given the importance of school quality to school families and the

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[1] Ibid., p. 2.

validity of the foregoing assumption, it is hypothesized that:

(1) A positive relationship holds between mobility and pupil-teacher ratio.

Exceptions:

(a) A negative relationship holds between attraction and pupil-teacher ratio.

(b) A negative relationship holds between in-movement and pupil-teacher ratio.

(c) A negative relationship holds between within-area movement and pupil-teacher ratio.

c. Industrial Acreage. Industrial land use tends to detract from the attractiveness or quality of nearby residential neighborhoods because of noise, appearance, odors, and traffic congestion.

In an attempt to determine what it is that leads people to change their residence, Lansing and Barth found dissatisfaction with the quality of the neighborhood to be significantly related to mobility intentions.[1] According to their findings, people prefer a neighborhood that is quiet, clean, and free from traffic rather than noisy, dirty, and congested.[2]

Thus, the hypothesis is:

(1) A positive relationship holds between mobility and industrial acreage.

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[1] John B. Lansing and Nancy Barth, Residential Location and Urban Mobility: A Multivariate Analysis (Ann Arbor: Survey Research Center, Institute for Social Research, University of Michigan, Dec. 1964), p. 17.

[2] Ibid., pp. 21-22.

Exceptions:

(a) A negative relationship holds between attraction and
industrial acreage.

(b) A negative relationship holds between within-area
movement and industrial acreage.

(c) A negative relationship holds between in-movement and
industrial acreage.

d. Open Space.[1] In this study, the distance variable is used as a surrogate for open space which according to Rossi's findings is an important structural element relative to the quality of the environment.[2] Alonso also emphasized the importance of open space when he stated, "the nature of the demand for space in this country seems to be a deeply ingrained cultural value, associated not only with such functional needs as play space for children, but also with basic attitudes toward nature, privacy, and the meaning of the family."[3]

Numerous studies have shown that a negative relationship holds between distance from the CBD and gross and net residential densities.[4]

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[1] Open space is defined here as consisting of external dwelling unit space and recreational areas such as playgrounds and parks located within the immediate neighborhood.

[2] Rossi, pp. 82-85.

[3] William Alonso, "The Historic and the Structural Theories of Urban Form," Internal Structure of the City: Readings on Space and Environment, ed. Larry S. Bourne (New York: Oxford Univ. Press. 1971) p. 440.

[4] Colin Clark, "Urban Population Densities," Journal of the Royal Statistical Society, Ser. A, Vol. 114, Part 4 (1951), 490-96; see also, Brian J. L. Berry, J. W. Simmons, and R. J. Tennant, "Urban Population Densities: Structure and Change," Geographical Review, 53 (1963), 389-405; and John H. Niedercorn and Edward F. R. Hearle, "Recent Land-Use Trends in Forty-eight Large American Cities," Land Economics, 40, No. 1 (Feb. 1964), 105-09.

Thus, other things being equal, one would expect the amount of open space to increase with increasing distance from the CBD. Assuming an approximately equal need or desire for open space on the part of school families regardless of their location in urban space, one would expect less household satisfaction with the amount of open space at or near the city center (CBD), and greater satisfaction with increasing distance from the center.

Consequently, it is hypothesized that:

(1) A negative relationship holds between mobility and open space.

Exceptions:

(a) A positive relationship holds between attraction and open space.

(b) A positive relationship holds between within-area movement and open space.

(c) A positive relationship holds between in-movement and open space.

C. Criteria for Testing Hypotheses

In geographic research of recent years, one element common to most if not all statistical studies that have attempted to identify geographical relationships has been the use of statistical significance tests to evaluate hypotheses. The use of these tests, when the basic underlying assumptions on which they are based are not met, has been seriously questioned.[1]

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[1] Peter Gould, "Is Statistix Inferens the Geographical Name for a Wild Goose?" Economic Geography, 46, No. 2 (Supplement), (June, 1970), 439-48; see also, Denton E. Morrison and Ramon E. Henkel, eds., The Significance Test Controversy (Chicago: Aldine Publishing Co., 1970).

Data for this study were not obtained by random sampling, making the use of statistical significance tests invalid. In this regard, two criteria are adopted to test hypotheses. First, in order for any independent variable to be retained in a stepwise regression model, the variable has to contribute a minimum of 0.01 to the multiple correlation coefficient (MULTR). Second, the direction of association between the independent and dependent variables must be as hypothesized. If both criteria are met for a given variable, then the hypothesis pertaining to that variable is accepted. Otherwise the hypothesis is rejected.

V. ASPATIAL AND SPATIAL MOBILITY PATTERNS

A. Mobility Intensity and Variability

The following questions are considered in this section. (1) How mobile was the population of interest? (2) How do the mobility indices vary according to school districts? (3) To what extent do the six mobility indices tend to covary?

The intensity of residential change among the school districts is reflected by the means of the mobility indices (Table IV). The generation and attraction measures show that the average rate of mobility in the school districts was approximately 28 percent[1] in the 1966-69 time period. The least amount of mobility, approximately 10 percent, occurred relative to within-area movement. This in comparison to in- and out-movement reveals that nearly twice as many households moved in or out of school districts as moved within them. Turnover, which is a measure of replacement, shows a mean rate of 22 percent.

The most comparable U. S. Census data on mobility for the 1966-69 time period indicates that intracounty mobility[2] was 11.7 percent annually.[3] The average annual rates[4] for generation and attraction, which by

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[1]The generation and attraction rates are higher than those of the other indices because, by definition, generation and attraction are composite measures.

[2]The U. S. Bureau of the Census defines intracounty mobility as those persons living in a different house but in the same county at the beginning and end of the specified period.

[3]U. S. Bureau of the Census, *Current Population Reports,* Series P-20, No. 193, p. 7.

[4]The average annual generation and attraction rates were calculated by dividing their means reported in Table IV by 2.58 years which

53

definition are similar to the census definition of mobility, were 10.7 and 10.9 percent respectively.

TABLE IV

MOBILITY RATES, SEPTEMBER 1966 THROUGH MARCH 1969

Mobility Index	Mean Rate for Elem. Sch. Districts[c]	Standard Deviation for Elem. Sch. Districts[c]
Generation[a]	27.7%[d]	16.6%
Out[a]	18.0	13.6
Within[a]	9.8	7.1
Attraction[b]	28.1	13.9
In[b]	17.9	10.6
Turnover[b]	22.0	13.4

[a]Based on 1966 data.

[b]Based on 1969 data.

[c]Unweighted.

[d]Since by definition the generation measure is comprised of out- and within-area movement, it may be observed that the sum of the means of the latter is equal to the mean of the former. Similarly, attraction is comprised of in- and within-area movement. However, the means of these do not sum to equal the attraction measure. This is due to the fact that within-area mobility was calculated on the basis of the 1966 set of school families which differs slightly from the 1969 set which was used in calculating the attraction and in measures.

This comparison shows that the intracity movement of the population of interest in the school districts was, on the average, of nearly the same intensity as intracounty movement of the total U. S. population in the time-period of interest.

The standard deviation provides a measure of the variation of

is the length of the time period of interest.

mobility rates among the school districts (Table IV). Generation, with a standard deviation of 16.6 percent, had a greater variance than any of the other indices. Within-area movement had the smallest amount of variability. All of the indices show a marked amount of variation about their respective means. In other words, mobility rates varied markedly among the school districts.

The six mobility indices were correlated to determine to what extent they exhibit similar patterns of variation. All mobility indices are positively associated with each other but there is considerable variation in the degree of association between the various pairs of indices (Table V). The correlations range from highs of .92, .91, and .80 for

TABLE V

CORRELATIONS BETWEEN THE MOBILITY INDICES

	Attraction	Turnover	In	Generation	Within	Out
Attraction	1.00	0.80	0.79	0.70	0.68	0.50
Turnover		1.00	0.41	0.92	0.71	0.75
In			1.00	0.32	0.15	0.32
Generation				1.00	0.60	0.91
Within					1.00	0.20
Out						1.00

turnover and generation, generation and out-mobility, and turnover and attraction respectively to lows of .15, .20, and .32 between in- and within-area mobility, out- and within-area mobility, and in- and out-mobility. High correlations are due, in part, to the fact that some of

the indices have common definitional components.[1] The low correlations

that exist between in-, out-, and within-area mobility indicate that

these indices are relatively linearly independent of each other. In all,

each of the six indices represents a specific aspect of mobility.

B. Spatial Patterns of Mobility

Focus turns now to spatial patterns of mobility. Greater em-

phasis is given to the out-, in-, and within-area movement indices than

to the generation, attraction, and turnover indices. The reason for this

is that the former may be considered as pure measures of mobility, whereas

the latter are composite measures derived from combinations of the former.

In all, the pattern of out-movement shows marked variation through-

out the city (Figure 2). School districts with the highest rates of out-

movement are located on the North and East Sides of Pittsburgh with the

exception of the Morse Elementary School District on the South Side. On

the South Side, low rates of out-movement tend to predominate. One may

also observe that school districts on the North Side that are adjacent

or in close proximity to one of the rivers tend to have high rates of out-

movement. This pattern is also present on the East Side, although to a

more limited extent. Out-movement rates are high in the vicinity of the

CBD and tend to decrease with distance from the city center, a pattern of

a mobility decline that has been shown in other studies of mobility.[2] In

_____

[1]One or more common properties are shared by the following pairs of
indices: turnover and generation, turnover and in-movement, turnover and
out-movement, attraction and in-movement, attraction and within-area move-
ment, attraction and generation, generation and out-movement, and generation
and within-area movement.

[2]Eric G. Moore, "Residential Mobility in an Urban Context: A Systems
Approach," p. 242.

OUT MOVEMENT

SEPTEMBER 1966 THROUGH MARCH 1969

AREA—SPECIFIC RATES
quintiles

— > 32.14 %
— 17.19 — 32.14
— 11.11 — 17.18
— 6.00 — 11.10
— < 6.00
— NOT INCLUDED IN STUDY
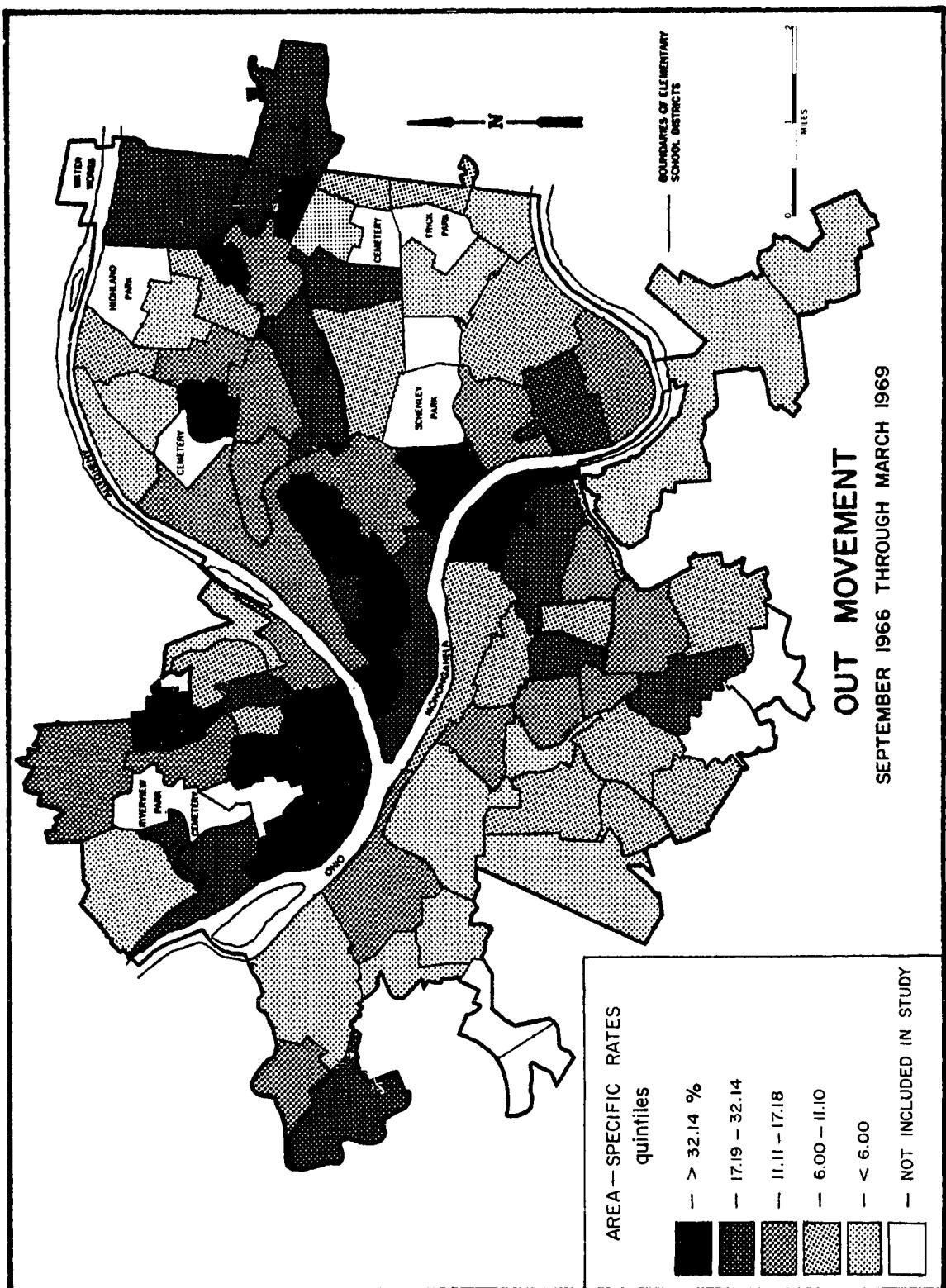
Figure 2

all, the total pattern of out movement shows marked variation throughout the city.

The spatial pattern of in-movement rates may be observed in Figure 3. School districts with the highest rates of in-movement tend to be evenly distributed among the three major areal divisions. Thus, several school districts with heavy in-movement are to be found on the North, East, and South Sides. School districts with the lowest rates of in-movement are to be found mostly on the East and South Sides. In comparing the movement patterns of the three major areas, on the average, the rate of in-movement tends to be highest on the North Side, lower on the East Side, and lowest on the South Side. In terms of the total city pattern, high rates in or near the CBD and decreasing rates toward the periphery are evident.

Similarities and differences in the patterns of in- and out-movement may be noted. On the North Side both out- and in-movement tend to be heavy. On the East Side the rate of out-movement, on the average, tends to be slightly heavier than in-movement, while on the South Side it is just the opposite. Both in- and out-movement rates are high in and near the CBD and tend to decline with distance from the CBD. Finally, both patterns exhibit marked areal variation of movement rates within the city.

The distribution of within-area movement rates is given in Figure 4. With reference to the two highest quintile groups, a relatively large number of the school districts in these groups are located on the North and East Sides. Of the lower three quintiles, a disproportionate number of the school districts are to be found on the East and South Sides of the city. In brief, the rate of within-area movement, on the average, tends to be highest on the North Side, moderately high on the East Side, and lowest on the South Side. One striking feature of the spatial pattern

IN MOVEMENT

SEPTEMBER 1966 THROUGH MARCH 1969

AREA – SPECIFIC RATES
quintiles

- > 28.21 %
- 20.00 – 28.21
- 14.29 – 19.99
- 9.09 – 14.28
- < 9.09
- NOT INCLUDED IN STUDY

Figure 3

WITHIN-AREA MOVEMENT

SEPTEMBER 1966 THROUGH MARCH 1969

AREA—SPECIFIC RATES

quintiles

— > 15.91 %
— 10.71 – 15.91
— 6.67 – 10.70
— 4.08 – 6.66
— < 4.08
— NOT INCLUDED IN STUDY
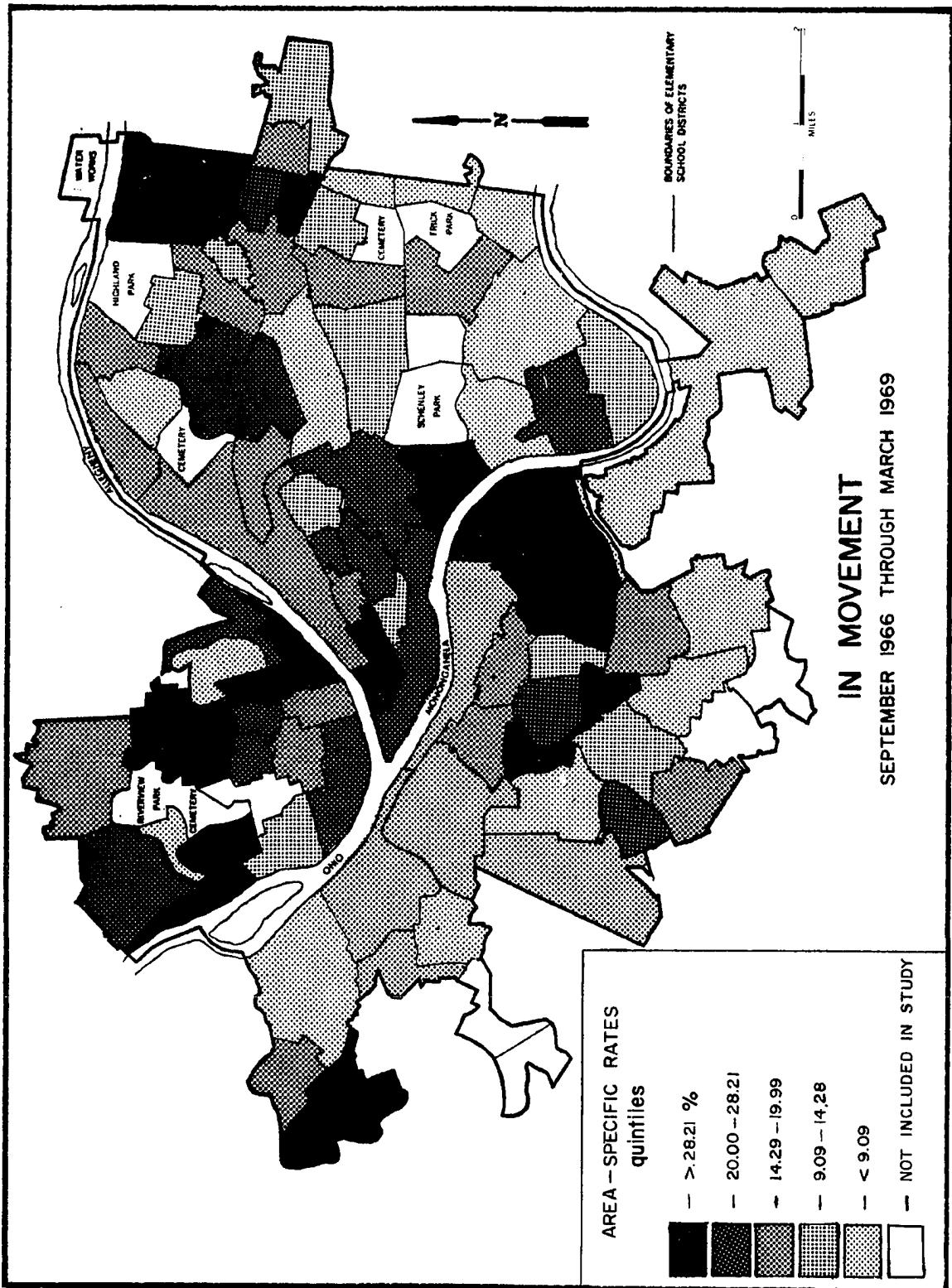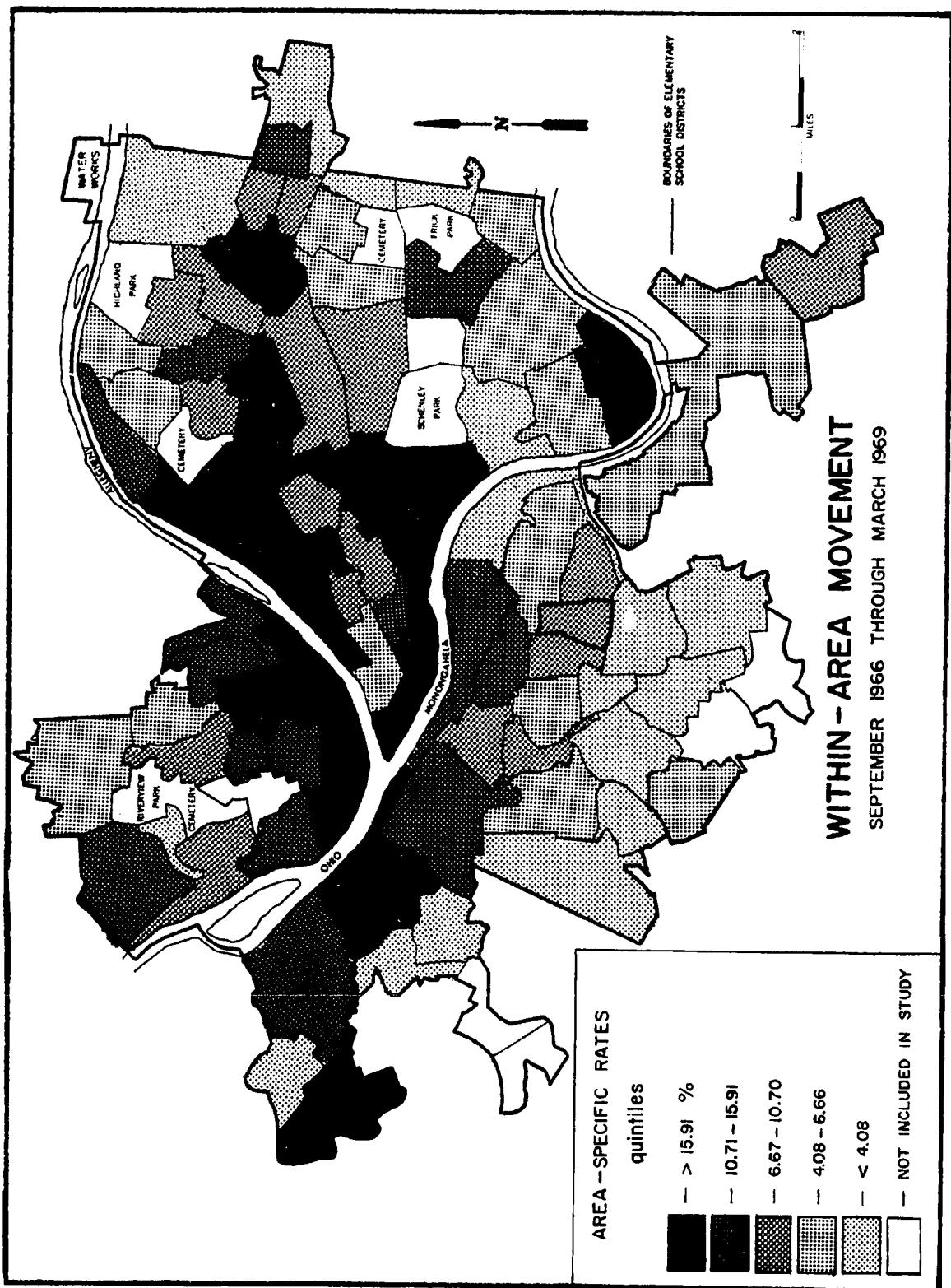
Figure 4

is that most of the school districts with high rates of within-area move-
ment are contiguous to or near the rivers. Another characteristic is that
of a gradient of high to low rates from the CBD to the periphery of the
city, as was the case for in- and out-movement.

In comparing the within-area, in-, and out-movement patterns, an
outstanding feature that can be observed is the relatively small number
of correspondences between the school districts relative to similar mag-
nitudes of movement on different mobility indices. In other words, school
districts that are in a given quintile group on one mobility index tend
not to be in the same quintile group on another. This was pointed out
in a previous section when it was reported that out-, in-, and within-
area movement indices are relatively independent of one another. Although
this lack of correspondence can be determined by a visual examination of
the maps, Table VII was devised to supplement the map comparisons. In
the division of the table that pertains to a comparison of out- and in-
movement, one can see that for the North, South, and East Sides only 2
out of 15, 10 out of 28, and 11 out of 39 school districts are in the same
quintile groups. For the city as a whole, there are only 23 out of a pos-
sible 82 correspondences. For the other two bivariate comparisons, the
out- and within-area movement and the in- and within-area movement, there
are even fewer correspondences. Given these patterns of weak correspon-
dences, one may argue that several mobility indices are necessary in order
to study comprehensively and meaningfully intraurban mobility.

It may be recalled that the generation measure is comprised of
out- and within-area movement. Thus, the spatial pattern of generation
rates reflects the combined rates of its two basic components (Figure 5).
This can be seen by close inspection of the three maps (Figures 2, 4, and

TABLE VI

QUINTILE CORRESPONDENCES OF SCHOOL DISTRICTS
FOR PAIRS OF MOBILITY INDICES BY THE
THREE AREAL DIVISIONS OF THE CITY

Area	Total Number of Sch. Distr.	Number of School Districts					Area Totals
		Quintiles					
		I	II	III	IV	V	
Out- and In-Movement							
North Side	15	1	0	1	0	0	2
South Side	28	1	0	3	2	4	10
East Side	39	3	3	2	1	2	11
City	82	5	3	6	3	6	23
Out- and Within-Area Movement							
North Side	15	2	0	1	0	0	3
South Side	28	0	0	2	2	3	7
East Side	39	3	1	0	2	0	6
City	82	5	1	3	4	3	16
In- and Within-Area Movement							
North Side	15	2	3	0	0	1	6
South Side	28	1	0	1	0	3	5
East Side	39	1	1	2	1	3	8
City	82	4	4	3	1	7	19

GENERATION OF MOVEMENT

SEPTEMBER 1966 THROUGH MARCH 1969

AREA SPECIFIC RATES
quintiles

▮	—	> 42.62 %
▮	—	30.30 – 42.62
▦	—	19.23 – 30.30
▨	—	13.33 – 19.23
░	—	< 13.33
☐	—	NOT INCLUDED IN STUDY

BOUNDARIES OF ELEMENTARY
SCHOOL DISTRICTS

MILES
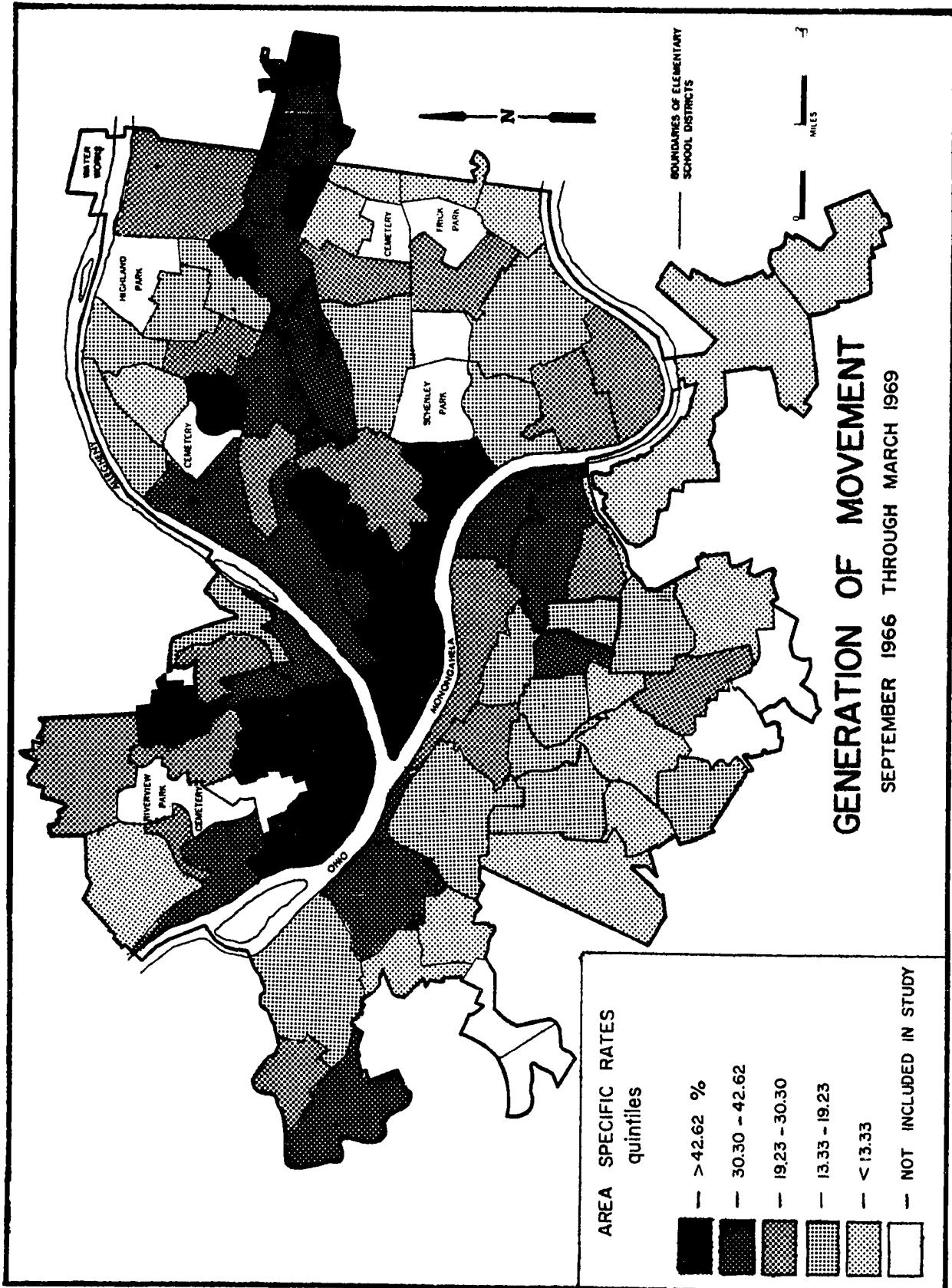
Figure 5

5). With respect to the generation pattern, on the average, the rate of movement is highest on the North and East Sides, and lowest on the South Side. A striking feature of the pattern on the South Side is that not one of the school districts located there is in the first quintile group. In terms of the overall city pattern, perhaps the most apparent feature is the gradient of high to low rates from the city center outward. Finally, at the risk of being redundant, attention is directed to the marked spatial variation in the city of the area-specific rates of generation.

The spatial distribution of attraction rates is given in Figure 6. The spatial pattern of attraction reflects the combined patterns of in- and within-area movement since, by definition, attraction consists of those two types of mobility. In respect to the three areal divisions of the city, one finds that rates of attraction are, on the average, higher on the North and East Sides of the city than on the South Side. In terms of the city's total spatial pattern, a mobility gradient emanating from the city center is discernable, although anomalies are present.

In comparing attraction with generation, one commonality is the pattern of higher rates of movement on the North and East Sides, and lower rates on the South Side. In addition, both patterns show a decline of rates from the city center outward.

The final map to be described is that of turnover (Figure 7). The turnover index is a combination of either in- or out-movement and within-area movement. As such, it reflects the spatial patterns of these components. With respect to the turnover pattern, one can see that the highest rates of turnover are on the North and East Sides of the city, and the lowest rates are on the South Side. In addition, the mobility gradient, characteristic of all the mobility patterns described above, is

ATTRACTION

SEPTEMBER 1966 THROUGH MARCH 1969

AREA—SPECIFIC RATES
quintiles

- > 41.03 %
- 30.00 – 41.03
- 23.33 – 29.99
- 14.88 – 23.32
- < 14.88
- NOT INCLUDED IN STUDY

Figure 6

TURNOVER

SEPTEMBER 1966 THROUGH MARCH 1969

AREA—SPECIFIC RATES
quintiles

- > 30.77 %
- 25.00 – 30.77
- 15.79 – 24.99
- 10.00 – 15.78
- < 10.00
- NOT INCLUDED IN STUDY

BOUNDARIES OF ELEMENTARY
SCHOOL DISTRICTS
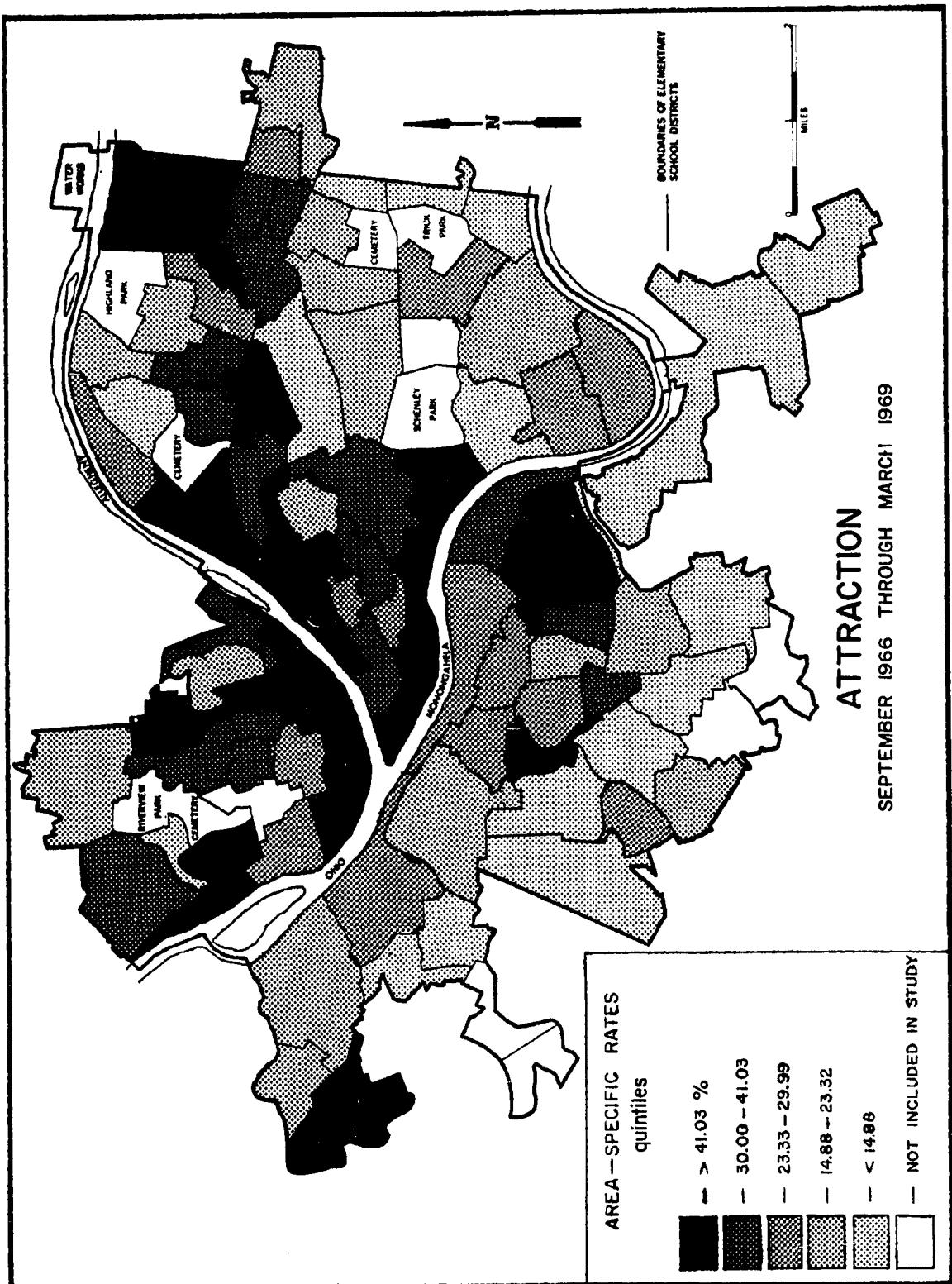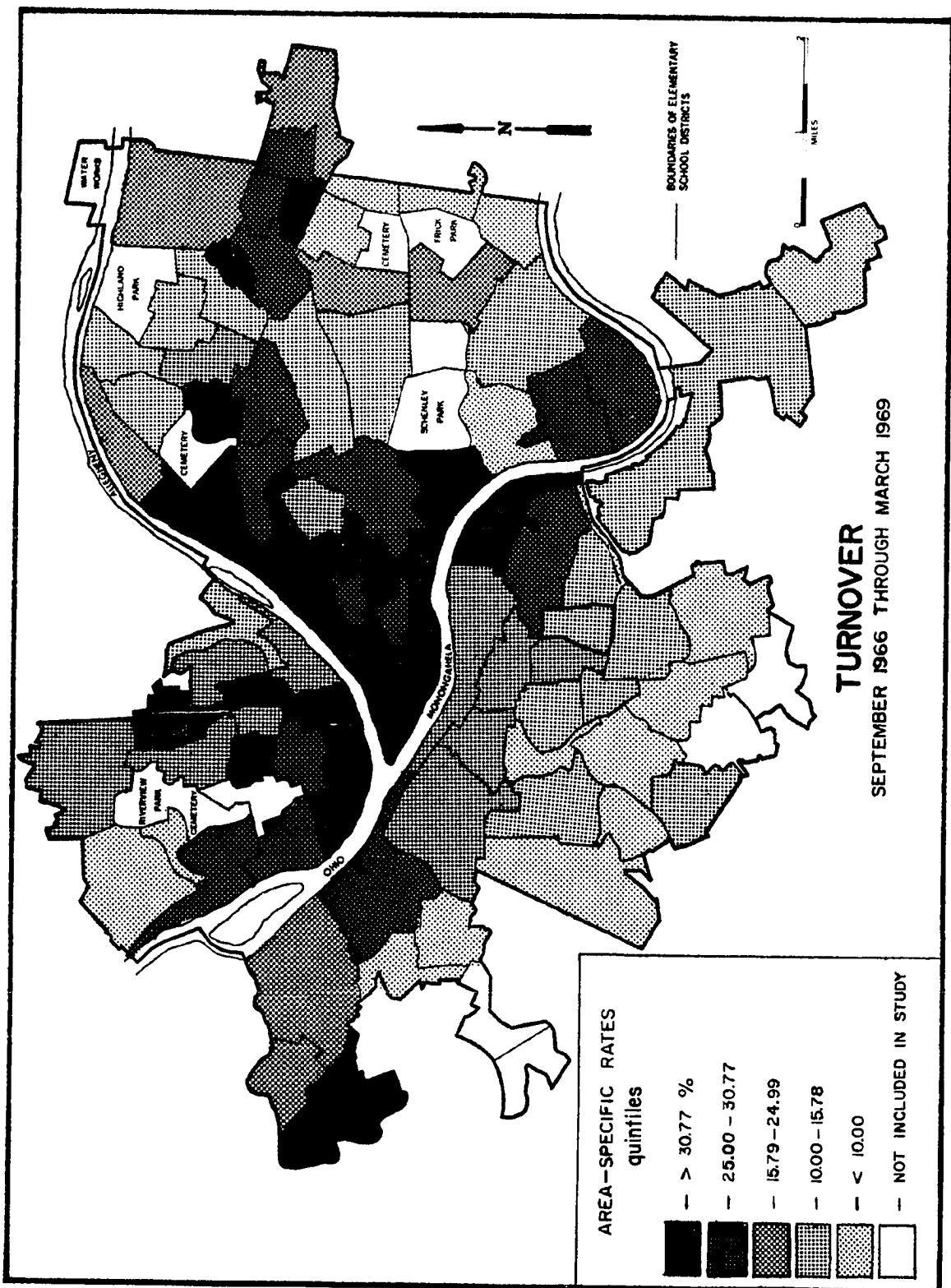
Figure 7

clearly observable. In all, the marked areal variation in turnover rates is a prominent feature of the map.

In conclusion, the examination of the six spatial patterns of mobility has shown that the magnitude of mobility varies markedly throughout the city no matter which of the indices is considered. Also, in describing and analyzing the patterns, certain similarities and differences have been noted. Some of the similarities are due to a technical reason, i.e., one or more common definitional components in different indices, while other similarities may be due to a common set of causal factors. Given the differences in the spatial patterns of the six mobility indices, one may argue that all of these indices are necessary in order to study meaningfully the mobility phenomenon.

In the next chapter, the analysis of the relationships between the mobility indices and the independent variables will shed some light on which if any of the independent variables are commonly related to the mobility indices, which if any tend to operate differentially, and which if any are significantly related to one or more but not all of the mobility indices.

VI. VERIFICATION OF THE RAW-DATA MODELS

Up to this point, residential mobility in Pittsburgh has been examined empirically. Mobility rates were seen to vary markedly among the school districts, presumably in response to differences in their demographic, socio-economic, and other characteristics. In this chapter, an attempt is made to identify such factors and assess their relative effects by taking mobility indices as dependent variables and regressing each against a set of twenty-three independent variables consisting of population, housing, and other environmental characteristics.[1]

The findings of the regression models seem plausible; however the results are not completely acceptable because of multicollinearity (Tables VII, IX, XI, XIII, XV, and XVII).[2] Because of this problem, in the next chapter the stepwise regression procedure is repeated with orthogonal components representing independent variables.

In the following sections, results from the analyses of relationships between the mobility indices and the population, housing, and other environmental characteristics of school districts are presented.

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[1]Solutions to the models were obtained by using the stepwise regression technique. Prior to obtaining the stepwise solutions, the linearity assumption of the model was tested. All independent variables were found to be linearly related to the mobility indices with the exception of distance, percent households with income of $15,000 or more, percent heads of household with educational attainment greater than 12 years, and percent heads of household with professional occupation. Logarithm transformations of these four variables ensured a linear fit between them and the mobility indices.

[2]Multicollinearity refers to the interaction effects between the independent variables which reduce the reliability of the regression coefficient estimates. For a discussion of this problem see: Hubert M. Blalock, Jr., "Correlated Independent Variables: The Problem of Multicollinearity," Social Forces, 42 (1963), 233-37; and, H. Wold and L. Jureen, Demand Analysis (New York: John Wiley and Sons, Inc., 1953), pp. 46-48.

A. Model I, Out-Movement

Zero order correlations show that out-movement is positively related to percentage of households with income of less than \$5,000 and to percentage of households with 4 or more children, and negatively related to P-T ratio, to log. distance, and to percentage of white households (Table VII).[1]

TABLE VII

SIMPLE CORRELATION MATRIX OF VARIABLES IN RAW-DATA MODEL I

	X_1	X_7	X_{15}	X_{21}	X_{22}	Y
X_1	1.000	0.593	-0.364	-0.351	-0.691	0.714
X_7		1.000	-0.033	-0.259	-0.404	0.629
X_{15}			1.000	-0.006	0.398	-0.424
X_{21}				1.000	-0.030	-0.314
X_{22}					1.000	-0.632
Y						1.000

X_1 = Percentage of households with income of less than \$5,000.

X_7 = Percentage of households with 4 or more children.

X_{15} = Pupil-teacher ratio.

X_{21} = Log. distance.

X_{22} = Percentage of white households.

Y = Out-movement.

---

[1]The rule for determining the number of independent variables in the final solution was that each variable had to contribute a minimum of .01 to the multiple correlation coefficient (Mult R) to be included in the regression model.

In the final regression solution, five independent variables are all that are required to explain 67.9 percent of the variation in out-movement, and most of the explanatory power of the model may be attributed to one predictor, low income (Table VIII). This variable alone accounts for 51.0 percent of the variation.

The standardized regression coefficients show that income (X_1) becomes less important relative to the other variables at each succeeding step, while some variables gain in importance.[1] Income (X_1) is the first variable entered, but by the final solution it has become the least important, producing not nearly as much change in out-movement as does family size (X_7). Percent white (X_{22}) is entered at step four and is the weakest of the four variables, but at the next step it has become the second most important variable. At the final solution, family size (X_7) and white households (X_{22}) together account for more change in out-movement than the remaining three variables combined.

The signs of the regression coefficients indicate that the percentage of households with income of less than \$5,000 (X_1), and the percentage of households with four or more children (X_7) are positively related to out-movement. Both of these findings are consistent with the hypothesized relationships; therefore, the hypotheses are accepted.[2]

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[1] It is necessary to correct for differences in the independent variables' scales of measurement if one wishes to compare the regression coefficients of the variables in terms of their relative abilities to produce change in the dependent variable. For example, one variable may be measured in years, while another is measured in terms of dollars. The scale differences are removed by standardizing the regression coefficients such that a unit change in one variable is comparable to a unit change in another. For a description of this procedure, see: Hubert M. Blalock, Jr., Social Statistics (New York: McGraw-Hill Book Co., 1960), pp. 275-79.

[2] Each hypothesis is tested on the basis of the variable's inclusion

TABLE VIII

SUMMARY TABLE FOR RAW-DATA MODEL I
DEPENDENT VARIABLE = OUT-MOVEMENT

1966 Data, N = 82

Step	Variable	MULT R	Increase	MULT R^2	Intercept	Regr. Coeff.	Std. Err. of Est.	Beta Coeff.
1	X_1*	0.714	0.714	51.0	5.4818	0.4315	9.554	0.7140
2	X_1					0.3180		0.5262
	X_7	0.758	0.044	57.5	-0.4627	0.3101	8.954	0.3168
3	X_1					0.2305		0.3814
	X_7					0.3853		0.3937
	X_{15}	0.797	0.039	63.5	34.5496	-1.2400	8.345	-0.2724
4	X_1					0.1564		0.2588
	X_7					0.3771		0.3853
	X_{15}					-1.0755		-0.2363
	X_{22}	0.811	0.014	65.6	37.4969	-0.0748	8.158	-0.2035
5	X_1					0.0815		0.1349
	X_7					0.3670		0.3749
	X_{15}					-1.1223		-0.2466
	X_{21}					-4.3288		-0.1802
	X_{22}	0.824	0.014	67.9	32.2405	-0.1083	7.925	-0.2947

*X_1 = Percentage of households with income of less than $5,000.

X_7 = Percentage of households with 4 or more children.

X_{15} = Pupil-teacher ratio.

X_{21} = Log. distance.

X_{22} = Percentage of white households.

The remaining regression coefficients show that negative relationships exist between out-movement and pupil-teacher ratio (X_{15}), log. distance (X_{21}), and percent white households (X_{22}). On this basis, the hypotheses for the latter two, X_{21} and X_{22}, are accepted. The hypotheses for P-T ratio (X_{15}) is rejected because the relationship between out-movement and pupil-teacher ratio is positive and not negative as hypothesized when the other variables are controlled. Examination of the data reveals a correspondence between the pupil-teacher ratio and the racial composition of school districts. Predominantly white school districts tend to have higher P-T ratios than either the racially mixed or the predominantly nonwhite districts. In addition, low ratios tend to exist in those districts characterized by low income, blighted housing, and single-parent families, all of which together with racial composition tend to be related to high rates of out-movement (Table XXXVIII, Appendix B). The P-T ratio, then, appears not to be a surrogate for school quality, but rather a surrogate measure for neighborhood quality. Finally, the hypotheses for the eighteen independent variables not included in the final regression solution are rejected because they do not meet the criterion established to determine a significant relationship.

B. Model II, Within-Area Movement

According to the simple correlations reported in Table IX, elementary school districts with high rates of within-area mobility are shown to be characterized by high percentages of low income households

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in the model and the direction of its association with the dependent variable when the other independent variables in the model are controlled.

TABLE IX

SIMPLE CORRELATION MATRIX OF VARIABLES IN RAW-DATA MODEL II

	X_1	X_{10}	X_{14}	X_{17}	X_{22}	Y
X_1	1.000	0.156	-0.757	0.149	-0.691	0.523
X_{10}		1.000	-0.163	0.002	0.008	0.350
X_{14}			1.000	-0.348	0.597	-0.605
X_{17}				1.000	-0.148	0.306
X_{22}					1.000	-0.257
Y						1.000

X_1 = Percentage of households with income of less than $5,000.

X_{10} = Percentage of heads of household age 50 and over.

X_{14} = Percentage of owner occupied housing.

X_{17} = Age of school.

X_{22} = Percentage of white households.

Y = Within-area movement.

(X_1) and older heads of household (X_{10}), by old school buildings (X_{17}), and by low percentages of owner occupied housing (X_{14}) and white households (X_{22}). Low rates of within-area movement are associated with the converse of the above.

In the first of five regression steps, the percent owner occupied housing (X_{14}) is entered and it accounts for 36.6 percent of the variation in within-area movement, and the addition of four predictor variables at succeeding steps increases the explained variation to approximately 48

percent (Table X).

With reference to the Beta coefficients, one can observe that, of the five predictors included in the final solution, the percent owner occupied housing (X_{14}) effects greater change in the dependent variable than any of the other variables. Low income (X_1) is the next most important predictor followed by the age (X_{10}) and race (X_{22}). Age of school (X_{17}) produces the smallest change in the dependent variable.

Hypotheses pertaining to the eighteen independent variables not included in the final solution are rejected. Of those variables included in the model, the hypotheses for low income (X_1), older heads of household (X_{10}), and owner occupied housing (X_{14}) are accepted. Those for age of school (X_{17}) and race (X_{22}) are rejected because the directions of association are contrary to those hypothesized when the other variables are controlled. It was hypothesized that both age of school and percent white households would be negatively related to within-area movement, but the regression findings show them to be positively related. One can see in Table IX that age of school correlates with percent households with income of less than $5,000 (.15), and with percent owner occupied housing (-.35). In addition, it correlates with percent deteriorated and dilapidated housing (.27) (Table XXXVIII, Appendix B). Hence, age of school may be a surrogate for neighborhood quality. Since low income and unsound housing were positively related to within-area mobility and owner occupied housing negatively related, the relationship between age of school and within-area movement is understandable.

The sign of the simple correlation coefficient indicates a negative relationship between percent of white households (X_{22}) and within-area movement (Table IX); however, the sign of the regression coefficient

TABLE X

SUMMARY TABLE FOR RAW-DATA MODEL II
DEPENDENT VARIABLE = WITHIN-AREA MOVEMENT

1966 Data, N = 82

Step	Variable	MULT R	Increase	MULT R^2	Intercept	Regr. Coeff.	Std. Err. of Est.	Beta Coeff.
1	X_{14}*	0.605	0.605	36.6	20.8988	-0.2168	5.688	-0.6054
2	X_{10}					0.3728		0.2586
	X_{14}	0.656	0.051	43.0	17.8652	-0.2017	5.421	-0.5633
3	X_{10}					0.3830		0.2656
	X_{14}					-0.1858		-0.5187
	X_{17}	0.669	0.013	44.8	15.2583	0.0364	5.390	0.1248
4	X_1					0.0539		0.1702
	X_{10}					0.3766		0.2612
	X_{14}					-0.1371		-0.3830
	X_{17}	0.682	0.013	46.5	10.9348	0.0427	5.366	0.1467
5	X_1					0.0937		0.2960
	X_{10}					0.3362		0.2332
	X_{14}					-0.1518		-0.4238
	X_{17}					0.0426		0.1464
	X_{22}	0.694	0.012	48.2	7.8587	0.0424	5.281	0.2202

*X_1 = Percentage of households with income of less than $5,000.

X_{10} = Percentage of heads of household ages 50 and over.

X_{14} = Percentage of owner occupied housing.

X_{17} = Age of school.

X_{22} = Percentage of white households.

indicates a positive relationship between these variables when the other
independent variables are controlled (Table X). One explanation rests
upon the recognition of the fact that there is not only inter-district
but also intra-district variation in income. In low and high income dist-
ricts, one will find households at most if not all income levels. It has
been argued earlier that mobility is selective relative to income such
that low income households tend to be more mobile than high income house-
holds.[1] On the one hand, then, school districts with disproportionately
large numbers of low income households will tend to have higher mobility
rates than school districts with small numbers of low income households.
In addition, when racial composition is considered together with low in-
come, one would expect the propensity for within-area movement to be high-
er for nonwhite than white districts because of socio-economic constraints
which would tend to reduce out-movement from nonwhite areas. One may ob-
serve in Table IX that the simple correlation between percent white and
within-area movement (-.26) indicates a tendency for nonwhite districts
to have higher rates than white districts. This may be explained by the
presence of disproportionate numbers of low income households in nonwhite
areas, and the greater tendency for within-area movement in the nonwhite
districts. On the other hand, relatively higher income households have
a lesser propensity to move. Thus, school districts with large numbers
of these households will tend to have lower rates than those districts
with fewer numbers. Furthermore, of those higher income households in
nonwhite areas that move, one would expect a tendency for less within-
area and more out-movement because of dissatisfaction with the neighborhood

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[1]See page 34.

environment and the limited supply of high quality housing within the
neighborhood together with the ability to overcome economic constraints
to moving into racially mixed or white districts. In predominantly white
districts, however, one would expect a tendency for higher within-area
movement rates than in nonwhite districts because of generally better
environmental conditions and a larger stock of quality housing. In sup-
port of this rationale, one can see that when percent white is entered
in the final regression solution, its relationship to the dependent vari-
able is positive (Table X). Since at this step low income is controlled,
one can infer that percent white is representing the higher income groups
in the school districts. Thus, the direction of its association to with-
in-area mobility when the other variables are controlled is in accord with
the expectations indicated above.

C. Model III, Generation of Movement

The correlation findings show that school districts with high per-
centages of low income households (X_1) and deteriorated and dilapidated
housing (X_{13}), with old school buildings, and with a low percentage of
households with three children (X_6) have shown a tendency to have high
rates of generation (Table XI). Conversely, school districts with low
percentages of low income households and deteriorated and dilapidated
housing, with newer school buildings, and with a high percentage of house-
holds with three children have experienced low rates of generation.

The regression analysis involved four steps. At the first step,
the percent households with income of less than $5,000 ($X_1$) is entered
and it accounts for approximately 66 percent of the variance in genera-
tion (Table XII). The inclusion of age of school (X_{17}) at step two and

TABLE XI

SIMPLE CORRELATION MATRIX OF VARIABLES IN RAW—DATA MODEL III

	X_1	X_6	X_{13}	X_{17}	Y
X_1	1.000	—0.383	0.733	0.149	0.810
X_6		1.000	—0.335	—0.085	—0.464
X_{13}			1.000	0.269	0.727
X_{17}				1.000	0.324
Y					1.000

X_1 = Percentage of households with income of less than $5,000.

X_6 = Percentage of households with three children.

X_{13} = Percentage of deteriorated and dilapidated housing.

X_{17} = Age of school.

Y = Generation of movement.

percent households with three children (X_6) at step three increases the MULT R^2 to 69.7 and 72.4 percent respectively. The percent deteriorated and dilapidated housing (X_{13}) is added at the final step, and the four independent variables together account for 74.3 percent of the variation in the dependent variable. Thus, the explanatory power of this model is greater than that of the out- and within-area movement models.

With respect to the relative abilities of the independent variables to produce change in the dependent variable, one can see that at each step the income variable (X_1) is more important than any of the

other variables even though it decreases in importance at each successive step both in an absolute and in a relative sense. At step four, income is at least two and one-half times stronger in its ability to effect change in the dependent variable than any of the three other variables. The second most important variable is deteriorated and dilapidated housing (X_{13}) and it is closely followed by percent of households with three children (X_6) and age of school (X_{17}). The finding of a negative relationship between generation and percent of households with three children (X_6) provides support for the notion stated earlier that a mobility threshold exists between those households with three children and those that are larger.

The hypotheses pertaining to the variables included in the model are accepted because they were included and the signs of the regression coefficients are as hypothesized. Rejected hypotheses are those relating to the predictor variables excluded from the model.

In comparing the correlates observed in the generation model with those of the out- and within-area movement models, the findings show that Models I and III have two variable correspondences, i.e., income and family size variables are included in the final solutions of both models. Models II and III have two correspondences, income and percentage of white households, and models I and II also have two, income and age of school. The percentage of households with income of less than $5,000 is the only variable common to all three models. From the fact that each of the models includes predictor variables which do not appear in the other two, one may infer that, in seeking to better understand the mobility phenomenon by identifying correlates of mobility, one should investigate a number

TABLE XII

SUMMARY TABLE FOR RAW-DATA MODEL III
DEPENDENT VARIABLE = GENERATION OF MOVEMENT

1966 Data, N = 82

Step	Variable	MULT R	Increase	MULT R^2	Intercept	Regr. Coeff.	Std. Err. of Est.	Beta Coeff.
1	X_1*	0.810	0.810	65,6	10.4412	0.5969	9.772	0.8096
2	X_1					0.5741		0.7787
	X_{17}	0.835	0.025	69.7	4.4008	0.1413	9.209	0.2082
3	X_1					0.5255		0.7128
	X_6					-0.3084		-0.1741
	X_{17}	0.851	0.016	72.4	13.9896	0.1378	8.863	0.2031
4	X_1					0.4188		0.5680
	X_6					-0.2864		-0.1616
	X_{13}					0.2247		0.2110
	X_{17}	0.862	0.011	74.3	12.7679	0.1147	8.602	0.1690

*X_1 = Percentage of households with income of less than \$5,000.

X_6 = Percentage of households with 3 children.

X_{13} = Percentage of deteriorated and dilapidated housing.

X_{17} = Age of school.

of mobility indices with differentiating power.

D. Model IV, In-Movement

The simple correlation matrix (Table XIII) shows that school dis-
tricts characterized by a high percentage of families in the $8,000 to
$15,000 income range ($X_2$), by a low percentage of large households (X_7),
by a low percentage of heads of household in ages 20 to 29 (X_{12}), by a
low percentage of unsound housing, and with a newer school tended to have

TABLE XIII

SIMPLE CORRELATION MATRIX OF VARIABLES IN RAW-DATA MODEL IV

	X_2	X_7	X_{12}	X_{13}	X_{17}	Y
X_2	1.000	-0.488	-0.581	-0.593	-0.133	-0.497
X_7		1.000	0.416	0.405	-0.037	0.462
X_{12}			1.000	0.504	-0.058	0.456
X_{13}				1.000	0.269	0.211
X_{17}					1.000	0.099
Y						1.000

X_2 = Percentage of households with income of $8,000 to $15,000.

X_7 = Percentage of households with four or more children.

X_{12} = Percentage of heads of household age 20 to 29.

X_{13} = Percentage of deteriorated and dilapidated housing.

X_{17} = Age of school.

Y = In-movement.

TABLE XIV

SUMMARY TABLE FOR RAW-DATA MODEL IV DEPENDENT VARIABLE = IN-MOVEMENT

1969 Data, N = 82

Step	Variable	MULT R	Increase	MULT R^2	Intercept	Regr. Coeff.	Std. Err. of Est.	Beta Coeff.
1	X_2*	0.497	0.497	24.7	25.8825	-0.2954	9.218	-0.4967
2	X_2					-0.2118		-0.3561
	X_7	0.557	0.060	31.0	16.6413	0.2339	8.879	0.2879
3	X_2					-0.1521		-0.2558
	X_7					0.2055		0.2529
	X_{12}	0.584	0.027	34.1	13.0973	0.2335	8.765	0.2019
4	X_2					-0.2108		-0.3544
	X_7					0.2277		0.2803
	X_{12}					0.2941		0.2543
	X_{13}	0.609	0.025	37.1	16.8136	-0.1633	8.588	-0.2404
5	X_2					-0.1979		-0.3327
	X_7					0.2472		0.3044
	X_{12}					0.3451		0.2984
	X_{13}					-0.2064		-0.3038
	X_{17}	0.628	0.019	39.4	12.8153	0.0713	8.483	0.1648

*X_2 = Percentage of households with income of $8,000 to $15,000.

X_7 = Percentage of households with 4 or more children.

X_{12} = Percentage of heads of household age 20 to 29.

X_{13} = Percentage of deteriorated and dilapidated housing.

X_{17} = Age of school.

low rates of in-movement. Districts with high rates of in-movement tended to have the converse of the above indicated characteristics.

The five variables included in the regression solution have an explanatory power of 39.4 percent (Table XIV). The low Mult R^2 indicates that in-movement is more difficult to account for than the other types of mobility that have been considered.

With respect to the Beta coefficients of the last regression solution, one can observe that none of the variables is dominant in terms of producing change in the dependent variable. The income (X_2), family size (X_7), age (X_{12}), and unsound housing (X_{13}) variables are nearly of equal strength. Age of school (X_{17}) is seen to be the weakest of the five variables.

The hypotheses pertaining to the income (X_2), family size (X_7), age (X_{12}), and condition of housing (X_{13}) predictors are accepted on the basis of the evidence. The hypothesis for age of school (X_{17}) is rejected because the direction of association is contrary to that hypothesized when the other variables are controlled. The hypotheses for all predictors not included in the final regression solution are rejected.

E. Model V, Attraction

Attraction is found to be positively related to low income (X_1) and old school buildings, and negatively related to percentage of households in the $8,000 to $15,000 income range ($X_2$), percentage of families with two children (X_5), and log. percentage of professional occupations (X_{19}) (Table XV).

TABLE XV

SIMPLE CORRELATION MATRIX OF VARIABLES IN RAW-DATA MODEL V

	X_1	X_2	X_5	X_{17}	X_{19}	Y
X_1	1.000	-0.787	-0.353	0.136	-0.628	0.732
X_2		1.000	0.369	-0.133	0.521	-0.711
X_5			1.000	-0.099	0.453	-0.394
X_{17}				1.000	-0.057	0.288
X_{19}					1.000	-0.397
Y						1.000

X_1 = Percentage of households with income of less than \$5,000.

X_2 = Percentage of households with income of \$8,000 to \$15,000.

X_5 = Percentage of households with two children.

X_{17} = Age of school.

X_{19} = Log. of percentage of heads of household with professional occupation.

Y = Attraction.

At the first of the five regression steps, percentage of households with income of less than \$5,000 (X_1) is entered and it explains 53.6 percent of the variance in the attraction index (Table XVI). The inclusion of the X_2, X_{17}, X_5, and X_{19} variables at the next four steps increases the explanatory power of the model to 64.3 percent.

With respect to the relative abilities of the predictors to bring about change in attraction, one can see that at each step the percent households with income of less than 5,000 dollars (X_1) is more important than

TABLE XVI

SUMMARY TABLE FOR RAW-DATA MODEL V
DEPENDENT VARIABLE = ATTRACTION

1969 Data, N = 82

Step	Variable	MULT R	Increase	MULT R^2	Intercept	Regr. Coeff.	Std. Err. of Est.	Beta Coeff.
1	X_1*	0.732	0.732	53.6	15.1832	0.4163	9.533	0.7321
2	X_1					0.2583		0.4542
	X_2	0.764	0.032	58.4	27.5771	-0.2768	9.088	-0.3533
3	X_1					0.2497		0.4391
	X_2					-0.2670		-0.3408
	X_{17}	0.782	0.018	61.2	22.6147	0.1046	8.777	0.1834
4	X_1					0.2395		0.4211
	X_2					-0.2462		-0.3142
	X_5					-0.1670		-0.1123
	X_{17}	0.792	0.010	62.7	26.8152	0.1017	8.709	0.1782
5	X_1					0.2913		0.5123
	X_2					-0.2474		-0.3157
	X_5					-0.2345		-0.1577
	X_{17}					0.0975		0.1708
	X_{19}	0.802	0.010	64.3	24.1752	1.9737	8.578	0.1708

*X_1 = Percentage of households with income of less than $5,000.

X_2 = Percentage of households with income of $8,000 to $15,000.

X_5 = Percentage of households with 2 children.

X_{17} = Age of school.

X_{19} = Log. of percentage of heads of household with professional occupation.

any of the other predictors. In the final solution, percent households
with income of \$8,000 to \$15,000 is the second most important predictor.
Next, age of school (X_{17}) and log. percent heads of household with pro-
fessional occupation (X_{19}) are of nearly equal strength. And last, the
percent households with two children (X_5) accounts for the least amount
of change in the dependent variable.

In respect to the hypotheses, those pertaining to the eighteen
predictors not included in the final solution are rejected. Of those
predictors included in the model, the hypotheses for income (X_1 and X_2)
and family size (X_2) are accepted. Those for age of school (X_{17}) and
professional occupation (X_{19}) are rejected because their direction of as-
sociation with attraction is different from that hypothesized when the
other variables are controlled. With reference to the association be-
tween age of school (X_{17}) and attraction, it seems that the explanation
given in Section B relative to the association between X_{17} and within-
area movement also applies here. That is, in lieu of being a surrogate
for school quality, the age of school appears to be a surrogate measure
for low quality neighborhoods characterized to some extent by low income
households, by renter status, and by deteriorated and dilapidated hous-
ing. School districts with these characteristics and an old school tend
to have high rates of attraction (Table XXXIX, Appendix B).

The simple correlation coefficient for professional occupation
(X_{19}) and attraction indicates a negative association which was hypothe-
sized (Table XV). However, when X_{19} is added to the four previously en-
tered variables in the final regression solution, the direction of its
association with attraction is changed to positive (Table XVI). On

the basis of the available data, no substantive explanation can be given for this regression finding.

Since the attraction index is comprised of both within-area and in-movement, the three models are compared to determine the number of variable correspondences. The comparison reveals that each pair of models, within-area and in-movement, within-area movement and attraction, and in-movement and attraction, has two correspondences. Since there are five independent variables included in the final solution of each model, one can see that there are three non-correspondences relative to each pair of models. Only age of school (X_{17}) is included in the final solution of each model. In all, this comparison reveals the usefulness of studying several different mobility indices in the search for correlates of mobility.

F. Model VI, Turnover

The correlations between turnover and four independent variables reveal that school districts with a high percentage of low income households (X_1), a high percentage of unsound housing (X_{13}), an old school, and a low percentage of heads of household with education greater than 12 years (X_{23}) tended to have high turnover rates (Table XVII). Conversely, school districts characterized by a low percentage of low income households, a low percentage of unsound housing, relatively new school buildings, and a high percentage of household heads with educational attainment greater than 12 years tended to have low turnover rates.

The four independent variables included in the regression model

TABLE XVII

SIMPLE CORRELATION MATRIX OF VARIABLES IN RAW—DATA
MODEL VI

	X_1	X_{13}	X_{17}	X_{23}	Y
X_1	1.000	0.706	0.136	-0.619	0.800
X_{13}		1.000	0.269	-0.518	0.692
X_{17}			1.000	-0.080	0.314
X_{23}				1.000	-0.400
Y					1.000

X_1 = Percentage of households with income of less than $5,000.

X_{13} = Percentage of deteriorated and dilapidated housing.

X_{17} = Age of school.

X_{23} = Log. percentage of heads of household with education greater than

12 years.

Y = Turnover.

explained 72.1 percent of the variation in turnover, with low income (X_1) being the major contributor to the explained variance (Table XVIII).

With respect to the Beta coefficients of the last regression solution, it may be observed that low income (X_1) is more than three times more important than any of the other variables in terms of producing change in the dependent variable (Table XVIII). Unsound housing (X_{13}) is the next most important, and education (X_{23}) ranks third. The least important of the four variables is age of school (X_{17}).

TABLE XVIII

SUMMARY TABLE FOR RAW-DATA MODEL VI
DEPENDENT VARIABLE = TURNOVER

1969 Data, N = 82

Step	Variable	MULT R	Increase	MULT R^2	Intercept	Regr. Coeff.	Std. Err. of Est.	Beta Coeff.
1	X_1*	0.800	0.800	64.0%	8.3714	0.4391	8.101	0.8001
2	X_1					0.4235		0.7717
	X_{17}	0.827	0.027	68.4	3.3825	0.1154	7.648	0.2096
3	X_1					0.3518		0.6410
	X_{13}					0.1653		0.1914
	X_{17}	0.838	0.011	70.2	2.9308	0.0969	7.485	0.1759
4	X_1					0.4019		0.7324
	X_{13}					0.1925		0.2228
	X_{17}					0.0934		0.1696
	X_{23}	0.849	0.011	72.1	-4.9579	2.4067	7.277	0.1821

*X_1 = Percentage of households with income of less than $5,000.

X_{13} = Percentage of deteriorated and dilapidated housing.

X_{17} = Age of school.

X_{23} = Log. percentage of heads of household with education greater than 12 years.

The hypotheses which pertain to low income (X_1), deteriorated and dilapidated housing (X_{13}), and age of school buildings (X_{17}) are accepted on the basis of the regression findings. The hypothesis for the education

variable (X_{23}) is rejected because the observed direction of its relationship to turnover is contrary to that hypothesized when the other predictors are controlled. The hypotheses relating to the nineteen predictors not included in the model are rejected.

G. Summary of Findings

In the previous sections, six mobility models have been examined in terms of the relationships between twenty three independent variables and each of six mobility indices.

The explanatory power of the models can be observed from Table XIX.

TABLE XIX

EXPLANATORY POWER OF RAW-DATA MODELS I THROUGH VI

Model	Mobility Index	MULT R^2	No. of Independent Variables
I	Out	67.9%	5
II	Within	48.2	5
III	Generation	74.3	4
IV	In	39.4	5
V	Attraction	64.3	5
VI	Turnover	72.1	4

Model III has the largest MULT R^2 indicating that 74.3 percent of the variation in generation is accounted for by four independent variables. Model VI ranks second with a MULT R^2 of 72.1 percent, and it is followed by Models I and V with values of 67.9 and 64.3 percent respectively. Models II and IV have the lowest explanatory power. The low MULT R^2 of Model

IV indicates a strong need for studying other variables such as vacancy rates which may improve the explanation of in-movement variation.

From Table XX one can observe the composition of each of the final stepwise regression models in terms of dependent and independent variables, the direction of association between the variables, and the status of hypotheses relative to acceptance or rejection.

TABLE XX

RELATIONSHIPS BETWEEN MOBILITY INDICES
AND INDEPENDENT VARIABLES INCLUDED IN THE FINAL
SOLUTIONS OF MODELS I THROUGH VI

Independent Variables	Beta Coefficients of the Models					
	I[a] (Out)	II[a] (Within)	III[a] (Gen.)	IV[e] (In)	V[e] (Attrac.)	VI[e] (Turn.)
X_1	0.1349*	0.2960*	0.5680*		0.5123*	0.7324*
X_2				-0.3327*	-0.3157*	
X_5					-0.1577*	
X_6			-0.1616*			
X_7	0.3749*			0.3044*		
X_{10}		0.2332*				
X_{12}			0.2110*	0.2984*		
X_{13}				-0.3038*		0.2228*
X_{14}		-0.4238*				
X_{15}	-0.2466					
X_{17}		0.1464	0.1690*	0.1648	0.1708	0.1696*
X_{19}					0.1708	
X_{21}	-0.1802*					
X_{22}	-0.2947*	0.2202				
X_{23}						0.1821

[a] Based on 1966 data.

<p style="text-align:center">TABLE XX (continued)</p>

* Hypothesis accepted. For all unstarred entries, the hypotheses are rejected. Hypotheses pertaining to variables for which no entries are given are also rejected.

X_1 = Percentage of households with income of less than $5,000.

X_2 = Percentage of households with income of $8,000 to $15,000.

X_5 = Percentage of households with two children.

X_6 = Percentage of households with three children.

X_7 = Percentage of households with four or more children.

X_{10} = Percentage of heads of household age 50 and over.

X_{12} = Percentage of heads of household age 20 to 29.

X_{13} = Percentage of deteriorated and dilapidated housing.

X_{14} = Percentage of owner occupied housing.

X_{15} = Pupil-teacher ratio.

X_{17} = Age of school.

X_{19} = Log. percentage of heads of household with professional occupation.

X_{21} = Log. distance.

X_{22} = Percentage of white households.

X_{23} = Log. percentage of heads of household with education 12 years.

The Beta coefficients, given in the table, provide the opportunity for comparing the relative abilities of the independent variables in each model to produce change in the model's dependent variable. With respect to the variable set in Model I, one can see that the percentage of

households with four or more children (X_7) is more important than any of the other four variables in producing change in out-movement. In Model II, the percent owner occupied housing (X_{14}) is the most important of the five predictors in relation to within-area mobility. In Models III, V, and VI, the percent households with income of less than \$5,000 (X_1) produces more change in generation, attraction, and turnover than any of the other predictors. And finally, in Model IV another income variable, the percent households with income of \$8,000 to \$15,000 (X_2), is the strongest predictor of in-movement. In brief, the inclusion of income in all six models and its dominant position in four of them indicate rather strongly its importance relative to residential change.

In the main, then, the final regression solutions reveal that in the eighty-two elementary school districts in which the life cycle stage of the population has been held constant, income $(X_1$ and $X_2)$, family size (X_7), home ownership (X_{14}), condition of housing (X_{13}), age (X_{12}), and race (X_{22}) are strong predictors of one or more of the mobility indices. The findings also show that age $(X_{10}$ and $X_{12})$, distance (X_{21}), and family size $(X_5$ and $X_6)$ are also related, but less strongly, to one or more of the mobility indices. All of the above, with the exception of percent white (X_{22}) in Model II, conformed to the hypothesized relationships. Several other variables--namely, pupil teacher ratio (X_{15}), age of school (X_{17}), professional occupation (X_{19}), and education (X_{23})- are also linearly related to one or more of the mobility indices; however, they are weak predictors and related in a direction opposite from that which was expected.

VII. A FACTOR ANALYTIC APPROACH

In this chapter, the six mobility indices are related to dimensions derived from a principal components analysis of the twenty-three predictors used in the raw-data models.[1] The components not only summarize the underlying generality of the original variables, but also are linearly independent of each other, thus eliminating the problem of multicollinearity which was encountered in all six raw-data models.

A. Analysis of Data

Initially, two simple correlation matrices are derived, one for 1966 data and the other for 1969 (Appendix B).[2] Next, the correlation matrices are submitted to principal components analyses producing two component patterns. In both the 1966 and 1969 patterns, six components have eigenvalues greater than one, and only these six components are retained for further analyses (Appendix C).[3] The six components of the

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[1] The procedure of using component dimensions in regression models in lieu of the original variables has been used previously in a limited number of studies. See: Brown and Longbrake, p. 376; see also: J. Barry Riddell, "A More Realistic Derivation of Regression Parameters," Papers in Geography, No. 2, Dept. of Geography, The Pennsylvania State University (June, 1969), pp. 6-7; Shue Tuck Wong, "A Multivariate Statistical Model for Predicting Mean Annual Flood in New England," Annals of the Association of American Geographers, 53 (1963), 298-311; and, William F. Massey, "Principal Components Regression in Exploratory Statistical Research," Journal of the American Statistical Association, 60 (1965), 234-56.

[2] All of the statistical analyses—correlation, principal components, rotation, and component scores—are solved by using the Cooley and Lohnes multivariate statistical routines which were obtained by the author while attending a course in multivariate statistics taught by Dr. Cooley at the University of Pittsburgh.

[3] The principal component method produces as many components as there are variables. Generally, however, only those components with

94

1966 and 1969 component patterns account for 73.8 and 75.2 percent respectively of the variance in the correlation matrices. In the attempt to achieve a simple structure in each component pattern, both are rotated according to the Varimax method. The rotated component patterns for 1966 and 1969 are given in Tables XXI and XXII respectively. A comparison of the 1966 and 1969 patterns, on the basis of loadings of 0.40 or higher, reveals markedly similar patterns. This strong correspondence of patterns, which represent structural characteristics at two points in time, adds to the credibility of the component dimensions.

1. Interpretation of the Rotated Factors

Careful study of the component loadings has resulted in assigning the same names to the corresponding pairs of components of both years. The labels which have been subjectively assigned to the six components are: (1) prestige value or social rank, (2) racial and economic status, (3) neighborhood quality, (4) open space and age, (5) urbanization, and (6) age. In interpreting the components only those loadings with values of 0.40 or higher are considered.

a. Prestige Value. Component one is labelled as a prestige value or social rank dimension because of its close association to income, occupation, and education. Examination of the factor loadings on this dimension in Tables XXI and XXII reveals that this dimension places elementary school districts on a continuous scale. For both 1966 and 1969, school

eigenvalues greater than one are retained for further analysis. See: William W. Cooley and Paul R. Lohnes, Multivariate Procedures for the Behavioral Sciences (New York: John Wiley and Sons, Inc., 1962), p. 166.

districts with high prestige value at one end of the scale are character-
ized by relatively large proportions of their populations with high levels
of education and income, and working in white collar and professional oc-
cupations. In addition, households in these districts tend to have two
children. At the other end of the scale, low prestige school districts
are characterized by relatively large proportions of households with low
educational attainment, low incomes, and blue collar occupations, and to
some extent by pressure on internal housing space. In addition, heads of
household tend to be young and households tend to be large, i.e., with
four or more children. It may be noted that the only significant dif-
ference between the 1966 and 1969 factors is that the age 20 to 29 vari-
able has a relatively high loading on the 1966 factor and a relatively
low loading on the 1969 factor.

b. Racial and Economic Status. This dimension is related to
race, middle and low income, occupation, age, and housing characteristics.
The loadings suggest that this dimension represents basically middle-in-
come predominantly white school districts at one end of the scale versus
low-income predominantly nonwhite districts at the other end. The white
middle-income districts are also characterized by a relatively high level
of home ownership, low levels of unsound and overcrowded housing, a small
number of heads of household in the 20 to 29 age group, and to some extent
by blue collar occupations. Characteristics associated with the low-in-
come mostly nonwhite school districts are a large proportion of house-
holds headed by the mother, a low level of home ownership, relatively high
levels of unsound housing and overcrowded units, and a relatively large
number of heads of household in the 20 to 29 age group. In comparing the

TABLE XXI

VARIMAX ROTATION OF SIX COMPONENTS: 1966 DATA
N - 82

Variable **	Component *					
	C_1	C_2	C_3	C_4	C_5	C_6
1	-0.358	0.825	-0.119	-0.180	-0.173	0.063
2	0.355	-0.720	-0.011	0.099	0.119	0.045
3	-0.753	-0.521	0.099	0.036	0.008	-0.097
4	0.759	-0.207	0.030	0.022	0.104	-0.032
5	0.619	-0.239	-0.054	-0.067	-0.183	-0.154
6	0.208	-0.183	0.174	0.032	0.815	0.246
7	-0.633	0.393	0.045	0.077	-0.339	-0.136
8	-0.202	0.892	-0.121	-0.065	-0.190	-0.011
9	-0.154	-0.434	0.541	0.014	0.098	-0.269
10	-0.565	0.555	0.159	-0.189	-0.035	0.053
11	0.340	-0.434	0.050	0.260	0.016	-0.722
12	0.264	-0.201	-0.253	0.276	0.020	0.739
13	0.052	0.076	0.055	-0.823	0.018	0.010
14	-0.408	0.579	-0.271	-0.288	-0.237	0.051
15	0.146	-0.798	0.321	0.195	-0.047	0.076
16	-0.597	0.642	0.125	-0.184	-0.084	-0.026
17	-0.076	0.213	0.200	-0.101	-0.722	0.294
18	-0.028	0.109	-0.833	0.010	0.048	0.068
19	0.098	-0.826	0.059	-0.175	0.172	-0.150
20	0.358	-0.058	0.069	0.627	0.137	0.058
21	0.756	-0.256	-0.037	0.263	0.178	0.120
22	0.744	-0.256	0.070	0.126	0.186	-0.015
23	0.697	-0.257	0.146	0.394	0.126	0.100

TABLE XXI -- (continued)

Eigenvalue	5.106	5.612	1.518	1.725	1.633	1.403

Cumulative

Percentage

of Variance

Explained	22.2	46.5	53.1	60.6	67.7	73.8

*C_1 - Prestige value.

C_2 - Racial and economic status.

C_3 - Neighborhood quality.

C_4 - Open space and age.

C_5 - Urbanization.

C_6 - Age.

**1 - Percentage of households with income of less than $5,000.

2 - Percentage of households with income of $8,000 to $15,000.

3 - Percentage of heads of household with blue collar occupation.

4 - Percentage of heads of household with white collar occupation.

5 - Percentage of households with two children.

6 - Percentage of households with three children.

7 - Percentage of households with four or more children.

8 - Percentage of households with mother as head of household.

9 - Pupil-teacher ratio.

10 - Percentage of heads of household age 20 to 29.

11 - Percentage of heads of household age 30 to 39.

12 - Percentage of heads of household age 40 to 49.

TABLE XXI -- (continued)

13 - Percentage of heads of household age 50 and over.

14 - Percentage of deteriorated and dilapidated housing.

15 - Percentage of owner occupied housing.

16 - Percentage of housing units with 1.01 or more persons per room.

17 - Industrial acreage.

18 - Age of school.

19 - Percentage of white households.

20 - Log. distance.

21 - Log. percentage of households with income over $15,000.

22 - Log. percentage of heads of household with professional occupation.

23 - Log. percentage of heads of household with education greater than
     12 years.

_____

1966 and 1969 components, although there are some differences in size of

component loadings, the same variables load highly and in the same direc-

tion on this dimension.

    c. <u>Neighborhood Quality</u>. On this dimension, pupil-teacher ratio

and age of school have the highest loadings but with opposite signs. It

may be recalled from the analysis of the raw-data models that it was in-

ferred that, in lieu of being measures of school quality, P-T ratio and

age of school were surrogate measures for neighborhood quality. Hence,

dimension three is labelled neighborhood quality. School districts rated

as high quality neighborhoods tend to have newer schools and higher P-T

ratios than do those districts rated as low quality. In terms of loadings

TABLE XXII

VARIMAX ROTATION OF SIX COMPONENTS: 1969 DATA
N = 82

Variable [*]	C_1	C_2	C_3	Component [*] C_4	C_5	C_6
1	-0.322	0.848	-0.112	-0.190	0.168	0.038
2	0.346	-0.745	0.066	0.133	-0.077	0.004
3	-0.776	-0.450	0.172	-0.041	0.141	-0.008
4	0.754	-0.278	-0.016	0.094	-0.197	-0.075
5	0.687	-0.224	0.179	-0.182	0.135	0.120
6	0.130	-0.095	0.158	0.183	-0.826	0.152
7	-0.583	0.312	0.050	0.056	0.443	-0.241
8	-0.139	0.915	-0.097	-0.087	0.138	-0.009
9	-0.095	-0.300	0.629	0.008	-0.070	-0.256
10	-0.174	0.790	0.220	-0.050	0.060	-0.114
11	-0.060	-0.302	0.093	0.316	-0.048	-0.835
12	0.171	-0.301	-0.181	0.162	-0.114	0.821
13	0.059	-0.015	-0.164	-0.796	0.202	0.289
14	-0.375	0.598	-0.293	-0.219	0.235	0.071
15	0.042	-0.791	0.392	0.177	-0.026	-0.034
16	-0.488	0.717	0.026	0.040	0.124	-0.104
17	-0.137	0.242	0.136	0.026	0.592	0.114
18	-0.053	0.030	-0.887	-0.042	-0.034	0.037
19	0.044	-0.737	0.165	-0.249	-0.347	-0.124
20	0.293	-0.234	-0.080	0.747	0.058	0.170
21	0.659	-0.386	-0.043	0.142	-0.151	0.321
22	0.714	-0.359	0.025	0.219	-0.201	-0.039
23	0.633	-0.426	-0.010	0.344	0.017	0.082

TABLE XXII -- (continued)

Eigenvalue	4.163	6.049	1.702	1.794	1.679	1.886

Cumulative

Percentage

of Variance

Explained	18.1	44.5	51.9	59.7	67.0	75.2

* For identification of components and variables, see pp. 98-99.

of 0.25 and over, high quality districts can be seen to have low levels of blighted housing and high levels of home ownership, while low quality districts tend to have high levels of blighted housing and relatively large numbers of renters. Finally, it may be observed that both the 1966 and 1969 dimensions have similar patterns of loadings.

d. Open Space and Age. The fourth dimension, or open space and age, is closely associated with log. distance, a surrogate for open space, and the age 50 and over variable. At one end of this dimension, elementary school districts are characterized by relatively small amounts of open space and relatively large proportions of older heads of household. At the other end, school districts display the converse characteristics, i.e., relatively large amounts of open space and relatively small proportions of older heads of household.

e. Urbanization. This dimension is closely associated with family size and industrial acreage and is referred to as urbanization. The urbanization dimension has been identified in previous studies of urban

ecological structure. In Murdie's study, for example, the urbanization dimension was closely associated with family size.[1] Examination of the factor loadings indicates that this dimension places elementary school districts on a continuum. At one end, school districts with a high level of urbanization are characterized by a large proportion of households with three children and by a small amount of industrial acreage. At the other end, school districts with a low level of urbanization tend to have a large number of households with four or more children and a large amount of industrial acreage. When the signs of the factor loadings are compared for 1966 and 1969, one can see that signs of the three variables that load highly on the urbanization dimension are the converse in 1969 of what they were in 1966. To aid in the comparison of the two components the signs for 1969 can be mentally inverted such that they correspond to those for 1966 without affecting the overall interpretation of the factors.

f. _Age_. The sixth dimension is strongly associated only with those in the age 30 to 39 and age 40 to 49 groups. No other variables load highly on either the 1966 or the 1969 component.

B. Hypotheses

The hypotheses that are given below are consistent with the rationales provided in support of the hypotheses pertaining to the original variables (see Section B of Chapter IV), with one exception. Age

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[1] Robert A. Murdie, _Factorial Ecology of Metropolitan Toronto, 1951-1961: An Essay on the Social Geography of the City_, Department of Geography Research Paper No. 116, The University of Chicago (1969), p. 87; see also: Theodore R. Anderson and Janice A. Egeland, "Spatial Aspects of Social Area Analysis," _American Sociological Review_, 26 (1961), p. 396.

of school and pupil-teacher ratio are considered to be surrogate measures of neighborhood quality rather than school quality. Therefore, the rationale concerning school quality and mobility is no longer pertinent. Instead, one would expect that low quality neighborhoods characterized by deteriorated and dilapidated housing and a large proportion of renters should have higher mobility rates than high quality neighborhoods characterized by a relatively small amount of unsound housing and a large proportion of home owners.

The hypotheses relating to the six mobility indices and six components are:

(1) A negative relationship holds between prestige value and mobility.

(2) A positive relationship holds between racial and economic status and mobility.

(3) A negative relationship holds between neighborhood quality and mobility.

(4) A negative relationship holds between the open space and age component and mobility.

(5) A negative relationship holds between urbanization and mobility.

(6) A negative relationship holds between age and mobility.

C. Component Models

In this section, the 1966 components are used as predictors for the out-movement, within-area movement, and generation models, and the 1969 components are used for the in-movement, attraction, and turnover

models.

1. Component Model I, Out-Movement

The findings show that, on the one hand, elementary school districts characterized by low prestige value, nonwhite low-income status, low neighborhood quality, and low urbanization have high out-movement rates (Table XXIII). On the other hand, school districts with high prestige value, white middle-income status, high neighborhood quality, and high urbanization have low rates.

TABLE XXIII

SIMPLE CORRELATIONS, COMPONENT
MODEL I

Component	Out-Movement
C_1 - Prestige value	-0.328
C_2 - Racial and economic status	0.621
C_3 - Neighborhood quality	-0.216
C_5 - Urbanization	-0.301

At the first regression step, the component representing racial and economic status (C_2) is entered and it explains 38.6 percent of the variation in out-movement (Table XXIV). At the next three steps, prestige value (C_1), urbanization (C_5), and neighborhood quality (C_3) are added and they together with racial and economic status account for 62.9 percent of the variation in out-movement. The hypotheses pertaining to the components included in the model are accepted. Hypotheses relating to the open space and age (C_4) and age (C_6) components, which are not included

in the model, are rejected.

TABLE XXIV

SUMMARY TABLE FOR COMPONENT MODEL I

DEPENDENT VARIABLE = OUT-MOVEMENT

1966 Data, N = 82

Step	Variable	MULT R	Increase	MULT R^2	Intercept	Regr. Coeff.	Std. Err of Est.	Beta Coeff.
1	C_2*	0.621	0.621	38.6	17.9684	8.3611	10.701	0.6205
2	C_1					-4.4157		-0.3276
	C_2	0.702	0.081	49.3	17.9668	8.3600	9.783	0.6205
3	C_1					-4.4158		-0.3276
	C_2					8.3595		0.6204
	C_5	0.763	0.061	58.2	17.9668	-4.0527	8.928	-0.3005
4	C_1					-4.7234		-0.3277
	C_2					8.3608		0.6205
	C_3					-2.9124		-0.2160
	C_5	0.793	0.030	62.9	17.9679	-4.0509	8.468	-0.3003

*C_1 = Prestige value.

C_2 = Racial and economic status.

C_3 = Neighborhood quality.

C_5 = Urbanization.

With respect to the effects of the components on out-movement, the racial and economic status dimension is the most important predictor, producing far more change in the dependent variable than any of the other

predictors. The second most important component is seen to be prestige value and it is closely followed by urbanization. Of the four components included in the model, neighborhood quality is the least important.

2. Component Model II, Within-Area Movement

The simple correlation coefficients in Table XXV reveal that within-area movement is positively related to racial and economic status (C_2), and negatively related to neighborhood quality (C_3) and open space and age (C_4).

TABLE XXV

SIMPLE CORRELATIONS, COMPONENT
MODEL II

Component	Within-area Movement
C_2 - Racial and economic status	0.460
C_3 - Neighborhood quality	-0.252
C_4 - Open space and age	-0.369

In the first regression solution, racial and economic status accounts for 21.2 percent of the variation in within-area movement (Table XXVI). At step two, the open space and age dimension is added and it increases the MULT R^2 to 34.8 percent. At the final step, neighborhood quality is added and the three components combined have an explanatory power of 41.1 percent.

Racial and economic status accounts for more change in within-area movement than either of the other two components. Open space and age is the second most important predictor and neighborhood quality is the least

important. The signs of the coefficients indicate that racial and economic status is positively related to within-area movement while open space and age and neighborhood quality are negatively related. Since these findings are consistent with the hypothesized relationships, the hypotheses for

TABLE XXVI

SUMMARY TABLE FOR COMPONENT MODEL II

DEPENDENT VARIABLE = WITHIN-AREA MOVEMENT

1966 Data, N = 82

Step	Variable	MULT R	Increase	MULT R^2	Intercept	Regr. Coeff.	Std. Err. of Est.	Beta Coeff.
1	C_2*	0.460	0.460	21.2	9.7470	3.2446	6.346	0.4598
2	C_2					3.2445		0.4598
	C_4	0.590	0.130	34.8	9.7464	-2.6064	5.807	-0.3693
3	C_2					3.2452		0.4599
	C_3					-1.7781		-0.2518
	C_4	0.641	0.051	41.1	9.7471	-2.6060	5.553	-0.3692

* C_2 = Racial and economic status.

C_3 = Neighborhood quality.

C_4 = Open space and age.

C_2, C_3, and C_4 are accepted. The hypotheses relating to those components not included in the model are rejected.

To sum up, the findings show that, on the one hand, school districts characterized by nonwhite low-income status, a relatively small amount of

open space, a relatively large proportion of older heads of household, and low neighborhood quality have high rates of within-area movement. On the other hand, school districts with white middle-income status, a relatively large amount of open space, a relatively small proportion of older heads of household, and high neighborhood quality have low rates of within-area movement.

3. Component Model III, Generation of Movement

Generation is more strongly associated with racial and economic status (C_2) than any of the other four components included in the model (Table XXVII). The signs of the correlation coefficients indicate that

TABLE XXVII

SIMPLE CORRELATIONS, COMPONENT
MODEL III

Component	Generation
C_1 - Prestige value	-0.291
C_2 - Racial and economic status	0.707
C_3 - Neighborhood quality	-0.285
C_4 - Open space and age	-0.189
C_5 - Urbanization	-0.273

generation is directly related to racial and economic status (C_2), and inversely related to prestige value (C_1), neighborhood quality (C_3), open space and age (C_4), and urbanization (C_5).

The stepwise procedure involved a total of five steps. At the first step, racial and economic status is entered and it explains 50.0

percent of the variation in generation of movement (Table XXVIII). The sequential inclusion of prestige value, neighborhood quality, urbanization, and open space and age increases the explanatory power of the model to 77.4 percent.

Comparison of the Beta coefficients of the last regression solution indicates that the racial and economic status component has a much stronger effect on generation of movement than any of the other components. Prestige value, neighborhood quality, and urbanization rank second, third, and fourth in order of importance, but the differences between them are relatively small. The fifth component, the open space and age dimension, has the least effect on the generation of movement. The signs of the coefficients in the final solution show that racial and economic status is positively related to generation, and the other four components are negatively related. The hypotheses for these components are accepted. The hypothesis for the age dimension (C_6) is rejected because it is not included in the model.

In brief, the regression results reveal that school districts with high prestige value, white middle-income status, high neighborhood quality, a relatively large amount of open space, a relatively small number of older heads of household, and a high level of urbanization have low generation rates. In contrast, school districts characterized by low prestige value, nonwhite low-income status, low neighborhood quality, a relatively small amount of open space, a relatively large proportion of older heads of household, and a low level of urbanization have high area-specific generation rates.

TABLE XXVIII

SUMMARY TABLE FOR COMPONENT MODEL III
DEPENDENT VARIABLE = GENERATION OF MOVEMENT

1966 Data, N = 82

Step	Variable	MULT R	Increase	MULT R^2	Intercept	Regr. Coeff.	Std. Err. of Est.	Beta Coeff.
1	C_2*	0.707	0.707	50.0	27.7155	11.6161	11.780	0.7066
2	C_1					-4.7756		-0.2904
	C_2	0.764	0.057	58.4	27.7138	11.6149	10.809	0.7066
3	C_1					-4.7778		-0.2906
	C_2					11.6169		0.7067
	C_3	0.815	0.051	66.4	27.7155	-4.6893	9.759	-0.2851
4	C_1					-4.7779		-0.2906
	C_2					11.6164		0.7067
	C_3					-4.6865		-0.2849
	C_5	0.860	0.045	74.0	27.7155	-4.4912	8.662	-0.2729
5	C_1					-4.7773		-0.2905
	C_2					11.6163		0.7067
	C_3					-4.6858		-0.2849
	C_4					-3.1112		-0.1892
	C_5	0.880	0.020	77.4	27.7147	-4.4927	8.098	-0.2730

* C_1 = Prestige value.

C_2 = Racial and economic status.

C_3 = Neighborhood quality.

C_4 = Open space and age.

C_5 = Urbanization.

4. Component Model IV, In-Movement

The findings show that school districts with high prestige value (C_1) and predominantly white middle-income status (C_2) tend to have low in-movement rates (Table XXIX). Conversely, school districts characterized by low prestige value and predominantly nonwhite low-income status tend to have high rates of in-movement.

TABLE XXIX

SIMPLE CORRELATIONS, COMPONENT
MODEL IV

Component	In-Movement
C_1 - Prestige value	-0.290
C_2 - Racial and economic status	0.408

The stepwise procedure involved two steps (Table XXX). At the first step, the racial and economic status component is entered and it explains 16.6 percent of the variation in in-movement. At step two, prestige value is added and it increases the explanatory power of the model to 25.1 percent.

The Beta coefficients of the final regression solution indicate that racial and economic status is more important than prestige value in producing change in the dependent variable (Table XXX). The signs of the coefficients indicate that racial and economic status is positively related to in-movement and that prestige value is negatively related. Since the findings support the hypotheses for C_1 and C_2, they are accepted. The hypotheses for the components not included in the final solution are rejected.

TABLE XXX

SUMMARY TABLE FOR COMPONENT MODEL IV
DEPENDENT VARIABLE = IN-MOVEMENT

1969 Data, N = 82

Step	Variable	MULT R	Increase	MULT R^2	Intercept	Regr. Coeff.	Std. Err. of Est.	Beta Coeff.
1	C_2*	0.408	0.408	16.6	17.8896	4.3016	9.697	0.4079
2	C_1					-2.9822		-0.2904
	C_2	0.501	0.093	25.1	17.8892	4.1909	9.251	0.4081

*C_1 = Prestige value.

C_2 = Racial and economic status.

5. Component Model V, Attraction

Five components were included in the regression model. The simple correlations between attraction and the five components show that racial and economic status (C_2) is most strongly related to attraction, and that urbanization (C_5) is least strongly related (Table XXXI). In addition, prestige value (C_1), neighborhood quality (C_3), and open space and age

TABLE XXXI

SIMPLE CORRELATIONS, COMPONENT MODEL V

Components	Attraction
C_1 - Prestige value	-0.261
C_2 - Racial and economic status	0.600
C_3 - Neighborhood quality	-0.218
C_4 - Open space and age	-0.180
C_5 - Urbanization	0.140

(C_4) are weakly related to attraction.

In the first of five steps, racial and economic status explains 36.0 percent of the variation in attraction (Table XXXII). In the four succeeding solutions, the additions of C_1, C_3, C_4, and C_5 increase the explanatory power of the model to 52.9 percent.

A comparison of the Beta coefficients of the final regression solution reveals that the racial and economic status component is more than twice as important as any of the other components in producing change in attraction. Prestige value, neighborhood quality, and the open space and age components rank second, third, and fourth respectively in order of importance. Urbanization is the least important of the five components. The signs of the coefficients in the final solution indicate that racial and economic status and urbanization are positively related to attraction and that the other three components are negatively related.

On the basis of the findings, the hypotheses for all components included in the final solution are accepted. One may question the acceptance of the hypothesis pertaining to urbanization and attraction since a negative relationship was hypothesized but the sign of the regression coefficient is positive. It may be recalled that the signs of the component loadings on the 1969 urbanization dimension were just the opposite from those on the 1966 dimension. Thus, in 1969, a high level of urbanization is associated with high negative component scores since households with three children loaded negatively on the component. A low level of urbanization, then, is represented by high positive component scores because of the positive loadings of households with four children and industrial acreage. Hence, the positive sign of the regression coefficient

TABLE XXXII

SUMMARY TABLE FOR COMPONENT MODEL V
DEPENDENT VARIABLE = ATTRACTION

1969 Data, N = 82

Step	Variable	MULT R	Increase	MULT R^2	Intercept	Regr. Coeff.	Std. Err. of Est.	Beta Coeff.
1	C_2*	0.600	0.600	36.0	28.1025	8.3403	11.193	0.6003
2	C_1					-3.6154		-0.2616
	C_2	0.655	0.055	42.9	28.1021	8.3431	10.644	0.6005
3	C_1					-3.6154		-0.2616
	C_2					8.3424		0.6004
	C_3	0.690	0.035	47.6	28.1025	-3.0100	10.258	-0.2177
4	C_1					-3.6114		-0.2613
	C_2					8.3399		0.6002
	C_3					-3.0152		-0.2181
	C_4	0.713	0.023	50.8	28.1025	-2.4834	10.000	-0.1798
5	C_1					-3.6104		-0.2613
	C_2					8.3413		0.6003
	C_3					-3.0155		-0.2181
	C_4					-2.4822		-0.1797
	C_5	0.727	0.014	52.9	28.1020	1.9394	9.862	0.1403

* C_1 = Prestige value.

   C_2 = Racial and economic status.

   C_3 = Neighborhood quality.

   C_4 = Open space and age.

   C_5 = Urbanization.

indicates that attraction rates are high where urbanization level is low, and the rates are low where urbanization level is high. Therefore, the hypothesis is accepted. The hypothesis for the age component (C_6) is rejected since it is not included in the final solution of the model.

In brief, the findings reveal that school districts characterized by high prestige value, predominantly white middle-income status, high neighborhood quality, a relatively large amount of open space, a small number of older heads of household, and a high level of urbanization tend to have low rates of attraction. At the other extreme, school districts with a low prestige value, predominantly nonwhite low-income status, low neighborhood quality, a relatively small amount of open space, a relatively large proportion of older heads of household, and a low level of urbanization have high rates of attraction.

6. Component Model VI, Turnover

The correlation findings show that racial and economic status (C_2) is more strongly related to turnover than any of the other components (Table XXXIII).

TABLE XXXIII

SIMPLE CORRELATIONS, COMPONENT MODEL VI

Component	Turnover
C_1 – Prestige value	−0.196
C_2 – Racial and economic status	0.669
C_3 – Neighborhood quality	−0.318
C_4 – Open space and age	−0.181
C_5 – Urbanization	0.252

The stepwise procedure involved a total of five steps (Table XXXIV). At the first step, the racial and economic status dimension is entered and it accounts for 44.8 percent of the variation in turnover. At the next four steps, C_3, C_5, C_1, and C_4 are added and together with C_2 they account for 68.4 percent of the variation in the dependent variable.

Significant differences are observed in the relative abilities of the components to produce change in the dependent variable. Racial and economic status is more than twice as important as any of the other components. The next three components in order of importance are neighborhood quality, urbanization, and prestige value. The open space and age component is the least important of the predictors. The signs of the coefficients indicate that racial and economic status and urbanization are positively related to turnover. Although the sign for the urbanization coefficient indicates a positive relation, the relationship between urbanization and turnover is, in fact, negative. The reason for this interpretation was given in the previous section. For the other three components, the signs indicate negative relationships with turnover.

On the basis of the findings, the hypotheses for all components included in the final regression solution are accepted. The age component (C_6) is not included in the final solution; therefore, its hypothesis is rejected.

To sum up briefly, the findings reveal that school districts characterized by high prestige value, predominantly white middle-income status, high neighborhood quality, a relatively large amount of open space, a relatively small number of heads of household age 50 and over, and a high level of urbanization have low turnover rates. At the other

TABLE XXXIV

SUMMARY TABLE FOR COMPONENT MODEL VI
DEPENDENT VARIABLE = TURNOVER

1969 Data, N = 82

Step	Variable	MULT R	Increase	MULT R^2	Intercept	Regr. Coeff.	Std. Err. of Est.	Beta Coeff.
1	C_2 *	0.669	0.669	44.8	21.9976	8.9743	10.034	0.6693
2	C_2					8.9734		0.6692
	C_3	0.741	0.072	54.9	21.9981	-4.2352	9.130	-0.3174
3	C_2					8.9759		0.6694
	C_3					-4.2358		-0.3175
	C_5	0.783	0.042	61.3	21.9973	3.3744	8.511	0.2530
4	C_1					-2.6228		-0.1967
	C_2					8.9779		0.6696
	C_3					-4.2359		-0.3175
	C_5	0.807	0.024	65.1	21.9969	3.3730	8.128	0.2529
5	C_1					-2.6189		-0.1964
	C_2					8.9754		0.6694
	C_3					-4.2409		-0.3179
	C_4					-2.4094		-0.1808
	C_5	0.827	0.020	68.4	21.9969	3.3715	7.788	0.2528

* C_1 = Prestige value.

C_2 = Racial and economic status.

C_3 = Neighborhood quality.

C_4 = Open space and age.

C_5 = Urbanization.

extreme, school districts with low prestige value, nonwhite low-income

status, low neighborhood quality, a relatively small amount of open space,

a relatively large proportion of older heads of household, and a low level

of urbanization have high rates of turnover.

D. Summary of Findings

Relationships between the six component predictors and each of the

mobility indices have been examined. The explanatory power of the models

is given in Table XXXV. The generation model has the highest Coefficient

TABLE XXXV

EXPLANATORY POWER OF COMPONENT MODELS I THROUGH VI

Component Model	Mobility Index	MULT R^2	Number of components
I	Out	62.9	4
II	Within	41.1	3
III	Generation	77.4	5
IV	In	25.1	2
V	Attraction	52.9	5
VI	Turnover	68.4	5

of Determination, with 77.4 percent of the variation in generation being

accounted for by five components. This model has a higher explanatory

power than any of the other models considered in this study. Model VI

with a MULT R^2 of 68.4 percent ranks second and it is followed by Models

I, V, II, and IV. The range of the MULT R^2 values indicates that the six

mobility indices are influenced differentially by the six component predictors.

In terms of relative abilities to produce change in mobility, the racial and economic status component is dominant in each model (Table XXXVI). Furthermore, the relationship between racial and economic status and the dependent variable of each model is consistently positive. Therefore, school districts with predominantly nonwhite low income status tend

TABLE XXXVI

RELATIONSHIPS BETWEEN MOBILITY INDICES
AND COMPONENT PREDICTORS INCLUDED IN THE
FINAL SOLUTIONS OF COMPONENT MODELS I THROUGH VI

Components[1]	I[a] (Out)	II[a] (Within)	III[a] (Gen.)	IV[e] (In)	V[e] (Attrac.)	VI[e] (Turn.)
C_1	-0.3277	*	-0.2905	-0.2904	-0.2613	-0.1964
C_2	0.6205	0.4599	0.7067	0.4081	0.6003	0.6694
C_3	-0.2160	-0.2518	-0.2849	*	-0.2181	-0.3179
C_4	*	-0.3692	-0.1892	*	-0.1797	-0.1808
C_5	-0.3003	*	-0.2730	*	-0.1403	-0.2528
C_6	*	*	*	*	*	*

[a] Based on 1966 data.

[e] Based on 1969 data.

* Hypothesis rejected. All other hypotheses were accepted.

[1] C_1 = Prestige value.

C_2 = Racial and economic status.

C_3 = Neighborhood quality.

C_4 = Open space and age.

C_5 = Urbanization.

C_6 = Age.

to have high rates of mobility, while predominantly white middle-income
school districts tend to have low rates. Of the remaining five components,
social prestige and neighborhood quality are each included in five of the
six models. In each model they are inversely related to the dependent vari-
able indicating that school districts with high prestige value and high
neighborhood quality tend to have low mobility rates and districts with
the converse characteristics tend to have high rates. The urbanization
and the open space and age components are each included in four models and
in each instance they are inversely related to the dependent variable.
Thus, school districts with relatively small amounts of open space and rel-
atively large proportions of older heads of household and a low level of
urbanization tend to have high mobility rates. At the other extreme school
districts with relatively large amounts of open space and small proportions
of older heads of household together with a high level of urbanization tend
to have low mobility rates. The sixth component, an age dimension, is not
included in the final solution of any of the models. The hypotheses per-
tinent to the relationships indicated in the table are all accepted.

VIII. CONCLUSIONS

This study has considered intraurban mobility in the City of Pittsburgh from September 1966 to March 1969. The basic units of analysis were eighty-two elementary school districts, and the population of interest in these districts was comprised of households who were in the same life cycle stage.

The major objective of the study was to identify significant relationships between the spatial distribution of intraurban mobility, as measured by six indices, and selected aspects of population, housing, and other environmental characteristics. The main findings of the study are given below.

The analysis of the simple correlations between the mobility indices themselves, and the cartographic analysis of the spatial distributions of the indices indicated that, although the six indices overlapped to some extent in their measurement of mobility, each one represented certain unique aspects of the complex phenomenon of intraurban mobility. Hence, the six indices provided meaningful and relatively comprehensive coverage of intraurban residential change.

The multivariate stepwise regression analyses of the raw-data models, each of which consisted of a mobility index and twenty three independent variables, produced the following expected relationships:

(A) Out-movement was positively related to percentage of households with income of less than $5,000 and percentage of households with four or more children, and negatively related to log. distance and percentage of white households.

121

(B) Within-area movement was positively related to percentage of households with income of less than $5,000 and percentage of heads of household age 50 and over, and negatively related to percentage of owner occupied housing.

(C) Generation of movement was positively related to percentage of households with income of less than $5,000, percentage of heads of household age 20 to 29, and age of school, and negatively related to percentage of households with three children.

(D) In-movement was positively related to percentage of households with four or more children and percentage of heads of household age 20 to 29, and negatively related to percentage of households with income of $8,000 to $15,000 and percentage of deteriorated and dilapidated housing.

(E) Attraction was positively related to percentage of households with income of less than $5,000, and negatively related to percentage of households with income of $8,000 to $15,000 and percentage of households with two children.

(F) Turnover was positively related to percentage of households with income of less than $5,000, percentage of deteriorated and dilapidated housing, and age of school.

The inclusion of income in all six models and its dominant position in four of them indicated rather strongly the importance of income in residential change. Other variables which were strongly related to one or more of the mobility indices were: percentage of households with four or more children, percentage of heads of household age 20 to 29, percentage of white households, percentage of owner occupied housing, and percentage of deteriorated and dilapidated housing.

The problem of multicollinearity was encountered in each of the raw-data models. To overcome this problem, a modified analytical approach was taken. This approach, which involved simple correlation, principal components, and rotation analyses, produced six significant components. On the basis of the loadings of the original variables, these components were interpreted as representing: (a) prestige value, (b) racial and economic status, (c) neighborhood quality, (d) open space and age, (e) urbanization, and (f) age.

The multivariate stepwise regression analyses of the component models, each of which consisted of a mobility index and the six components indicated above, produced the following expected relationships:

(A) Out-movement was positively related to racial and economic status, and negatively related to prestige value, neighborhood quality, and urbanization.

(B) Within-area movement was positively related to racial and economic status, and negatively related to neighborhood quality and the open space and age dimension.

(C) Generation of movement was positively related to racial and economic status, and negatively related to prestige value, neighborhood quality, open space and age, and urbanization.

(D) In-movement was positively related to racial and economic status, and negatively related to prestige value.

(E) Attraction was positively related to racial and economic status, and negatively related to prestige value, neighborhood quality, open space and age, and urbanization.

(F) Turnover was positively related to racial and economic status,

and negatively related to prestige value, neighborhood quality, open
space and age, and urbanization.

Racial and economic status was the most important of the six predictors.
This was evidenced by the fact that, in each of the six models, it ac-
counted for a greater amount of change in the dependent variable than
any of the other components.

In summary, the findings of the component models indicated that
high rates of generation, attraction, and turnover were associated with
elementary school districts characterized by low prestige value, predom-
inantly nonwhite low-income status, low neighborhood quality, relatively
small amounts of open space, relatively large numbers of older heads of
household, and a low level of urbanization. In contrast, low rates of
generation, attraction, and turnover were associated with the converse
of the above indicated characteristics. High rates of out-movement were
found to be associated with school districts with low prestige value, pre-
dominantly nonwhite low-income status, low neighborhood quality, and a
low level of urbanization; and conversely, low rates of out-movement were
associated with high prestige value, predominantly white middle-income
status, high neighborhood quality, and a high level of urbanization. High
rates of in-movement were associated with low prestige value and predom-
inantly nonwhite low-income school districts. Low rates of in-movement
were related to high prestige value and white middle-income status. High
rates of within-area movement were associated with school districts char-
acterized by predominantly nonwhite low-income status, small amounts of
open space, relatively large numbers of older heads of household, and
low neighborhood quality. In contrast, low rates of within-area movement
were related to districts with predominantly white middle-income status,

large amounts of open space, small numbers of older heads of household, and high neighborhood quality.

The modified approach proved to be an effective method of analysis because orthogonal and meaningful components were derived which led to the identification of significant relationships between components and mobility indices.

This study has shown that intraurban mobility is a complex phenomenon which is related to a variety of demographic, socio-economic, and other environmental characteristics.

A. Suggestions for Further Research

A number of questions concerning intraurban mobility remain to be answered. Two of these are: What are the differences, if any, in demographic and socio-economic characteristics of those who move within areas as opposed to those who move in or out? For any homogeneous group of households such as a low income group, is the propensity to move the same or not in different types of environments? A cross-level analysis of intraurban mobility could provide answers to questions such as these and many others. The approach would involve the use of factor analytic and grouping techniques to delineate homogeneous areas based on aggregate data. Within this derived framework of homogeneous areas, the mobility behavior of individual decisionmakers or of variously defined sub-groups of the population could be studied.

BIBLIOGRAPHY

126

BIBLIOGRAPHY

Albig, William. "The Mobility of the Urban Population," Social Forces, 11 (1932-33), pp. 351-67.

Alonso, William. "The Historic and the Structural Theories of Urban Form," in Internal Structure of the City: Readings on Space and Environment. Edited by Larry S. Bourne. New York: Oxford University Press, 1971.

Anderson, T. R., and J. E. Egeland. "Spatial Aspects of Social Area Analysis," American Sociological Review, 26 (1961), pp. 392-98.

Associated Educational Consultants, Inc., Pittsburgh. A Long Range Developmental Program, Pittsburgh School District, 3 (1969).

Bahr, Howard M., and Jack P. Gibbs. "Racial Differentiation in American Metropolitan Areas," Social Forces, 45 (1967), pp. 521-32.

Barclay, George W. Techniques of Population Analysis. New York: John Wiley and Sons, Inc., 1958.

Berry, Brian J. L., and Frank E. Horton. Geographic Perspectives on Urban Systems: With Integrated Readings. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1970.

_____, J. W. Simmons, and R. J. Tennant. "Urban Population Densities: Structure and Change," The Geographical Review, 53 (1963), pp. 389-405.

Beshers, J. M. Urban Social Structure. Glencoe: The Free Press, 1962.

Blalock, Hubert M., Jr. "Correlated Independent Variables: The Problem of Multicollinearity," Social Forces, 42 (1963) pp. 233-37.

_____, Social Statistics. New York: McGraw-Hill Book Co., In., 1960.

Brown, Lawrence A., and David B. Longbrake. "Migration Flows in Intraurban Space: Place Utility Considerations," Annals of the Association of American Geographers, 60, 2 (June 1970) pp. 368-84.

_____, Frank E. Horton, and Robert I. Wittick. "On Place Utility and the Normative Allocation of Intra-Urban Migrants," Demography, 7, No. 2 (May 1970), pp. 175-83.

Brown, Robert K. Public Housing in Action: The Record of Pittsburgh. Ann Arbor: Edwards Brothers, Inc., 1959.

Burgess, Ernest W., and Robert E. Park. The City. Chicago: The University of Chicago Press, 1925.

Butler, Edgar W., et al. _Moving Behavior and Residential Choice: A National Survey._ National Cooperative Highway Research Program. Report 81, Washington, D. C.: Highway Research Board, 1969.

_____, Georges Sabagh, and Maurice D. Van Arsdol, Jr. "Demographic and Social Psychological Factors in Residential Mobility," _Sociology and Social Research,_ 48 (Jan. 1964), pp. 139-54.

Buttimer, Anne. "Social Geography," _International Encyclopedia of the Social Sciences._ ed. David L. Sills, VI (1968), pp. 134-45.

Caplow, Theodore. "Incidence and Direction of Residential Mobility in a Minneapolis Sample," _Social Forces,_ 27 (1948-49), pp. 413-17.

Cave, P. W. "Occupancy Duration and the Analysis of Residential Change," _Urban Studies,_ 6, 1 (Feb. 1969), pp. 58-69.

Chapin, F. Stuart, Jr. "Activity Systems and Urban Structure: A Working Schema," _Journal of the American Institute of Planners,_ 34, No. 1 (January 1968), pp. 11-18.

_____, _Urban Land Use Planning._ Urbana: University of Illinois Press, 1965.

Clark, Colin. "Urban Population Densities," _Journal of the Royal Statistical Society,_ Ser. A, 114, 4 (1951), pp. 490-96.

Clemence, Theodore G. "Residential Segregation in the Mid-Sixties," _Demography,_ 4 (1967), pp. 562-68.

Cooley, W. C. and P. R. Lohnes. _Multivariate Procedures for the Behavioral Sciences._ New York: John Wiley and Sons, Inc., 1962.

Corbally, J. E. "Measure of Intra-Urban Mobility," _Sociology and Social Research,_ 14 (1929-30), pp. 547-53.

Cowgill, Donald O. "Residential Mobility of an Urban Population." Unpublished Master's Thesis, Washington University, St. Louis, 1935.

Dogan, Mattei and Stein Rokkan (eds.). _Quantitative Ecological Analysis in the Social Sciences._ Cambridge: The M.I.T. Press, 1969.

Duncan, Beverly. "Intra-Urban Population Movement," in Hatt, P. K., and A. J. Reiss, Jr. _Cities and Society._ Glencoe: The Free Press, 1957, pp. 297-309.

_____, and Otis D. Duncan. "Intra-City Locational Patterns," _Journal of Regional Science,_ 2 (1960), pp. 37-54.

Duncan, Otis Dudley, and Beverly Duncan. _The Negro Population of Chicago: A Study of Residential Succession._ Chicago: The University of Chicago Press, 1957.

_____, and Leo F. Schnore. "Cultural, Behavioral, and Ecological Perspectives in the Study of Social Organization," American Journal of Sociology, 65 (July 1959), pp. 132-46.

_____, Ray P. Cuzzort, and B. Duncan. Statistical Geography. Glencoe: The Free Press, 1961.

Fairbairn, K. "Population Movements within the Christchurch Urban Area, 1959," New Zealand Geographer, 19 (1963), pp. 143-59.

Foote, Nelson N., Janet Abu-Lughod, Mary M. Foley, and L. Winnick. Housing Choices and Housing Constraints. New York: McGraw-Hill Book Co., 1960.

Frank, Ronald E. "Use of Transformations," Journal of Marketing Research, 3 (Aug. 1966), pp. 247-53.

Freedman, Harry Ajzen. "Intra-Urban Mobility in Toronto: A Study in Micro-Migration Analysis." Unpublished Master's Thesis, Geography Department, The Pennsylvania State University, 1967.

Gibbard, Harold A. "The Status Factor in Residential Succession," American Journal of Sociology, 46 (1940-41), pp. 835-42.

Glick, Paul C. "The Family Cycle," American Sociological Review, 12 (1947), pp. 164-74.

_____, and Robert Parke, Jr. "New Approaches in Studying the Life Cycle of the Family," Demography, 2 (1965), pp. 187-202.

Goldstein, Sidney. "City Directories as Sources of Migration Data," American Journal of Sociology, 59 (1953-54), pp. 167-76.

_____, Patterns of Mobility, 1910-1950: The Norristown Study. Philadelphia: University of Pennsylvania Press, 1958.

Gould, Peter. "Is Statistix Inferens the Geographical Name for a Wild Goose?" Economic Geography, 46, 2 (Supplement), (June 1970), pp. 439-48.

Green, Howard Wipple. Movement of Families within the Cleveland Metropolitan District. Cleveland: Real Property Inventory, Reports Number 3 (1934), 5 (1935), 7 (1936), 9 (1937), and 11 (1938).

Grodzins, Morton. The Metropolitan Area as a Racial Problem. Pittsburgh: The University of Pittsburgh Press, 1964.

Haenszel, William. "Concept, Measurement, and Data in Migration Analysis," Demography, 4 (1967), pp. 253-61.

Harman, Harry H. Modern Factor Analysis. 2d ed. rev., Chicago: The University of Chicago Press, 1967.

Hauser, Philip M., and Otis Dudley Duncan. (eds.). The Study of Population. Chicago: The University of Chicago Press, 1959.

Heiges, Harvey E. "Intra-Urban Residential Movement in Seattle, 1962-1967." Unpublished Ph.D. dissertation, University of Washington, 1968.

Herbert, J. D., and B. H. Stevens. "A Model for the Distribution of Residential Activity in Urban Areas," Journal of Regional Science, 2 (1960), pp. 21-36.

Horton, Frank E., and David R. Reynolds. "Effects of Urban Spatial Structure on Individual Behavior," Economic Geography, 47, 1 (January 1971), pp. 36-48.

Hotelling, Harold. "Analysis of a Complex of Statistical Variables in Principal Components," The Journal of Educational Psychology, 24 (Sept. and Oct. 1933), pp. 417-21 and 498-520.

Johnston, R. J. "Some Tests of a Model of Intra-Urban Population Mobility: Mebourne, Australia," Urban Studies, 6, 1 (Feb. 1969), pp. 34-57.

Kalbach, Warren E., George C. Myers, and John R. Walker. "Metropolitan Area Mobility: A Comparative Analysis of Family Spatial Mobility in a Central City and Selected Suburbs," Social Forces, 42 (May 1964), pp. 310-14.

King, Leslie J. Statistical Analysis in Geography. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1969.

Lambert, Richard D. "Methods of Measuring Intra-Urban Population Movements," Social Forces, 27 (1948-49), pp. 269-71.

Lansing, John B. Residential Location and Urban Mobility, The Second Wave of Interviews. Ann Arbor: Institute for Survey Research, University of Michigan, 1966.

_____, and Eva Mueller. Residential Location and Urban Mobility. Ann Arbor: Institute for Survey Research, University of Michigan, 1964.

_____, and Nancy Barth. Residential Location and Urban Mobility: A Multivariate Analysis. Ann Arbor: Institute for Survey Research, University of Michigan, 1964.

Leslie, Gerald R., and Arthur H. Richardson. "Life-Cycle, Career Pattern, and the Decision to Move," American Sociological Review, 26, 6 (Dec. 1961), pp. 894-902.

Lubove, Roy. Twentieth Century Pittsburgh. New York: John Wiley and Sons, Inc., 1969.

Massey, William F. "Principal Components Regression in Exploratory Statistical Research," Journal of the American Statistical Association, 60 (1965), pp. 234-56.

McKenzie, Roderick D. "The Neighborhood," American Journal of Sociology, 27 (1921) pp. 145-68.

Menzel, Herbert. "Comment on Robinson's 'Ecological Correlations and the Behavior of Individuals'," American Sociological Review, 15 (1950), p. 674.

Michelson, W. "An Empirical Analysis of Urban Environmental Preferences," Journal of the American Institute of Planners, 32 (1966), pp. 355-60.

Moore, Eric G. "Comments on the Use of Ecological Models in the Study of Residential Mobility in the City," Economic Geography, 47, 1 (Jan. 1971), pp. 73-85.

_____, "Intraurban Residential Mobility and Urban Spatial Structure," Paper Presented at the Annual Meeting of the Population Association of America in Atlanta in April, 1970, pp. 1-32.

_____, "Models of Migration and the Intra-Urban Case," The Australian and New Zealand Journal of Sociology, 2 (1966), pp. 16-37.

_____, "Residential Mobility in an Urban Context: A Systems Approach." Unpublished Ph.D. dissertation, University of Queensland, Australia, 1966.

_____, "The Nature of Intra-Urban Migration and Some Relevant Research Strategies," Department of Geography, Northwestern University, 1970.

_____, "The Structure of Intraurban Movement Rates: An Ecological Model," Urban Studies, 6, 1 (Feb. 1969), pp. 23-32.

Morrill, Richard L. "The Negro Ghetto: Problems and Alternatives," The Geographical Review, 55 (1965), pp. 339-61.

Morrison, Denton E., and Ramon E. Henkel (eds.). The Significance Test Controversy: A Reader. Chicago: Aldine Publishing Co., 1970.

Murdie, Robert A. Factorial Ecology of Metropolitan Toronto, 1951-1961: An Essay on the Social Geography of the City. Department of Geography Research Paper No. 116, University of Chicago, 1969.

Myers, George C. "Variations in Urban Population Structure," Demography, 1 (1964), pp. 156-63.

Niedercorn, John H., and Edward F. R. Hearle. "Recent Land-Use Trends in Forty-eight Large American Cities," Land Economics, 40, 1 (Feb. 1964), pp. 105-09.

Office of Research, Pittsburgh Public Schools. Demographic Survey Report, 1969. unpublished, February 1970.

Olsson, Gunnar. Distance and Human Interaction: A Review and Bibliography. Bibliography Series Number Two, Philadelphia: Regional Science Research Institute, 1965.

Pittsburgh City Planning, Pittsburgh, Pa. Community Facilities and Public Service Study, CRP Community Renewal Program, 1964.

_____, Land Use Classification for Pittsburgh's Land Use Survey, 1958-1960. unpublished. (April 1962).

Quinn, James A. "Migration and Mobility," Chapter XVII in Human Ecology. New York: Prentice-Hall Inc., 1950, pp. 372-95.

Riddell, J. Barry. "A More Realistic Derivation of Regression Parameters," Papers in Geography, No. 2, Department of Geography, The Pennsylvania State University, June 1969.

Robinson, William S. "Ecological Correlations and the Behavior of Individuals," American Sociological Review, 15 (1950), pp. 351-57.

Rossi, Peter H. Why Families Move: A Study in the Social Psychology of Urban Residential Mobility. Glencoe: The Free Press, 1955.

Rummel, R. J. "Understanding Factor Analysis," The Journal of Conflict Resolution, 11, 4 (December 1967), pp. 444-80.

Sherif, C. W. "Self Radius and Goals of Youth in Different Urban Areas," Sociological and Social Research, 38 (Feb. 1954), pp. 141-48.

Shryock, Henry S., Jr. Population Mobility Within the United States. Chicago: Community and Family Study Center, University of Chicago, 1964.

Simmons, James W. "Changing Residence in the City: A Review of Intra-urban Mobility," The Geographical Review, 58, 4 (1968), pp. 622-51.

Speare, Alden, Jr. "Home Ownership, Life Cycle Stage, and Residential Mobility," Paper Presented at the Annual Meeting of the Population Association of America in Atlanta, Ga., April 1970, pp. 2-11.

Straits, Bruce C. "Residential Movement Among Negroes and Whites in Chicago," Social Science Quarterly, 49, 3 (Dec. 1968), pp. 573-92.

Sullenger, Earl T. "Intra-Urban Mobility," Sociology and Social Research, 17 (1932) pp. 16-24.

Taeuber, Karl E., and Alma F. Taeuber. Negroes in Cities: Residential Segregation and Neighborhood Change. Chicago: Aldine Publishing Co., 1965.

_____, Leonard Chiazze, Jr., and William Haenszel. Migration in the United States: An Analysis of Residence Histories. Public Health Monograph No. 77, U. S. Dept. of Health, Education and Welfare, 1968.

Thomlinson, Ralph. Urban Structure. New York: Random House, 1969.

The Report of the President's Committee on Urban Housing. _A Decent Home_.
Washington, D. C.: U. S. Government Printing Office, December 1968.

U. S. Department of Commerce, Bureau of the Census. _1970 Census of Popu-
lation Advance Report: Final Population Counts, Pennsylvania, PC (VI)-40_.
Washington, D. C.: U. S. Government Printing Office, 1971.

_____, _Fertility Indicators: 1970_, Current Population Reports, Series
P-23, No. 36, Washington, D. C.: U. S. Government Printing Office, 1971.

_____, _Mobility of the Population of the United States: March 1968 to
March 1969_. Current Population Reports, Series P-20, No. 193, Washing-
ton, D. C.: U. S. Government Printing Office, 1969.

_____, _Mobility of the Population of the United States: March 1967
to March 1968_. Current Population Reports, Series P-20, No. 188, Wash-
ington, D. C.: U. S. Government Printing Office, 1969.

_____, _U. S. Census of Housing: 1960, Series H C (3)-345, City Blocks,
Pittsburgh, Pa_. Washington, D. C.: U. S. Government Printing Office.

U. S. Department of Labor, Office of Policy Planning and Research, _The
Negro Family: The Case for National Action_: Washington, D. C.: U. S.
Government Printing Office, 1965.

U. S. Public Roads Administration. _A Bibliography on Residential Mobility
in Urban Areas_. Washington, D. C.: U. S. Government Printing Office,
1947.

Van Arsdol, Maurice D., Georges Sabagh, and Edgar W. Butler, "Retrospec-
tive and Subsequent Metropolitan Residential Mobility," _Demography_, 5
(1968), pp. 249-67.

_____, S. F. Camilleri, and Calvin F. Schmidt. "The Generality of
Urban Social Area Indexes," _American Sociological Review_, 23 (1958),
pp. 277-84.

Webber, Melvin M., et al. _Explorations into Urban Structure_. Philadel-
phia: University of Pennsylvania Press, 1964.

Whitney, Vincent H., and Charles M. Grigg. "Patterns of Mobility Among
a Group of Families of College Students," _American Sociological Review_,
23 (Dec. 1958), pp. 643-52.

Wold H., and L. Jureen. _Demand Analysis_. New York: John Wiley and Sons,
Inc., 1953.

Wolpert, Julian. "Behavioral Aspects of the Decision to Migrate," _Papers
and Proceedings of the Regional Science Association_, 15 (1965), pp. 159-69.

Wong, Shue Tuck, "A Multivariate Statistical Model for Predicting Mean
Annual Flood in New England," _Annals of the Association of American Geog-
raphers_, 53 (1963), pp. 298-311.

APPENDICES

APPENDIX A

DATA MANAGEMENT

A magnetic tape containing the records of the 66,030 respondents
to the 1969 Demographic Survey was provided on a loan basis by the Re-
search Office of the Pittsburgh Board of Education. In order to derive
the population of interest in this study from the total respondent set,
a special computer program was written and run on the IBM 360 computer
at Indiana University of Pennsylvania.[1] The program was written so that
the data were aggregated by elementary school districts for 1966 and 1969.
It was necessary to aggregate by school districts because respondents had
not been asked to report their addresses for 1966 and 1969, but instead
had been requested to record a school code for the school of attendance
of the oldest child for the years of interest. Thus, it was necessary to
assume that respondent households resided in those school districts where
their oldest child was attending school. The validity of this assumption
was investigated by consulting with staff members of the Research Office
and of the Office of the Associate Superintendent of Elementary Schools.
From these sources it was learned that approximately two percent or less
of the households of interest in this study could have been residing in
a school district other than the one where their oldest child was attend-
ing school. A test for this was included in the computer program by ob-
taining a count of all households who reported no move in the time period
of interest, but who reported different school codes for 1966 and 1969.

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[1]Mr. Edward H. Pechan, III, a consultant to the Research Office of
the Pittsburgh Board of Public Education, assisted in the writing of this
program.

135

The computer output indicated a total of seventy-three of these households.
These respondents were deleted from this study since there was no way of
determining their place of residence. Thus, the assumption relating to
place of residence of respondents included in this study appears to be val-
id.

Two hundred and fourteen other respondent records were deleted be-
cause of no response to questionnaire items relating to mobility and the
school codes. This number together with the 73 indicated above comprise a
total of 287 records that were deleted from this study.

Provision was also made in the computer program to obtain a count
by elementary school districts of the respondents who did not answer one
or more items on the questionnaire relating to demographic and socio-econ-
omic characteristics. Table XXXVII shows the magnitude of these missing
data for the school families of interest for 1966. It may be seen that the
missing data ranges from 0.8 percent for head of household to 7.4 percent
for income. This problem of missing data was handled in the following way.
Since the data for those who had responded in each elementary school dis-
trict were categorized into groups on the basis of each characteristic, a
mean for the grouped data on each characteristic was calculated. Then,
for each school district, the respondents who had not responded to a given
characteristic were assigned to the category whose range of values includ-
ed the mean. This procedure was followed for characteristics (a) through
(d) of Table XXXVII. With respect to the remaining characteristics, (e)
through (g), the foregoing procedure was not used since these characteris-
tics were measured at the nominal scale which precluded the calculation of
a meaningful mean. Consequently, no correction was attempted. Instead,
only the data for those who had responded were used in calculating the

TABLE XXXVII

NON-RESPONSE, 1966 DATA SET

Characteristic	Number of Respondents	Percentage of Total Respondent Set *
(a) Age of head of household	142	4.8%
(b) Income of household	221	7.4
(c) Number of children	39	1.3
(d) Educational attainment of head of household	73	2.4
(e) Race	119	4.0
(f) Head of household (Father, Mother, or Other)	24	0.8
(g) Occupation of head of household	107	3.6

* The total respondent set is comprised of 2973 households.

percentage distributions for the elementary school districts.

The same procedures were followed for the 1969 data set. A table showing the missing data pattern for 1969 is not given because it would be nearly identical to the 1966 pattern in view of the fact that 97 percent of the 1969 population is derived from the 1966 population.

APPENDIX B

TABLE XXXVIII

MATRIX OF CORRELATION COEFFICIENTS, 1966 DATA
N = 82

Variable*	1	2	3	4	5	6	7
1	1.00	-0.76	-0.22	-0.52	-0.32	-0.38	0.59
2	-0.76	1.00	0.09	0.48	0.34	0.31	-0.54
3	-0.22	0.09	1.00	-0.53	-0.26	-0.08	0.20
4	-0.52	0.48	-0.53	1.00	0.35	0.21	-0.53
5	-0.32	0.34	-0.26	0.35	1.00	0.00	-0.59
6	-0.38	0.31	-0.08	0.21	0.00	1.00	-0.54
7	0.59	-0.54	0.20	-0.53	-0.59	-0.54	1.00
8	0.90	-0.73	-0.35	-0.38	-0.26	-0.39	0.51
9	-0.36	0.13	0.37	0.01	0.07	0.12	-0.03
10	0.63	-0.49	0.14	-0.48	-0.40	-0.22	0.53
11	-0.57	0.41	0.05	0.34	0.31	0.08	-0.28
12	-0.16	0.19	-0.20	0.22	0.14	0.19	-0.32
13	0.16	-0.10	-0.06	-0.04	-0.07	-0.06	0.06
14	0.73	-0.58	-0.02	-0.51	-0.33	-0.34	0.50
15	-0.76	0.70	0.29	0.34	0.27	0.23	-0.32
16	0.74	-0.65	0.17	-0.58	-0.39	-0.29	0.61
17	0.28	-0.28	-0.07	-0.24	-0.12	-0.37	0.28
18	0.15	-0.08	-0.16	-0.04	-0.04	-0.09	0.02
19	-0.69	0.55	0.29	0.26	0.23	0.34	-0.41
20	-0.35	0.31	-0.18	0.26	0.18	0.25	-0.26
21	-0.55	0.49	-0.41	0.58	0.41	0.39	-0.56
22	-0.55	0.44	-0.36	0.50	0.47	0.35	-0.61
23	-0.61	0.48	-0.33	0.58	0.34	0.36	-0.51
24	0.81	-0.66	-0.23	-0.39	-0.34	-0.46	0.59
25	0.52	-0.47	-0.28	-0.14	-0.24	-0.22	0.17
26	0.71	-0.56	-0.14	-0.40	-0.29	-0.45	0.63

TABLE XXXVIII -- (continued)

Variable	8	9	10	11	12	13	14
1	0.90	-0.36	0.63	-0.57	-0.16	0.16	0.73
2	-0.73	0.13	-0.49	0.41	0.19	-0.10	-0.58
3	-0.35	0.37	0.14	0.05	-0.20	-0.06	-0.02
4	-0.38	0.01	-0.48	0.34	0.22	-0.04	-0.51
5	-0.26	0.07	-0.40	0.31	0.14	-0.07	-0.33
6	-0.39	0.12	-0.22	0.08	0.19	-0.06	-0.34
7	0.51	-0.03	0.53	-0.28	-0.32	0.06	0.50
8	1.00	-0.40	0.57	-0.47	-0.18	0.07	0.65
9	-0.40	1.00	-0.18	0.31	-0.13	-0.03	-0.39
10	0.57	-0.18	1.00	-0.62	-0.49	0.08	0.53
11	-0.47	0.31	-0.62	1.00	-0.28	-0.23	-0.45
12	-0.18	-0.13	-0.49	-0.28	1.00	-0.26	-0.22
13	0.07	-0.03	0.08	-0.23	-0.26	1.00	0.24
14	0.65	-0.39	0.53	-0.45	-0.22	0.24	1.00
15	-0.76	0.41	-0.46	0.39	0.18	-0.16	-0.63
16	0.66	-0.16	0.74	-0.49	-0.37	0.10	0.65
17	0.28	-0.16	0.30	-0.28	-0.08	0.07	0.37
18	0.17	-0.42	0.03	-0.19	0.16	0.00	0.27
19	-0.79	0.40	-0.47	0.49	0.03	0.01	-0.53
20	-0.25	-0.01	-0.31	0.25	0.20	-0.24	-0.37
21	-0.44	-0.04	-0.65	0.37	0.40	-0.14	-0.55
22	-0.48	0.08	-0.56	0.38	0.25	-0.09	-0.55
23	-0.47	0.02	-0.58	0.40	0.34	-0.25	-0.56
24	0.78	-0.44	0.57	-0.48	-0.19	0.15	0.73
25	0.50	-0.21	0.20	-0.24	-0.12	0.35	0.48
26	0.69	-0.42	0.59	-0.46	-0.17	0.00	0.64

TABLE XXXVIII -- (continued)

Variable	15	16	17	18	19	20	21
1	-0.76	0.74	0.28	0.15	-0.69	-0.35	-0.55
2	0.70	-0.65	-0.28	-0.08	0.55	0.31	0.49
3	0.29	0.17	-0.07	-0.16	0.29	-0.18	-0.41
4	0.34	-0.58	-0.24	-0.04	0.26	0.26	0.58
5	0.27	-0.39	-0.12	-0.04	0.23	0.18	0.41
6	0.23	-0.29	-0.37	-0.09	0.34	0.25	0.39
7	-0.32	0.61	0.28	0.02	-0.40	-0.26	-0.56
8	-0.76	0.66	0.28	0.17	-0.79	-0.25	-0.44
9	0.41	-0.16	-0.16	-0.42	0.40	-0.01	-0.04
10	-0.46	0.74	0.30	0.03	-0.47	-0.31	-0.65
11	0.39	-0.49	-0.28	-0.19	0.49	0.25	0.37
12	0.18	-0.37	-0.08	0.16	0.03	0.20	0.40
13	-0.16	0.10	0.08	0.00	0.01	-0.24	-0.14
14	-0.63	0.65	0.37	0.27	-0.53	-0.37	-0.55
15	1.00	-0.56	-0.14	-0.35	0.60	0.28	0.35
16	-0.56	1.00	0.27	-0.01	-0.58	-0.27	-0.68
17	-0.14	0.27	1.00	-0.05	-0.24	0.04	-0.01
18	-0.35	-0.01	-0.05	1.00	-0.15	-0.10	-0.23
19	0.60	-0.58	-0.24	-0.15	1.00	-0.03	0.22
20	0.28	-0.27	-0.10	0.04	-0.03	1.00	0.45
21	0.35	-0.68	-0.23	-0.01	0.22	0.45	1.00
22	0.29	-0.63	-0.20	-0.05	0.30	0.37	0.63
23	0.40	-0.57	-0.15	-0.13	0.26	0.49	0.71
24	-0.72	0.57	0.33	0.32	-0.63	-0.39	-0.50
25	-0.61	0.33	0.19	0.31	-0.26	-0.30	-0.32
26	-0.56	0.52	0.31	0.24	-0.63	-0.31	-0.44

TABLE XXXVIII -- (continued)

Variable	22	23	24	25	26
1	-0.55	-0.61	0.81	0.52	0.71
2	0.44	0.48	-0.66	-0.47	-0.56
3	-0.36	-0.33	-0.23	-0.28	-0.14
4	0.50	0.58	-0.39	-0.14	-0.40
5	0.47	0.34	-0.34	-0.24	-0.29
6	0.35	0.36	-0.46	-0.22	-0.45
7	-0.61	-0.51	0.59	0.17	0.63
8	-0.48	-0.47	0.78	0.50	0.69
9	0.08	0.02	-0.44	-0.29	-0.42
10	-0.56	-0.58	0.57	0.20	0.59
11	0.39	0.40	-0.48	-0.24	-0.46
12	0.25	0.34	-0.19	-0.12	-0.17
13	-0.09	-0.25	0.15	0.35	0.00
14	-0.55	-0.56	0.73	0.48	0.64
15	0.29	0.40	-0.72	-0.61	-0.56
16	-0.63	-0.57	0.57	0.33	0.52
17	-0.05	-0.13	0.33	0.19	0.31
18	-0.20	-0.15	0.32	0.31	0.24
19	0.30	0.26	-0.63	-0.26	-0.63
20	0.37	0.49	-0.39	-0.30	-0.31
21	0.63	0.71	-0.50	-0.32	-0.44
22	1.00	0.69	-0.46	-0.23	-0.45
23	0.69	1.00	-0.51	-0.29	-0.48
24	-0.46	-0.51	1.00	0.60	0.91
25	-0.23	-0.29	0.60	1.00	0.20
26	-0.45	-0.48	0.91	0.20	1.00

TABLE XXXVIII -- (continued)

*1 - Percentage of households with income of less than $5,000.

2 - Percentage of households with income of $8,000 to $15,000.

3 - Percentage of heads of household with blue collar occupation.

4 - Percentage of heads of household with white collar occupation.

5 - Percentage of households with two children.

6 - Percentage of households with three children.

7 - Percentage of households with four or more children.

8 - Percentage of households with mother as head of household.

9 - Pupil-teacher ratio.

10 - Percentage of heads of household age 20 to 29.

11 - Percentage of heads of household age 30 to 39.

12 - Percentage of heads of household age 40 to 49.

13 - Percentage of heads of household age 50 and over.

14 - Percentage of deteriorated and dilapidated housing.

15 - Percentage of owner occupied housing.

16 - Percentage of housing units with 1.01 or more persons per room.

17 - Industrial acreage.

18 - Age of school.

19 - Percentage of white households.

20 - Log. distance.

21 - Log. percentage of households with income over $15,000.

22 - Log. percentage of heads of household with professional occupation.

23 - Log. percentage of heads of household with education greater than
    12 years.

TABLE XXXVIII -- (continued)

24 - Generation.

25 - Within-area movement.

26 - Out-movement.

TABLE XXXIX

MATRIX OF CORRELATION COEFFICIENTS, 1969 DATA
N = 82

Variable *	1	2	3	4	5	6	7
1	1.00	-0.79	-0.15	-0.55	-0.35	-0.30	0.53
2	-0.79	1.00	0.06	0.53	0.37	0.22	-0.49
3	-0.15	0.06	1.00	-0.56	-0.31	-0.13	0.30
4	-0.55	0.53	-0.56	1.00	0.38	0.22	-0.55
5	-0.35	0.37	-0.31	0.38	1.00	0.04	-0.55
6	-0.30	0.22	-0.13	0.22	0.04	1.00	-0.54
7	0.53	-0.49	0.30	-0.55	-0.55	-0.57	1.00
8	0.90	-0.73	-0.32	-0.42	-0.25	-0.28	0.40
9	-0.31	0.16	0.30	0.05	0.10	0.47	0.13
10	0.64	-0.58	-0.12	-0.34	-0.28	-0.16	0.42
11	-0.32	0.23	0.27	0.08	-0.07	0.07	0.07
12	-0.29	0.27	-0.18	0.25	0.23	0.17	-0.39
13	0.20	-0.09	-0.01	-0.13	0.13	-0.21	-0.05
14	0.70	-0.59	0.02	-0.49	-0.32	-0.30	0.41
15	-0.75	0.71	0.34	0.32	0.25	0.21	-0.25
16	0.78	-0.65	0.13	-0.58	-0.41	-0.21	0.54
17	0.32	-0.30	0.09	-0.28	-0.11	-0.25	0.25
18	0.14	-0.13	-0.12	-0.06	-0.10	-0.10	-0.04
19	-0.66	0.51	0.23	0.32	0.20	0.33	-0.36
20	-0.40	0.36	-0.17	0.30	0.20	0.18	-0.26
21	-0.57	0.50	-0.39	0.57	0.47	0.32	-0.57
22	-0.63	0.52	-0.39	0.58	0.45	0.38	-0.57
23	-0.62	0.53	-0.26	0.56	0.42	0.25	-0.45
24	0.73	-0.71	-0.10	-0.40	-0.39	-0.27	0.46
25	0.80	-0.70	-0.19	-0.38	-0.31	-0.36	0.46
26	0.46	-0.50	0.02	-0.36	-0.36	-0.14	0.46

TABLE XXXIX -- (continued)

Variable	8	9	10	11	12	13	14
1	0.90	-0.31	0.64	-0.32	-0.29	0.20	0.71
2	-0.73	0.16	-0.58	0.23	0.27	-0.09	-0.59
3	-0.32	0.30	-0.19	0.27	-0.18	-0.01	0.02
4	-0.42	0.05	-0.34	0.08	0.25	-0.13	-0.49
5	-0.25	0.10	-0.28	-0.07	0.23	0.13	-0.32
6	-0.28	0.05	-0.16	0.07	0.17	-0.21	-0.30
7	0.40	0.13	0.42	0.07	-0.38	-0.05	0.41
8	1.00	-0.31	0.69	-0.29	-0.29	0.09	0.61
9	-0.31	1.00	-0.07	0.40	-0.33	-0.24	-0.39
10	0.69	-0.07	1.00	-0.25	-0.48	-0.08	0.50
11	-0.29	0.39	-0.25	1.00	-0.58	-0.50	-0.29
12	-0.29	-0.23	-0.48	-0.58	1.00	0.03	-0.22
13	0.09	-0.24	-0.08	-0.50	0.03	1.00	0.22
14	0.61	-0.39	0.50	-0.29	-0.22	0.22	1.00
15	-0.76	0.41	-0.50	0.35	0.16	-0.22	-0.63
16	0.72	-0.16	0.61	-0.06	-0.41	-0.03	0.65
17	0.26	-0.16	0.28	-0.10	-0.17	0.08	0.37
18	0.12	-0.42	-0.06	-0.19	0.18	0.13	0.27
19	-0.72	0.36	-0.52	0.27	0.12	0.02	-0.50
20	-0.28	-0.01	-0.31	0.13	0.32	-0.37	-0.37
21	-0.51	-0.06	-0.48	-0.11	0.49	0.03	-0.52
22	-0.52	0.09	-0.40	0.16	0.24	-0.15	-0.58
23	-0.54	0.01	-0.48	0.13	0.33	-0.16	-0.52
24	0.64	-0.19	0.48	-0.21	-0.26	0.16	0.51
25	0.71	-0.38	0.48	-0.29	-0.19	0.21	0.69
26	0.41	0.04	0.46	-0.11	-0.20	-0.09	0.21

TABLE XXXIX -- (continued)

Variable	15	16	17	18	19	20	21
1	-0.75	0.78	0.32	0.14	-0.66	-0.40	-0.57
2	0.71	-0.65	-0.30	-0.13	0.51	0.36	0.50
3	0.34	0.13	0.09	-0.12	0.23	-0.17	-0.39
4	0.32	-0.58	-0.28	-0.06	0.32	0.30	0.57
5	0.25	-0.41	-0.11	-0.10	0.20	0.20	0.47
6	0.21	-0.21	-0.25	-0.10	0.33	0.18	0.32
7	-0.25	0.54	0.25	-0.04	-0.36	-0.26	-0.57
8	-0.76	0.72	0.26	0.12	-0.72	-0.28	-0.51
9	0.41	-0.16	-0.16	-0.42	0.36	0.01	-0.06
10	-0.50	0.61	0.28	-0.06	-0.52	-0.31	-0.48
11	0.35	-0.06	-0.10	-0.19	0.27	0.13	-0.11
12	0.16	-0.41	-0.17	0.18	0.12	0.32	0.49
13	-0.22	-0.03	0.08	0.13	0.02	-0.37	0.03
14	-0.63	0.65	0.37	0.27	-0.50	-0.37	-0.52
15	1.00	-0.56	-0.14	-0.35	0.62	0.28	0.30
16	-0.56	1.00	0.27	-0.01	-0.60	-0.27	-0.66
17	-0.14	0.27	1.00	-0.05	-0.25	-0.10	-0.28
18	-0.35	-0.01	-0.05	1.00	-0.13	0.04	-0.02
19	0.62	-0.60	-0.25	-0.13	1.00	-0.03	0.25
20	0.28	-0.27	-0.10	0.04	-0.03	1.00	0.41
21	0.30	-0.66	-0.28	-0.02	0.25	0.41	1.00
22	0.33	-0.64	-0.22	-0.06	0.31	0.40	0.61
23	0.37	-0.56	-0.15	-0.08	0.24	0.46	0.67
24	-0.63	0.50	0.32	0.29	-0.42	-0.38	-0.45
25	-0.70	0.55	0.34	0.31	-0.56	-0.35	-0.44
26	-0.31	0.37	0.24	0.10	-0.28	-0.21	-0.36

TABLE XXXIX — (continued)

Variable	22	23	24	25	26
1	-0.63	-0.62	0.73	0.80	0.46
2	0.52	0.53	-0.71	-0.70	-0.50
3	-0.39	-0.26	-0.10	-0.19	0.02
4	0.58	0.56	-0.40	-0.38	-0.36
5	0.45	0.42	-0.39	-0.31	-0.36
6	0.38	0.25	-0.27	-0.36	-0.14
7	-0.57	-0.45	0.46	0.46	0.46
8	-0.52	-0.54	0.64	0.71	0.41
9	0.09	0.01	-0.19	-0.38	0.04
10	-0.40	-0.48	0.48	0.48	0.46
11	0.16	0.13	-0.21	-0.29	-0.11
12	0.24	0.33	-0.26	-0.19	-0.20
13	-0.15	-0.16	0.16	0.21	-0.09
14	-0.58	-0.52	0.51	0.69	0.21
15	0.33	0.37	-0.63	-0.70	-0.31
16	-0.64	-0.56	0.50	0.55	0.37
17	-0.22	-0.15	0.32	0.34	0.24
18	-0.06	-0.08	0.29	0.31	0.10
19	0.31	0.24	-0.42	-0.56	-0.28
20	0.40	0.46	-0.38	-0.35	-0.21
21	0.61	0.67	-0.45	-0.44	-0.36
22	1.00	0.72	-0.40	-0.44	-0.25
23	0.72	1.00	-0.42	-0.40	-0.34
24	-0.40	-0.42	1.00	0.80	0.79
25	-0.44	-0.40	0.80	1.00	0.41
26	-0.25	-0.34	0.79	0.41	1.00

TABLE XXXIX -- (continued)

*1 - Percentage of households with income of less than $5,000.

 2 - Percentage of households with income of $8,000 to $15,000.

 3 - Percentage of heads of household with blue collar occupation.

 4 - Percentage of heads of household with white collar occupation.

 5 - Percentage of households with two children.

 6 - Percentage of households with three children.

 7 - Percentage of households with four or more children.

 8 - Percentage of households with mother as head of household.

 9 - Pupil-teacher ratio.

10 - Percentage of heads of household age 20 to 29.

11 - Percentage of heads of household age 30 to 39.

12 - Percentage of heads of household age 40 to 49.

13 - Percentage of heads of household age 50 and over.

14 - Percentage of deteriorated and dilapidated housing.

15 - Percentage of owner occupied housing.

16 - Percentage of housing units with 1.01 or more persons per room.

17 - Industrial acreage.

18 - Age of school.

19 - Percentage of white households.

20 - Log. distance.

21 - Log. percentage of households with income over $15,000.

22 - Log. percentage of heads of household with professional occupation.

23 - Log. percentage of heads of household with education greater than
     12 years.

TABLE XXXIX -- (continued)

24 - Attraction.

25 - Turnover.

26 - In-movement.

APPENDIX C

TABLE XL

SIGNIFICANT COMPONENTS FROM PRINCIPAL COMPONENTS ANALYSIS, 1966 DATA
N = 82

Variable*	Component					
	1	2	3	4	5	6
1	0.286	−0.635	0.713	0.135	0.200	0.119
2	−0.895	0.277	0.062	0.006	0.079	0.014
3	0.776	−0.147	−0.113	−0.093	−0.161	0.013
4	−0.090	−0.846	−0.325	0.042	−0.131	−0.103
5	0.656	0.356	0.248	−0.089	0.041	0.061
6	0.499	0.230	0.374	−0.103	−0.229	−0.000
7	0.466	0.044	−0.379	−0.202	0.644	0.117
8	−0.729	−0.236	0.038	0.296	−0.105	−0.094
9	−0.821	0.409	0.159	0.110	0.105	−0.052
10	0.649	−0.495	−0.023	−0.313	−0.109	−0.026
11	−0.782	−0.121	−0.025	0.035	0.216	0.132
12	0.600	−0.236	0.460	0.158	−0.005	−0.493
13	0.335	0.419	−0.602	0.072	−0.257	0.273
14	−0.195	−0.046	0.290	−0.684	0.040	0.308
15	−0.808	0.147	0.004	−0.159	−0.129	−0.045
16	0.710	−0.432	−0.084	0.166	−0.182	0.222
17	−0.853	−0.090	0.008	0.144	0.205	0.030
18	−0.160	0.405	−0.360	−0.319	−0.319	−0.526
19	−0.377	0.074	0.195	0.239	−0.470	0.496
20	0.444	0.270	−0.124	0.487	0.137	−0.106
21	0.751	0.429	0.012	0.061	0.040	0.027
22	0.726	0.321	0.172	−0.016	0.108	0.045
23	0.748	0.331	0.046	0.262	0.084	0.090

TABLE XL -- (continued)

Eigenvalue	9.037	2.972	1.4C5	1.327	1.160	1.082
Cumulative Percentage of Variance Explained	39.3	52.2	58.3	64.1	69.1	73.8

* For identification of variables, see page 148.

TABLE XLI

SIGNIFICANT COMPONENTS FROM PRINCIPAL COMPONENTS ANALYSIS, 1969 DATA
N = 82

Variable *	Component 1	2	3	4	5	6
1	-0.915	0.218	0.083	-0.080	-0.033	0.043
2	0.813	-0.120	-0.103	0.049	0.101	-0.066
3	-0.103	-0.752	-0.460	0.248	0.033	0.117
4	0.683	0.297	0.271	-0.193	0.002	-0.187
5	0.501	0.304	0.015	-0.424	0.309	-0.032
6	0.412	0.070	0.198	-0.001	-0.675	0.346
7	-0.666	-0.395	0.018	0.165	0.263	-0.039
8	-0.842	0.311	0.274	-0.107	-0.017	0.023
9	0.243	-0.651	0.151	-0.308	0.028	0.159
10	-0.712	0.041	0.358	-0.237	-0.032	0.169
11	0.230	-0.672	0.346	0.097	-0.038	-0.443
12	0.416	0.511	-0.368	0.338	0.015	0.427
13	-0.158	0.310	-0.669	-0.436	0.087	-0.148
14	-0.791	0.191	-0.137	0.068	0.009	-0.087
15	0.712	-0.488	-0.123	0.028	0.153	0.173
16	-0.844	-0.084	0.203	0.069	-0.052	0.116
17	-0.383	-0.011	-0.023	0.007	0.545	0.128
18	-0.142	0.410	-0.255	0.462	-0.210	-0.532
19	0.641	-0.370	-0.330	-0.195	-0.262	-0.076
20	0.468	0.156	0.360	0.533	0.242	0.149
21	0.734	0.426	0.026	-0.016	0.071	0.073
22	0.755	0.236	0.290	-0.091	0.025	-0.107
23	0.735	0.228	0.214	0.092	0.241	-0.045

TABLE XLI -- (continued)

Eigenvalues	8.654	3.201	1.851	1.354	1.202	1.029
Cumulative Percentage of Variance Explained	37.6	51.5	59.6	65.5	70.7	75.2

*
 For identification of variables, see page 148.

TABLE XLII

THE 1966 DATA SET FOR THE EIGHTY-TWO
ELEMENTARY SCHOOL DISTRICTS[c]

Elem. Sch. Dist. Code[a]	Variable[b]							
	1	2	3	4	5	6	7	8
01	40.0%	17.5%	50.0%	20.0%	20.0%	17.5%	47.5%	32.5%
02	66.7	8.3	4.0	16.7	41.7	33.3	16.7	41.7
03	7.3	60.0	47.3	38.2	32.7	29.1	20.0	5.5
04	45.6	12.7	44.3	17.7	26.6	24.1	32.9	43.0
05	11.9	50.0	52.7	23.7	27.6	40.8	21.1	10.5
06	35.7	7.1	41.1	28.6	35.7	26.8	33.9	39.3
07	25.0	13.9	52.8	22.2	33.3	27.8	22.2	19.4
08	15.8	31.6	63.2	15.8	26.3	26.3	21.1	5.3
09	6.3	50.0	62.5	25.0	37.5	25.0	6.3	0.0
10	8.0	64.0	34.0	50.0	34.0	16.0	22.0	12.0
11	70.3	8.1	51.4	13.5	21.6	29.7	37.9	40.5
12	19.2	26.9	65.4	26.9	26.9	19.2	34.6	7.7
13	8.3	47.9	56.3	33.3	27.1	27.1	29.2	10.4
14	35.8	14.3	35.7	32.1	14.3	21.4	53.6	32.1
15	4.8	39.8	4.8	56.6	49.4	31.3	4.8	13.3
16	11.5	23.1	61.5	26.9	23.1	28.9	19.2	7.7
17	60.9	17.4	56.5	8.7	17.4	26.1	47.8	34.8
18	43.2	16.2	32.4	35.1	24.3	18.9	32.4	48.7
19	42.9	12.2	34.7	30.6	32.7	14.3	36.7	34.7
20	18.7	47.9	45.8	31.3	27.1	39.6	18.8	12.5
21	81.8	9.1	27.3	18.2	36.4	9.1	27.3	54.5
22	50.0	30.0	70.0	0.0	10.0	30.0	50.0	10.0
23	28.6	17.1	54.3	22.9	22.9	37.1	34.3	22.9
24	40.9	27.3	50.0	45.5	36.4	13.6	22.7	18.2
25	40.0	10.0	20.0	50.0	10.0	20.0	30.0	60.0
26	45.2	19.4	51.6	22.6	22.6	25.8	41.9	29.0

154

TABLE XLII -- (continued)

Elem. Sch. Dist. Code	Variable 1	2	3	4	5	6	7	8
27	40.9%	25.0%	36.4%	18.2%	18.2%	36.4%	22.7%	38.6%
28	17.6	35.3	44.1	32.4	20.6	11.8	26.5	11.8
29	14.5	40.6	29.0	39.1	24.6	39.1	18.8	8.7
30	35.0	25.0	45.0	25.0	25.0	35.0	35.0	30.0
31	33.4	15.2	60.6	15.2	24.2	24.2	39.4	21.2
32	16.7	40.0	38.3	45.0	36.7	33.3	16.7	11.7
33	0.0	20.0	66.7	26.7	20.0	33.3	33.3	0.0
34	11.1	44.4	83.3	5.6	16.7	44.4	22.2	5.6
35	66.7	13.3	3.3	26.7	20.0	13.3	46.7	40.0
36	30.4	30.4	47.8	17.4	8.7	17.4	47.8	30.4
37	21.4	35.7	50.0	35.7	28.6	7.1	57.1	7.1
38	75.0	10.0	25.0	10.0	15.0	20.0	60.0	60.0
39	12.0	24.0	68.0	20.0	28.0	24.0	36.0	8.0
40	17.9	35.7	60.7	21.4	28.6	21.4	21.4	14.3
41	88.9	5.6	38.9	0.0	27.8	22.2	44.4	72.2
42	18.2	30.3	24.2	39.4	33.3	27.3	9.1	18.2
43	41.3	13.8	24.1	27.6	34.5	13.8	24.1	48.3
44	3.2	31.3	6.3	34.4	35.9	43.8	10.9	7.8
45	48.1	29.6	40.7	29.6	22.2	7.4	44.4	48.2
46	60.8	7.1	32.1	17.9	21.4	7.1	53.6	50.0
47	30.8	34.6	65.4	19.2	19.2	30.8	34.6	11.5
48	6.6	60.0	60.0	35.6	35.6	26.7	28.9	4.4
49	68.0	8.0	32.0	16.0	28.0	16.0	48.0	48.0
50	0.8	45.9	17.2	55.7	38.5	36.1	18.0	3.3
51	18.1	22.7	45.5	36.4	13.6	22.7	50.0	13.6
52	12.1	45.5	48.5	36.4	18.2	30.3	24.2	9.1
53	41.7	25.0	66.7	8.3	41.7	8.3	53.3	25.0
54	8.0	20.0	68.0	24.0	20.0	36.0	24.0	4.0

TABLE XLII -- (continued)

Elem. Dist.	Sch. Code	Variable							
		1	2	3	4	5	6	7	8
55		64.0%	8.0%	36.0%	16.0%	24.0%	20.0%	48.0%	60.0%
56		17.7	29.4	64.7	23.5	11.8	29.4	41.2	5.9
57		70.0	5.0	35.0	30.0	5.0	35.0	35.0	45.0
58		21.4	35.7	42.9	39.3	28.6	28.6	14.3	21.4
59		41.0	8.2	59.0	16.4	14.8	19.7	57.4	26.2
60		5.6	55.6	77.8	16.7	22.2	38.9	16.7	16.7
61		12.5	58.3	37.5	29.2	29.2	29.2	25.0	8.3
62		43.7	12.5	62.5	12.5	18.8	31.3	28.1	28.1
63		30.6	25.0	59.7	18.1	29.2	27.8	29.2	19.4
64		8.3	58.3	16.7	66.7	16.7	41.7	8.3	0.0
65		41.0	7.7	56.4	15.4	23.1	35.9	23.1	28.2
66		18.3	18.4	61.2	30.6	24.5	24.5	32.7	12.2
67		5.2	50.0	50.0	42.1	29.0	26.3	31.6	2.6
68		39.1	8.7	69.6	13.0	26.1	26.1	21.7	17.4
69		10.3	47.1	59.8	24.1	27.6	28.7	28.7	5.8
70		20.6	26.5	73.5	17.6	29.4	17.7	29.4	14.7
71		12.1	30.3	45.5	45.5	42.4	24.2	12.1	9.1
72		0.0	38.7	19.4	48.4	51.6	35.5	0.0	3.2
73		9.6	38.7	74.2	22.6	22.6	19.4	29.0	9.7
74		6.0	63.6	15.2	62.1	40.9	39.4	6.1	1.5
75		0.0	62.5	68.8	18.8	50.0	12.5	12.5	0.0
76		69.1	9.5	35.7	26.2	19.1	28.6	40.5	47.6
77		57.5	17.5	40.0	22.5	35.0	20.0	30.0	42.5
78		6.3	46.9	56.3	34.4	50.0	25.0	12.5	3.1
79		8.0	53.2	54.8	32.3	25.8	37.1	24.2	8.1
80		21.6	25.5	49.0	33.3	21.6	25.5	35.3	11.8
81		4.0	30.0	4.0	46.0	42.0	44.0	10.0	8.0
82		25.0	12.5	70.8	16.7	16.7	12.5	41.7	16.7

TABLE XLII -- (continued)

Elem. Sch. Dist.	Code	9	10	11	12	Variable 13	14	15	16	17
01		45.0%	37.5%	10.0%	7.5%	11.9%	53.5%	16.1%	19.2%	8
02		33.3	16.7	33.3	16.7	35.2	43.4	13.7	17.6	30
03		10.9	49.1	38.2	1.8	11.9	84.1	5.7	0.2	33
04		31.7	39.2	24.1	5.1	27.0	43.5	14.1	2.4	60
05		35.5	42.1	18.4	4.0	14.9	68.7	8.1	0.7	61
06		42.9	39.3	16.1	1.8	32.3	45.2	12.3	4.4	69
07		13.9	13.9	50.0	2.8	16.8	61.1	12.0	5.5	64
08		31.6	26.3	42.1	0.0	12.6	59.2	8.0	5.4	46
09		31.3	50.0	18.8	0.0	8.2	85.5	8.6	5.4	14
10		16.0	60.0	20.0	4.0	8.7	76.1	4.6	1.4	62
11		56.8	21.6	21.6	0.0	15.3	38.6	19.7	4.7	34
12		0.0	50.0	50.0	0.0	8.4	74.3	8.6	1.7	10
13		22.9	37.5	33.3	6.3	7.7	67.0	6.4	0.1	46
14		39.3	35.7	17.9	7.1	26.8	53.3	10.0	5.2	11
15		9.6	48.2	33.7	8.4	1.2	51.8	1.7	0.0	58
16		15.4	53.9	25.0	5.8	5.1	66.3	6.3	0.9	31
17		56.5	4.4	30.4	8.7	40.3	22.0	16.8	10.1	83
18		37.8	46.0	10.8	5.4	31.7	22.6	12.4	7.0	74
19		34.7	38.8	16.3	10.2	31.0	47.3	12.3	2.7	30
20		14.6	50.0	31.2	4.2	24.6	33.5	11.3	1.5	55
21		36.3	36.3	18.2	9.1	51.9	12.8	10.8	5.0	99
22		30.0	30.0	10.0	30.0	41.1	43.7	13.0	1.2	63
23		40.0	45.7	8.6	5.7	7.8	35.6	22.4	2.6	47
24		36.4	36.4	18.2	9.1	21.5	43.0	13.9	3.7	62
25		30.0	50.0	10.0	10.0	37.5	21.7	12.9	9.2	84
26		35.5	51.6	12.9	0.0	41.3	56.6	14.9	0.6	62

TABLE XLII -- (continued)

Elem. Dist.	Sch. Code	Variable 9	10	11	12	13	14	15	16	17
27		29.6%	45.5%	25.0%	0.0%	7.0%	16.9%	6.0%	2.5%	42
28		20.6	41.2	32.4	5.9	14.6	27.2	5.6	1.3	69
29		13.0	52.2	21.7	13.0	6.8	46.3	4.0	0.6	76
30		35.0	35.0	25.0	5.0	35.8	55.6	14.8	5.4	43
31		18.2	54.6	18.2	9.1	25.1	57.2	10.7	1.0	8
32		15.0	60.0	21.7	3.3	11.4	70.7	10.2	1.1	2
33		40.0	46.7	6.7	6.7	9.7	61.9	10.9	0.0	44
34		50.0	38.9	5.6	5.6	30.0	62.1	15.2	1.9	60
35		46.7	20.0	33.3	0.0	35.6	38.7	10.2	25.6	76
36		39.1	39.1	21.7	0.0	51.7	32.5	15.9	12.6	68
37		28.6	64.3	0.0	7.1	11.1	61.1	8.1	0.5	43
38		25.0	35.0	35.0	5.0	41.1	40.2	17.5	4.8	73
39		20.0	48.0	24.0	8.0	3.1	73.0	6.0	0.9	57
40		35.7	35.7	25.0	3.6	15.8	68.8	9.9	24.4	32
41		38.9	33.3	27.8	0.0	54.7	12.9	15.6	3.7	64
42		18.2	48.5	27.3	6.1	13.4	23.2	2.9	4.8	58
43		41.4	34.5	13.8	10.3	32.8	35.2	12.1	19.9	39
44		9.4	54.7	35.9	0.0	9.3	59.1	2.1	1.7	66
45		25.9	25.9	44.4	3.7	19.5	47.2	12.2	1.0	78
46		42.9	39.3	3.6	14.3	45.6	37.9	17.3	36.6	5
47		53.9	26.9	15.4	3.9	23.1	59.4	10.9	0.2	65
48		24.4	53.3	17.8	4.4	5.1	82.9	6.8	0.8	37
49		56.0	24.0	8.0	12.0	68.9	14.6	17.8	1.5	63
50		21.3	60.7	13.1	4.9	6.7	68.3	4.0	0.0	12
51		18.2	40.9	36.4	4.6	13.3	75.5	4.9	10.6	72
52		21.2	57.6	18.2	3.0	12.3	63.6	5.6	1.9	74
53		41.7	33.3	25.0	0.0	43.5	44.5	16.5	20.7	95
54		28.0	44.0	28.0	0.0	20.6	57.1	7.5	1.8	71

TABLE XLII — (continued)

Elem. Dist.	Sch. Code	Variable								
		9	10	11	12	13	14	15	16	17
55		60.0%	32.0%	4.0%	4.0%	6.7%	22.5%	27.5%	0.0%	14
56		29.4	35.3	29.4	5.9	25.7	55.0	14.5	16.6	69
57		55.0	15.0	25.0	5.0	52.6	18.6	24.7	5.7	54
58		39.3	21.4	25.0	14.3	10.0	56.8	6.2	1.1	61
59		37.7	45.9	16.4	0.0	5.1	54.4	12.0	2.0	7
60		38.9	33.3	22.2	5.6	4.0	79.7	5.2	5.1	41
61		8.3	62.5	20.8	8.3	7.7	52.7	1.9	0.3	66
62		31.3	21.9	28.1	18.8	41.7	43.8	14.5	7.6	11
63		26.4	48.6	16.7	8.3	24.8	50.2	10.5	8.1	37
64		16.7	16.7	58.3	8.3	0.0	71.7	1.5	0.0	41
65		33.3	41.0	23.1	2.6	20.9	32.6	8.1	2.7	54
66		22.5	59.2	14.3	4.1	9.9	67.1	7.6	1.4	10
67		31.6	52.6	21.1	5.3	2.0	75.7	5.8	1.4	9
68		13.0	65.2	21.7	0.0	32.7	28.3	13.4	3.8	31
69		18.4	55.2	21.8	4.6	19.9	66.4	7.5	5.4	10
70		32.4	50.0	8.8	8.8	36.1	50.4	13.6	17.4	31
71		21.2	51.5	15.2	12.1	14.6	55.5	9.6	0.8	73
72		3.2	51.6	41.9	3.2	6.6	49.3	2.0	4.9	70
73		29.0	35.5	25.8	9.7	36.0	56.7	11.8	4.7	31
74		19.7	50.0	27.3	3.0	8.6	88.3	3.3	7.6	15
75		12.5	62.5	18.8	6.3	1.7	87.7	7.1	0.9	65
76		50.0	26.2	11.9	11.9	48.1	20.8	21.8	0.0	55
77		47.5	25.0	20.0	7.5	29.1	12.4	15.4	0.5	27
78		21.9	37.5	34.4	6.3	8.5	77.5	6.4	2.6	31
79		29.0	53.2	14.5	3.2	17.0	81.8	5.3	6.3	13
80		31.4	43.1	15.7	9.8	16.4	63.3	9.1	7.6	31
81		6.0	58.0	28.0	8.0	3.1	50.8	1.6	0.0	71
82		37.5	37.5	16.7	8.3	34.0	44.7	13.0	11.9	72

TABLE XLII — (continued)

Elem. Sch. Dist. Code	Variable 18	19	20	21	22	23	24	25
01	65.0%	2.74	0.0%	2.5%	7.5%	32.5%	5.0%	27.5%
02	75.0	2.69	0.0	16.7	16.7	41.7	25.0	16.7
03	100.0	2.73	9.1	12.7	49.1	7.3	1.8	5.5
04	2.5	6.72	1.3	2.5	8.9	35.4	11.4	24.1
05	98.7	2.04	9.2	14.5	18.4	13.2	5.3	7.9
06	0.0	6.29	1.8	5.4	17.9	38.2	7.1	30.4
07	11.1	1.81	8.3	11.1	13.9	16.7	5.6	11.1
08	100.0	1.44	0.0	10.5	15.8	15.8	10.5	5.3
09	100.0	2.49	0.0	12.5	18.8	12.5	0.0	12.5
10	100.0	3.45	4.0	12.0	30.0	14.0	6.0	8.0
11	37.8	4.56	0.0	2.7	8.1	29.7	16.2	13.5
12	57.7	3.51	11.5	3.8	23.1	19.2	3.9	15.4
13	93.8	3.28	4.3	4.2	18.8	20.8	6.3	14.6
14	75.0	1.55	0.0	7.1	14.3	42.9	10.7	32.1
15	95.2	5.14	41.0	36.1	69.9	19.3	14.5	4.8
16	100.0	3.96	5.8	7.7	15.4	11.5	1.9	9.6
17	43.5	0.64	0.0	0.0	4.4	78.3	17.4	60.9
18	45.9	1.00	0.0	0.0	2.7	45.9	10.8	35.1
19	0.0	7.23	6.1	4.1	20.4	34.7	4.1	30.6
20	89.6	5.39	4.3	12.5	18.8	14.6	8.3	6.3
21	81.8	0.92	0.0	9.1	0.0	72.7	27.3	45.5
22	77.8	1.69	0.0	0.0	0.0	40.0	20.0	20.0
23	68.6	3.82	0.0	11.4	5.7	34.3	14.3	20.0
24	68.2	1.53	0.0	4.5	0.0	27.3	18.2	9.1
25	20.0	1.28	0.0	0.0	20.0	60.0	40.0	20.0
26	61.3	4.27	0.0	3.2	9.7	45.2	9.7	35.5

TABLE XLII -- (continued)

Elem. Dist.	Sch. Code	18	19	20	Variable 21	22	23	24	25
27		27.3%	3.01	4.5%	25.0%	25.0%	29.6%	15.9%	13.6%
28		91.2	4.20	2.9	14.7	32.4	32.4	20.6	11.8
29		97.1	5.39	18.8	27.5	43.5	15.9	10.1	5.8
30		60.0	4.25	0.0	0.0	10.0	25.0	5.0	20.0
31		100.0	1.59	0.0	3.0	6.1	18.2	12.1	6.1
32		100.0	3.81	11.7	5.0	30.0	13.3	1.7	11.7
33		93.3	2.54	0.0	6.7	13.3	26.7	0.0	26.7
34		94.4	5.85	0.0	5.6	22.2	11.1	5.6	5.6
35		40.0	3.02	0.0	0.0	6.7	60.0	20.0	40.0
36		0.0	6.18	0.0	13.0	17.4	47.8	8.7	39.1
37		92.9	2.14	0.0	14.3	14.3	35.7	7.1	28.6
38		5.0	5.71	0.0	0.0	5.0	60.0	25.0	35.0
39		100.0	2.70	8.0	4.0	12.0	8.0	0.0	8.0
40		10.7	6.50	10.7	10.7	28.6	28.6	3.6	25.0
41		0.0	1.12	0.0	0.0	0.0	50.0	5.6	44.4
42		72.7	4.35	18.2	27.3	51.5	30.3	9.1	21.2
43		3.4	5.45	6.9	6.9	6.9	31.0	17.2	13.8
44		95.3	5.18	56.3	56.3	82.8	23.4	6.3	17.2
45		0.0	2.95	3.7	3.7	25.9	48.1	7.4	40.7
46		7.1	1.42	0.0	3.6	7.1	57.1	10.7	46.4
47		92.3	2.16	3.8	0.0	7.7	34.6	7.7	26.9
48		100.0	7.27	2.2	2.2	15.6	8.9	6.7	2.2
49		0.0	1.62	0.0	0.0	0.0	52.0	12.0	40.0
50		99.2	4.66	31.2	27.0	53.3	15.6	6.6	9.0
51		100.0	5.40	4.5	4.5	18.2	13.6	4.6	9.1
52		100.0	3.12	9.1	3.0	24.2	12.1	12.1	0.0
53		91.7	2.58	0.0	0.0	8.3	41.7	0.0	41.7
54		100.0	2.57	0.0	8.0	8.0	16.0	8.0	8.0

TABLE XLII -- (continued)

Elem. Sch. Dist. Code	18	19	20	21	22	23	24	25
55	28.0%	2.84	0.0%	0.0%	8.0%	20.0%	8.0%	12.0%
56	94.1	4.30	0.0	5.9	5.9	17.7	11.8	5.9
57	0.0	1.91	0.0	0.0	5.0	40.0	10.0	30.0
58	89.3	2.15	0.0	7.1	7.1	21.4	7.1	14.3
59	72.1	2.58	1.6	1.6	3.3	42.6	6.6	36.1
60	100.0	3.38	0.0	0.0	0.0	22.2	0.0	22.2
61	70.8	6.19	12.5	20.8	29.2	8.3	0.0	8.3
62	93.8	1.86	0.0	3.1	9.4	21.9	15.6	6.3
63	97.2	1.01	0.0	4.2	16.7	26.4	9.7	16.7
64	66.7	6.20	16.7	8.3	41.7	8.3	0.0	8.3
65	69.2	4.83	2.6	5.1	10.3	28.2	12.8	15.4
66	100.0	3.16	0.0	8.2	6.1	16.3	4.1	12.2
67	100.0	2.21	5.3	7.9	21.1	5.3	2.6	2.6
68	100.0	1.47	0.0	0.0	8.7	30.4	17.4	13.0
69	96.6	2.53	2.3	9.2	19.5	17.2	11.5	5.8
70	100.0	2.29	0.0	0.0	8.8	17.7	11.8	5.9
71	90.9	2.19	0.0	6.1	9.1	21.2	12.1	9.1
72	93.6	5.82	45.2	32.3	71.0	6.5	6.5	0.0
73	90.3	1.44	3.3	0.0	6.5	32.3	16.1	16.1
74	100.0	4.75	19.7	22.7	51.5	10.6	6.1	4.6
75	81.3	5.99	6.3	12.5	18.8	6.3	6.3	0.0
76	0.0	2.36	0.0	2.4	9.5	57.1	19.1	38.1
77	0.0	2.27	0.0	5.0	10.0	45.0	10.0	35.0
78	100.0	2.63	0.0	9.4	21.9	9.4	3.1	6.3
79	100.0	2.01	8.1	6.5	21.0	6.5	1.6	4.8
80	98.0	0.95	3.9	11.8	19.6	17.7	11.8	5.9
81	98.0	4.31	62.0	48.0	80.0	16.0	10.0	6.0
82	91.7	3.48	0.0	0.0	4.2	29.2	16.7	12.5

TABLE XLII -- (continued)

a Code	Elem. Sch. District	Code	Elem. Sch. District	Code	Elem. Sch. District
01	Arlington	31	Grandview	61	Park Place
02	Arsenal	32	Greenfield	62	Phillips
03	Banksville	33	Halls Grove	63	Prospect
04	Baxter	34	Hays	64	Regent Sq.
05	Beechwood	35	Holmes	65	Rogers
06	Belmar	36	Homewood	66	Q. Roosevelt
07	Beltzhoover	37	Knoxville	67	Schaeffer
08	Boggs Ave.	38	Larimer	68	Schiller
09	Bon Air	39	Lee	69	Sheraden
10	Brookline	40	Lemington	70	Spring Garden
11	Burgwin	41	Letsche	71	Spring Hill
12	Chartiers	42	Liberty	72	Sterrett
13	Chatham	43	Lincoln	73	Stevens
14	Clayton	44	Linden	74	Sunnyside
15	Colfax	45	Madison	75	Swisshelm
16	Concord	46	Manchester	76	Vann
17	Conroy	47	Mann	77	Weil
18	Cowley	48	Mifflin	78	W. Liberty
19	Crescent	49	Miller	79	Westwood
20	Dilworth	50	Minadeo	80	Whittier
21	E. Park	51	Morningside	81	Wightman
22	E. Street	52	Morrow	82	Woolslair
23	Fairywood	53	Morse		
24	Fineview	54	Mt. Oliver		
25	Forbes	55	Murray		
26	Fort Pitt	56	McCleary		
27	Frick	57	McKelvy		
28	Friendship	58	McNaugher		
29	Fulton	59	Northview		
30	Gladstone	60	Overbrook		

TABLE XLII -- (continued)

b1 - Percentage of households with income of less than $5,000.

2 - Percentage of households with income of $8,000 to $15,000.

3 - Percentage of heads of household with blue collar occupation.

4 - Percentage of heads of household with white collar occupation.

5 - Percentage of households with two children.

6 - Percentage of households with three children.

7 - Percentage of households with four or more children.

8 - Percentage of households with mother as head of household.

9 - Percentage of heads of household age 20 to 29.

10 - Percentage of heads of household age 30 to 39.

11 - Percentage of heads of household age 40 to 49.

12 - Percentage of heads of household age 50 and over.

13 - Percentage of deteriorated and dilapidated housing.

14 - Percentage of owner occupied housing.

15 - Percentage of housing units with 1.01 or more persons per room.

16 - Percentage of industrial acreage.

17 - Age of school (in years).

18 - Percentage of white households.

19 - Distance (in miles).

20 - Percentage of households with income over $15,000.

21 - Percentage of heads of household with professional occupation.

22 - Percentage of heads of household with education greater than 12 years.

23 - Generation

24 - Within-area movement.

25 - Out-movement.

cPupil-teacher ratio is not included in the data set because permission to report P-T ratio data in this study was not granted by officials of the Board of Public Education.

TABLE XLIII

THE 1969 DATA SET FOR THE EIGHTY-TWO
ELEMENTARY SCHOOL DISTRICTS[b]

Elem. Sch. Dist.	Code[c]	Variable[a]							
		1	2	3	4	5	6	7	8
01		68.1%	10.6%	29.8%	19.2%	23.4%	21.3%	44.7%	57.5%
02		75.0	0.1	25.0	16.7	33.3	33.3	25.0	41.7
03		5.2	65.5	41.4	39.7	31.0	29.3	20.7	6.9
04		41.4	12.9	42.9	17.1	27.1	20.0	34.3	40.0
05		12.2	50.0	51.4	25.7	27.0	40.5	24.3	10.8
06		38.0	8.0	32.0	24.0	36.0	18.0	38.0	42.0
07		27.5	15.0	47.5	22.5	27.5	27.5	30.0	22.5
08		18.2	24.2	57.6	18.2	18.2	33.3	27.3	9.1
09		15.0	30.0	60.0	15.0	30.0	20.0	20.0	15.0
10		5.6	61.1	38.9	46.3	38.9	16.7	20.4	11.1
11		52.8	11.1	58.3	13.9	19.4	33.3	38.9	33.3
12		11.1	33.3	77.8	18.5	18.5	29.6	37.0	3.7
13		14.6	45.8	52.1	27.1	25.0	29.2	29.2	14.6
14		25.0	20.8	37.5	37.5	20.8	29.2	41.7	25.0
15		5.3	41.1	5.3	60.0	46.3	32.6	6.3	12.6
16		8.2	22.5	65.3	20.4	24.5	26.5	20.4	10.2
17		75.0	0.0	66.7	0.0	16.7	25.0	50.0	25.0
18		42.9	17.9	35.7	25.0	25.0	10.7	39.3	53.6
19		33.3	15.4	35.9	33.3	30.8	20.5	30.8	25.6
20		20.0	49.1	38.6	29.1	25.5	36.4	21.8	16.4
21		85.7	0.0	28.6	14.3	28.6	28.6	14.3	57.1
22		58.3	25.0	66.7	0.0	16.7	25.0	50.0	25.0
23		41.0	12.8	35.9	20.5	15.4	35.9	41.0	41.0
24		48.2	25.9	40.7	40.7	22.2	25.9	22.2	22.2
25		70.0	0.0	20.7	40.0	10.0	10.0	30.0	50.0
26		52.0	16.0	52.0	11.5	16.0	32.0	44.0	32.0

TABLE XLIII -- (continued)

Elem. Sch. Dist. Code	Variable 1	2	3	4	5	6	7	8
27	50.0%	22.9%	31.3%	18.8%	25.0%	31.3%	29.2%	52.1%
28	23.1	28.2	33.3	41.0	20.5	12.8	25.6	20.5
29	13.7	41.1	28.8	37.0	26.0	38.4	19.2	9.6
30	45.0	15.0	45.0	20.0	20.0	38.0	35.0	30.0
31	31.6	16.0	55.3	15.8	21.1	26.3	39.5	23.7
32	12.5	44.6	41.1	44.6	37.5	33.9	16.1	8.9
33	0.0	25.0	75.0	16.7	25.0	41.7	16.7	0.0
34	11.1	38.9	83.3	11.1	22.2	44.4	16.7	5.6
35	46.2	15.4	38.5	23.1	23.1	30.8	23.1	46.2
36	45.0	30.0	40.0	20.0	5.0	20.0	45.0	25.0
37	18.2	36.4	36.4	36.4	18.2	9.1	63.6	9.1
38	73.3	6.7	33.3	13.3	26.7	6.7	53.3	53.3
39	20.0	20.0	53.3	30.0	26.7	30.0	33.3	16.7
40	15.8	31.6	65.8	13.2	23.7	23.7	39.5	13.2
41	86.7	6.7	33.3	0.0	33.3	20.0	40.0	60.0
42	14.8	25.9	25.9	33.3	29.6	22.2	11.1	11.1
43	36.7	13.3	23.3	26.7	30.0	16.7	26.7	40.0
44	4.8	33.9	6.5	29.0	38.7	43.6	8.1	11.3
45	33.3	38.9	66.7	16.7	16.7	11.1	33.3	22.2
46	76.5	11.8	52.9	11.8	29.4	17.7	41.2	41.2
47	45.5	18.2	45.5	30.3	18.2	24.2	42.4	21.2
48	6.8	59.1	61.4	34.1	36.4	25.0	29.6	4.5
49	64.7	11.8	23.5	17.7	23.5	17.7	41.2	52.9
50	0.8	47.1	19.0	53.7	36.4	35.5	19.8	2.5
51	12.5	33.3	54.2	37.5	12.5	25.0	50.0	8.3
52	19.0	42.9	50.0	26.2	19.1	28.6	28.6	14.3
53	45.5	18.2	54.5	9.1	27.3	9.1	54.5	27.3
54	18.2	15.2	66.7	18.2	18.2	39.4	27.3	15.2

TABLE XLIII -- (continued)

Elem. Dist.	Sch. Code	1	2	3	4	5	6	7	8
					Variable				
55		80.0%	5.7%	20.0%	17.1%	22.9%	31.4%	37.1%	71.4%
56		31.6	26.3	63.2	15.8	10.5	26.3	42.1	10.5
57		76.5	5.9	29.4	23.5	11.8	41.8	23.5	58.8
58		17.2	34.3	40.0	40.0	14.3	31.4	28.6	17.1
59		65.0	6.7	50.0	5.0	16.7	16.7	60.0	33.3
60		7.1	50.0	64.3	14.3	21.4	35.7	14.3	14.3
61		8.7	56.5	34.8	30.4	26.1	30.4	21.7	4.4
62		45.5	9.1	51.5	15.2	18.2	24.2	33.3	33.3
63		29.6	24.0	56.3	14.1	36.6	19.7	29.6	21.1
64		0.0	58.3	8.3	58.3	16.7	41.7	0.0	8.3
65		42.2	6.7	53.3	20.0	24.4	26.7	33.3	24.4
66		20.8	20.8	54.7	32.1	22.6	20.8	34.0	11.3
67		4.9	53.7	48.8	39.0	34.2	26.8	26.8	2.4
68		41.4	3.5	62.1	10.3	17.2	27.6	34.5	20.7
69		11.1	44.4	61.1	23.3	26.7	30.0	27.8	5.6
70		25.0	22.5	65.0	15.0	27.5	20.0	32.5	22.5
71		9.4	31.3	46.9	40.6	40.6	25.0	12.5	6.3
72		0.0	37.1	20.0	45.7	51.4	37.1	0.0	2.9
73		10.4	31.0	72.4	20.7	20.7	13.8	37.9	10.3
74		6.1	65.2	16.7	62.1	40.9	37.9	7.6	1.5
75		0.0	70.6	64.7	17.7	47.1	11.8	11.8	0.0
76		65.7	8.6	31.4	25.7	20.0	34.3	25.7	48.6
77		58.9	20.6	29.4	29.4	38.2	11.8	38.2	50.0
78		6.1	48.5	57.6	33.3	48.5	21.2	15.1	3.0
79		8.1	56.5	53.2	32.3	27.4	35.5	24.2	8.1
80		17.0	24.5	45.3	32.1	22.6	26.4	34.0	7.6
81		3.7	22.2	3.7	46.3	44.4	40.7	13.0	5.6
82		32.0	12.0	64.0	24.0	20.0	12.0	36.0	24.0

TABLE XLIII — (continued)

Elem. Sch. Dist. Code	9	10	11	12	Variable 13	14	15	16	17
01	27.7%	48.9%	14.9%	8.5%	11.9%	53.5%	16.1%	19.2%	8
02	33.3	16.7	33.3	16.7	35.2	43.4	13.7	17.6	30
03	5.2	55.2	29.3	10.3	11.9	84.1	5.7	0.2	33
04	15.7	47.1	25.7	11.4	27.0	43.5	14.1	2.4	60
05	10.8	56.8	24.3	8.1	14.9	68.7	8.1	0.7	61
06	18.0	50.0	26.0	6.0	32.3	45.2	12.3	4.4	69
07	10.0	37.5	42.5	10.0	16.8	61.1	12.0	5.5	64
08	15.2	51.5	18.1	15.2	12.6	59.2	8.0	5.4	46
09	5.0	65.0	25.0	5.0	8.2	85.5	8.6	5.4	14
10	0.0	70.4	20.4	9.3	8.7	76.1	4.6	1.4	62
11	16.7	61.1	19.4	2.8	15.3	38.6	19.7	4.7	34
12	3.7	44.4	33.3	18.5	8.4	74.3	8.6	1.7	10
13	4.2	37.5	43.8	14.6	7.7	67.0	6.4	0.1	46
14	20.8	50.0	20.8	8.3	26.8	53.3	10.0	5.2	11
15	5.3	43.2	42.1	9.5	1.2	51.8	1.7	0.0	58
16	10.2	44.9	36.7	8.2	5.1	66.3	6.3	0.9	31
17	0.0	41.7	41.7	16.7	40.3	22.0	16.8	10.1	83
18	21.4	46.4	21.4	10.7	31.7	22.6	12.4	7.0	74
19	18.0	38.5	33.3	10.3	31.0	47.3	12.3	2.7	30
20	7.3	38.2	41.8	12.7	24.6	33.5	11.3	1.5	55
21	0.0	28.6	28.6	42.9	51.9	12.8	10.8	5.0	99
22	16.7	50.0	8.3	25.0	41.1	43.7	13.0	1.2	63
23	20.5	64.1	5.1	10.3	7.8	35.6	22.4	2.6	47
24	7.4	55.6	29.6	7.4	21.5	43.0	13.9	3.7	62
25	30.0	50.0	10.0	10.0	37.5	21.7	12.9	9.2	84
26	16.0	64.0	20.0	0.0	41.3	56.6	14.9	0.6	62

TABLE XLIII -- (continued)

Elem. Dist.	Sch. Code	Variable 9	10	11	12	13	14	15	16	17
27		16.7%	58.3%	22.9%	2.1%	7.0%	16.9%	6.0%	2.5%	42
28		2.6	38.5	41.0	18.0	14.6	27.2	5.6	1.3	69
29		6.9	37.0	41.1	15.1	6.8	46.3	4.0	0.6	76
30		15.0	55.0	25.0	5.0	35.8	55.6	14.8	5.4	43
31		5.3	63.2	18.4	13.2	25.1	57.2	10.7	1.0	8
32		3.6	55.4	30.4	10.7	11.4	70.7	10.2	1.1	2
33		8.3	75.0	16.7	0.0	9.7	61.9	10.9	0.0	44
34		11.1	66.7	16.7	5.6	30.0	62.1	15.2	1.9	60
35		23.1	61.5	15.4	0.0	35.6	38.7	10.2	25.6	76
36		10.0	60.0	30.0	0.0	51.7	32.5	15.9	12.6	68
37		9.1	72.7	9.1	9.1	11.1	61.1	8.1	0.5	43
38		0.0	60.0	33.3	6.7	41.1	40.2	17.5	4.8	73
39		10.0	50.0	26.7	13.3	3.1	73.0	6.0	0.9	57
40		10.5	50.0	29.0	10.5	15.8	68.8	9.9	24.4	32
41		33.3	13.3	33.3	20.0	54.7	12.9	15.6	3.7	64
42		0.0	55.6	25.9	18.5	13.4	23.2	2.9	4.8	58
43		20.0	46.7	20.0	13.3	32.8	35.2	12.1	19.9	39
44		3.2	40.3	46.8	9.7	9.3	59.1	2.1	1.7	66
45		5.6	22.2	55.6	16.7	19.5	47.2	12.2	1.0	78
46		23.5	41.2	5.9	29.4	45.6	37.9	17.3	36.6	5
47		18.2	48.5	24.2	9.1	23.1	59.4	10.9	0.2	65
48		4.6	61.4	27.3	6.8	5.1	82.9	6.8	0.8	37
49		35.3	35.3	17.7	11.8	68.9	14.6	17.8	1.5	63
50		5.0	62.8	23.1	9.1	6.7	68.3	4.0	0.0	12
51		0.0	58.3	33.3	8.3	13.3	75.5	4.9	10.6	72
52		11.9	59.5	21.4	7.1	12.3	63.6	5.6	1.9	74
53		18.2	36.4	36.4	9.1	43.5	44.5	16.5	20.7	95
54		15.2	57.6	21.2	6.1	20.6	57.1	7.5	1.8	71

TABLE XLIII -- (continued)

Elem. Dist.	Sch. Code	Variable								
		9	10	11	12	13	14	15	16	17
55		25.7%	60.0%	11.4%	2.9%	6.7%	22.5%	27.5%	0.0%	14
56		10.5	57.9	26.3	5.3	25.7	55.0	14.5	16.6	69
57		29.4	47.1	17.7	5.9	52.6	18.6	24.7	5.7	54
58		25.7	42.9	17.1	14.3	10.0	56.8	6.2	1.1	61
59		23.3	46.7	21.7	8.3	5.1	54.4	12.0	2.0	7
60		0.0	57.1	35.7	7.1	4.0	79.7	5.2	5.1	41
61		0.0	60.9	21.7	17.4	7.7	52.7	1.9	0.3	66
62		9.1	30.3	39.4	21.2	41.7	43.8	14.5	7.6	11
63		8.5	62.0	15.5	14.1	24.8	50.2	10.5	8.1	37
64		0.0	25.0	66.7	8.3	0.0	71.7	1.5	0.0	41
65		15.6	53.3	26.7	4.4	20.9	32.6	8.1	2.7	54
66		3.8	69.8	20.8	5.7	9.9	67.1	7.6	1.4	10
67		9.8	58.5	22.0	9.8	2.0	75.7	5.8	1.4	9
68		13.8	51.7	27.6	6.9	32.7	28.3	13.4	3.8	31
69		7.8	56.7	27.8	7.8	19.9	66.4	7.5	5.4	10
70		7.5	60.0	22.5	10.0	36.1	50.4	13.6	17.4	31
71		6.3	59.4	12.5	21.9	14.6	55.5	9.6	0.8	73
72		0.0	42.9	51.4	5.7	6.6	49.3	2.0	4.9	70
73		17.2	48.3	20.7	13.8	36.0	56.7	11.8	4.7	31
74		1.5	59.1	33.3	6.1	8.6	88.3	3.3	7.6	15
75		0.0	58.8	23.5	17.7	1.7	87.7	7.1	0.9	65
76		20.0	45.7	20.0	14.3	48.1	20.8	21.8	0.0	55
77		23.5	47.1	17.7	11.8	29.1	12.4	15.4	0.5	27
78		9.1	36.4	42.4	12.1	8.5	77.5	6.4	2.6	31
79		11.3	58.1	24.2	6.5	17.0	81.8	5.3	6.3	13
80		9.4	62.3	15.1	13.2	16.4	63.3	9.1	7.6	31
81		1.9	44.4	42.6	11.1	3.1	50.8	1.6	0.0	71
82		20.0	48.0	20.0	12.0	34.0	44.7	13.0	11.9	72

TABLE XLIII -- (continued)

Elem. Sch. Dist. Code	Variable 18	19	20	21	22	23	24	25
01	51.1%	2.75	0.0%	2.1%	8.5%	42.6%	27.7%	38.3%
02	75.0	2.69	0.0	8.3	8.3	41.7	41.7	16.7
03	100.0	2.73	5.2	15.5	43.2	12.1	6.9	10.3
04	2.9	6.72	1.4	4.3	8.6	27.1	27.1	14.3
05	97.3	2.04	9.5	13.5	18.9	10.8	10.8	5.4
06	0.0	6.29	0.0	4.0	18.0	30.0	30.0	22.0
07	10.0	1.81	7.5	10.0	15.0	25.0	15.0	20.0
08	100.0	1.44	0.0	9.1	12.1	51.5	9.1	45.5
09	100.0	2.49	0.0	10.0	15.0	30.0	10.0	30.0
10	100.0	3.45	3.7	9.3	25.9	20.4	13.0	14.8
11	41.7	4.56	0.0	0.0	11.1	27.8	27.8	11.1
12	55.6	3.51	14.8	0.0	14.8	22.2	18.5	18.5
13	95.8	3.28	2.1	6.3	16.7	20.8	20.8	14.6
14	83.3	1.55	0.0	8.3	16.7	33.3	33.3	20.8
15	95.8	5.14	37.9	32.6	68.4	29.5	16.8	16.8
16	100.0	3.96	4.1	8.2	16.3	6.1	6.1	4.1
17	41.7	0.64	0.0	0.0	8.3	58.3	58.3	25.0
18	46.4	1.00	0.0	0.0	3.6	28.6	28.6	14.3
19	0.0	7.23	7.7	5.1	23.1	18.0	18.0	12.8
20	81.8	5.39	3.6	12.7	20.0	25.5	12.7	18.2
21	85.7	0.92	0.0	0.0	0.0	57.1	57.1	14.3
22	83.3	1.69	0.0	0.0	8.3	50.0	33.3	33.3
23	56.4	3.82	0.0	10.3	5.1	41.0	30.8	28.2
24	63.0	1.53	0.0	3.7	0.0	40.7	22.2	25.9
25	10.0	1.28	0.0	0.0	20.0	60.0	60.0	20.0
26	48.0	4.27	0.0	0.0	4.0	32.0	32.0	20.0

TABLE XLIII -- (continued)

Elem. Sch. Dist. Code	18	19	20	Variable 21	22	23	24	25
27	16.7%	3.01	2.1%	16.7%	20.8%	35.4%	27.1%	20.8%
28	84.6	4.20	5.1	10.3	23.1	41.0	28.2	23.1
29	97.3	5.39	19.2	28.8	43.8	20.6	15.1	11.0
30	60.0	4.25	0.0	0.0	5.0	25.0	25.0	20.0
31	100.0	1.59	0.0	5.3	10.5	29.0	15.8	18.4
32	100.0	3.81	8.9	5.4	26.8	7.1	7.1	5.4
33	91.7	2.54	0.0	8.3	16.7	8.3	8.3	8.3
34	94.4	5.85	0.0	5.6	22.2	11.1	11.1	5.6
35	46.2	3.02	0.0	7.7	7.7	53.9	53.9	30.8
36	0.0	6.18	0.0	15.0	15.0	40.0	40.0	30.0
37	81.8	2.14	0.0	18.2	18.2	18.2	18.2	9.1
38	6.7	5.71	0.0	0.0	13.3	46.7	46.7	13.3
39	100.0	2.70	6.7	6.7	10.0	23.3	6.7	23.3
40	2.6	6.50	2.6	10.5	29.0	47.4	21.1	44.7
41	0.0	1.12	0.0	0.0	0.0	40.0	40.0	33.3
42	66.7	4.35	22.2	29.6	55.6	14.8	14.8	3.7
43	0.0	5.45	10.0	6.7	6.7	33.3	30.0	16.7
44	93.6	5.18	54.8	59.7	83.9	21.0	21.0	14.5
45	0.0	2.95	5.6	0.0	16.7	22.2	22.2	11.1
46	0.0	1.42	0.0	0.0	5.9	29.4	29.4	11.8
47	93.9	2.16	3.0	0.0	3.0	48.5	27.3	42.4
48	100.0	7.27	2.3	2.3	13.6	6.8	6.8	0.0
49	0.0	1.62	0.0	0.0	0.0	29.4	29.4	11.8
50	99.2	4.66	28.1	25.6	52.1	14.9	14.9	8.3
51	100.0	5.40	0.0	0.0	12.5	20.8	12.5	16.7
52	95.2	3.12	7.1	4.8	19.1	31.0	9.5	21.4
53	81.8	2.58	0.0	0.0	9.1	36.4	36.4	36.4
54	100.0	2.57	0.0	6.1	6.1	36.4	12.1	30.3

TABLE XLIII -- (continued)

Elem. Sch. Dist. Code	Variable 18	19	20	21	22	23	24	25
55	11.4%	2.85	0.0%	0.0%	5.7%	42.9%	14.3%	37.1%
56	94.7	4.30	0.0	5.3	5.3	26.3	15.8	15.8
57	0.0	1.91	0.0	0.0	5.9	29.4	29.4	17.7
58	80.0	2.15	0.0	5.7	5.7	37.1	17.1	31.4
59	46.7	2.58	1.7	1.7	1.7	41.7	41.7	35.0
60	100.0	3.38	0.0	0.0	0.0	0.0	0.0	0.0
61	78.3	6.19	17.4	21.7	30.4	4.4	4.4	4.4
62	97.0	1.86	0.0	0.0	6.1	24.2	21.2	9.1
63	95.8	1.01	1.4	2.8	14.1	25.4	25.4	15.5
64	75.0	6.20	16.7	16.7	50.0	8.3	8.3	8.3
65	57.8	4.83	4.4	2.2	8.9	37.8	24.4	26.7
66	100.0	3.16	1.9	9.4	5.7	22.6	15.1	18.9
67	100.0	2.21	4.9	7.3	19.5	12.2	4.9	9.8
68	89.7	1.47	3.5	0.0	3.5	44.8	24.1	31.0
69	95.6	2.53	2.2	8.9	18.9	20.0	16.7	8.9
70	97.5	2.29	0.0	0.0	10.0	30.0	15.0	20.0
71	87.5	2.19	0.0	6.3	9.4	18.8	18.8	6.3
72	94.3	5.82	45.7	34.3	71.4	17.1	5.7	11.4
73	93.1	1.44	3.5	0.0	6.9	27.6	27.6	10.3
74	100.0	4.75	18.2	21.2	50.0	10.6	10.6	4.6
75	82.4	5.99	11.8	17.7	23.5	11.8	5.9	5.9
76	0.0	2.36	0.0	2.9	8.6	48.6	48.6	25.7
77	0.0	2.27	0.0	5.9	11.8	35.3	35.3	23.5
78	100.0	2.63	0.0	9.1	21.2	12.1	9.1	9.1
79	100.0	2.01	8.1	8.1	21.0	6.5	6.5	4.8
80	98.1	0.95	3.8	11.3	20.8	20.8	17.0	9.4
81	98.1	4.31	70.4	48.2	83.3	22.2	14.8	13.0
82	88.0	3.48	0.0	0.0	4.0	32.0	28.0	16.0

TABLE XLIII -- (continued)

[a]1 - Percentage of households with income of less than $5,000.

2 - Percentage of households with income of $8,000 to $15,000.

3 - Percentage of heads of household with blue collar occupation.

4 - Percentage of heads of household with white collar occupation.

5 - Percentage of households with two children.

6 - Percentage of households with three children.

7 - Percentage of households with four or more children.

8 - Percentage of households with mother as head of household.

9 - Percentage of heads of household age 20 to 29.

10 - Percentage of heads of household age 30 to 39.

11 - Percentage of heads of household age 40 to 49.

12 - Percentage of heads of household age 50 and over.

13 - Percentage of deteriorated and dilapidated housing.

14 - Percentage of owner occupied housing.

15 - Percentage of housing units with 1.01 or more persons per room.

16 - Percentage of industrial acreage.

17 - Age of school (in years).

18 - Percentage of white households.

19 - Distance (in miles).

20 - Percentage of households with income over $15,000.

21 - Percentage of heads of household with professional occupation.

22 - Percentage of heads of household with education greater than 12 years.

23 - Attraction

24 - Turnover.

25 - In-movement.

[b]Pupil-teacher ratio is not included in the data set because permission to report P-T ratio data in this study was not granted by officials of the Board of Public Education.

[c]Elementary school districts are identified by code and name on p. 163.