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DETERMINANTS OF RESIDENTIAL LOCATION OF FEMALE HOUSEHOLDERS

The Ohio State University

Ph.D. 1982

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DETERMINANTS OF RESIDENTIAL LOCATION
OF FEMALE HOUSEHOLDERS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Christine C. Cook, B.A., M.Sc.

* * * * * *

The Ohio State University
1982

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"The important thing is this: To be able at any moment to sacrifice what we are for what we could become."

Charles du Bois
To My Parents
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Chapter I
INTRODUCTION

More than one-fourth of all households and 15% of all families (U.S. Dept. of Commerce, 1980c) are headed by women.* Black women head 43% of all black households; white women head 24% and Hispanics 23% of their respective households (U.S. Dept. of Commerce, 1980c). During the 1970's female headed families had the highest growth rate of any family type (U.S. Dept. of Commerce, 1980a). Among families with children under 18 years, 18% were maintained by women (U.S. Dept. of Commerce, 1980d). An estimated 45% of all children born in 1977 will reside in one-parent households sometime before they reach the age of 18 (Glick, 1979). These one parent households will most frequently be headed by a female householder.

Determinants of household headship among women have been investigated by both Sweet (1972) and Carlinger (1975). Sweet examined female headed families with at least one child under 18 years using

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* In the 1980 census, the Bureau of the Census discontinued the use of the term "head of household" and "head of family" (U.S. Dept. of Commerce, 1980). Instead, the terms householder and family householder are used. Under the new procedure, the householder, in whose name the home is owned or rented, is the first adult household member to be listed (U.S. Dept. of Commerce, Oct. 1980a). In the past the husband was always designated as the head in a husband-wife family. The female householder with no spouse present is the subject of this study.
1960 data. He hypothesized that a woman would prefer to head her own household if she had children living with her, had access to earned or nonearned income and if she were older. The findings generally supported the hypotheses. Using multiple classification analysis Sweet was able to investigate the interrelationships among age, education, marital status, number of children, race and income as factors influencing headship rates among women in disrupted marital statuses with one or more children under 18 years present. He found education only weakly associated with headship rates but age and number of children significantly related. Mothers with children over 11 years and/or with two or more children present were most likely to head their own households. Although the findings suggested headship rates rose with income, Sweet questioned the reliability of the income measure used. The influence of income on living arrangements was uncertain because respondents often fail to report the amount of nonearned income from social security, child support, alimony, pensions, welfare and exchanges because it goes unrecorded or undeclared by the recipient. Sweet found no significant differences among the headship rates of black and white women heading families. However, Sweet failed to include those households headed by women with illegitimate children.

Carliner (1975) found headship rates among unmarried women (those never married, separated, widowed or divorced) to vary by age, marital status, location and earnings level. Unmarried women accounted for 21.5% of all households. Rates of headship were highest for divorcees (76.3%) and widows (75%), and lowest for never marrieds (12.8%). For previously married women headship rates peaked during middle age and
then declined but for the never married group increases continued with age. As earnings rose, headship rates did likewise. Education and race were not significant determinants of headship rates but never married black women were more likely to head families than white women. Carliner suggested the difference was not a result of race, per se, but of "differences in marital status and motherhood between the two races" (pg. 33). Of the nonwhites under 35 years, 21% had never married and were mothers compared to only 1.6% of the whites. Among previously married women with children, blacks and whites had almost identical headship rates.

There is much evidence to suggest that nontraditional household arrangements may be even more common in the future (U.S. Dept. of Housing and Urban Development, 1979; Kobrin, 1976; Stein, 1981). In particular, the number of one-parent families headed by women and nonfamily female householders is expected to rise.

(The) nuclear family as it is now constituted, and is ordinarily studied will become a less central social institution. Family membership will occur over a more restricted portion of the life cycle, and at any given time, perhaps less than a majority ... will be living in (traditional) families (Kobrin, 1976, pg. 137).

Eight and one-half million families are maintained by female householders (U.S. Dept. of Commerce, 1980a). Contributing to this phenomenon during the 1970's were increases in childbearing outside of marriage, the dissolution of nuclear families through separation and divorce, the ability of women to establish independent families due to increases in earned and nonearned income and the "disproportionate population increase in the young adult ages" (Rawlings, 1980, pg. 1).
Purpose of the Study

The purpose of this study was to identify the determinants of residential location of female heads of household. Determinants were extrapolated from the socio-economic factors: income, education, occupation, ethnicity, living arrangements and age. Also important to the model's design were characteristics of urban neighborhoods such as proximity to the central business district, neighborhood age and population size. A causal (path) model (Figure 4) was advanced which attempted to predict the location of female householders using the variables, distance from the central business district (CBD), the percent of structures built prior to 1950, density, urban/suburban character, the median value of the renter-occupied dwelling, the percent residents 65 years and over, and the percent black residents. The predictive ability of the determinants, the direct and indirect paths, and the overall model were evaluated.

The model was tested with 1980 census tract data for Franklin County, Columbus, Ohio. Residential location of female householders was examined for similarities and differences among all female householders, one person female householders, female householders with children under 18 present, two or more person family female householders, and nonfamily female householders.

Justification

Female heads of household are a growing segment of the urban population. The change in size and structure of the unmarried female population has important implications for the future allocation of
housing, transportation, medical facilities, child care and other social services. Targeting the allocation of resources to those areas most clearly in need partly rests upon the ability to identify the current, and predict the future residential location of population subgroups. Path analysis, the technique employed in this study provides insight into the direct and indirect determinants underlying locational processes among female householders in general as well as the one person, two or more person and nonfamily households headed by women and for female householders with children under 18 years present.

Description of the locational processes of female headed households permits not only the future placement of public services but also provides implications for policy actions which may improve the residential location of female householders. Differences in locational processes by household type and family status can be interpreted as differences in the interaction of income, social, and spatial variables. These differences in results suggest alternative remedies and policy directions.

Identification of the locational process and its determinants paves the way for future research. The evaluation of housing needs and preferences, neighborhood quality, social services and public policy are possible extensions of this research effort. In addition, the use of path analysis in this study permits comparison of an analysis based on current data with earlier research efforts.
The Socioeconomic Characteristics of Female Householders: An Overview

Despite the growth in nontraditional and female headed households, few investigations have examined their residential location, living arrangements or housing characteristics. Investigations of the residential location of families (Burgess, 1925; Hoyt, 1939; Hawley, 1950; Guest, 1972; Roncek, Bell and Choldin, 1980), blacks (Shevky and Bell, 1955; Farley and Taeuber, 1968; Edwards, 1974; Clay, 1979), and those 65 years and over (Golant, 1972; Cowgill, 1978; Pampel and Choldin, 1978; Gutowski and Feild, 1979; LaGory et al., 1981a) have shown that socioeconomic factors account for many of the differences in spatial location. Factors such as income, occupation, education, age, ethnicity and family size and structure provide the conceptual framework upon which the determinants of spatial organization rest. Thus a prerequisite to establishing a model of residential location and distribution of female householders is an understanding of these factors.

The families maintained by women are small, averaging 3.28 persons (U.S. Dept. of Commerce, 1980d). Only 21% of the whites but 42% of the blacks have three or more children. Seventy-two percent of all black and 60% of all white female heads of household have children under 18 years. However, not all female heads of household are mothers, 59% are householders living alone or with unrelated persons in nonfamily households.

Most families in the lowest income categories are likely to be maintained by women. The poverty rate for female headed families is 36%, which is considerably higher than the 10% for persons in families
overall (U.S. Dept. of Commerce, 1980a). While 40% of all married couples earn $25,000, nearly one-fourth of all female householders earn below $5000 (U.S. Dept. of Commerce, 1980b). The poverty rate for all female householders is 31.4%, the rate for those with children under 18 years is 51%. Among children in black and Hispanic families maintained by women the poverty rates (66% and 69%) are higher than that for white children (40%). The median income for all female householders, $8537, is less than half the income ($17,640) of all families (U.S. Dept. of Commerce, 1980a). Among those female householders over 65 years the median income is $9,584 compared to $10,152 for elderly married couples.

The income and earnings of individual and family heads of household usually are largely attributable to factors such as work experience, educational attainment, occupational distribution and industry of employment. Both the educational attainment and the occupational status of female heads contribute to their low income and high poverty rate. Although the majority of female householders graduate from high school, only 7% have 4 or more years of college (U.S. Dept. of Commerce, 1980a). White female heads are more than twice as likely to have completed 4 or more years of college than similar blacks (8.5% versus 3.3%). Educational differences among blacks and whites are especially pronounced among those over 45 years. Among white female heads over 45 years, with children under 18, 40% have graduated from high school, but only 15% of similar blacks have done so.
Sixty percent of all female heads of household are in the labor force (U.S. Dept. of Commerce, 1980a). About 62% of white women compared with 54% of black women are in the labor force. Most female householders (49%) are employed as either clerical or service workers. For the many women maintaining families with young children, it is difficult to enter the labor force on either a full or part-time basis unless child care is available. Among black female householders, 33% have children under 6 years compared to 9% of white householders (U.S. Dept. of Commerce, 1980d). This, along with lower levels of educational attainment and discrimination in employment opportunities may explain the differences in black and white employment and poverty rates.

The low earnings of women, discrimination in both homeownership opportunities (Kanowitz, 1969; U.S. House of Representatives, 1974; U.S. Dept. of Housing and Urban Development, 1975; Burgess, 1980) and the rental market (Clearinghouse Publications, 1974; Children's Defense Fund, 1979; Survey Research Center Report, 1980; U.S. Dept. of Housing and Urban Development, 1980) and the combined effect of inflation and high interest rates act as serious deterrents to housing for women. One-half of all families maintained by a woman own their own home compared to 75% of husband-wife families (U.S. Dept. of Commerce, 1980a). Whereas only 25% of all families are renters, 42% of all female householders rent private housing and 8% are renting public housing.
The contrast between homeownership rates of young husband-wife householders and female householders is revealing (U.S. Dept. of Commerce, 1980a). Among those husband-wife households 29 years and under, 54% own their own home compared to 24% of all female householders in the same age category. For white females who are householders and are 29 years and under, 26% are owners compared to 20% of similar blacks. For those under 45 years, 57% of the white female householders are owners compared to only 34% of similar blacks. Black women who maintain families are thus more likely to be renters. They are also more likely to rent public housing than white women. Among women householders, 6% of the whites but 22% of the blacks under 29 years are public housing tenants.

Twenty-six percent of the nation's rental units are in buildings which ban families with children (Children's Defense Fund, 1979). This policy is apparently on the increase. A study at the Survey Research Center at the University of Michigan found approximately 50% of those families with children experienced difficulty finding a rental unit. The study did not indicate if any of these families were headed by women. New rental units being added to the market are those with high rents while those being abandoned or removed have the lower rents (Dolbeare, 1978). As household income rises renters usually become owners, perpetuating a cycle of vacancies among high rent units. Thus rental units in short supply and landlord bias against women with children create a reduced housing market for female householders.
Card (1980) suggests that traditional attitudes about women's roles continue to influence their property dealings.

"There were 3 socially accepted models of homeownership by women: separated and divorced women usually retained the family home and stayed there to raise children; widows lived their lives out in their married locations; and single "spinsters" might inherit a home from their parents. In none of these cases did homeownership ordinarily involve a purchase" (pg. S216).

Sweet (1972) found the proportions of homeowners among women varied by age and education. Older women were more likely than younger women to be homeowners. Women with 16 or more years of education had significantly higher homeownership rates than those with only 13-15 years of education.

Among households headed by women, 55% live in units constructed before 1950 (U.S. Dept. of Housing and Urban Development, 1978). The housing of female householders is more likely to lack some or all plumbing and be in need of interior ceiling and wall repairs than that of homes of husband-wife households. They are also more likely to live in crowded conditions (U.S. Dept. of Commerce, 1978). The probability of being inadequately housed increases for women householders who are poor. Twenty percent of all poor female householders and 26% of Hispanic and 28% of black female heads are inadequately housed (U.S. Dept. of Housing and Urban Development, 1978). For elderly women the probability of being inadequately housed is similar to that of poor female householders.

A generally accepted standard is that shelter costs should not exceed one-fourth of a household's income. Only 22% of married couples who own their own homes pay one-fourth or more of their incomes
for housing but 57% of women with no spouses pay that amount (U.S. Dept. of Commerce, 1978). Housing expenditures of family and nonfamily female householders are large. Among owners, fifty-six percent of the former and 63% of the latter pay one-fourth or more of their income on owned units. Among those who rent, 62% of those who are female family householders and 67% of those who are nonfamily heads pay 25% or more of their incomes for housing.

Female householders are distributed throughout the nation. However, highly populated states tend to be the ones in which most families maintained by women reside (U.S. Dept. of Commerce, 1980a). For example, in Ohio, female householders represent 12.3% of all families. In fact, one-half of all female headed households live in just eight states: California, New York, Pennsylvania, Texas, Illinois, Ohio, Michigan and Florida.

More families headed by women live in the central city than suburbia. Black and Hispanic females maintaining families are most concentrated in and around cities; 80% of such blacks and 90% of such Hispanics live in metropolitan areas. While 39% of all white female heads live in suburban areas and 29% live in nonmetropolitan areas only 15% of the black female householders live in suburbia and 21% live in nonmetropolitan areas (U.S. Dept. of Commerce, 1980a).

Thus, distinct categories of female householders evolve from the literature: 1) a renter - usually low income, often black with children under 18 years; 2) a single woman - homeowner or renter, without children and 3) an elderly head - widowed, living alone and frequently a homeowner. Two phenomena shape the housing choices of these females:
first, low income - women underpaid and underemployed who cannot afford adequate rental housing or homeownership on their present salaries, and second, discrimination in obtaining mortgage credit and in securing rental housing either as women alone but especially as heads with children. Minority women have the added problems associated with racial discrimination.
Chapter II
REVIEW OF SELECTED LITERATURE

Neighborhood Location Theories - economic competition, social choice and past growth.

Research has done much to explain the spatial organization of the population as a whole. Three alternative propositions have helped to explain the location of groups within the city. Advocates of the first, economic competition, argue that spatial patterns are a function of market supply and demand (Burgess, 1925; Hawley, 1950; Muth, 1961; Kain, 1962; Alonso, 1965; Moriarity, 1974). Vigorous competition exists for central city land which is prized for its accessibility to all parts of the city. Business and industry often are able to outbid others for the most central locations.

In this model, household locational choice is influenced principally by costs of land and the journey to work. City growth increases the competition for residential space which results in the land nearest the central business district (CBD) being intensely developed with large numbers of dwellings per acre. Resulting congestion and high density around the CBD drive those with higher incomes to the outskirts. The differences in population distribution are a function of the incomes of various groups, i.e., their ability
to pay. The end result is families with similar socioeconomic status living together in different parts of the city.

A second hypothesis, social choice, also suggests that neighborhoods are homogeneous but for different reasons (Moriarity, 1974). In addition to economic considerations, family life-styles, values, needs, life cycle and social status are viewed as factors motivating the selection of residential location. The social choice of a home rests on preferences for homogeneous social areas. Compatible neighbors, those who share values, desires and needs, seek out one another.

The notion that social factors affect population location and distribution was made explicit by Park (1926).

"It is because social relations are so frequently and so inevitably correlated with spatial relations; because physical distances so frequently are, or seem to be, the indexes of social distances that statistics have any significance whatever for sociology" (pg. 18).

Many social scientists have confirmed Park's observation that the spatial organization of the city is influenced by the social status of its inhabitants. Duncan and Duncan (1955) found that different socioeconomic groups possessing similar incomes did not exhibit the same patterns of residential location and distribution. Income did not, as the economic competition theory suggests, explain differences and similarities in spatial organization. "It would appear that social status or prestige is more important in determining the residential association ... than is income" (pg. 503).

Further support for factors of social choice operating as determinants of locational choice comes from the factorial analysis
literature (Shevky and Bell, 1955; Anderson and Bean, 1961; Abu-Lughod, 1969) and the ethnic and racial differentiation/segregation literature (Lieberson, 1962; Taeuber, 1968; Taeuber and Farley, 1968; Marshall and Jiobu, 1975; Kirby, 1978). The former, factorial analysis, suggests cities in "developed" countries differentiate people along dimensions of social class, life style and culture (LaGory et al., 1981a). Shevky and Bell (1955) translate these 3 dimensions into social rank, family characteristics or degree of urbanization, and ethnic composition or segregation. "A great deal of the variety in local residential patterns within the western world can be explained by these 3 underlying factors" (LaGory et al., 1981a, pg. 100).

The research on ethnic and racial differentiation, or segregation, also confirms the effect of social status, lifestyle and values on location. By implication it is assumed that differences in residential location reflect differences in preferences or "social choice". However, it is not clear that racial segregation is fully out of choice. This body of literature warrants closer attention. Because a disproportionate number of female householders are black (U.S. Dept. of Commerce, 1980c), the racial differentiation literature is examined in more depth later in this chapter.

The final explanation of residential location emphasizes the aging process of the city and its neighborhoods (Guest, 1972). Past growth is viewed as a major determinant of land use, and thus population location and distribution. Winsborough (1963) showed neighborhood age affected neighborhood density independently of distance from the CBD.
He concluded neighborhood characteristics and density may be a function of neighborhood age and only indirectly a function of distance from the CBD.

The growth and change in communication technology and transportation are among the essential components which affect the growth, past and present, of the city. Each city has a unique topological, social, cultural, political and technological quality which "interacts over time to prescribe growth and change" (Arnold, Schwab and Schwirian, 1977). This "growth inertia" can be useful in describing the location of various population groups within the city.

Models of City Structure - concentric zone, sector and multiple-nuclei theories.

Taken together the alternative propositions of spatial organization of the city, economic competition, social choice and past growth, help to explain the homogeneous socioeconomic areas observed by Burgess (1925), Hoyt (1939), and Harris and Ullman (1945).

Burgess described the city using concentric rings drawn from the center city to the fringe areas. He pointed out the tendency for low income groups to be located in the rings closest to the CBD. Upper income groups were located nearer the periphery.

Five zones, characterized by a distinct type of land use, are identified by Burgess (Burgess, 1925; LaGory et al., 1981a*).

* Discussion of city structure adopted from LaGory et al., 1981a, pgs. 90-96.
Zone 1: Central Business District. Intensely developed, this area is the central public space. It is the focal point of the city's commercial, civic and social life. It includes the downtown commercial district and the surrounding wholesale district of warehouses and markets.

Zone 2: Zone in Transition. Moving out from the CBD, this inner section consists of factories surrounded by deteriorating housing. As the city grows this area changes from desirable suburban fringe housing to an undesirable area of absentee landlords, speculative land opportunities and the location of businesses and industries.

Zone 3: Zone of Workingmen's Homes. Once residents of Zone 2, occupational mobility has permitted these area residents to move away from the undesirable CBD. Multiple-unit dwellings are still the rule in this zone.

Zone 4: Zone of Better Residences. This zone is the home of the American middle class. The ring contains single family detached housing and more expensive (luxury) apartments.

Zone 5: The Commuters' Zone. Outside the legal boundaries of the city, this zone is largely composed of "dormitory" suburbs each differing in residential character. It is the least homogeneous area of the city.

Burgess did not assume the concentric zone theory to be entirely accurate for each city but that the city could be viewed as growing in a patterned, orderly and predictable way.

Hoyt (1939) qualified the observations of Burgess by showing that the actual distribution of socioeconomic groups was generally confined to sectors of the city. However, within sectors distribution appeared to be like that identified by Burgess. Like Burgess, Hoyt assumed a growing city with expansion emanating from the center. He described wedges, or sectors, in which high rent sectors extended from the center but were located on one side of the city. The high rent areas "originate at the periphery of the CBD near the retail, financial and office district ... and are (far) removed from the industrial
sector of the city" (LaGory, 1981, pg. 93). Middle-class housing will appear in sectors on either side of the high rent areas or on the edges of low class areas. Low income areas are usually centralized and often are opposite high rent areas.

The concentric zone and sector theories assume a central city core. The multiple-nuclei theory proposed by Harris and Ullman (1945) does not. This model, advanced in response to the deficiencies of the former hypotheses, suggests that districts grow up around many centers, each specializing in a particular activity. Although Harris and Ullman view each city as distinctive in its growth, they assert that 1) certain activities have unique requirements for land, transportation, market accessibility, and so on; 2) because certain activities benefit from proximity to one another, clustering of business or industries is possible; 3) other activities, like heavy industry and high income residential areas, repel one another and 4) certain activities which require great expanses of land must locate where land is less expensive.

No matter which view one takes of city structure, low income or low social status groups are most likely to reside in or near wholesale or manufacturing areas. They will inhabit those areas left behind by high income and high status households or in areas deemed undesirable by the upper class.

Moriarity (1974) asserted that the Burgess, Hoyt and Harris and Ullman models describe the locational behavior of home seekers. The housing choice and location preference of home seekers are influenced by (pg. 450):
1. a social accessibility preference to reside close to households of prestige or compatible neighbors;

2. an employment accessibility preference to reside close to job locations;

3. a life-style preference for more spacious living environments; and

4. a segregation preference to reside close to households of similar racial or ethnic status.

Moriarity's own research (1974) findings supported two of these notions, that an area's employment accessibility and social accessibility were important to home seekers. Moriarity calculated the segregation indices for 45 residential areas in Michigan. He determined the predominant social groups residing in each area. Two indices, an employment index and social accessibility index were used to determine the relationship between accessibility and the observed pattern of socioeconomic segregation.

The social accessibility index was able to rank social areas in accord with the household choices of various socioeconomic groups. For those areas where the upper class predominated the social accessibility rank was highest for the upper class and lowest for the working class. The reverse was true for working class residential areas. The upper class rated these areas low and they were rated high by the working class. The investigation by Moriarity also determined that social accessibility was the best single indicator of housing patterns. Social accessibility explained nearly 82% of the variation found in the distribution of housing while employment accessibility accounted for 68% of the variation in housing patterns. He concluded that both "an area's
employment and social accessibility are important attributes evaluated
... in (the) selection of a home" (pg. 465).

The Urbanization of Female Householders

The Journey to Work

In the past, the principle explanation for the location of women
in urban areas was the availability of employment (Freeman, 1980). The
more urban the environment, the higher the female labor force partici­
pation rate. However, since 1977 there have been more working women
in the suburbs than in the center city. Bunce (1979) suggested center
cities are increasingly composed of female headed and primary individual
families who do not work but rely on public assistance as their primary
source of income. "No longer do jobs appear to be the reason women are
concentrated in the center city" (Freeman, 1980, pg. 58).

Freeman (1980) suggested that there are at least two other reasons
why unmarried women may be urbanized—the availability of transportation
and affordable housing. Public transportation attracts women to the
city. Women are 50% more likely to use mass transit than men (Freeman,
1980). Only 32.5% of those women over 16 years, in cities of one million or
more, have driver's licenses compared to 68.2% of men. Even controlling
for age, income and other variables only partially eliminates the
difference in the use of cars versus public transit among men and women.

In the literature on male headed households, the journey to work
and its associated costs have been found to have significant bearing on
residential location (Kain, 1973; Moriarity, 1974; Hochmann, Fishelson
and Pines, 1975; Guest and Cluett, 1976; Clark and Burt, 1980). The
residential location decision is seen as a tradeoff between the household's desire to be close to work and the desire for residential space and amenities. "It is assumed that the cost of the journey to work increases with increasing distances, and that the price the household must pay for residential space of a stated quality decreases monotonically from its workplace" (Clark and Burt, 1980).

Kain (1973) found that households located at varying distances from their workplace according to transportation costs, space consumption preferences and income. Those employed in higher income occupations and who worked in the inner rings of the CBD tended to make longer journeys to work and reside in outer rings. Lower income workers made shorter journeys to work and lived closer to their workplace. The largest and smallest families were found to make the shortest journeys to work. Although Kain did not distinguish between male and female householders, he found female workers had shorter travel times than men and resided within their workplace ring or nearby rings. The proportion of workers who resided in low density structures increased as workplace distance from the CBD increased. The findings suggested a tradeoff between housing consumption and transportation costs. Upper income families preferred to consume more housing. In order to do this they had to (or were able to) move further out from their workplace where residential space per unit price decreased with distance.

In research by Clark and Burt (1980) the journey to work was shown to be important to households who were relocating. Using Milwaukee metropolitan area data for 1962-1963, the authors determined that for those who were moving ... there was "a marked tendency to move closer to the workplace" (pg. 67).
Few studies have evaluated the journey to work costs for women. Ericksen (1977) found that the family roles of married women took precedence over the demands of their job and its resultant journey. She hypothesized that married women, and especially married women with children, would travel shorter times to work than their unmarried or childless counterparts. Ericksen expected that black women would have longer journeys to work because of limited access to automobiles. Forced to use public transit blacks would be faced with traffic congestion and associated problems. Their travel time would be greater than whites even if their travel distance was less than that of whites.

The results confirmed the hypotheses: 1) women who drove to work had shorter travel times than either car-poolers or those using public transit; 2) married blacks and whites traveled shorter distances than unmarried women and 3) white women with young children traveled less time to work than those with older children. Blacks, regardless of their children's ages, spent more time traveling. The greater travel time was found to be due to mode of transportation. Suburban women, usually white, traveled greater distances to employment in automobiles but spent less time in transit.

While the explanation of the journey to work may lend itself to an understanding of the interaction of income, and transportation and housing costs, it is best suited to the household with a single male breadwinner. Dual family earners and unmarried women are not as well served by the traditional journey to work explanation. It does not provide adequate information about female householders who have only
themselves as an income recipient, who have low incomes and who are immobile due to low income or discrimination in employment opportunities. The journey to work tradeoff for female householders is not simply a function of income and transportation and housing costs. For many, the family role, housing opportunities, and the location of child care and social services also must be considered as influencing residential location.

The movement "Back to the City" said to be emerging in America (Laska and Spain, 1980) also might be identified as a factor in the location of female householders. Although there is debate as to whether the movement is significant, Dolbeare (1978) and Spain (1980) found female householders being displaced more than other households by "revitalization". Spain (1980) also found that female heads of household increased as a percent of city outmovers from 1973 to 1976.

Clay (1980) suggested that because housing supply has not kept pace with demand, city neighborhoods have been "rediscovered". He found the unmet housing need to be almost 200,000 units in 1976. He identified two groups who are primarily responsible for the revitalization movement, the incumbent upgraders - the reinvestment by long term residents - and the gentrifiers - the young, middle class professionals who move from other metropolitan neighborhoods.

This movement may affect subgroups of female householders differently. The black, low income head with young children may be displaced by the white, unmarried professional woman. Though this push-pull action of low and middle income women within the center city may involve relatively few families, it may be significant in the location of female householders.
Segregation of Socioeconomic Groups

"The social distance separating various groups is reflected in the degree of physical distance among them in their residential separation" (Schwirian, 1974, pg. 385). For the most part, residential distance between high and low status individuals is the greatest and exhibits the most distinct physical pattern (Park, 1926; Duncan and Duncan, 1955; Mehta, 1968; Morgan, 1970; Schwirian and Rico-Velasco, 1971).

Socioeconomic status is generally assumed to be a composite measure of occupational, income, and educational levels. Frequently only one of these factors is investigated and used as a proxy for the others. Occupation has been found to be most accurate in its predictions of socio-economic status and residential location (Duncan and Duncan, 1955).

Any one of 4 measures of residential patterns is usually investigated to determine the degree of separation between various groups: 1) The index of segregation is the degree of residential segregation of each group in relationship to all the others; 2) The index of dissimilarity is used to measure the extent of non-overlap in the patterns of residence of any two groups. Scores range from zero - totally balanced or assimilated groups - to 100 - totally differentiated groups. The measure is interpreted as the percent of people who would have to move from x-community to y-community to achieve a balanced ratio; 3) The index of centralization determines to what extent a group is centralized with regard to the rest of the population; and 4) The index of low rent-area concentration is designed
to measure the relative concentration of each group in low rent areas. Duncan and Duncan (1955) computed these 4 indices to determine the residential patterning of occupational groups. They found that the most segregated occupation groups are those at the extremes of the socioeconomic scale, that the concentration of residence in low-rent areas is inversely related to socio-economic status, and that centralization of residence is likewise inversely related to socio-economic status.

Other researchers also have found that occupational groups at the extremes of the status hierarchy are more segregated than middle ranking groups (Morgan, 1970; Kirby, 1978; Simkus, 1978). For example, clerical workers, fourth on the occupational status scale between sales workers and craftsmen, usually fall within the "ambiguous" group. Their residential location is not clearly differentiated from members of other social status groups. Sales workers and craftsmen and foremen are also found to be somewhat ambiguous on the segregation indices.

Some have noted unusual locational relationships between service workers and higher status occupations. Simkus (1978) showed that in white communities service workers tended to be less segregated from white collar workers than operatives (a higher status group) but that in black communities service workers were more segregated than operatives. Morgan (1970) later corroborated this finding noting that the

"substantially lower income of service workers compared with operatives did not prevent them from living in closer proximity to white collar workers than operatives. There was also greater association between service workers and white
collar groups in terms of intergenerational mobility and marriage ..." (Morgan, 1970, pgs. 69).

The pattern of spatial distribution of social classes occupation, education or income is complex. There is only limited study of how these factors individually or collectively affect the residential location and distribution of female householders. Although the number of professional workers who are women is growing, the largest proportion of women still work in clerical or service worker categories (U.S. Dept. of Commerce, 1980a). We can only assume the process of segregation of socioeconomic groups operates similarly for male and female householders.

**Segregation of Racial Groups**

Although the segregation of blacks is due in part to low income, occupational status and educational levels, racial segregation cannot be totally explained by these characteristics (Taeuber, 1968; Farley and Taeuber, 1968; Erbe, 1975; Clay, 1979). Taeuber (1968) evaluated the population trends in the Cleveland metropolitan area between 1910-1965. He concluded the city of Cleveland housed the majority of the metropolitan black population regardless of family income. "If incomes were the only factor at work in determining where white and Negro families lived there would be little racial segregation" (pg. 538). The older housing stock was more sharply differentiated by race than by price. Taeuber also found that the few black suburban residents were not randomly distributed either. Twelve suburban tracts out of 162 delineated contained three-fourths of all black suburbanites. Farley
and Taeuber (1968) later reconfirmed these findings in other American cities.

Erbe (1975) found in Chicago in 1970 that the socioeconomic composition of white and black middle class neighborhoods "differed dramatically". Although the black middle and upper class avoided the inner city ghetto and public housing their housing location put them in much closer proximity to lower class blacks than comparable whites.

"Black professionals and managers lived in tracts with an occupational composition equal, on the average, to that of tracts where unskilled white workers lived. The neighbors of white high school drop-outs had educational backgrounds similar to those of black college graduates. Black families with incomes over $25,000 lived in poorer tracts than white families with incomes below $3,000" (Erbe, 1975, pg. 801).

The suburbanization of blacks represents more of a "resegregation" of blacks than dispersal in an open housing market (Clay, 1979). Like Erbe and Taeuber, Clay (1979) found that the distribution of blacks across neighborhoods was not consistent with the distribution of the incomes of blacks. Many who could have afforded more expensive homes moved to lower status communities. A sectorial model seemed to best explain the location of black suburbanites. Blacks with incomes similar to whites were confined to designated sectors instead of being dispersed within sectors. Homogeneity by race, not income, was the rule. Clay concluded that the housing market had failed to provide opportunities for blacks equal to those for comparable whites.
DeVise (1976) found that the pattern of residential location and employment for blacks did not agree with earlier findings by Kain (1973). Kain suggested that blacks lived in the center city because 1) employment for them was in the center city and 2) they "traded off" a location close to work and less expensive transportation costs for suburban locations and higher transportation costs. The findings of DeVise (1976) contradicted this notion by showing that job suburbanization was occurring twice as fast as the labor force movement to the suburbs. "In a color blind housing market, 170,300 blacks would work in the suburbs compared to the 82,000 that actually worked there, based on a redistribution of black workers matching their occupational, industrial and earnings characteristics to those of the jobs available in each suburb" (DeVise, 1976, pg. 348).

Edwards (1974) showed that black city neighborhoods were segregated by income and stage of the life cycle. Like the white suburbs, black families with higher incomes and children were overrepresented in those areas undergoing racial change. He concluded that the inner city, undergoing white to black residential change, functioned for the black community much like the suburbs do for the white family.

Research continues to confirm the results of Taeuber (1968), Farley and Taeuber (1968), Erbe (1975) and Clay (1979). The residential location of black heads can most certainly be predicted to be within specific sectors and within inner rings, closest to the CBD. It is not likely that the traditional models of economic competition or social choice are sufficient to explain the residential location of black male or female householders.
Segregation of the Elderly

The segregation of the elderly is well documented (Cowgill, 1958; Cowgill, 1978; Golant, 1972; LaGory et al., 1981b). The elderly are disproportionately represented in two settings, the core of major metropolitan cities and small rural communities (Struyk and Soldo, 1980). In 1958 and again in 1978, Cowgill (1978) reported "patterns of relative concentration of residences of persons 65 years and over in 57 American cities" (Cowgill, 1978, pg. 446). He found five variables contributed significantly to the age segregation he observed: the rate of growth of the total population, the percent of the population over 65 years, the size of the metropolitan area, the total nonwhite population and the percent of the population living in institutions. He determined that

"The new growth made up predominately of young populations takes place on the periphery; as growth speeds up this new growth is more uniformly young and the contrast between the new ring and old becomes more vivid and measurable; as growth slows the pattern stabilizes and the lines of differentiation may even begin to blur. The larger the community the greater the differentiation" (Cowgill, 1978, pg. 452).

Pampel and Choldin (1978) examined the urban location and segregation of the aged using a path model. They found the aged did not live on census blocks that had low housing value or high population potential. Although blocks near the center city had a higher proportion of old people than peripheral blocks, the differences were not large. They concluded the elderly were dispersed throughout the city.
LaGory et al. (1980) also used path analysis to test a causal model he hypothesized would explain age segregation. He found population size and growth were positively related to median value of renter-occupied units. Population size and growth also had an indirect affect on age segregation through median value of the renter-occupied unit. Neighborhoods with older housing were found to have low housing values. The variables, median value of renter-occupied units, percent suburbanization, and age of residential structure directly affected age segregation. Cities with high rental values and a large suburban population had greater age segregation. Those metropolitan areas with a higher proportion of older rental properties had lower segregation. Like Cowgill (1978), LaGory et al. found most elderly were located in the center city.

There can be no question that significant concentrations of older people live in center cities. Whether the elderly will appear to be spatially concentrated or dispersed in the future depends on the spatial scale being used (Golant, 1972; Golant, 1975). Golant (1975) predicted that, if viewed at the metropolitan scale, agglomerations of elderly people will result as a function of natural increases in population numbers and that older people will be dispersed over an increasingly large suburban area. Concentrations of elderly in the center city will merely represent one of many population nodes scattered throughout the metropolitan area.

There is growing support for Golant's notion of increased dispersion of the elderly throughout suburban communities (U.S. Dept. of Housing and Urban Development, 1970; Sclar, 1976; Gutowski and
Feild, 1979). In 1970, the Department of Housing and Urban Development found approximately 33% of the people over 60 who owned their homes had lived in them 20 or more years. They found a high concentration of older people appearing in older suburbs (Sclar, 1976). The suburban elderly have tended to be concentrated in neighborhoods where the housing stock was constructed prior to World War II or during the early post war years (Sclar, 1976; Gutowski and Feild, 1979).

Myers (1978) found that there was a uniform relationship between housing age and proportion of long term occupants. His research findings implied that since the spatial distribution of the population is manifested through the housing stock, in every new decade as new cohorts of housing are added new populations will inhabit them. Thus it can be anticipated that as the existing housing grows old, it will house families with changing characteristics, i.e., the housing and populations will age together.

The dual aging of households and the housing stock was confirmed by Gutowski and Feild (1979). Gutowski and Feild attempted to determine the proportion of the population over 65 years in 125 census tracts. They found that 40% of the variation in the proportion of the population over 65 years was explained by the age of the housing stock. They determined that by 1976 over 4.5 million households headed by persons over 65 years lived outside central cities. The number of elderly households had risen by 31% from 1970 to 1976 in suburban areas compared to only 10% in the center city.
"The share of the elderly population living in the suburbs is likely to continue to grow primarily because of the large proportion of pre-elderly currently living in the suburbs. These pre-elderly households can be expected to age in place, contributing to what could be labeled the suburbanization of the elderly" (Gutowski and Feild, 1979, pg. ix-x).

The authors assume that the relationship between age of residents and age of residential structure will be more pronounced for owner-occupied structures than for multi-family rental units and that the wide range of income transfers available to the elderly will sustain the suburbanization of the elderly.

Since many elderly households are headed by women, age segregation must also affect their residential location and distribution. The dual operation of age and race may also be found to affect the location of aging female householders. The dynamics of spatial patterns of the elderly must be investigated in other locations (Gutowski and Feild, 1979) and for population subgroups of the aging.

Previous Models Examining the Residential Location and Distribution of Female Householders

Models specific to the process by which female heads of household establish their residential location are difficult to find in the literature. In early work by Guest (1972), a path model was developed to explain patterns of family location. (See Figure 1) Six family types were represented including young and old couples, young and older families, single heads and primary individuals. The model did a good job of predicting the proportions of young and old families and
primary individuals located in an area. For the remaining groups, the young and old couples and single heads, the model was less predictive.

"In general the most important variables for predicting family types were age of structure and internal space" (Guest, 1972, pg. 166); site features (recreational and industrial activity variables) played a very little role. Guest concluded that for primary individuals the effect of distance from the CBD was transmitted through the age of the housing structure and density. For single heads "distance had an effect on location independent of other variables" (Guest, 1972, pg. 167). Primary individuals were found to be centralized. Single heads were partially centralized. According to Guest, "these results suggest that much of the distribution of families is simply a function of differential intensity of residential land use" (Guest, 1972, pg. 167). However, it is not clear whether this is cause or effect. The

Figure 1. Hypothesized model of family location by Guest (1972).
median value of renter- or owner-occupied units may be responsible for
the observed phenomenon but it was not included in Guest's model. The
results for single heads and primary individuals are reproduced below.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Single Heads</th>
<th>Primary Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of Structure</td>
<td>0.37</td>
<td>0.31</td>
</tr>
<tr>
<td>Internal Space</td>
<td>0.09</td>
<td>-0.63</td>
</tr>
<tr>
<td>Density</td>
<td>0.37</td>
<td>0.13</td>
</tr>
<tr>
<td>Industry</td>
<td>-0.02</td>
<td>-0.12</td>
</tr>
<tr>
<td>Recreation</td>
<td>-0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>R²</td>
<td>0.46</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Figure 2. Standardized partial regression coefficients (path
coefficients) for effects of structural variables on
location of family types as determined by Guest (1972).

Roncek, Bell and Choldin (1980) used Guest's model as a starting
point to examine female headed families. According to them, Guest's
model "implies that all household types respond equally to the
characteristics of residential areas" (Roncek et al., 1980, pg. 157).
Roncek et al. attempted to correct this shortcoming by adding variables
of racial composition, concentration of husband-wife families, economic
status of city subareas and population potential to their path model.
Population potential was used to measure the concentration of population
around a subarea, in this case a city block, and was the measure of the
intensity of residential development in the surrounding area. Economic
status was measured with an index variable composed of the mean value of owner-occupied housing, a dummy variable for missing owner values and proportion of owned units.

Figure 3. Hypothesized model of female headed family location by Roncek, Bell and Choldin (1980).

Unlike Guest who employed census tract data, Roncek et al. used block data to test their path model. They found "blocks with higher concentrations of female headed families tended to have low economic status, low percentages of husband-wife families and a high percentage of black residents" (Roncek et al., 1980, pg. 167). Percentage of black residents and low economic status were found to be the most important predictors of high concentrations of female headed families.
They concluded that female heads were less successful than husband-wife families in obtaining desirable locations because of insufficient market resources and discrimination in the housing market.

Taken together, the models of Guest (1972) and Roncek et al. (1980) imply that age of structure, internal space, the percentage of black residents, economic status and the percent of husband-wife families influence residential location of female householders. In particular, The Roncek et al. study implies that economic status of female headed families is very important to predicting location. Given the generally low income of women it is no wonder their residential location is affected by economic variables.
Chapter III
HYPOTHESES AND METHODOLOGY

Based on the preceding literature the proposed model of determinants of residential location of female householders (Figure 4) includes the variables: percent of residential structures built prior to 1950 (Golant, 1972 and 1975; Myers, 1978; Gutowski and Feild, 1979; LaGory et al., 1980), tract density (Guest, 1972); urban/suburban character of the tract (Park, 1926; Duncan and Duncan, 1955; Farley and Taeuber, 1968; Logan, 1978; Clay, 1979) and median contract rent (LaGory et al., 1980; Roncek et al., 1980). These variables were expected to tap important components of the spatial, social and economic factors affecting residential location. Because a disproportionate number of female householders are black or are elderly two more variables were introduced. Combining the spatial and economic variables, with these two additional social variables (percent householders 65 years and percent black householders, per tract) was expected to provide a highly predictive model of residential location for female householders.

Hypotheses

The hypothesized relationships among the determinants of residential location of female householders are:
1. As distance from the CBD \( (x_1) \) increases, a) the percent of housing units built prior to 1950 \( (x_2) \) is expected to decrease, b) the tract density \( (x_3) \) is expected to decline, and c) the likelihood that the tract will be designated suburban \( (x_4) \) is expected to increase.

2. As the proportion of residential structures built prior to 1950 \( (x_2) \) increases, the median contract rent \( (x_5) \) is expected to decrease.

3. As tract density \( (x_3) \) increases, the median contract rent is expected to increase.

4. Tracts designated urban \( (x_4) \) are expected to have greater proportions of householders over 65 years \( (x_6) \) and greater proportions of black households \( (x_7) \). Suburban tracts are expected to have smaller proportions of householders over 65 years and smaller proportions of black households.

5. As the median contract rent \( (x_5) \) increases, the percentage of female householders \( (Y) \) is expected to decline.

6. As percentage of householders 65 and over \( (x_6) \) increases, and as the percentage of black householders \( (x_7) \) increases, the proportion of female householders \( (Y) \) is expected to increase.

In this model there are several indirect effects which are expected to occur.

7. Distance from the CBD \( (x_1) \) is expected to have an indirect effect on the median contract rent \( (x_5) \) through variables \( x_2 \) and \( x_4 \). Consequently, \( x_1 \) will indirectly affect \( Y \), percent female householders.

8. Distance from the CBD \( (x_1) \) is expected to have an indirect effect on the proportion of householders 65 years and over \( (x_6) \) and proportion of black householders \( (x_7) \) through the variable urban/suburban tract \( (x_4) \). Consequently, \( x_1 \) will indirectly affect \( Y \), percent female householders.

9. Percent of residential structures built prior to 1950 \( (x_2) \) and tract density \( (x_3) \) are expected to have an indirect effect on \( Y \) through median contract rent.

10. Urban/suburban tracts \( (x_4) \) are expected to have an indirect effect on \( Y \) through \( x_6 \), percent householders 65 years and over, and \( x_7 \), percent black householders.
Hypothesized Model and Variable Key

![Path diagram of the proposed model of determinants of residential location of female householders, no spouse present.]

**Key:**

- \(x_1\) - Tract distance from the central business district (CBD)
- \(x_2\) - Age of residential structures - proportion of housing built prior to 1950 within each tract
- \(x_3\) - Tract density - tract population per square mile
- \(x_4\) - Urban/suburban character - census tracts whose subparts fall completely within the municipal boundaries of Columbus City designated '1'; those outside the municipal boundaries coded '0'
- \(x_5\) - Median contract rent per tract
- \(x_6\) - Proportion of households per tract in which the householder was 65 years or over
- \(x_7\) - Proportion of black households per tract
- \(Y\) - The proportion of female householders, no spouse present, per census tract

**Figure 4.** Path diagram of the proposed model of determinants of residential location of female householders, no spouse present.
The Data

The hypothesized model was tested with 1980 census tract data from Ohio*. Sample data consisted of 253 of the 256 tracts in Franklin County, Columbus, Ohio. Three tracts with predominately institutionalized populations were eliminated from the sample**.

For the purposes of this study, the residential location of female householders, with no spouse present, was investigated. The 1980 census discontinued use of the terms "head of household" and "head of family" (U.S. Dept. of Commerce, 1980a). Instead, the terms "householder" and "family householder" are used. Under the new terminology, the householder refers to the first adult household member listed on the census questionnaire in whose name the home is owned or rented. In this study, the terms female head of household and female householder are used interchangeably. The absence of a spouse is implied.

Separate analyses were conducted for five categories of female householders: 1) all female householders (including one person, two or more person family and nonfamily female headed households); 2) one person female headed households; 3) female heads with one or more children under 18 years present; 4) female headed families with two or more persons present; and 5) nonfamily female headed households. Data for 253

* The data tape, Summary Tract File 1 (STF1) was made available by the Ohio Data Users Commission (ODUC).

** Tract 33.00 - Ohio Penitentiary, 44.00 - Columbus State Hospital and School, 68.30 - School of the Deaf and Blind were not used in this study.
census tracts of Franklin County were employed to test hypotheses for each of the five female headed household arrangements. Hypothesized and revised models were assessed individually, for overall characteristics, and collectively, for similarities and differences.

The Variables

The hypothesized model of location for female householders contained seven proposed determinants of residential location and distribution: distance from the central business district (CBD), proportion of housing structures built prior to 1950, tract density, urban/suburban character, median contract rent and the proportion of elderly and black residents. All the independent variables except distance from the CBD had paths to them from other variables in the model. Figure 4 is a path diagram for the initial model.

Five different dependent variables were analyzed: all female householders, one person female householders, householders with children under 18 years and for two or more person family and nonfamily female householders. The census defines the two or more person family female householder as a householder living with one or more persons related to her by birth, marriage or adoption. The nonfamily female householder is defined as a householder living alone or only with persons not related to her. Throughout the remainder of this study the terms, two or more person (female) householders, female heads with two or more persons, and two or more person heads are used interchangeably to designate the female headed family with two or more persons.
Percentage of Female Householders

By definition, a female householder, no spouse present, is the woman listed first on the census questionnaire (U.S. Dept. of Commerce, 1980a). She is the person in whose name the home is owned or rented. The new terminology, female householder, is not substantively different from the "female head of household" term used prior to the 1980 census. Only female householders (no spouse present) were used for this study.

The percentage of all female householders was calculated for each of the 253 tracts in Franklin County as were the percentages of one person female householders, householders with children under 18 years and for two or more person and nonfamily female householders.* Given the other variables - tract distance from the CBD, proportion of housing structures in each tract built prior to 1950, tract density, urban/suburban character of each tract, median contract rent per tract and the proportion of black and elderly residents within each tract - the percentage of female householders provided the information necessary to evaluate the spatial concentration of women in Franklin County.

Most female householders are urbanized and living in cities with populations greater than one million (U.S. Dept. of Commerce, 1980a).

* In order to maintain the confidentiality promised respondents, the Census Bureau suppresses tabulations of characteristics of very small groups of people or housing units. On summary tapes, such as the one employed in this study, zeroes are entered in suppressed cells and flag fields which indicate suppression are shown for each record. For all five of the dependent variables examined Suppression Flag #10 (suppression due to fewer than 5 occupied housing units in the geographic area) applied. In the Appendix, Table 2 summarizes the specific tracts and suppression flags which applied to this study.
The assumption was that within Columbus* women with different socio-economic characteristics would live in different rings or sectors of the city. For example, it was thought that women with children under 18 years might reside in the inner most rings/sectors of the city due to transportation needs and economic constraints while the nonfamily female householder, though still in the city, would live further out from the CBD. It was further expected, these differences would be detected by the model through unique patterns of association among the predictor variables for each of the five models of female household arrangements.

**Distance from the Central Business District**

Distance from the census defined central business district (CBD) was estimated by measuring the distance in inches from the CBD (Broad and High Streets, Columbus, Ohio) to the center of each of the 253 census tracts in Franklin County**. The 'inches' measure was then converted to miles (1" was equivalent to 1 mile).

Using distance from the CBD as the sole exogeneous variable is in keeping with the previous studies of population location. Thus for historical as well as theoretical reasons this variable was well suited to the study of the residential location of female householders.

* Hereafter Columbus and Franklin County will be used interchangeably. "Columbus City" will be used when referring to only those tracts within the city municipal boundaries.

** A 2' x 3' map for this purpose was secured from the City of Columbus, Department of Development, Marconi and Long Streets.
Age of Residential Structure

Because 1980 census data were not available on the Summary Tape File 1 (STF1) for proportion of structures built prior to 1950*, 1970 data were used to calculate this determinant. For tracts where no boundary changes had occurred between 1970 and 1980, the number of structures was used exactly as it appeared in the 1970 data (U.S. Dept. of Commerce, 1970). Split tracts and/or newly defined tracts were reconstructed using the U.S. Dept. of Commerce bulletin "Approved Revised Tracts" for Franklin County, Columbus, Ohio* and the maps of Franklin County 1970 and 1980 census tracts**. Once the new/split tracts were adjusted to 1970 boundaries, the total number of structures built prior to 1950 was divided by the total number of structures in that tract in 1980, to give the proportion of 'aged structures'. In some tracts, a loss of housing due to interstate highway expansion, neighborhood changes and/or demolition was experienced between 1970 and 1980. Due to these changes, in some tracts the number of structures built prior to 1950 exceeded the number of houses in the tract in 1980. In these tracts the proportion of housing built prior to 1950 was simply recorded as 100%.

It was assumed that the oldest structures would be concentrated in the core of the metropolitan area. Distance from the CBD and the distribution of housing by age of residential structures have been shown to display a negative relationship (Coulson, 1968; Guest, 1972; Lagory, * Available from Ohio Data Users Commission (ODUC), The State Building, East Broad Street, Columbus, Ohio.

** Available from the City of Columbus, Dept. of Development, Marconi and Long Streets.
Ward and Juravich, 1980). Tracts with older housing should have lower average rental values since "age reduces the housing services a dwelling can provide" (LaGory, Ward and Mucatel, 1981, pg. 2). An inverse relationship between structure age and median rent was hypothesized. In addition, female householders reside most frequently in structures built prior to 1950 (U.S. Dept. of Housing and Urban Development, 1978). Thus it was expected that age of structure indirectly would affect the number of female householders per tract.

**Tract Density**

Tract density, the population per tract by the area in square miles per tract, was not available on the 1980 Summary Tape File 1 (STF1) for Franklin County. Once again 1970 data were employed. Acreage figures for all 1970 tracts were available in *Housing and Population Density by Census Tract*, a City of Columbus, Department of Development publication. The 1970 acreage figures were used for all tracts in which there were no boundary changes between 1970 and 1980. Split or newly defined tracts were measured using an overlay of squares with dots marked in the center of each square (64 squares/dots were equivalent to 1 square inch; 1 square inch was equivalent to 1 square mile). The 'dots' were counted for a gross measure of square miles. A planimeter, although available, was not found to calculate square miles significantly different from the measure employed in this study.

Distance from the CBD and population density have been shown to be inversely related. Viewed in concentric rings from the CBD, as distance increases the population first declines, then increases substantially, then declines and then flattens out into the city's periphery. This
relationship has been designated the "negative exponential" and has been found true for most large cities of developed nations (Winsborough, 1963; Clark, 1967; Muth, 1969; Arnold, Schwab and Schwirian, 1977).

In general, the populations of female black and elderly householders have a disadvantaged position in the housing market (Roncek, Bell and Choldin, 1980). Whether due to discrimination and segregation or due to economic statuses which prevent competition with those whose financial means and mobility are greater, these populations must live closer to the CBD, in the more densely populated settings. Density was expected to affect the proportion of female householders indirectly through median rent. It was hypothesized that as tract density increased, demand for structures in these tracts would increase, supply would decline, and median rent would rise. Those tracts with higher median rents would house fewer female householders.

**Urban/Suburban Tract**

Each census tract in the sample was designated either urban or suburban. Tracts were labeled '1' if all of their parts were identified as Columbus City (within the municipal boundaries) on the Summary Tape File. All the remaining tracts were labeled '0'. The difficulty with this variable lay in the definition of Columbus City municipal boundaries. Not all parts of Columbus City are close to the CBD or are densely populated, nor are all parts of the city urban in nature. Conversely, some so-called suburban tracts display these characteristics. Thus if one were to observe each of the tracts, a subjective assessment of each tract might not occur with the 0,1 designation used in this study. This was a problem not easily remedied and it was left to future
researchers to develop better measures for the urban/suburban concept.

It has been suggested that within urban/suburban tracts there are inherent differences which influence the location of specific population subgroups. The urban/suburban dichotomy has been supported in the social science literature principally by Logan (1976). Social and economic disparities have been observed. The "suburban wall" (Long, 1967) is said to have institutionalized the segregation of classes and races, and exacerbated the inequitable distribution of jobs and wealth through exclusionary zoning and other political processes (Logan, 1976 and 1978).

"The ... stratification of places is ... constructed by political action. Political social, and economic inequality among places should be understood not only as a result of differentiation, but also as a cause of the particular pattern of differentiation which evolves" (Logan, 1978, pg. 406).

Logan (1978) also asserted that government fragmentation permits resources to be concentrated in specific locations within a metropolitan area. Opposition is ineffectual because neither power, nor resources are sufficient to overcome the problem.

Freeman (1980) suggested that female householders will reside in center city tracts because of services - particularly transportation. For female householders then, suburbia was expected to be relatively inaccessible, physically, economically and socially. Blacks were supposed to be even more segregated in the urban tracts because of racial discrimination.

Those 65 years and over may be found living in suburbia simply through the process of "aging in place". As suggested by Golant (1972) and Gutowski and Feild (1978) the phenomenon would in time cause the
number of elderly in older suburban neighborhoods to increase. It was not clear at the onset of this study whether 1980 census data would reflect this anticipated trend. Therefore the hypothesized model projected that the more urban a tract the more black and elderly households one could expect to be located in that tract. On the other hand, the proportion of black and elderly populations were expected to be inversely related to the tracts designated suburban.

**Median Contract Rent**

Like previous research, median contract rent was used as a proxy for the extent of economic competition (LaGory, Ward and Juravich, 1980)*. Since LaGory, Ward and Juravich (1980) found the median contract rent and the median value of owner-occupied units to be highly correlated, only the former was employed in this study. The measure was calculated from the 1980 census tract data file. Difficulty was encountered in calculating this variable due to data suppression (see footnote below) and the hierarchical nature of the data file. The Summary Tape File reported median contract rent by parts of tracts instead of by complete tract. Frequently no rent value was available either because of data suppression or because no renters were present in the tract's subparts. In cases where this was true, a weighted average (by households per tract subpart) was employed. Even with all

* Median contract rent was subject to suppression flag #18 (suppression caused by fewer than five housing units in the renter-occupied category of the geographic area). See the Appendix, Table 2 for tracts to which suppression applied.
nonzero median rents a complete tract might have had as many as seven different average contract rents - one for each subpart. Again an average, weighted by households per tract subpart, was used for calculations.

Female householders are a major category of people to whom the housing market is unresponsive (Roncek, Bell and Choldin, 1980). Low income and discriminatory practices force women into lower valued housing units. Therefore, the median contract rent was expected to exert an effect on the percentage of female householders per tract. Specifically, as the median contract rent increased the proportion of female householders was expected to decline.

As an urban area ages, housing quality and housing services deteriorate and inhabitants seek housing outside the CBD. This action causes the value of urban rental units to decline. Thus it was expected that the variables, percent residential structures built prior to 1950 and median contract rent would exhibit a negative relationship.

Further, high density and large populations indicate a setting in which demand for space is high while the supply is limited. This condition produces a tight housing market. The situation results in limiting sites available for residential living, and in turn, raises the price of rental housing. Thus it was assumed that density and median contract rent would exhibit a positive relationship. Earlier work by LaGory et al. (1980 and 1981) supported this expectation.
**Percentage of Black Households**

Simple percentages were used to measure the proportion of black households in the 1980 census tracts of Franklin County. A disproportionate number of black women head households (U.S. Dept. of Commerce, 1980a). Their incomes are low and like other blacks they have not participated in the movement to suburbia (Lieberson, 1967; Farley and Taeuber, 1968; DeVise, 1976; Clay, 1979). Consequently, the percentage of black households in any given census tract was expected to positively affect the percentage of female householders. If the tract was designated suburban in character the proportion of black households was expected to decline.

**Householders Over 65 Years**

The proportion of residents per tract who were householders and who were 65 years* or over was used to calculate the predictor variable, households over 65 years.

Like blacks, the number of elderly females who head households is disproportionately high and their incomes low. Ability to pay is a critical factor in housing selection and location for the elderly. Living on relatively small or fixed incomes, they will have to live in neighborhoods where housing is priced within their reach (LaGory, Ward and Juravich, 1980). "In neighborhoods with high proportions of elderly persons, the dwelling units themselves tend to be older and

---

* Suppression flag 10 was invoked because there were fewer than five occupied housing units in the geographic area. See the Appendix, Table 2 for tracts affected by suppression.
of comparatively poorer quality. The average property value in the neighborhoods is relatively low" (Struyk and Soldo, 1980, pg. 58). Therefore, householders over 65 years are more frequently located in the central city where property values are lower (Cowgill, 1978).

The relationships hypothesized for the elderly were similar to those hypothesized for blacks: 1) if the tract was designated urban/suburban in character the proportion of elderly householders would increase/decrease; 2) as the number of householders over 65 years increased, the percentage of female householders would increase also.

Causal Analysis

The purpose of this study was to test a proposed model of determinants of residential location of female householders. The hypothesized model is illustrated in Figure 4. A causal analysis technique, path analysis, was employed to test the predictive ability, i.e., the goodness of fit of the model.

Path analysis makes it possible for the researcher to state hypotheses about the process (cause and effect) by which residential location of a specific population occurs. The causal modeling which must precede analysis should be based on a substantive theoretical framework. The initial theorizing begins with

"Attempts to resolve questions about possible causes - providing explanations of phenomena (effects) as the result of previous phenomena (causes) ... (The) technique is to assist in the selection to those variables that are potential determinants of the effects and then ... to isolate the separate contributions to the effects made by each cause (predictor variable)" (Asher, 1976, introduction).
From the hypothesized model it can be inferred that the location and distribution of female householders is a result of housing market processes which operate sequentially (Roncek, Bell and Choldin, 1980). However, it is important to note that the path model can only "suggest" relationships exist between the determinants. The hypothesized causal model cannot establish causality finally (Wright, 19821; Duncan, 1966; Asher, 1976).

Three conditions are necessary to infer the existence of a causal relationship between variables (Selltiz, Jahoda, Deutsch and Cook, 1959; Kerlinger and Padhazur, 1973; Asher, 1976). First, there must be concomitant variation or covariation between x and y. Thus as x varies, y too must vary. Second, if the causal direction is x → y (read x leads to y) then time ordering is assumed, i.e., x must come before y. In the proposed model, the independent variables \(x_{1-6}\) are hypothesized as occurring prior to the dependent variable \(y\), percent female householders. A third necessary condition is that other "spurious causes" must not be responsible for the observed relationship between the x's and y. Other causal factors which might be producing the relationship \(x \rightarrow y\) must be eliminated. This is known as causal closure. The last condition is perhaps the most difficult to meet (Asher, 1976).

"(Although) there is a potentially infinite universe of (confounding) variables and there is no statistical test or coefficient that can tell us if we have made the correct decision, yet at some point we must establish closure ... and examine the relationship among a finite set of measured variables. At some point we must assume that the effects of confounding variables are negligible" (Asher, 1976, pg. 12).
Thus path analysis permitted the measurement of the independent variables which both directly and indirectly affect the location of female householders. For example, in the proposed model, having determined the extent to which the independent variables accounted for the dependent variable, and having found the relative importance of various paths, the indirect effects could be hypothesized as:

a) distance from the CBD ($x_1$) is expected to indirectly affect both $x_5$ median contract rent, $x_6$ proportion of elderly householders, $x_7$ percent black households and thus $Y$, the percent of female householders;

b) $x_2$ residential structures built prior to 1950, $x_3$ density and $x_4$ urban/suburban tract through $x_5$, $x_6$, and $x_7$ are expected to influence the location of female householders and so on.

The system of causal linkages among the exogenous and endogenous variables may be specified by a path diagram as in Figure 4 or by a series of structural equations. The structural equations below reflect the linkages between variables in the model of determinants of residential location of female householders. There is one structural equation for each variable within the model. Only those variables which directly affect the variable are included.
In short, the structural equations and the path diagram illustrate three kinds of variables (Asher, 1976). First, $x_1$ is termed an exogenous variable because it is not influenced by any other variables in the model. Second, the endogenous variables, which are affected by other variables in the model, are labeled $x^2 - x^7$ and $Y$. The e's are the residual error or disturbance terms which represent factors which affect the endogenous variables but which are not measured in the model.

The $b_x$ terms represent the unstandardized coefficients, the weights of the specific $x$ variables in the equations. For example, in Figure 5 the first term of the third equation ($b_{yx}x^5$) is interpreted as $b$ for predicting $y$ given $x$, with $z$ controlled.
Traditional in path analysis, the coefficients are standardized, where $b_{yx} \cdot (\frac{S_x}{S_y})^* = \beta = p_{yx}$. Thus, the structural equation (5) on page 54 also may be written in the form:

$$x_5 = p_{52}x_2 + p_{53}x_3 + p_{5e_5}e_5.$$ 

The path coefficients ($p_{yx}$) represents the impact of one variable on another. The first of the two subscripts indicates the effect (dependent variable), and the second indicates the cause (independent variable) (Kerlinger and Pedhazur, 1973). Accordingly, $p_{52}$ indicates the variable $x_2$, structures built prior to 1950, was expected to cause an effect on $x_5$, median contract rent (see Figure 4 for variable list).

Path analysis begins with the estimation of path coefficients. The simplest way to obtain the coefficients is to use ordinary least squares (OLS), a regression technique (Asher, 1976). The assumptions

* Where $S_x$ = the standard deviation of the independent variable and $S_y$ = the standard deviation of the dependent variable.
of regression must be met to employ the technique. These are (Kerlinger and Pedhazur, 1973, pg. 309):

1) The relations among the variables in the model must be linear, additive, and causal. Consequently, curvilinear, multiplicative, or interaction relations are excluded.

2) Residuals are not correlated with variables preceding them in the model, nor are they correlated among themselves. The implication of this assumption is that all relevant variables are included in the system. Endogenous variables are conceived as linear combinations of exogenous or other endogenous variables in the system and a residual. Exogenous variables are treated as givens. Moreover, when exogenous variables are correlated among themselves, these correlations are treated as givens and remain unanalyzed.

3) There is a one-way causal flow in the system. That is, reciprocal causation between variables is ruled out.

4) The variables are measured on an interval scale.

Standardized path coefficients are reported in this study. Unstandardized coefficients are not reported. However, the standard deviations of variables are reported and thus unstandardized coefficients can be calculated. The unstandardized coefficients are preferable when making comparisons of specific paths across subsets of data because "they are immune to the effects of the different variances in the same variable that may arise due to subsetting" (Asher, 1976, pg. 47). Thus in comparing all female householders, one person, two or more person or nonfamily female householders the unstandardized coefficient would be most enlightening if one wanted to compare the strength of association between variables. When making within population comparisons the standardized coefficient is most appropriate because it adjusts for the different scales of measurement of the
variables. In this study only general differences between models were noted and the standardized coefficients were felt to be adequate for this purpose.

"The standardized coefficient is equal to the unstandardized coefficient times the ratio of the standard deviation of the independent variable to the standard deviation of the dependent variable. That is, $\beta_{21} = (b_{21}) \left( \frac{\sigma_{x_1}}{\sigma_{x_2}} \right)$ where $\beta$ (beta) is the standard coefficient and $b$ the unstandardized coefficient" (Asher, 1976, pg. 48). Therefore, the standardized coefficients are partial regression coefficients, i.e. partial r's. The standardized coefficients were calculated through the use of the computer program, IPA, the Interactive Path Analyzer available through Baker Systems at The Ohio State University.*

In sum, path analysis was selected as the most appropriate technique to test the proposed model of residential location of female householders. This technique permitted measurement of the predictive ability of the model as a whole as well as the contribution of each variable to the whole. Direct and indirect effects were also evaluated. Insignificant variables or paths were deleted from the revised models in order to reduce the differences between observed correlations and predicted correlations (residual correlations) to .1 or less. The effect of the elimination of variables and paths was evaluated and revised models were advanced. Comparisons of findings for all female householders, one person householders, householders with

* Contact Dr. Kent Schwirian, Department of Sociology for information.
children under 18 years and for two or more person and nonfamily female householders are reported. The strength of economic competition variables - density, median contract rent - and the past city growth variable - structures built prior to 1950 - and social variables - urban/suburban tract, percent elderly and black households - and their impact on location of female householders were evaluated also. And finally, the use of path analysis with the most current data permitted a comparison with the earlier works of Guest (1972) and Roncek, Bell and Choldin (1980).
Chapter IV

RESULTS

Descriptive Overview

The hypothesized model of residential location for female householders was tested using 1980 census tract data for Franklin County in Columbus, Ohio. Of the 320 tracts in the Columbus Standard Metropolitan Statistical Area (SMSA), 256 are located in Franklin County (80%). Two hundred and fifty three of the 256 census tracts of Franklin County were examined. Three tracts were eliminated because their populations were primarily institutionalized.

The total population of Franklin County is 869,109 which represented an overall increase from 1970 (833,249 population) of 4.3%.* This growth rate was larger than the 1.3% growth rate of the state overall.

The growth in Franklin County has not been evenly distributed around the central business district (CBD) as shown in Figure 6. For the nine segments created by the intersection of I-70 East and West,

Figure 6. Growth segments created by the intersection of I-70 East and West, I-71 North and South, and the I-270 outerbelt illustrate the uneven distribution of population growth and distribution in 1980 around the central business district in Franklin County, Columbus, Ohio.
I-71 North and South and the I-270 outerbelt, only 3 segments, the outer northeast, northwest and southwest have exhibited substantial growth between 1970 and 1980 (53%, 62% and 32%, respectively). Most of the remaining six segments have gained little or lost population during the period.

Eighty-three percent of the population of Franklin County are white (725,697 population) and 15% are black (131,016 population). Slightly more than 95% of the black population of Franklin County reside within the municipal boundaries of Columbus City* (124,880 of 131,016) compared to only 59% of the white population (430,633 of 725,697).

There are 322,817 households in Franklin County. Of the black households in Franklin County (45,180), 56.8% (25,702) are renters compared to 40.4% of the whites. Thus white households (273,945) are more likely to be homeowners (163,118) than blacks (59.5% vs. 43.1%, respectively). Of the households in Franklin County, 17% (55,383) are households with one or more persons 65 years and over present. In those households with one or more elderly persons, 87% (48,090) are headed by householders over 65 years.

* For purposes of this study Franklin County and Columbus are used interchangeably. Where municipal boundaries are implied 'Columbus City' will be used as the designated title.
The number of female householders in Columbus in 1980 is 96,187, which represents 29.8% of all households. Of those female householders, 50,062 (52%) are identified as one person households, 37,517 (39%) are family householders with 2 or more persons present and 8,608 (8.9%) are nonfamily households. In general females are much more likely to be householders with no spouse present than are males. Males (with no spouse present) head 53,315 households and are more likely to be living in one person or nonfamily households (63.2%, 21.8%, respectively) than in 2 or more person households (14.9%). Women also head 21.8% of all families with children under 18 years present; 3.1% of such families are headed by men (no spouse present) and 74.3% are headed by married couples.

In Franklin County the number of housing units increased 28% from 1970 to 1980. The median number of rooms in year round housing units is 5.3 and the median number of persons per unit is 2.27. The median contract rent ($175) and median house value ($47,300) are lower than the national averages.

Overall, renters are less satisfactorily housed when using the traditional standard of rooms per person and plumbing facilities for exclusive occupant use. Although most units for renters and owners have complete plumbing facilities for the exclusive use of the occupant, renters are five times more likely to be lacking plumbing for their exclusive use.

Analyses of population and housing characteristics specific to female householders in Franklin County, Ohio are not possible. Although future census reports will permit tabulation of median rooms, room
density, median rent, house value, etc. by sex and household type, and permit a breakdown of one person, two or more person and nonfamily households by race and marital status, these data are not expected to be available until late 1982 or early 1983.

Path Analysis

The hypothesized path model of residential location was tested separately for each of five categories of female householders. First examined were all female householders which included the total tract population of one person, two or more person family and nonfamily female headed households. Next, households of one person, households with one or more children under 18 years present, and family households of two or more persons were examined individually for a total of three resulting path models. Lastly, those nonfamily units with female head were examined. Both an hypothesized model, indicating the strengths and weaknesses of the initial model, and a revised model, in which additional paths were added to reduce the differences between the observed and predicted correlations, were formulated for each of the five groups of female householders.

Correlations and standard deviations for each of the variables are presented in Table 3. Several of the correlations were over .5 which may suggest problems in distinguishing the effects of one variable from the effects of another. Tract distance and percent residential structures built prior to 1950, urban/suburban tracts and median contract rent, and percent residential structures built prior to 1950
and median contract rent were strongly correlated. Alternative measures for each were considered. However, in order to take advantage of the most recent census data and to be in keeping with past models of population location, other measures were ultimately dismissed. In short, alteration of the model was deemed inappropriate for theoretical as well as historical reasons.

**All Female Householders**

The results of the path analysis on the hypothesized model of all female householders are presented in Figure 7. Standardized partial coefficients are used as path weights to indicate significant and insignificant linkages.

The relationships between $x_1$ and $x_2$, $x_3$, and $x_4$, tract distance from the CBD and percent residential structures built prior to 1950, tract density and urban/suburban tract were found to be inverse. This finding simply confirms the results of many earlier studies in population location and distribution, i.e., that as distance from the central city increases the number of older housing structures, density and the number of urban tracts declines. A significant path between median rent and structure age also confirms previous research by LaGory, Ward and Juravich (1980) which concluded that as housing ages its ability to provide services declines and thus median value also declines.

Weaker, but significant, associations were suggested by the path coefficients between variables percent householders over 65 years per tract ($x_6$) and percent black households per tract ($x_7$) with the
Path Coefficients:

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<th>Coefficient</th>
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<td>.3106</td>
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</table>

Coefficients of Determination ($R^2$) for Dependent Variables:

- a. Percent residential structures built prior to 1950: .43
- b. Tract density: .23
- c. Urban/suburban tract: .33
- d. Median contract rent: .27
- e. Percent householders over 65 years: .06
- f. Percent black households: .13
- g. Percent all female householders: .40

Key: —— significant paths ($P < .05$)
------ insignificant paths

Figure 7. Results of hypothesized path model: All female householders.
variable urban/suburban tract \((x_4)\). The relationship for each was positive indicating that these populations were found more frequently in urbanized areas.

Thus the relationships among predictor variables were significant and in the hypothesized direction with the exception of the path between tract density \((x_3)\) and median contract rent \((x_5)\). The reason for the lack of significance of this path is not clear. Increases in density have been shown consistently to result in a rise in median rent due to increased rental housing demand. In this study, density figures were available only for the 1970 census tracts in Franklin County. For tracts newly defined in the 1980 census these same figures had not yet been calculated, thus it became necessary to employ another method of estimating density for new tracts. Perhaps this measurement of density was insufficiently accurate to predict the documented association. (See pages 41-51 for discussion of problems associated with variable measurement.)

According to the model's results, one would expect greater concentrations of all female householders in census tracts with lower median rents and in those with higher populations of householders over 65 years and black households. The distance variable affected the overall model through both the variables, percent householders over 65 years and percent black households. Median rent also acted as a pathway to link physical characteristics of tracts (residential structures built prior to 1950) and the spatial variable, tract distance from the CBD, to percent all female householders. The \(R^2\) between the dependent variable, all female householders and its direct predictors was .40.
The Revised Model

Figure 8 illustrates the revised model for all female householders. The original model was revised to exclude the insignificant path, density-median rent, and to add those paths which decreased the differences between the observed and predicted correlations (the residual correlations) among predictor variables. Five additional paths were necessary to reduce the residuals to .1 or below.

Of particular interest were the new paths between $x_2$ and $x_6$ (percent residential structures built prior to 1950 and percent householders over 65 years in each tract) and between $x_5$ and $x_7$ (median rent and percent black households in each tract). Both relationships are well documented in the literature and were worthwhile additions to the explanatory power of the model.

Studies by Coulson (1968), Golant (1972 and 1979) and LaGory, Ward and Juravich (1980) have suggested that as housing structures age their inhabitants do likewise. Golant (1972) and Gutowski and Feild (1979) hypothesized that since mobility is low among the pre-elderly (ages 55-65 years), 'aging in place' would occur in aging neighborhoods throughout the city and suburbs. The required new paths seemed to imply these processes are underway in Columbus, Ohio.

It is not surprising that the variables median contract rent ($x_5$) and the percent black households ($x_7$) would be associated. Low median income among blacks, high unemployment rates and low levels of education perpetuate an economic cycle in which blacks must consistently seek lower valued housing. Thus the addition of this path was theoretically well justified.
Path Coefficients:

- $P(2,1) = -0.6567$
- $P(3,1) = 0.4772$
- $P(4,1) = -0.4352$
- $P(4,3) = 0.2852$
- $P(5,1) = 0.3262$
- $P(5,2) = -0.3078$
- $P(6,2) = 0.4745$
- $P(7,4) = 0.1862$
- $P(7,5) = -0.4360$
- $P(8,1) = -0.2871$
- $P(8,3) = 0.2134$
- $P(8,5) = -0.1457$
- $P(8,6) = 0.1618$
- $P(8,7) = 0.2426$

Coefficients of Determination ($R^2$) for Dependent Variables:

- a. Percent residential structures built prior to 1950: 0.43
- b. Tract density: 0.23
- c. Urban/suburban tract: 0.39
- d. Median contract rent: 0.33
- e. Percent householders over 65 years: 0.23
- f. Percent black households: 0.29
- g. Percent all female householders: 0.53

Figure 8. Results of the revised path model: All female householders.
Additional paths with weaker, but significant, associations resulted in a rise in the overall explanatory power of the model. These included linkages between $x_1$ and $x_5$ (tract distance from the CBD and median contract rent), $x_1$ and $x_8$ (distance and the percent of all female householders in each tract), $x_3$ and $x_4$ (tract density and urban/suburban tract) and $x_3$ and $x_8$ (tract density and the percent all female householders). These new paths seemed to imply that the processes associated with residential location for all female householders are most related to the physical characteristics of census tracts. Tract distance from the CBD and density, for example, were influential in the model directly (paths between $x_1$ and $x_8$, and paths $x_3$ and $x_8$) and indirectly through their association with $x_2$ and $x_4$, respectively. Percent residential structures built prior to 1950 ($x_2$) affected the percent all female householders ($x_8$) through median contract rent ($x_5$) and percent households over 65 years per tract ($x_6$).

The new paths suggest that female householders are concentrated in census tracts close to the center city, with high density, low median rents and with larger populations of blacks and householders over 65 years. In all, the revised model increased the coefficients of determination ($R^2$) value for all the dependent variables. For the dependent variable, percent of female householders in tracts, the $R^2$ rose more than 25% from .40 to .53.
One Person Female Householders

In Figure 9 the results of the separate path analysis for percent one person female headed householders per tract are displayed. As predicted the tract distance from the CBD ($x_1$) and the urban/suburban tract ($x_4$) variables functioned indirectly to affect the location of female householders in this subcategory. As the distance from the CBD increased a tract was more likely to be designated suburban in nature. There was a strong direct association between the percent of householders over 65 years ($x_6$) and the percent of one person female householders in tracts ($x_8$) suggesting that women living alone, heading their own household are frequently elderly. Distance and urban/suburban tract affected the percent one person female householders through the variable percent householders over 65 years.

In the initial model the path between $x_3$ and $x_5$ (tract density and median contract rent) was again insignificant as were two other predicted linkages, those between $x_5$ and $x_8$ (median rent and percent one person female householders) and between $x_7$ and $x_8$ (percent black households and percent one person female householders). Because it has been determined previously that elderly households are frequently living on low, fixed incomes an inverse relationship between median rent and percent one person female householders was hypothesized. The relationship between median rent and percent one person female headed households was negative but the association was insignificant. Since the hypothesized relationship continues to have intuitive appeal and theoretical support, the problem may be the appropriateness of the measure for this group of female householders.
Figure 9. Results of hypothesized path model: One person female households.
Householders over 65 years are usually homeowners (Struyk and Soldo, 1980). Their homes are usually small and of lower median value. Given the strength of the association between percent householders over 65 and percent one person female householders it may simply have been more appropriate to use a measure of median value of owner-occupied housing as did LaGory, Ward and Juravich (1980).

It is also possible that the relative well-being of the elderly may have improved during the 1970's. If this is the case, the median rent variable would be less likely to be associated with the dependent variable, percent one person female householders.

The Revised Model

A revised model to decrease the difference between the observed and predicted correlations was developed for one person, female headed households. The results are presented in Figure 10. As with the revised model for all female householders, in this new model the insignificant path between tract density \((x_3)\) and median contract rent \((x_5)\) was deleted. Insignificant paths linking directly to the dependent variable (median contract rent and percent one person female householders, and percent black householders and percent one person female householders) were not deleted in this step. They remained in the model so that in the event the variables median contract rent and percent black households linked to the dependent variable through a new pathway the resulting associations could be analyzed.
Figure 10. Results of the revised path model: One person female households.
Additional paths between density \((x_3)\) and urban/suburban tract \((x_4)\), tract distance from the CBD \((x_1)\) and median contract rent \((x_5)\), percent of residential structures built prior to 1950 \((x_2)\) and percent householders over 65 years per tract \((x_6)\), median rent and percent of black households per tract \((x_7)\), and distance from the CBD and percent one person female householders \((x_8)\) were included in the new model. The new paths were shown to increase the coefficient of determination \((R^2)\) for five of the seven dependent variables. In particular, the \(R^2\) for the percent of one person female headed households rose from .29 to .37.

As in the previous model for all female householders, the linkages, median rent and percent black households per tract, and residential structures built prior to 1950 and percent households over 65 years were strong. As the number of older structures increased the percent of elderly householders per tract increased. Thus percent of householders over 65 years per tract was important for two reasons; first, for its direct effect on the location of one person female headed households, and second for serving as a pathway linking the effects of the spatial and physical features of the tracts (distance from the CBD and percent residential structures built prior to 1950, respectively) to the concentration of one person female householders per tract.

Distance impacted the revised model through density as well as the urban/suburban tract variable. This spatial variable also had a direct effect on the subgroup's location. Simply put, as one moves away from the central business district (CBD), the tract density and the urbanized character of the tract decline. These two variables
affected the percentage of black households in the tract which was inversely related to the presence of one person female householders.

The path between urban/suburban tract and percent householders over 65 years was determined to be insignificant and was dropped from the model. However, as the distance from the central city increased the percent of one person female householders declined (path between $x_1$ and $x_8$). These two findings seemed somewhat inconsistent. LaGory, Ward and Juravich (1980) as well as other researchers have found the elderly to be highly centralized in urban areas around the CBD (Golant, 1972 and 1979; Hiltner and Smith, 1974; Cowgill, 1978; etc.). Although Golant (1972) suggested that in time as suburbs aged the population of older households would increase due to "aging in place," the variable urban/suburban tract did not appear to capture either phenomenon. In this investigation, evaluating the urban or suburban character of a tract was done by assigning a 'one' to those tracts in Columbus City as defined by the census. (See pages 40-50 for discussion of variable measurement.) If a tract or any of its parts fell outside the municipal boundaries of Columbus City it was assigned a 'zero' value. However, Columbus City does not include all the central tracts in Franklin County. Thus it would appear that the elderly households and one person female householders were centralized (as indicated by the positive relationship with the variable percent residential structure built prior to 1950 and by the association of distance from the CBD with one person female householders) but that they are not living in the urban tracts of Columbus City. The census summary file tape showed that 95% of all blacks but only 59% of all whites live in
Columbus City. This is consistent with the finding that tracts designated urban were associated with percent black households, but percent black households was inversely related to one person female householders. It appears that the one person female householders, who were primarily elderly householders, were centralized in urban tracts not in Columbus City and in tracts apart from black households.

The most important predictors of the percent of one person female householders in tracts were the variables, percent of householders over 65 years in tracts and tract distance from the CBD. Of lesser importance was the percent of black householders in tracts which declined as the percent of one person householders rose. This latter finding represented a significant departure from the hypothesized relationship in which it was assumed that percent black households and percent female householders would be positively associated with the dependent variable since both are highly centralized and urban populations.

Female Householders with One or More Children Under 18 Years Present

The results of the path analysis on the hypothesized model for female householders with one or more children under 18 years present is illustrated in Figure 11. As in previous models the relationships between variables $x_1$ and $x_2$, $x_3$ and $x_4$, distance from the CBD and percent residential structures built prior to 1950, tract density and urban/suburban tract were found to be negative and significant at $p < .05$. In addition, median rent was found to decline as the percent of residential structures built prior to 1950 rose.
Figure 11. Results of hypothesized path model: Female householders with one or more children under 18 years present.
The strongest predictor in the initial model was percent black households per tract \(x_6\) thus confirming the earlier research of Roncek, Bell and Choldin (1980) in which a path model for predicting concentrations of female headed families was examined. Also important to predicting the location of female householders with children was median rent \(x_5\). Freeman (1980) observed that not only were female householders more likely to be renters but that low income employment status and levels of education prevented unmarried householders from finding affordable and adequate housing.

An inverse relationship between percent of householders over 65 years per tract \(x_7\) and percent female householders with children was found to exist \(x_8\). Since the elderly, blacks and female householders with children have been shown to be highly urbanized a positive association between the percent of householders over 65 years and the percent of female headed families per tract was expected. However, this was not supported by the data. Apparently the elderly, though highly segregated and centralized do not reside in the same tracts as female householders with children. In short, the hypothesized model suggests that female householders with children will be located in tracts with lower median rents, fewer elderly householders and higher concentrations of black households.

**The Revised Model**

Figure 12 contains the revised model for female householders with children present. The new paths were similar to those included in previous models. The new paths did not change the \(R^2\) from .57 for
Figure 12. Results of the revised path model: Female householders with one or more children under 18 years present.
the dependent variable, percent female householders with children. However, several other variables were helped by their inclusion. In particular, the coefficients of determination for percent of householders over 65 years ($x_6$) and percent of black households ($x_7$) more than doubled, rising from .06 to .23 and from .13 to .29, respectively.

As with the hypothesized model, the percent of black households was most important in predicting the tract location of female householders with children. The variable ($x_7$), percent of black households was important to this version of the model not only for its direct effect. This variable also acted as the link between the spatial variables, distance from the CBD ($x_1$), tract density ($x_3$), and the urban/suburban tract variable ($x_4$) to the dependent variable, percent of female householders with children ($x_8$).

Median rent played a similar role in the new model; acting first as a direct, inverse effect and secondly as the path linking distance and structure age to percent female headed households with children. These findings were simply interpreted. As distance from the central business district (CBD) increased the median rent increased but as structure age rose median rent fell. Female householders, both in general and specifically those with children, have been found by other researchers to be in low income rental structures, close to the CBD, often in housing built before 1950. These findings have been confirmed by this study.
Two or More Person Family Female Headed Households

Figure 13 illustrates the results of the hypothesized path model for two or more person family female headed households. The zero order correlation of 0.9681 between percent female householders with children under 18 years and two or more person family female headed households suggested both models essentially tapped the same population subgroup of female householders. Consequently the two models are very similar in their hypothesized and revised versions.

The paths were significant and in the hypothesized direction with only two exceptions. Like previous models the first insignificant path was between tract density ($x_3$) and median contract rent ($x_5$). The second insignificant path was between percent of householders over 65 years ($x_7$) and two or more person family female householders ($x_8$), the dependent variable. As with the model of percent female householders with children present, the percent of householders over 65 years was expected to vary directly with the percent of two or more person families with female household heads. The insignificant path in the hypothesized model suggested female heads of families with two or more members will reside in tracts with a low median rent, a disproportionate percent of black households and in tracts unassociated with elderly households.

The Revised Model

The revised model for female headed families with two or more members (Figure 14) was similar to that of female householders with one or more children under 18 years present. Several new links were required to reduce the residuals to 0.1 or less.
Figure 13. Results of hypothesized path model: Two-or-more-person family female householders.

Path Coefficients:

- $P_{(2, 1)} = -0.6567$
- $P_{(6, 4)} = 0.2354$
- $P_{(3, 1)} = -0.4772$
- $P_{(7, 4)} = 0.3547$
- $P_{(4, 1)} = -0.5713$
- $P_{(8, 5)} = -0.2859$
- $P_{(5, 2)} = -0.5220$
- $P_{(8, 6)} = -0.0774$
- $P_{(5, 3)} = 0.0001$
- $P_{(8, 7)} = 0.6219$

Coefficients of Determination ($R^2$) for Dependent Variables:

- a. Percent residential structures built prior to 1950: 0.43
- b. Tract density: 0.23
- c. Urban/suburban tract: 0.33
- d. Median contract rent: 0.27
- e. Percent householders over 65 years: 0.06
- f. Percent black households: 0.13
- g. Percent two or more person family female householders: 0.63
Path Coefficients:

- $P(2,1) = -0.6567$
- $P(3,1) = -0.4772$
- $P(4,1) = -0.4352$
- $P(4,3) = 0.2852$
- $P(5,1) = 0.3262$
- $P(5,2) = -0.3078$

Figure 14. Results of the revised path model: Two-or-more-person family female householders.
The revised version of the model included a path between $x_1$ and $x_5$ (distance from the CBD and median rent). This implied that distance had an effect on the location of female householders in families with two or more persons through the variables percent residential structures built prior to 1950 ($x_2$), tract density ($x_3$), urban/suburban tract ($x_4$), and later in the model through median rent ($x_5$) and percent black households ($x_7$).

As median rents decreased across tracts, the population of female householders with families of two or more persons increased. Median rent by a newly created path affected the percent black householders. In turn, the latter (percent black households) had a strong impact on the dependent variable, percent family female householder with two or more persons. Both effects are well supported by previous research. Roncek, Bell and Choldin (1980) found their economic variable and the percent black population per census block to be the best predictors of the concentration of female headed families.

The final model of two or more person family female headed households suggested that to predict the tract location of this subgroup of female householders, determining the median rent and the percent black households would be most enlightening. The percent householders over 65 years was not a significant predictor and yet was useful in understanding the locational processes of this group by its suggestion that two or more person family female householders and elderly households, while both centralized, in general do not reside in the same census tracts. Distance from the CBD, percent residential structures built prior to 1950, tract density and urban/suburban tract
variables operated indirectly. The revised model increased the $R^2$ for most of the predictor variables. The changes did not alter the dependent variable's coefficient of determination significantly, leaving the overall $R^2$ for percent female householders with 2 or more person at .62.

**Female Householder, Nonfamily Household**

Figure 15 illustrates the results of the path analysis for the hypothesized model of nonfamily female headed households. There were no changes from the previous models in the relationships among predictor variables distance from the CBD ($x_1$) and percent residential structures built prior to 1950 ($x_2$), median rent ($x_5$), and urban/suburban tracts ($x_4$). Of interest were the linkages between median rent ($x_5$) and percent nonfamily female householders ($x_8$), and between percent householders over 65 years ($x_6$) and percent nonfamily female householders ($x_8$), and between percent householders over 65 years ($x_6$) and percent nonfamily female householders. These paths were significant at $p < .05$ but the path values (- .1687 and -.2070, respectively) were low. The relationship between $x_7$ and $x_8$ (percent black households and percent nonfamily female householders) was insignificant.

As the percent of householders over 65 years ($x_6$) rose and as the median rent per tract ($x_5$) increased, the concentration of nonfamily female householders ($x_8$) was found to decline. This suggested that tracts with significant percentages of elderly households were not the same tracts that housed nonfamily female householders. In addition, lower rents characterized the tracts in which nonfamily female
Figure 15. Results of hypothesized path model: Nonfamily female householders.
householders lived. The former relationship (householders over 65 years and nonfamily female householders) was a departure from the hypothesized relationship in which simultaneous increases in black households, householders over 65 years and nonfamily female householders were to have occurred.

The Revised Model

The revised model for nonfamily female householders includes linkages similar to previous revised models (Figure 16). Paths between density \(x_2\) and urban/suburban tracts \(x_4\), distance from the CBD \(x_1\), and median rent \(x_g\), residential structures built prior to 1950 \(x_2\) and percent householders over 65 years \(x_6\), and between median rent and percent black households \(x_7\) per tract helped to increase the explanatory power of the independent variables.

In the modified version of the model the associations between median rent \(x_g\) and percent nonfamily female householders \(x_8\), and between percent black households \(x_7\) and percent nonfamily female householders became insignificant and were subsequently deleted. This suggested that like the model of percent of person female householders, percent of black households and median rent were not important additions to the explanation of residential location of nonfamily female householders.

Unlike any of the previous models examined, the path between density \(x_3\) and percent of nonfamily female householders \(x_8\) was significant and had a large direct as well as indirect effect. Distance from the CBD and density impacted indirectly on the location of
Figure 16. Results of the revised path model: Nonfamily female householders.

Path Coefficients:

- $P(2,1) = -0.6567$
- $P(3,1) = -0.4772$
- $P(4,1) = -0.4352$
- $P(4,3) = 0.2852$
- $P(5,1) = 0.3262$
- $P(5,2) = 0.3078$
- $P(6,2) = 0.4745$
- $P(7,4) = 0.1862$
- $P(7,5) = -0.4360$
- $P(8,3) = 0.5597$
- $P(8,6) = -0.2448$

Coefficients of Determination ($R^2$) for Dependent Variables:

- a. Percent residential structures built prior to 1950: 0.43
- b. Tract density: 0.23
- c. Urban/suburban tract: 0.39
- d. Median contract rent: 0.33
- e. Percent householders over 65 years: 0.29
- f. Percent black households: 0.29
- g. Percent nonfamily female householders: 0.34

**Key:**
- Solid lines: significant paths ($P < .05$)
- Dashed lines: paths which have no affect on the dependent variable, percent nonfamily female householders.
nonfamily female householders through the variables urban/suburban tract and percent householders over 65 years. Though early research has consistently suggested that female headed householders were located in densely populated, urban areas, close to the central business district, why this direct association should appear for this model alone is not clear. Perhaps this population of female householders may have included young college students of which there are many in Columbus or single women living in nonfamily household arrangements. Alternative explanations were not apparent. Further study may be needed to clarify the determinants of residential location for this population group more definitely.

Comparison of Models of Residential Location of Female Householders

Comparison of the revised models of location and distribution of female householders suggests both similarities and differences in the major determinants of the locational processes for the subcategories—one person, two or more person and nonfamily female householders—and the aggregate populations of all female householders (see Table 1). The extent to which predictor variables differed among these groups suggests the use of at least three separate analyses in future research on the residential location of female householders. At the very least models of one person, two or more person and nonfamily female householders are recommended. This study illustrated that the percent of two or more person households and the percent households with one or more children under 18 years in tracts are highly correlated (.9681) thus either grouping could be used in later work. The all female household model
TABLE 1
Comparison of Selected Paths in the Revised Models of Determinants of Residential Location of Female Householders

<table>
<thead>
<tr>
<th>Actual Directions of Hypothesized Paths for Female Householder Types</th>
<th>Hypothesized Direction</th>
<th>All Female Householders</th>
<th>One Person Female Householders</th>
<th>Householders with Children Under 18 Years</th>
<th>Two or More Person Family Householders</th>
<th>Nonfamily Female Householders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance - Structure Age</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
</tr>
<tr>
<td>Distance - Density</td>
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<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
</tr>
<tr>
<td>Distance - Urban/Suburban Tract</td>
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<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
</tr>
<tr>
<td>Density - Urban/Suburban Tract</td>
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<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
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<td>Distance - Median Rent</td>
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<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
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<tr>
<td>Structure Age - Median Rent</td>
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<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
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<td>Structure Age - Householders Over 65 Years</td>
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<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
</tr>
<tr>
<td>Urban/Suburban Tract - Black Households</td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
</tr>
<tr>
<td>Median Rent - Black Households</td>
<td>NH</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
</tr>
<tr>
<td>Distance - Percent Female Householder Type</td>
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<td>(-)</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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<tr>
<td>Density - Percent Female Householder Type</td>
<td>NH</td>
<td>(+)</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Median Rent - Percent Female Householder Type</td>
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<td>(-)</td>
<td>NS</td>
<td>(-)</td>
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<tr>
<td>Householders Over 65 Years - Percent Household Type Female</td>
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<td>(+)</td>
<td>(+)</td>
<td>(-)</td>
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<tr>
<td>Black Households - Percent Female Householder Type</td>
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<td>(+)</td>
<td>(-)</td>
<td>(+)</td>
<td>(+)</td>
<td>NS</td>
</tr>
</tbody>
</table>
Table 1. Continued.

Key:

Distance - Tract distance from the central business district (CBD)

Structure Age - Age of residential structures - proportion of housing built prior to 1950 within each tract

Density - Tract density - tract population per square mile

Urban/Suburban - Urban/suburban character - census tracts whose subparts fall completely within the municipal boundaries of Columbus City designated '1'; those outside the municipal boundaries coded '0'

Median Rent - Median contract rent per tract

Householders - Proportion of households per tract in which the householder was 65 years or over

Black Households - Proportion of black households per tract

Percent Female - The proportion of female householders, no spouse present, per census Householder type tract

NOTE: NH = Direct relationship not hypothesized
      NS = Not significant at p < .05.
which included the total populations of one person, two person and nonfamily female households though interesting, tended to suppress characteristics uncovered in the separate path analyses.

Part of the similarity between the revised models occurred between the variables distance from the CBD and percent residential structures built prior to 1950, density, urban/suburban tract and median rent. Percent residential structures built prior to 1950 and median rent were found to be inversely related in all revised models as well. These paths were highly significant and were in keeping with the findings of earlier research in the field. Through an examination of the literature it was expected that as distance from the central business district (CBD) rose, the proportion of structures built prior to 1950, the population per square mile (density) and the urbanized character in each tract would decline. As this distance increased so would the rent value. The latter relationship (distance and median rent) was added to each of the revised models. Age reduces the housing services a dwelling can provide (LaGory, Ward and Mucatel, 1981), a possible explanation for both the negative relationship between residential structures built prior to 1950 and median rent, and the positive association between distance from the CBD and median rent.

The variables tract density ($x_3$) and urban/suburban tract ($x_4$), and urban/suburban tract and percent black households ($x_7$) were only weakly associated. In all models the path between urban/suburban tract and percent householders over 65 years ($x_6$) was insignificant and consequently was deleted. It was somewhat surprising that this link consistently had to be eliminated in the revised models. Like black
households and female headed households in general, householders over 65 years are thought to be highly centralized. In this investigation, urban tracts are defined as those completely within the Columbus City municipal boundaries. Perhaps it would be necessary to include other urban areas in Franklin County, as well as Columbus City, to form the expected link between urban tracts and percent householders over 65 years. The association between percent residential structures built prior to 1950 and percent of householders over 65 years in tracts, however was common to all the models in this study. If, as the discussion above suggested, the elderly are not highly centralized in Columbus City, they are nonetheless located in areas with a disproportionate number of structures built prior to 1950. Thus it appears that households over 65 years were outside of Columbus City but still relatively close to the CBD.

The paths between percent residential structures built prior to 1950 \((x_2)\) and percent of householders over 65 years \((x_6)\), and between median rent \((x_5)\) and percent black households \((x_7)\) were of greater or lesser importance depending on the specific model. This is because the variables, percent of householders over 65 years and percent of black households, were not themselves always important to predicting the concentrations of female householders.

Significant relationships between percent of residential structures built prior to 1950 \((x_2)\) and percent of householders over 65 years \((x_6)\), and between median rent and percent of black households \((x_7)\) were confirmed for all revised models. Each is theoretically well founded. Repeatedly housing age has been found to be correlated with aging
households (Coulson, 1968; Golant, 1972; Hiltner and Smith, 1974; Cowgill, 1978; etc.). Lower earnings by black households force them to lower priced housing alternatives thus leading to the inverse association between median rent and percent black households. In this study, however, the importance of knowing determinants of percent householders over 65 years and percent black households was specifically related to their ability to predict concentrations of female householders.

Percent householders over 65 years ($x_6$) was an especially important predictor for the location of one person female headed householders. A moderate path coefficient in the revised model implied that one person female householders were often elderly women living alone. This same variable was of only little importance in the all female householder model and in the nonfamily female householder model. Its significance in the latter model (nonfamily) and in the models of two or more person households and households with children headed by females was partly derived from its negative coefficient. In these three models the implication was that the location of female householders was influenced by the presence of fewer rather than greater percentages of householders over 65 years.

Like the variable percent householders over 65 years ($x_6$), the predictor, percent black households ($x_7$) was important to only specific models of location of female householders. It was of particular relevance in the model of two or more person households headed by women and in the model of the female headed households with one or more children under 18 years present. The percent of black households was of moderate importance to the all female householders model and was
dropped completely from the revised version of the percent nonfamily female householders model. For the one person female householders model, the path coefficient with percent black households was negative thus suggesting that one person households (many of whom were elderly households) did not reside in the same location as female headed families with two or more persons or those households with children (many of whom were black).

The importance of median rent ($x_5$) was only evident in the models of all female householders, female headed families with two or more persons present and female headed households with children under 18 years present. In these models the association with median rent was always negative suggesting that as the median rent increased the percent of these household types per tract would decline. The percent of black households ($x_7$) was especially important to the explanation of the latter two models, two or more person family female households and female householders with children under 18 years. Also, the variable median rent was consistently associated with percent black household. Thus it was inferred that female householders with two or more persons and/or with children under 18 years were often black and were likely to be located in tracts with low median rent. This confirmed earlier research which found blacks and female householders, because of discrimination in the housing market and because of low income, economic status and education levels, tend to live in less adequate housing than their married couple counterparts.

The path linking density ($x_3$) and the dependent variable percent female householders was significant only in the models of all female householders and nonfamily female householders. Density was the only
predictor of any real importance in the latter model. Although non-
family female householders represent only 8.9% of all female
householders in Ohio, future investigators may find it necessary to
advance other determinants of location for this group of female
householders. Except for density and the inverse effect of percent
householders over 65 years, the determinants advocated by this study
were less than successful in predicting location of nonfamily female
householders.

The most variance was explained by the direct predictor variables
for the models of residential location of female headed families with
two or more persons and for those with children under 18 years. The
$R^2$ values for each were exceptionally high, .62 and .57, respectively.
The determinant most effective in predicting location in these two
models was the percent of black households. Thus tracts with high
percentages of black households, with few households over 65 years and
lower rents were found to house this subcategory of female householder.

In the model of percent one person female householders the
variables, percent householders over 65 years ($x_6$), the percent black
households ($x_7$) and the distance from the CBD ($x_1$) were the important
direct predictors of location. Percent black households and distance
from the CBD and the dependent variable, percent one person female
householder, were inversely related. Median rent ($x_5$) formed an
insignificant path with both percent nonfamily and percent one person
female householders and was dropped in their final models. Because
percent of one person female householders was associated with percent
of householders over 65 years and since householders over 65 years
usually own their one home perhaps the variable median contract rent should be replaced with the variable median value-owner-occupied dwelling in future research.

The explanatory power of the models of one person and nonfamily female headed households increased significantly from the hypothesized to their revised versions. In the revised model for all female householders 53% of the variance for the variable percent of all female householders was explained. A moderate amount of variance for the other predictor variables was also explained (see respective models for $R^2$ values). The path coefficients for the variables assumed to directly affect the location of all female householders, namely, median rent ($x_5$), percent householders over 65 years ($x_6$), percent black households ($x_7$) and distance from the CBD ($x_1$) were of moderate predictive value.

The most important contribution of the revised models of location determinants to the study of residential location of female householders was the support they lent to the idea of separate analyses for each subgroup of female householders. The results of this study suggest future investigations must concentrate on improving the prediction of location for female householders separately, not in the aggregate.
Chapter V
SUMMARY AND IMPLICATIONS

The number of female householders with no spouse present increased between 1970 and 1980. During the 1970's, female headed families were the fastest growing family type. Extensive research has been conducted to examine the determinants of residential location of the population as a whole (Burgess, 1925; Duncan and Duncan, 1955; Winsborough, 1963; Alonso, 1965; Clark, 1967; Hoyt and Muth, 1969; Guest, 1972) as well as the population of blacks (Lieberson, 1967; Farley and Taeuber, 1968; Rose, 1972; Edwards, 1974; Simkus, 1978; Clay, 1979) and the population of elderly (Cowgill, 1958, 1962 and 1978; Coulson, 1968; Golant, 1972 and 1979; Hiltner and Smith, 1974; Kennedy and DeJong, 1977; Dolbeare, 1980; LaGory, Ward and Juravich, 1980). Despite the fact that women head 26% of all households and 15% of all families, determinants of their residential location (spatial organization) have been the focus of only a few investigations. This study was carried out in response to this void.

This study identified determinants associated with the residential location of female householders. A path model was developed which tested the hypothesized relationships among the
potential determinants, tract distance from the central business
district (CBD), proportion of structures in each tract built prior to
1950, tract density, urban/suburban tract designation, median contract
rent, proportion of householders over 65 years and proportion of black
households per tract. The determinants themselves were extrapolated
from socio-economic factors common to female householders and spatial
organization considerations common to investigations of residential
location.

Separate analyses were conducted for each of five groups of
female householders: all female householders (including the total popu-
lation of one person, two or more person family and nonfamily female
headed households), one person householders; householders with children
under 18 years present; two or more person family householders and
nonfamily female headed households. An Interactive Path Analyzer (IPA)
was employed to develop both an hypothesized and revised model for each
group of householders with female heads. The paths of the hypothesized
models were evaluated and insignificant links were eliminated. The
revised models, reflecting these deletions as well as the additions of
new paths, were examined for similarities and differences between the
models for all female householders, one person householders, households
with children under 18 years, two or more person family householders and
nonfamily female householders.

The models of residential location for female householders were
tested using 1980 census tract data for Franklin County, Columbus, Ohio.
Of the 256 tracts in Franklin County, 253 were used in this study.
Three tracts were eliminated because they contained largely institutionalized populations.

Results of this investigation indicate that separate analyses for all female householders, one person, two or more person, and non-family female householders were warranted. Although there were similarities among models, there were also important differences. However, the proportion of female-headed families with two or more persons present in each tract and the percent with children under 18 years present were found to be highly correlated; thus separate analyses seem unnecessary for these groups.

Evaluation of each hypothesized model confirmed the need for additional links for all models between the predictor variables, tract density and urban/suburban tract; tract distance from the CBD and median contract rent per tract; proportion of residential structures built prior to 1950 and proportion of households over 65 years per tract, and median contract rent and proportion of blacks per tract.

For the revised model for all female householders (the model which included one person, two or more person and non-family householders), the paths between tract distance from the CBD, median contract rent, tract density, the proportion of households over 65 years and the percent black householders, and the percent of all female headed households were weak, but significant. According to these results, as median contract rent and tract distance from the CBD increases the percent of female householders in the tract declines. This finding confirms the results of earlier work which has shown that the generally
lower earnings of female householders precludes residential location outside the CBD. More affordable housing, public transportation and a more complete range of social services found in the central city seem to best accommodate the needs of the female householder. All female householders were also more likely to reside in census tracts with higher densities and larger percentages of elderly and black households. Later models revealed that the combining of the populations of one person, two or more persons and nonfamily householders, had the effect of suppressing the unique locational processes of the individual populations of female householders. However, the overall variance explained by the model (.53) of all female householders was fairly high.

The most important predictors of the percent one person female householders per tract were the variables percent of households over 65 years per tract and tract distance from the CBD. As percent of households over 65 years and distance increased the percent of one person female headed households also increased. Of lesser importance was the inverse relationship between percent of one person female householders and the percent of black households. This latter finding represented a significant departure from the hypothesized relationship in which it was assumed that percent black households and percent one person female householders would be positively associated since both are highly centralized and urban populations. The model indicated that one person householders were highly centralized as suggested by the inverse relationship with distance from the CBD and the positive
relationship with household over 65 years who were affected by distance from the CBD through percent of structures built prior to 1950. It was concluded that one person female headed households resided in centralized tracts but in sectors/segments of the city apart from black households.

The revised models of two or more persons and householders with children under 18 years headed by women were similar as was suggested by the high correlation between the two household types. In contrast to the weak, inverse association obtained between percent black households and one person female householders, there was a large positive and significant path coefficient between percent black households and the percent two person female headed families and the percent householders with children. In both models (two or more persons and households with children) as median rent increased the proportion of female householders decreased. Only in the model of female householders with children under 18 years was the variable percent of households over 65 years significant; in the model of two or more person female headed families the path was insignificant and was deleted. The relationship between predictor variable households over 65 years and the dependent variable, percent female householders with children under 18 years, was negative, suggesting as in the revised model of one person female householders that householders over 65 years live in urban tracts apart from black households and/or those families with two or more persons or those with children under 18 years. This finding implied the segregation of the elderly even within
central urban areas thus confirming previous research by Cowgill (1958 and 1978), Coulson (1968), Golant (1972 and 1979), LaGory, Ward and Juravich (1980) and others. Unlike the models of all female householders and one person female householders, the revised models of two or more persons and female householders with children did not include a link between tract distance from the CBD and the dependent variable. The effects of distance were apparently transmitted through the predictor variables urban/suburban tract and median contract rent. High coefficients of determination ($R^2$) for the revised model of female headed families of two or more persons and female householders with children under 18 years indicated that much of the variance in location of these populations was explained by the selected, direct determinants (.57 and .62, respectively).

In the revised version of the model for nonfamily female householders neither median contract rent nor percent black households were significant determinants and were subsequently deleted. These findings indicate that, as was the case for one person female householders, percent black households and median rent were not important in explaining the location of nonfamily female householders. Unlike any of the previous models except that for all female householders, the nonfamily female householder model included a large, significant path coefficient between tract density and percent nonfamily female householders. Of lesser value but still significant was the negative association between percent of households over 65 years and the percent of nonfamily female householders. According to this
model only distance from the CBD, operating through tract density and tract density itself were important predictors of the percent of nonfamily female householders. In addition, the revised model implied that while nonfamily householders were highly centralized they were not in the urban tracts that housed black households or households over 65 years.

The revised models in this study did not include all the determinants which might affect the locational processes of female householders. However, the study did extend previous research on the location of population subgroups by illustrating the need for separate analyses for one person, two or more person family and nonfamily female householders. In addition, the separate analyses performed in this study suggest the need for future research to include new hypothesized determinants especially for one person and nonfamily female householders where the amount of variance explained was lower. However, the use of current data and the exclusive focus on female householders were major contributions of this research to the current literature on residential location.

Implications for Future Research

Future researchers must perform separate analyses of one person, two or more person and nonfamily female householders in order to gain a more complete picture of the locational processes of these distinct population groups. As shown in this study, the model of all female householders, while explaining a fairly high proportion of the variance
in the location of female householders, suppressed the unique characteristics uncovered by separate analyses of household types. Because of the dearth of literature on location of female householders it behooves social scientists to retest the model presented here with other data sets and to answer the questions: How does the model perform for populations outside of Franklin County, Ohio? How do results compare from large to small cities, from state to state and from region to region?

The results of this investigation suggest that additional variables may need to be included in the model of one person and nonfamily female householders. While more than one-third of the variance in residential location was explained for both groups, effective new variables could probably increase the model's explanatory power. More explanatory power for the model of one person female householders might come from at least two sources. First, for this group the variable median value of owner-occupied dwelling might have proved more useful than the variable median contract rent. The positive path coefficient between variables, percent householders over 65 years and percent one person female householders indicated that tracts with one person female householders were those tracts with greater percentages of households over 65 years. Householders over 65 years usually own their own homes though the homes are older and of lower median value (Struyk and Soldo, 1980). Including a hypothesized negative linkage between a new variable, median value of owner-occupied dwelling, and percent female householders with one person present might prove informative in future models of location.
For all models including the one person female householder, a second variable which may need to be redefined in future efforts is the urban/suburban tract designation. In this investigation the census tracts exclusively in Columbus City were labelled '1'. Ninety-five percent of all black persons reside in Columbus City so it was not surprising that a positive relationship, though weak in value, existed between urban/suburban tract and percent black households. It was clear from the model that households over 65 years and one person female householders were also urban populations (due to their association with the variables, structures built prior to 1950 and distance from the CBD, respectively). However, the linkage between urban/suburban and percent householders over 65 years, which was to have acted indirectly on one person female householders, was consistently found insignificant. This finding suggests that a more exact urban/suburban designation is necessary in later research. An index or scale of urban qualities - accessibility of public transportation, health care and other social services - might be designed. In the new analyses each tract might be assigned a value based on its scale value.

It is not clear that including a median value of owner-occupied dwelling would help predict the residential location and distribution of nonfamily female householders. This group was truly an enigma. Median contract rent and percent black households were deleted from the revised model and percent householders over 65 years was inversely associated with percent nonfamily female householders. Perhaps
because Columbus, Ohio is a city with several universities, the nonfamily female householders were primarily female college students. Thus a variable, percent ages 18-25 or percent ages 26-35 might help to explain the location of this group beyond its association with high density.

A more complete measure of economic status than median contract rent could be included in future studies. Median contract rent was of weak, although significant, value in the revised models of all female householders, two or more person householders and female householders with children under 18 years present. In each case the negative coefficient indicated an inverse relationship. This finding is not surprising since previous research has confirmed that female householders have much lower incomes than their married couple counterparts. Including median rent plus a new variable, households with low income (under $3000 or $5000) might prove enlightening.

The five revised models of residential location for female householders suggest that female householders are urban dwellers, living close to the CBD. It cannot be deduced from these models which dimensions of urban living are attractive to either female householders in general, or to specific groups of householders - the one person, two or more person or nonfamily female head. For which groups are accessible transportation or employment or quality schools or local health care or child care the factors contributing to city residence? Of course, there is considerable evidence that centralized, high density living may not be by choice. Housing affordability, and
discrimination and segregation in the housing market may account for the location of female householders in the central city. For example, it is well documented that black households have been barred from suburbia. Discrimination and socioeconomic factors have often prevented their movement outside the CBD. These two perspectives, choice of the central city versus restriction from suburbia, must be sorted out in future investigations. We need to know more about these processes including housing and neighborhood selection and intra- and inter-regional mobility, specifically for the individual populations of female householders. From this investigation it is clear that one person and two or more person family households are usually residents of the central city. Now we need to know why and how this residential location and neighborhood selection process occurs.

An important contribution to research on the housing and residential location of female householders would be made by revising the current census questionnaire. According to C. Hartman (1975), a leading spokesman for urban housing research:

"We need more frequent censuses, possibly through sampling techniques, or a constant national or state monitoring system, based on local construction and demolition statistics and on-site checks to gauge the upgrading and deterioration of the existing housing stock, as indicators of emerging problems and as guides to remedial action ... It is a telling commentary on the nation's unwillingness to face its housing problem squarely that adequate data are not even assembled" (pg. 6).

The use of plumbing (whether or not for exclusive use by occupant) and room (1.01 persons per room) standards as the index of housing quality also renders the census archaic. Again from Hartman:
"Housing need or deprivation (should) be measured along a number of dimensions: the physical quality of the dwelling unit, extent of overcrowding, the burden of housing costs, and the quality of the social and physical environment" (pg. 8).

The Annual Housing Survey meets some of these criteria but because of its small sample size it needs to be expanded to include more housing units and more specific information about the housing and location of population subgroups.

The census or censuses of the future could add to the knowledge of housing and residential location for the population as a whole and for population subgroups by providing information on location and housing conditions. In this way, housing and neighborhood quality indices could be designed. Too, the growth of the neighborhood restoration movement requires that displacement and rehabilitation statistics be collected in older neighborhoods. Longitudinal as well as cross sectional data is needed to understand how neighborhoods age and how populations are moving about in the CBD. How can we expect to know where populations are going and why if we do not have complete information on where they have been? Complete data of this type would result in better housing need assessment and thus public policy which is targeted to specific populations for their specific needs.

In sum, fine tuning of location models might include creating new variables or redefining old variables. Specifically, median value of owner-occupied dwelling, percent households with low income, percent residents aged 18-25 or 26-35, and a new index of urban/suburban character might improve understanding of the locational processes of
female householders. Secondly, an expansion of the census data base with a longitudinal housing and location survey component would allow more complete research to be conducted. In addition, more rigorous research efforts on the distinct subpopulations of female householders - one person, two or more person and nonfamily heads - were indicated by this investigation. Future researchers will want to emphasize individual level data for these groups. Relevant government policies can only come from increased efforts to diagnose the locational processes of female householders. Type and housing quality and the effect of housing/neighborhood environment on the lives of female householders with and without families is essential. In short, residential location cannot be neatly summarized in one dimension. Multi-faceted data collection and research efforts must be provided if increased understanding and effective public policy are to follow.

**Implications for Public Policy**

Policy implications can be gleaned from the revised models for one person, two or more person (or households with children under 18 years) and nonfamily female householders. Among the best predictors for one person female householders were percent of householders over 65 years and distance from the CBD. As the percent of elderly households rose so did the percent of one person householders. However, as distance from the CBD increased the percent of one person female householders declined. The overall impression was that many of the one person householders were elderly householders living in
centralized tracts. In addition, the association between structures built prior to 1950 and percent of households over 65 years was positive so it can be expected one person householders are living in older dwelling units closer to the CBD. Housing of this age will frequently have high maintenance needs and is often of lower value.

Based on the analysis of the model of one person female householders, perhaps low interest loans for housing maintenance and/or a 'handy man' service for tracts with one person female householders would be well received. To date, such a loan program has been available only in rural areas through the Farmer's Home Administration. Accessible transportation, shopping/marketing and health care are important to elderly householders. Therefore locating these services in tracts with larger percentages of one person households will be an effective means of providing these services to them. Efforts to prevent crime against elderly women in one person households should be placed similarly.

Lastly, from the model of one person female householders it appeared that one person householders were segregated from two or more person and nonfamily female householders thus implying segregation of the elderly. Planners, policy makers and researchers need to determine whether this segregation is self-induced or the result of housing market processes, low income, immobility and/or other factors beyond the control of this group. The question of whether age segregation exists, and to what extent it is good or bad has been argued
extensively by planners and theoreticians. The conclusion has generally been that segregation due to factors beyond the control of the elderly is the problem that needs to be addressed. Low cost housing outside the CBD, low interest loans, income supplements and/or diffused placement of social service and elderly housing are possible solutions.

The model of two or more person female headed families (or households with children under 18 years) also points to public policy needs. This population of female householders is often black as indicated by the path coefficient between percent black households and percent two or more person female headed families. The inverse association between median contract rent and percent black householders, and between median contract rent and two or more person householders also suggested these householders were located in lower rent tracts. In addition, the negative relationship between percent elderly householders and percent two or more person female headed families suggested this group is segregated in urban tracts also. Practitioners will want again to consider accessible transportation, shopping/marketing as well as child care needs in the tracts with larger percentages of two person female headed families.

What socio-economic barriers prevent two person, like one person female householders from a more even distribution throughout the area? What public policies will provide this group with better income, open housing opportunities and occupational mobility? In the past there have been calls for adult education, intensive training, low cost housing alternatives, income maintenance programs and corrective
legislation. It can only be hoped that the promised improvements in the national economic climate will provide these needed remedies.

Lastly, those organizations which call themselves family oriented must address the needs of the two or more person female headed family. Although married couples constitute 60% of all households, it is time more emphasis is placed on the nontraditional and nonfamily units by home economists, housing educators, urban planners, sociologists, economists and community service organizations.

Policy implications for nonfamily female householders are more difficult to ascertain from the revised model of location. Only tract density and percent nonfamily householders were found to be directly related by a highly significant path. However, since a negative association between percent householders over 65 years was found and since the percent black households was deleted due to its insignificance we can be certain that high density tracts (closer to the CBD as indicated by the association between distance and density) house one person, two or more person family and nonfamily female householders.

Collectively the models for one person, two or more person family and nonfamily householders suggest that there are neighborhood pockets in which each of these populations of female householders reside. These neighborhoods are to some extent mutually exclusive in that tracts with one person female householders consisted of larger percentages of elderly, tracts with two or more person families consisted of larger percentages of black households and tracts with nonfamily female householders consisted of neither a large proportion of black households nor elderly households.
To the extent that there are mutually exclusive neighborhoods of one person, two person and nonfamily householders we can conclude that there are self-induced or other-induced social or economic barriers preventing these groups of female householders from being evenly distributed throughout the area. On the one hand, this may not be desirable and planners may wish to force changes to occur through low cost alternative housing, placement of social services, schools and transportation. On the other hand, before these changes occur the public and social services can be targeted to tracts in which the needs are most evident. The models of one person and two or more person family female householders in particular illustrate that these tracts and their needs can be identified. Public and social services are only meaningful in so far as they meet the needs of those which they were intended to serve. Placement needs to be tract specific or more logically, neighborhood specific. To be neighborhood specific requires we understand more about residents' perceptions of neighborhood boundaries.

The female householder phenomenon is not going to go away in spite of our failure to focus on the needs of this group. Collectively these women face barriers which are insurmountable as long as they go unrecognized. Discrimination in the rental and housing market, neighborhood segregation, low income and low socio-economic status must be addressed. Until researchers and public policymakers direct their attentions to the specific housing needs and location of one person, two or more person family and nonfamily female householders
these problems will not be remedied. Awareness is only the first step to correcting the problems of female householders. The second step is implementation of low cost housing opportunities, tract directed social services - transportation, child care, health care, low interest home maintenance loans, service programs geared to the population of female householders, accessible housing and employment opportunities outside the CBD. Housing and locational processes and the national socio-economic climate have combined to create an environment of favored and less favored consumers. Public policy and its practitioners must move the female headed householder - one person, two or more person family and nonfamily - from the category of the less favored consumer.
**TABLE 2**

Summary of Model Variables and Census Tracts in Franklin Count, Ohio Affected by Data Suppression,* 1980

<table>
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<th>Tract Number</th>
<th>SUPFLG 10</th>
<th>SUPFLG 18</th>
<th>Tract Number</th>
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**KEY:**

SUPFLG 10 - suppression flag #10 applied because there were fewer than five occupied housing units in the geographic area (parts of tract).

Variables affected by SUPFLG 10:
- Percent all female householders
- Percent one person female householders
- Percent two or more person family female householders
- Percent female householders with 2 or more children under 18 years present
- Percent nonfamily female householders
- Percent householders over 65 years

SUPFLG 18 - suppression flag #18 applied because there were fewer than five housing units in the renter-occupied in the geographic area (parts of tract).

Variables affected by SUPFLG 18:
- Median contract rent

**NOTES:**

* In order to maintain the confidentiality promised respondents and required by law, the Census Bureau suppresses tabulations of characteristics of very small groups of people or housing units. On summary tapes, zeroes are entered in suppressed cells and flag fields which indicate suppression are shown on each record. However, a zero in a cell does not automatically mean suppression. Only by checking the suppression flag can it be determined if the zero in a specific table is suppressed data or an actual count of zero (from Summary Table File 1, data description available from the Ohio Data Users Commission in the State Building, Broad St., Columbus, Ohio). Of the 253 tracts in Franklin County, Ohio used in this sample 24 were affected by suppression flag #10, 46 were affected by suppression flag #18.

+ Because the census data file used in this study was hierarchical in nature the geographic unit affected by suppression was 'parts of tract'. Thus a tract identified as having been affected by suppression usually was only affected in part. Never was a whole tract's data suppressed.
### TABLE 3

**Correlation Matrix, Means and Standard Deviations of the Variable in the Study, Determinants of Residential Location of Female Householders**

<table>
<thead>
<tr>
<th>Variable List Tract</th>
<th>(X_1)</th>
<th>(X_2)</th>
<th>(X_3)</th>
<th>(X_4)</th>
<th>(X_5)</th>
<th>(X_6)</th>
<th>(X_{bb})</th>
<th>(X_{bc})</th>
<th>(X_{bd})</th>
<th>(X_{be})</th>
<th>Means</th>
<th>Standard Deviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>(X_1) Distance from the central business district</td>
<td>1.0000</td>
<td>-0.6567</td>
<td>-0.4772</td>
<td>-0.5713</td>
<td>0.5283</td>
<td>-0.4272</td>
<td>-0.4302</td>
<td>-0.6394</td>
<td>-0.4361</td>
<td>-0.4067</td>
<td>-0.3333</td>
<td>-0.2973</td>
</tr>
<tr>
<td>(X_2) Percent residential structures built prior to 1950 per tract</td>
<td>1.0000</td>
<td>0.4043</td>
<td>0.4764</td>
<td>-0.5220</td>
<td>0.4745</td>
<td>0.3274</td>
<td>0.4523</td>
<td>0.3003</td>
<td>0.3131</td>
<td>0.2119</td>
<td>0.1647</td>
<td>33.5719</td>
</tr>
<tr>
<td>(X_3) Tract density</td>
<td>1.0000</td>
<td>0.4929</td>
<td>-0.2110</td>
<td>0.1330</td>
<td>0.1279*</td>
<td>0.4337</td>
<td>0.2775</td>
<td>0.1779</td>
<td>0.1235</td>
<td>0.5271</td>
<td>520.6695</td>
<td>4320.0786</td>
</tr>
<tr>
<td>(X_4) Urban/suburban tract</td>
<td>1.0000</td>
<td>-0.3865</td>
<td>0.2354</td>
<td>0.3547</td>
<td>0.4813</td>
<td>0.3078</td>
<td>0.3073</td>
<td>0.2423</td>
<td>0.2800</td>
<td>0.4585</td>
<td>1324.9029</td>
<td>1470.1595</td>
</tr>
<tr>
<td>(X_5) Median contract rent</td>
<td>1.0000</td>
<td>-0.2851</td>
<td>-0.5080</td>
<td>-0.5118</td>
<td>-0.1665</td>
<td>-0.5798</td>
<td>-0.5202</td>
<td>-0.0706*</td>
<td>182.7233</td>
<td>59.2015</td>
<td>15.4734</td>
<td>10.5631</td>
</tr>
<tr>
<td>(X_6) Percent householders over 65 years</td>
<td>1.0000</td>
<td>0.1493</td>
<td>0.3966</td>
<td>0.5288</td>
<td>0.0970*</td>
<td>-0.0195*</td>
<td>-0.1704</td>
<td>15.4734</td>
<td>10.5631</td>
<td>15.4734</td>
<td>10.5631</td>
<td></td>
</tr>
<tr>
<td>(X_7) Percent black households</td>
<td>1.0000</td>
<td>0.4916</td>
<td>0.0035*</td>
<td>0.7556</td>
<td>0.7089</td>
<td>0.2224*</td>
<td>0.1584</td>
<td>26.3220</td>
<td>0.1235</td>
<td>0.5271</td>
<td>520.6695</td>
<td>4320.0786</td>
</tr>
<tr>
<td>(X_{bb}) Proportion all female householders</td>
<td>1.0000</td>
<td>-0.0613*</td>
<td>-0.1088*</td>
<td>0.3306</td>
<td>15.0117</td>
<td>8.4680</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(X_{bc}) Proportion one person female householders</td>
<td>1.0000</td>
<td>0.9681</td>
<td>0.0638*</td>
<td>11.9402</td>
<td>7.9720</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(X_{bd}) Proportion two or more person family female householders</td>
<td>1.0000</td>
<td>-0.0187*</td>
<td>1.0000</td>
<td>-0.0588</td>
<td>0.0638*</td>
<td>11.9402</td>
<td>7.9720</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(X_{be}) Proportion female householders with one or more children under 18 years</td>
<td>1.0000</td>
<td>-0.0588</td>
<td>0.0638*</td>
<td>11.9402</td>
<td>7.9720</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: All variables are significant at p < .01, except those designated: (*) p < .05; (+) insignificant.
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