

CHANGING HOUSEHOLD STRUCTURE  
AND  
THE IMPACT ON THE JOURNEY TO WORK

by

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ABSTRACT

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Submitted to the Department of Urban Studies and Planning  
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The trends in household structure were examined to determine their relationship to residential location. Knowledge of the residential density in an urban area is a key component in planning transportation capacity, especially for the demand during commuting hours. The married couple category accounts for the majority of households though single member and single parent households have the highest rate of growth. The motivation for this study was to examine whether the wider diversity in the living arrangements of Americans has affected the patterns of residential density in metropolitan areas. An objective was to determine the significance of household structure in the choice of housing attributes and its location. Economic theories of residential location assume the presence of one dominant type of household. If this assumption is invalid then models which forecast residential density and travel demand should reflect the diversity of household types.

A regression analysis of housing choices was performed using 1980 Census data on the Boston metropolitan area. The relationship of household structure with housing attributes, commuting travel times, and status of the residential area was modelled. Household structure categories have explanatory power in predicting choice of housing attributes. These categories were less useful in forecasting residential location. Household structure is not correlated with travel time to work. Number of workers in a household is a significant variable in predicting travel time. The type of household structure is related to the members' preferences in housing.

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I dedicate this thesis to my parents, Donald and Bernice, who have given me their knowledge on the value of the family. This work was made possible by their unwavering support.

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## I. INTRODUCTION

Human societies are continuously evolving. From the vantage point of one individual lifetime a particular change might seem very dramatic yet over the course of several centuries the change may have had a minimal impact. The family is a basic component of society which we use as a point of reference. The definitions used to describe the family have changed over time. The role of the family in America has changed during the course of our history (Skolnick and Skolnick,1983). Since the second World War the trends in the composition of the family have fluctuated dramatically (Masnick and Bane,1980). Are the current changes in family structure temporary aberrations or is a fundamental shift occurring in a basic component of society?

The city planner is always concerned with major trends which affect society. Does the urban master plan, designed in the past, suit the future needs of the area's residents? Knowledge of the fundamental trends in society is imperative if we are to design for the demands of tomorrow. To know when a transportation investment is prudent requires information on the level of demand that service is likely to generate. Predicting future demand requires the planner to understand how people determine their needs. The choices citizens

make are affected by the composition of their household. A young adult, living alone has different priorities in her demand for transport services than a single mother with two children.

A basic element of transportation planning is the forecast of travel patterns in a defined area. One basic component of this analysis is predicting where people live and where they work. Simply knowing the percentages of the locations of work and home will not reveal the travel pattern over the transportation network. To design for system capacity during the peak hours of the work commute, the planner must have information on the expected loads over the major links of the network. To plan for future capacity we must anticipate the location of tomorrow's residences and employment sites. This thesis examines the relationship of residential location to the changing structure of households.

Predicting the course of current trends is a tricky task. Was it possible to anticipate the baby boom in America after the second World War? Could planners be expected to forecast the rapid growth in suburban residences? Examining these trends with hindsight makes these phenomenon appear almost inevitable. For fifteen years family formation had been slowed by economic depression and then war. Much of the population was employed during the war years but purchases were constrained by rationing and shortages, leaving a large pool of savings. These elements helped to create the post war boom in high rates of fertility (Fuchs,1983) and increased consumer spending. Such a neat picture of the past does not do justice to the complexity of forecasting such trends before they occur. At the conclusion of



this War many economic forecasts expected a long period of readjustment before industry would be geared for civilian products. Can we accurately anticipate the unknown future which appears so certain when examined as history?

Many of the trends shaping household structure in today's society will affect the pattern of residential location. Care must be taken before predicting these future patterns from the relationships which existed in the past. Many of the changes in household structure suggest an increase in urbanization. The increase in single member households and in the population over sixty-five years of age signals rising demand for residence close to services found in the city. But while household patterns are changing so is the structure of metropolitan areas. Services, once found only near the urban core have been relocating to suburban areas. Employment is no longer centered in the downtown area of a metropolitan area (Grubb,1982). While the priorities of households may be shifting so is the location of the services these households are seeking. The interactive effects between supply and demand over time must be examined closely before predicting future travel patterns.

Given the many layers of changing elements affecting travel behavior, finding the core of the pattern appear impenetrable. To develop theories which serve as tools for anticipating future needs, simplification of these patterns is required. Constructing models to mirror the key components of the trends is one technique. The ever present challenge is to simplify the task by including the essential elements and pare away the distraction of superfluous ones. This

thesis examines one component, residential location, which has a major influence on the demands placed upon the transportation network. Household structure is examined to understand its impact on the choice of residential location and determine if it is a key component.

The thesis has four main components. The next chapter reviews the theory of residential location, primarily as studied in the field of urban economics. The relationship between household structure and residential location is revealed in many of the theories of urban economics. In general, economists have taken the structure of the family as a given and not probed the changes occurring to it. The third chapter examines the nature of the changes occurring within the American family. It addresses whether these changes are fundamental or temporary in nature. The fourth chapter examines the impact different household structures have on the choice of housing attributes and location. The fifth chapter undertakes a modelling exercise of residential location and travel patterns in the Boston Standard Metropolitan Statistical Area. The final chapter draws conclusions from the results of the research.

## II. ECONOMIC THEORIES OF RESIDENTIAL LOCATION

### 2.1 Introduction

Urban economics has developed as a separate branch of economics only in the past twenty-five years. In this period economists have developed theories on the underlying forces of urban spatial development. Among the various phenomenon they have studied is the relationship between residential and employment locations.

Through research of urban spatial patterns, economists have developed theories of urban growth. One useful concept in their efforts is the bid rent curve (e.g. Alonso,1964). The theory behind this concept is that the value of land is determined by the bid price set by potential users of the resource. Land which is close to the center of a city has a high bid price due to the advantages of accessibility. Thus the bid rent curve should be downward sloping as distance increases from the center of the city. From this concept the idea of rent gradients was developed (e.g. Muth,1969). The bid rent curve will not be a smoothly shaped inverted cone with the center in the middle of the city. Peaks and valleys will develop around nodal points in an urban area. In essence, a city can be mapped like a mountain range, using the value of land instead of height from sea level to determine contour lines. Such a map would give a clear indication of the rent gradient for that locale.

From these concepts of land rents, came theories of spatial development. Certain types of businesses will locate in the city center because they require the maximum accessibility to various markets. Residential areas will be pushed away from the center.

Theories have been proposed on the importance of transportation technology in shaping the pattern of residential location. In a walking city the upper classes will outbid other groups to live near the major activity center. When mechanical means of travel were developed the pattern was inverted. Wealthy families sought additional space outside the crowded urban area and used trains or later streetcars for access into town (Warner,1962). Similar to these theories are the models based on the relationship between the commute to work and the desire for additional living space. Economists have studied the tradeoff workers make between reducing the distance they travel to their job and increasing their housing space by seeking lower priced land farther from their job (e.g. Kain,1975a). Such models can be used to forecast the residential location of the population by income, predict residential density and other characteristics of residences. The weakness of this type of model is the assumption it makes that all workers are employed in the center of the urban area. These and other theories have been developed in an attempt to explain such behavior as the flight of the middle class from the city to the suburbs.

#### 2.1.1 Assumptions on Household Structure

Most theories of residential location assume the individual decision maker is part of a larger family. The composition of this family is rarely questioned. Generally, it is viewed as a "typical" family, that is a married couple with two children. Some of the theories of residential location do begin to question such implicit assumptions in order to determine the impact household structure has

on residential location. In most studies the importance of household composition is negated by the assumption that it is constant for all individuals.

## 2.2 Origins of the Theory

One of the first economists to seriously consider the relationship between location and land rents was Johann von Thunen in the 1820s. He based his theories on postulates about economic behavior and the nature of space. His hypothesis was formed around a model of a single city in the center of a large fertile plain with no navigable waterways through the space. His concerns were with the production of agricultural products and the rents property owners could charge growers. Products with the highest transportation costs, like milk and fruit, would be produced closest to the city while grains would be grown farther away. "The difference in land rents between any two locations devoted to the same type of use depends upon the difference in costs, primarily transport costs, associated with the two locations" (Muth,1969,p.7). The theories of von Thunen formed the foundation upon which later urban economists would build.

### 2.2.1 Land Economics

Since the 1920s a vast amount of literature has been written on "land economics." Robert Haig was the leading economist of his time on theories of urban land values. Like economists before him he stated that rents are a function of accessibility which enables savings in transportation costs. The value of rents is established in a bidding process in an open marketplace. He built his theory on the concept of the "friction of space." Transportation devices help to reduce this friction. Theoretically the perfect site for the user is the one with the lowest cost of friction. One of his disciples, Richard Ratcliff, stated "... the perfect land market would produce a pattern of land uses in a community which would result in the minimum aggregate land value for the entire community. The most convenient arrangement results in the lowest aggregate transportation costs, in terms of savings of transportation costs, the advantages of the more convenient sites are reduced" (Alonso,1964,p.7). The work of the land economists was based primarily on agricultural producers and manufacturing firms. Retailers are concerned with the impact of location on their volume of sales. Haig's consideration of residential location is again based on accessibility and does not include the amount of space used. Residential space to be used is a major decision variable for households. Later theorists would show the relevance between accessibility and housing space.

### 2.2.2 Human Ecology

During the same time period the land economists were writing another group, the human ecologists, were publishing their views on the city. This group was composed primarily of sociologists and their work tended to be descriptive without giving theories of causal relations. In 1924 Ernest Burgess published his theory of concentric zones for urban areas. The central business district is the first zone at the center, followed by a zone of transition between poor quality housing and invading businesses and light manufacturing. The third zone in Burgess's schema consists of the independent workingman in triple deckers and attached single family houses. The fourth zone contains the better quality housing and the suburbs are in the fifth zone. The highest land rents are in the center and decrease with distance from the CBD.

Homer Hoyt developed a competing theory in 1934 (Muth,1964). His model was based on a pattern of sectors and not zones. He stated that in every city there is one or more sectors with the highest rentals. In his studies the relation between the location of the high rent sector and the CBD was different in each city. The rents declined in all directions from the high rent sector in Hoyt's model.

Another ecologist, Amos Hawley, gave an explanation to the apparent paradox of low housing rents being charged on high priced land in or near the CBD (Alonso,1964). He reasoned that this land is actually being held on the speculation that the Business District would soon encompass this property. Any investment made to the housing to maintain or improve its quality would not be realized in a profit since the speculative value was in the land and not the

structure. This reasoning was based on the expectation of rapid growth of the urban area. Later theorists would not disprove this concept but rather show other reasons to explain the phenomenon of poor quality housing in the urban core.

### 2.3 The Urban Economists

A number of books and articles were published in the first half of the 1960s which defined the field of urban economics (e.g. Alonso, 1964, Wingo, 1961, Muth, 1969). The various theories constructed were largely based on the work of von Thunen. A major objective was to construct models which would be useful in forecasting behavior in urban areas and to test the probable outcome of proposed policies. The leading theorists during this time included William Alonso, John Kain, Herbert Mohring, Richard Muth, and Lowdon Wingo. Their focus on urban issues was in part a result of the growing concern over the problems of United States cities.

These economists built models which placed most of the area's employment in the Central Business District, which was surrounded by residential and other non-agricultural activities. The CBD is the point with the maximum accessibility, that is transportation costs are lowest there. Producers with high transportation costs will locate there as will those with low space requirements. The value of rents in these models will be highest in the CBD and decrease with distance as proposed by earlier theorists. The actual shape of this rent gradient has been continuously debated.



### 2.3.1 Alonso's Theory of Residential Location

William Alonso was the first to attempt to mathematically derive the bid rent curve. The bid rent curve is what the individual or firm is willing to pay for a given quantity of space at various distances from the CBD. He attempts to tackle the dual problem of firm location, based on principles of von Thunen, and residential location. For predicting location of the household, he assumes the individual worker travels to the CBD. Rent values for land are established in a competitive bid process.

The greatest contribution of Alonso's early work is on residential location. Though he states that the firm can locate anywhere in the city, for modelling purposes he actually restricts employment to the center. The two main areas to be addressed in order to achieve an economic equilibrium in the market for residential location is first, what quantity of land is to be used and second, at what distance from the center of the city is the household's location. To accomplish this task his model has three major assumptions. The monocentric city, i.e. all employment located in the center has been discussed. The next is that the urban area is a featureless plain. There are no hills, valleys or waterways to divide the space. The last assumption is, one made by all economists, that people are utility maximizers.

"An individual who arrives in a city and wishes to buy some land to live upon will be faced with the double decision of how large a lot he should purchase and how close to the center of the city he should settle. In reality he would also consider the apparent character

and racial composition of the neighborhood, the quality of the schools in the vicinity, how far away he be from any relatives he might have in the city, and a thousand other factors. However, the individual in question is an "economic man," defined and simplified in a way such that we can handle the analysis of his decision-making. He merely wishes to maximize his satisfaction by owning and consuming the goods he likes and avoiding those he dislikes. Moreover, an individual is in reality a family which may contain several members. Their decisions may be reached in a family council or be the responsibility of a single member. We are not concerned with how these tastes are formed, but simply with what they are. Given these tastes, this simplified family will spend whatever money it has available in maximizing its satisfaction" (Alonso,1964,p.18).

Alonso in a footnote to this quote raises the issues of simplification required for modeling and states its necessity. It is interesting to note that the decision-making process varies but for purposes of this model tastes are a given.

In Alonso's model the utility function contains three commodities: the quantity of land used, distance to the center of the city and all other goods. It is a unique feature of his model that distance is contained within the utility function. The budget constraint contains the price of goods and the cost of transportation.

$$U = U(q,t,Z)$$

with the constraint:

$$y = P_z Z + P(t)q + k(t)$$

where:

q:quantity of land  
t:distance  
Z: all other goods

P<sub>z</sub>:price of composite good Z  
z: quantity of composite good Z  
P(t):price of land at distance t  
from the center of the city  
k(t):commuting costs to distance t

It is important to note that the price of land is a function of its distance from the center of the city. This variation in land costs is what drives the model. The commuting cost is considered a disutility of time spent traveling and the nuisance associated with the commute.

Each individual has a residential bid price curve based on his willingness to pay for a quantity of land at a specific distance from the city center. The unsolvable knot in this model was the interdependency between employment and residential location. It proved impossible to set a bid price curve for the household if the workplace was free to locate anywhere in the city. The monocentric assumption was established in an attempt to derive the surface of the bid price curve theoretically and then test it empirically.

### 2.3.2 Muth's Model of Residential Location

Richard Muth does not attempt to mathematically derive the bid rent curve but rather points to its properties and states what it must be given empirical evidence (Muth,1969). His utility function excludes the accessibility factor of distance and incorporates it in his budget constraint.

$$U = U(Z, q)$$

with the constraint:

$$y = pz \cdot Z + p(t)q + T(t, y)$$

where:

$pz \cdot Z$ : dollars expended on all commodities except housing and transportation

$q$ : consumption of housing

$p$ : price per unit of housing

$t$ : distance from CBD

$T$ : cost per trip as a function of location and income times the number of trips

$y$ : income

Accessibility costs are not only a function of distance but also of income. This function incorporates the concept of differing value of time for each person. This budget constraint includes not only money expended on travel but also the disutility of travel as a function of income. In Muth's model housing is considered a composite good. His focus is not on the quantity of land consumed as in Alonso's model but the total housing unit.

### 2.3.3 Comparisons of Alonso's and Muth's Models

The findings of both models are similar in their broadest components. As income rises people move farther from the center of the city. Since housing is not considered an inferior good people with more income desire more housing units or space and find it costs less the farther one travels from the CBD. People remain close to the city to reduce time spent traveling. These models place emphasis on the relation of the income elasticities of housing consumption versus income elasticities of travel costs. The distance traveled to satisfy the household's desire for more housing consumption depends on the

members willingness to travel.

Neither of these two models addressed the issue of the quality of housing according to the location. The various amenities and negative features of a particular site which influence the household's decision on location are not represented in these models. The other facet which policy analysts found very restrictive about these models is the monocentric assumption of employment. John Kain and several of his colleagues began to address these issues (Kain,1975a).

#### 2.4 Kain and the Journey to Work Model

In his 1963 article, "The Journey to Work as a Determinant of Residential Location", John Kain attempted to relax the monocentric assumption used in previous urban models while still maintaining the same theoretical foundations. He postulated the expected patterns of residential location by the household's income, number of members, and space according to developed theories. His set of expectations were tested against data on whites in working households from the Detroit area. He divided the urban area into six concentric rings and tested for the effects of employment location. His central hypothesis was that households substitute expenditures on the site location for expenditures on the journey to work. "This substitution depends primarily on household preferences for low density as opposed to high density residential location" (Kain, 1975a p.29).

Kain, similar to Muth, does not derive the rent gradient but rather observes that it is a declining curve from the CBD toward the suburbs. Other assumptions made are similar to above models, such as residential space is not an inferior good and households seek to maximize their utility. The key assumption made is "that the existence of a market for residential space in which the price per unit a household must pay for residential space of a given quality decreases with distance from its workplace" (Kain,1975a,p.32). This rule holds when the workplace is in the CBD or close to it but it weakens when employment is in the outer rings of the city. He goes on to show that the tradeoff between travel cost and consumption of housing space for households with different incomes has the expected relationship when employment is in the inner rings. For workers in the CBD, as income increases so does travel distance from the workplace. The relationship between income and distance from employment does not have the same consistent pattern when work is in the outer rings of Detroit.

Kain's hypothesis is based on the importance of the journey to work in relation to all other expenditures. He assumes that expenditures on non-work trips are invariant to household location. These costs may vary across different areas but not between places with similar characteristics. Work as a home-based trip is the dominant trip purpose in a survey of 38 cities presented in his paper. Work trips account for 43.9% of home-based trips with social-recreation trips second at 21.4% and shopping third at 11.9%. He does note that this model will only apply to households with a member in the labor force but that this rule should apply to 80 or 90

percent of all households. Exceptions include retired persons who may chose to live near to relatives or single persons who may want to be closer to cultural and recreational centers.

#### 2.4.1 Effects of Household Structure

Kain recognizes that the characteristics of the household members, such as their age, marital status and the presence of children, has a significant impact on the choice of a residential area.

"Suburban living must be far less attractive to the young married or the childless couple than to those with children; their social and recreational activities are to a much greater degree directed outside the home. For the unattached person, residence in a suburban neighborhood far from the center of activity is even more unsatisfactory" (Kain,1975a,p.46).

It is in the case of the single member household and, to a lesser extent, the two person household that Kain realizes the focus on the journey to work relative to other travel costs will not predict such phenomenon as the reverse commute. His study shows that of persons working in an outer ring, 47.7% of the single member households commute from an inner ring while the average of all households is 13.9% for this same commute.

For larger families the opposite tendency of desiring more housing space and living farther from the CBD is expected and revealed in Kain's paper. The relationship is not a positive linear one since as family size increases income per member decreases. The demand for other required goods and services creates a constraint on consumption of housing space. When the workplace is in the outer rings of the

city, large households, defined as six or more members, clearly prefer to live in that ring or the next outer ring. In this manner the larger families both minimize their travel costs to work and find more housing space per dollar expended.

#### 2.4.2 Causes for Suburban Migration

Theorists of residential location have been debating for almost twenty-five years whether less expensive land in the suburbs has been luring higher income families from the cities or if urban blight has driven these families to seek better services outside the urban core. How large a role do public services, such as the quality of schools and the quality of housing, play in the choice of household location? Kain notes that government services and housing quality do improve as distance from the CBD increase. The causality of this relationship does not originate with these services in Kain's opinion. "It is my belief that housing quality is less of a determinant of residential choices than are collective residential choices a determinant of the quality of housing services and of the quality of governmental services. ...This leaves me to the tentative conclusion that observed distribution of housing quality is the result of the long run operation of an admittedly imperfect market, but one which is possibly less imperfect than often supposed" (Kain,1975a,p.50-51).



### 2.4.3 Summary of the Contributions by Kain

The major contribution of Kain's paper is that it applied the theories of Alonso, Muth, and others to empirical data from a major U.S. city. Kain relaxed the monocentric employment assumption to test the theory's applicability when workplace is in various zones of the urban area. When the surface of location rents, which declines with distance from the CBD, is at its steepest the expected relationships are found. Some variations to the theory occur toward the periphery of the city where the rent surface is flatter. Of particular interest, for this study, is that Kain addresses the issue of household structure and its impact on residential location. He admits that his specification of transportation costs as a function of travel to work expenses will not yield a satisfactory result for all households. This is particularly the case for single member households.

### 2.5 Exodus to the Suburbs

Different models have been postulated to explain the shift in population from the central city to the suburbs. Unfortunately for theoretical clarity, empirical evidence can be used to support many of these models. A reason is that the models are not mutually exclusive. When examining human behavior using aggregate data, one simple theory cannot adequately predict individual decisions. The two most prominent models specify different causal relations to explain similar behavior. Determining which model dominates as the explanation for the shift in population becomes almost futile.

There are two theories of the population movement from city to suburbs which have received the most attention within the field of urban economics. One pair of authors has termed these two theories as the "Accessibility Model" and the "Blight Flight Model" (Follain & Malpezzi, 1981). The first theory argues that as personal income increases the household wants to consume more and higher quality housing space. People go to the suburbs because land prices are lower than in the central city. This model assumes that the utility of better and bigger housing outweighs the increased commuting cost of living farther from work and other needed services. The Blight Flight Model explains that cities have become less desirable for higher income families and to white people in general. The cities experienced a rapid influx of low income and black households during and after the second World War. Once some middle to upper income families moved to the suburbs the trend became self perpetuating since the percentage of low income families would increase with each departure of middle class families. The housing concentration of low income households led to a declining quality of housing stock and neighborhood characteristics according to this model.

This issue is especially important when determining the appropriate policy to revive deteriorating urban areas. The Accessibility Model emphasizes income growth and transportation improvements as reducing the relative costs of moving to the suburbs. This model would lead to policies which subsidize housing costs in the cities to lessen costs relative to the suburbs. The Blight Flight Model stresses racial prejudice, poor quality of neighborhoods, physical decay and fiscal problems of the cities as the reason for the

middle class exodus. The remedies this model suggest are to improve city services, invest in the neighborhoods, integrate the schools, and reduce crime.

#### 2.5.1 Relevance of Household Structure

The interest of this issue to this study is that these models may reflect the importance of changing household structure. The Blight Flight Model would suggest that even though households may be smaller, with fewer children and more working members that they will still move away from the problems of the city. The Accessibility Model would suggest the opposite for these households. Given fewer reasons to view greater utility in greater housing space and the higher costs of accessibility to the urban core more households will locate closer to the central city. The assumption underlying these arguments is that employment is primarily located in the CBD.

#### 2.5.2 The Follain and Malpezzi Study

The results of one modelling effort by Follain and Malpezzi (1981) was inconclusive in determining which model is more relevant. The authors created hedonic housing prices for 39 SMSAs in order to compare price differentials of housing with the same qualities in the central city and the suburbs. Prices in the central city should be more expensive to buy or rent housing since value is placed on the location's greater accessibility. However, the racial strife, poor schools, and crime should lessen the value of similar housing in the city in comparison to the suburbs. Their results have a high degree of variation across specific SMSAs. In general, the older cities in

the northeast have less expensive prices in the cities than the suburbs for the same level of housing. In the southwest, such as San Diego and San Francisco, the urban prices are generally higher. The cities where the relative prices are particularly weighted in favor of the suburbs include Detroit, Newark, Patterson, and Philadelphia. "(These places) conform to the image of the declining northeastern city where , many believe, the factors contributing to the Blight Flight Model are most prevalent, i.e., high concentration of minorities and low-income households, fiscal problems, and poor and declining neighborhood conditions"(Follain and Malpezzi,1981,p.397). Their regression results also showed the importance of many of the independent variables associated with the Accessibility Model.

### 2.5.3 Grubb's Employment Location Study

Another study on the flight to the suburbs examined the causes of suburbanization of employment. Grubb (1982) divided employment into the four sectors of manufacturing, services, retail, and wholesale. He found that for all sectors high density central cities tend to drive employment to the suburbs. The manufacturing and wholesale sectors had the greatest "persistence effect" of being less likely to relocate their plants. The manufacturing and service sectors tend to flow toward the low income population while retailers and wholesalers tend to move toward the high income population, following customers in the former case and moving away from high crime areas in the latter. The adjustment of employment to population movements requires longer than a decade to take place. Its impacts have tended to be reinforcing of the trend for high income households to move to the

suburbs while lower income households remain in the cities.

#### 2.5.4 Location of Upper Class Residences

The various theories of residential location state that as a person's income increases the probability is much greater that this person's household will be at a greater distance from the CBD. As high income households move out of the central city this creates a self-reinforcing trend of upper income households moving to the suburbs. However, there has been a counter phenomenon of upper income households moving into the urban core. Is there a trend beginning which will stop the flow of middle and upper income households to the suburbs? A theoretical model of this phenomenon suggests that the "back to the city movement" is limited in scope and is only evidenced in particular types of cities. Clifford Kern (1981) bases his argument on the importance of non-work trips to households with three general attributes. Individuals with an upper income who locate in the urban core are most likely to be households with unmarried adults, childless couples, or those with a high level of education. The attraction of social, recreational, and cultural events found almost exclusively in the CBD are the reason these households would locate near to the city center. The desire to participate in events or to consume products unique to the CBD results in many non-work trips which outweigh considerations of having more living space in the suburbs. In Kern's examination of New York City he found that upper income households were increasing their residence only in or around the surrounding areas of the city center. The older neighborhoods in the city, but outside the urban core, were experiencing growth in

lower income households and a decline in upper income households. He found that the growth of upper income households in the city center was not primarily due to the lower costs of renovating the older urban structures relative to the costs of new construction. Three fourths of those households moving into the city center were in new buildings. These figures are for the 1960s. The process of gentrification, the term given to upper income households renovating older structures, may have become more prominent in the 1970s. Kern also disputes the idea that the higher value of travel time for those with large salaries has induced them, especially those without children or with several workers, to live in the urban core. If this were the reason, he argues, then the percentage of these upper income households would be fairly consistent across different CBDs. In the 1970 Census upper income households were twice the percentage in Boston, Philadelphia, and San Francisco as those households in Detroit and St. Louis. The greater number of social and cultural opportunities in the first three cities as compared with the last two are the reason for the difference according to this model. If this model is accurate then the revival of upper income households within the city will be limited to certain areas of the city and to certain types of cities. The gain in these places will not offset the loss of upper income families in other parts of the city. The underlying cause of demand for living in the urban core may be childless marriages.

#### 2.5.5 Impact of Transportation Technology

A different model of relocation of upper income households to the city is based on comparative advantage of a transport mode. The basis

of this theory is the comparison of the income elasticity of housing to the income elasticity of marginal commuting cost. When the elasticity of housing is greater than that for commuting the household will be located farther away from the central city as income increases. When a transportation innovation is first introduced, such as the streetcar or the automobile, only the wealthy can afford to use it. This innovation enables the rich to reduce their marginal cost of commuting and to take advantage of less expensive housing in the suburbs. When walking was the most common means of traversing the city, the rich outbid lower income families for the most central location. The innovation, such as the car, is made available to all households as the price is lowered relative to people's incomes. Today most households have some access to a car and they can now commute to work by car. Housing in the suburbs has greater competition since more people can afford the commute and thus the price of housing in the suburbs is bid upward. The rich, having lost their comparative advantage to buy less expensive housing in the suburbs will move to the inner regions of the city where commuting costs are less and they can outbid lower income households for space. This theory developed by Stephen Leroy and Jon Sonstelie (1983) is based on the Alonso-Muth models and so assumes employment is in the CBD. The regentrification of the city will continue according to this model unless a new mode of transportation is introduced which will give the comparative advantage to the rich or if the relative costs of commuting increase which would force the poor out of the housing market in the suburbs.

## 2.6 Conclusions

The residential location theories introduced in this chapter have stressed two approaches. Most of the models developed from these theories have emphasized the issue of accessibility. Other models use the reasoning of the apothegm "like attracts likes". The former models build upon the concept, developed by Haig, of the friction of space. As the perceived costs of transportation decrease a household will tend to locate farther from the center of the city. The work trip is of major importance in these models because of its regularity and importance to the household worker(s). The major assumption, and resulting weakness, of these models is that employment is primarily located in the Central Business District of a metropolitan area. This assumption is not currently true for most American metropolitan areas. These models also assume that the household will consume additional housing as income rises. The preference for housing over other goods should depend on the household structure. The other set of models is based on the phenomenon that people are attracted to areas which display attributes similar to their own characteristics. If the homogeneity of their current neighborhood is challenged people will move to an area where this perceived threat is minimized. The attributes of a neighborhood which are generally most visible include race, age, income and level of education. The work trip is of secondary importance in these models. Household structure would only be significant in these latter models if it is correlated with the attributes which determine neighborhood homogeneity to the residents.

The user's responsiveness to altering housing consumption has been exhaustively debated in studies on the income elasticity of



housing. The question remains if the relative priority for additional housing consumption is the same for all households. If the composition of households were very similar this point is insignificant. But with the current diversity of household types, the demand for additional housing space varies according to household size, age of members, and other factors. An aggregate measure, such as income elasticity of housing, may not reflect the wide variances between actual decision-makers. The hypothesis of this thesis is that people in different types of household structures have differing demands for housing space and other housing attributes. Is the degree of the diversity of household structure a cause for concern? The next chapter addresses the current trends in household composition.

### III. DEMOGRAPHICS AND HOUSEHOLD STRUCTURE

#### 3.1 Introduction

The nature of the family has been changing in America since the Pilgrims first came to the New World. The most dramatic change in the past twenty years in the United States is that the term household is no longer synonymous with family. Survey measures of the household are broken into the two categories of family and non-family, e.g. U.S. Bureau of the Census. The non-family category has been increasing at a very rapid rate since the mid-1960s. Does this indicate that the family is fading in importance as a social institution in America? It is clear that the structure of the family, both the nuclear unit and the extended clan, has been changing in fundamental ways. This phenomenon is not new nor is it necessarily cause for alarm. For many individuals a cause for concern is that by various measures the role of the family in an individual's life is becoming less important. This chapter will present the most important trends occurring within family and non-family households.

### 3.1.1 Five Basic Trends

There are many important trends occurring within the household in America. The five most significant trends are:

- \* Increase in number of households
- \* Decline in family size
- \* Aging of the population in the United States
- \* Increase in multiple worker households
- \* Increase in divorce rates

The first two of these are related to changes in household size. The increase in the number of households is related to the increase in the non-family household category, especially in single member households. The decline in the number of members within a household has also contributed to the increase in households formed. The next factor to be reviewed is the fertility rate which is an important correlate with all the trends discussed in this chapter. Whether the change in fertility rate is the cause or the outcome of other trends is a complex issue. One clear result of the change in the number of births over time is that the population is aging in America. The percent of elderly people in the population is higher than ever and will continue to increase. The fourth trend to be examined is the increase in multiple worker households. Women have been entering the labor force in record numbers since the early 1950s. The change is most significant among married women with husband and children present in the household. The final trend reviewed is the patterns of conjugal relations. Some people are very alarmed at the rapid increase in divorce rates over the past fifteen years. Others point

to the high rates of remarriage to indicate that the importance of this ancient institution is not fading in importance. Add each of these trends into our picture of life in America and we begin to see the dynamic nature of social relations within the households of this country.

### 3.1.2 Impact on Urban Planning

The concern for the transportation planner in reviewing this complex tapestry of the household is how these trends affect decisions on residential location and demands placed on the transportation system. These changes may indicate a new relationship between where a worker resides relative to his or her workplace. In the past theorists would say that single member households and elderly people tend to migrate toward the urban core. Today with the development of important subcenters in most metropolitan regions such a concept may not be applicable. Does the decline in family size indicate a diminished priority to children on the part of parents? Do parents prefer the amenities of the city over those of the suburbs? Or does the smaller family indicate a willingness to give preference to careers for both parents and thus an increased concern for employment location as it relates to residential location? These questions are very important for urban planners to address in order to adapt basic services to the needs of a constantly evolving society.

### 3.1.3 Causal Relations of Trends

It is vital to separate a short term change from a more fundamental one. This is not an easy task. The decline in fertility in the U.S. has been occurring for about two hundred years. The decline was at a stable rate until this century when large fluctuations occurred (Fuchs,1983). Some of the trends discussed above are factors of the sharp increase in births which occurred during the post World War II period. After 1960 there was a dramatic drop in the birth rate. This fluctuation can be said to have produced the large increase in proportion of elderly people in the population. Though this trend was created by dramatic changes over a twenty-five year period the impacts will remain for another fifty years. This is because fertility rates have continued to decline and the size of the baby boom generation is unlikely to be matched, at least before they reach their elder years. The reasons will be discussed below. Other changes have been encouraged by social policies which are subject to change fairly quickly. If social security were to be cut substantially, the number of elderly persons living alone might decrease very rapidly.

Economic conditions have a strong impact on household decisions and tend to fluctuate regularly. The increase in single member households is, in part, the ability of these people to afford the expenses. If the economy soured in the United States the number of one person households could drop quickly. The non-family category, in this scenario, would decrease by much less as unrelated people share living quarters to minimize expenses. There is a web of interaction

between the various forces affecting household structure. Some of the trends, such as the decline in household size, have been established over a long period of time. Some patterns are likely to fluctuate more readily, such as the percentage of single member households.

### 3.2 Household Size

The decline in household size is not a new phenomenon. As the population tended to migrate from rural areas to urban areas the advantages of having large families disappeared. The recent increase in single member households may be in large part a function of higher real income. The importance, in turn, of non-family households may result from the baby boom generation reaching the age when they are independent of their parents but not yet married. It is important to separate short term fluctuations from longer term trends, if urban planners can appropriately meet the population's needs. While the relative size of each cohort can be traced through the population, it would be unwise to assume that one generation is sure to follow the life cycle patterns of the last generation. It would appear unlikely that there will be another baby boom of the magnitude seen after World War II within the next thirty years. Yet unforeseen factors could change this forecast, such as economic swings of depression and prosperity, similar to those experienced before and after the second World War.

### 3.2.1 Household Formation Trends

There was a rapid growth in household formation during the 1970s. From 1970 to 1982 the number of households grew by 32 percent to a total of 83.5 million households (Norton,1983). Families maintained by women without a husband present increased by 71 percent and accounted for 15 percent of all families in 1982 (Norton,1983). During this time period the number of family households increased by 19 percent and within this category married couples increased only 11 percent to a total of 49.6 million households. The non-family category went up by 89 percent enlarging its total share of all households from 19 percent in 1970 to 27 percent in 1982. This rapid growth rate in household formation slowed down in the 1982 to 1983 period. For the first time since 1966 to 1967 the increase in number of households formed was less than one million (Gick,1984). The increase was 391 thousand households. The economic recession of 1981-1982 is a likely cause for this slow down. The recent health of the economy has probably stimulated a higher growth rate in household formation than this last measure.

### 3.2.2 Rise of the Non-Family Household

The non-family household was the biggest contributor to the swelling in household number. This category consists of single member households or those sharing living quarters with one or more unrelated members. Non-family households are predominantly made up of individuals living alone. Just under 90 percent of the non-family category are single member households. Adults living alone have grown

as a percentage of the population from 4 percent in 1950 to 11 percent in 1980 (Fuchs,1983). These single member households consist mainly of two age groups, the elderly and the young. The elder population have dominated this type of household though they are declining as a percentage of the total. In 1970 the elderly consisted of 45 percent of single member households while in 1982 they made up 36 percent of this type of household (Norton,1983). Young people are forming single member households at a very rapid rate. In 1950 6 percent of single men and 4 percent of single women between the ages of 25 to 34 lived alone. In 1980 29 percent of single men and women between these ages lived alone. In earlier times young people lived with parents or shared quarters with other people. Higher real income for single working people has made living alone possible and the young have shown a high preference for autonomy and privacy. Another source for single member households is from couples who divorce creating two households out of one. This group tends to be less significant due to the high remarriage rate of divorced individuals. The single member household category is forecasted to continue growing at a very rapid rate (Glick,1984). The projected rate of increase for one person households from 1981 and 1990 is 30 percent as opposed to 15 percent increase for all households.

A major reason that many elderly people live alone is the combined factors of increased longevity and different life expectancy for women than that of men (Fuchs,1983). Due to improved health care and better access to medical facilities people are living longer. The increase is especially significant for people over 65 years of age.



Women have a longer life expectancy than men, so wives tend to outlive their husbands (Fuchs,1983). Also, women generally marry older men. A wife would have to marry a husband five years younger than herself to even the probability of living to the same age. Men who are divorced or widowed remarry at a higher rate than do women. Women over 65 years of age are much more likely to be single than are men of the same age. During this century single elderly mothers are much less likely to move in with one of their children. An important reason for this reduced probability of three generation households forming is that Social Security has increased the income available to most elderly people (Fuchs,1983). Also, the government provides more services aimed directly at older people which makes living alone more accessible. There is less willingness of adult daughters and sons to take in an elderly parent. Frances Korbin (1976) has termed this "uncomprising nuclearity" as the parents-children unit has reduced ties to the extended family.

For the young the preference for living alone is based on increased income and the delaying of marriage. Young people have had a higher level of real wages during the 1970s. This factor is tempered by the fact that the rate of growth of income was very low during the 1970s, especially for young people. There was also relatively high unemployment which had a stronger effect on the young. For those who did have jobs their paycheck was likely to be healthy. In part, this was due to the higher level of education for the generation entering the work force in the 1970s. Another important factor is that the young were delaying marriage until they were older.

The average age of marriage for men in 1966 was 22.8 years of age while in 1981 it was 24.8 (Norton,1983). The change for women was from 20.5 years of age in 1966 to 22.5 years old in 1981. By another measure, in 1970 the percent of never married women from 20 to 24 years old was 36, and in 1982 it was 53 percent. In 1970 never married women from 25 to 29 years of age composed 11 percent of the total population of women between these ages while in 1982 it was 23 percent (Norton,1983). The vast majority of young people do eventually marry, simply when they are older.

There are other types of non-family households besides single member. About 10 percent in this category consist of two persons households. Many of these are classified as Partners of the Opposite Sex Sharing Living Quarters (POSSLQs). This type of household is the rarest of all categories at 3 percent of the total but it is rapidly growing. In 1970 there were 0.5 million households considered as POSSLQs and in 1982 the number had grown to 1.9 million (Norton,1983). This discussion should be placed in perspective. The family household makes up 73 percent of all households and married couples still account for 59 percent of all households.

The long term projection is that the non-family category will continue to grow at a faster rate than the family category. In the case of young single member households and unmarried couples, it is likely that the baby boom generation swelled these categories as they matured through their third decade. Since the cohorts born in the 1960s are much smaller in number than those born ten years earlier the significance of these two categories is likely to decline. As a

whole the single member household category will continue to increase as a percentage of the total but at a slower rate. In part this rate will depend upon the age at which people enter into their first marriage. Women will continue to have a longer life expectancy than men and many will live alone in their latter years. Some researchers have suggested that the different life expectancy between the sexes will narrow in coming years since currently more women smoke than do men. Another reason may be that more women are working full time and encountering the type of stress that has harmed the lives of working men. By the end of this century the percentage of single member households will plateau as the baby boom generation moves through the prime of their family years. This will be true unless there is a large increase in middle-aged singles which is not probable given the persistence of people to marry even though at a later age.

### 3.2.3 Decline of Household Size

Given the increase in percentage of people living alone it is not surprising that the average household size is declining. This decline is not a recent phenomenon, it dates back two hundred years in this country. In 1790 the average number of persons per household was 5.8 and in 1973 it had decreased to 3.0 persons per household (Korbin,1976). More recently this decline went from 3.14 persons per household in 1970 to 2.72 persons in 1982 (Norton,1983). There has been a decrease in family size as parents have fewer children. The average number of children per household, given at least one child was present, was 2.4 in 1970 and 2.0 children per household in

1979 (Fuchs,1983). The percent of couples with none or one child has remained about the same over this time period. The big change has occurred in the decrease in large families (Fuchs,1983). Two reasons for the increase in smaller families are better control over fertility and women entering the labor force. There has been a large increase in the number of married women in the labor force. These women find it much harder to raise large families. The correlation is clear but the causal direction is not as easy to identify. Couples have much better control over fertility and can plan the number and timing of children at very low costs. While these two factors help to understand the near term decline in family size they do not explain the longer term trend. There has been a continuous decline in family size since the rise of industrialization (Fuchs,1983). The larger families in earlier times were not composed simply of related members. Often unrelated people lived with families as paid help or paying boarders. As production moved outside of the home these people found work elsewhere or were able to increase their income to start their own families. The shift from an agricultural society living in rural environs to a more urbanized society reduced the economic advantages of having children.

"Economic development shifted the locus of work from the farm to the city and raised the age at which children began work, thus making them less valuable to parents as a source of production and income. Growing opportunities for accumulating savings in banks, securities, and annuities virtually eliminated the need for children as a method of saving. And the expanding role of government in providing retirement benefits, health insurance, unemployment insurance, and other social programs diminished the importance of having

one's own children as a source of insurance later in life, even though society as a whole depends upon future generations to pay the retirement benefits of the preceding ones" (Fuchs,1983,p.18).

Another economic consideration is that the cost of raising children became more expensive as families moved into urban areas (Fuchs,1983). The general cost of living was higher. Though the incomes were usually higher the cost per person increased with each additional nonworking member. Children remain in the home for a longer period of time as nonproductive members in an urbanized society than do those on farms. It should be noted that the large increase in fertility after the second World War was more an abnormality given the declining fertility rates before and after this period (Westoff,1979). These trends will be discussed in more detail in the next section.

### 3.3 Trends in Fertility

The average number of children per family in a society is correlated to the birth rate at the particular time. A better measure than birth rate is the fertility rate which is the number of births per one thousand women of child bearing age, considered as 15 to 44 years of age. This measure takes into account the cohort sizes of the population between these ages. The fertility rate and the birth rate curves show the same trends but to a different degree. The fertility rate curve is much more pronounced than the birth rate in the upward and downward swings during the baby boom of the 1950s. This difference illustrates the relatively small size of the female cohorts

which gave birth to that generation.

### 3.3.1 Long Term Cycles of Fertility

Similar to the decline in household size, the fertility rate has also been decreasing over a long period of time. The rate fell by half from 1800 to 1910 and then it fell by half again from 1910 to 1980 (Fuchs,1983). During the nineteenth century the decline in the fertility rate was at a rate of 0.8 percent per year. In the twentieth century this rate fell an average of 0.9 percent each year (Fuchs,1983). The difference was that in the nineteenth century the fertility rate declined at a steady rate while in this century the rate had wide fluctuations, particularly over a forty year period in the middle (Fuchs,1983). During the mid-1920s, and especially during the depression, the fertility rate decreased. From 1936 to 1957 the fertility rate rose by 67 percent. Then from 1957 to 1977 the rate fell by a total of 55 percent. Since 1973 the fertility rate has been below replacement level in this country. While the depression had a powerful negative effect on fertility and the economic upturn after the second World War had a positive effect these economic swings came after the origins of the fluctuations in the fertility rate.

### 3.3.2 Theories of Fertility Cycles

Many explanations for the dramatic changes in the fertility rate during the twentieth century are based on the economic climate of the period. One approach is based on people's perception of financial stability or security. For instance, the upturn in births at the end

of the 1930s may have been based on Americans confidence in President Roosevelt's programs and faith in a brighter tommorrow. The sudden spurt in the fertility rate may have been due to the release of pent up demand for offspring which had been delayed during the Depression. The fertility rate went up and down in fits and halts during the early 1940s as couples rushed their decisions to have children or wait for the husband to return from war. The economic pressures to delay starting a family and the physical separation of war created the foundation for the response which happened after the soldiers returned. The peak of the baby boom lasted from the end of the 1940s through the end of the 1950s. The large increase in births during this period involved every subgroup by income, education, race and other social characteristics. The most unusual feature of this rapid increase in fertility was the large increase in family size which as discussed was counter to all long term trends. There was a timing overlap between younger and older cohorts. The larger, older cohorts were having their fourth, or more, child while the smaller, younger cohorts were just beginning their families after the second World War (Russell,1982).

Given the unusual nature of the baby boom there have been many different theories postulated to explain it and the fluctuations which have followed this rise and decline in the fertility rate. One which has been used by the Census Bureau to make projection of future rates is the theory of demographic echo. A large generation will produce another large generation and a small generation will give birth to fewer number of offspring (Rusell,1982). This concept makes implicit

sense but does not accurately produce the baby boom phenomenon. During the peak of the baby boom the cohort size of the parents was small. To date the baby boom generation has not given birth to large cohorts, though it is still too early to declare this as fact. Another theory takes the opposite approach. Richard Easterlin (1980) has written that a small generation has a relatively easy journey through life by virtue of their "fewness". Such a small generation faces a good labor market and will receive on average higher incomes upon taking their first adult jobs. A large generation faces crowded school rooms, tight job markets, and prospects of lower income. This situation gives them less security and they tend to have smaller families. This theory predicts the baby boom and the following baby bust but one full cycle is not deemed adequate to test this concept's robustness. It will be more fully tested in the 1990s when the next smaller cohorts will be entering their child-rearing phase. Victor Fuchs (1983) has argued that the change in income is of most importance in determining the average size of the family. He speculates that it is the relative rate of change in earning power not the absolute real wage rate that is of most significance. The 1950s were viewed at the time as an era of great prosperity in relation to the 1930s when real wages declined by one third. The real earning power during the 1950s increased 2.4 percent each year, the annual rate in the 1960s was 1.8 percent, and in the 1970s the increase was 0.2 percent per year (Fuchs, 1983). The percentage increase was even lower for young men and women during the 1970s. Even though the real hourly earnings was 35 percent higher in the 1970s than in the 1950s,



the expectations by workers was the rate of increase was going to be larger. The disappointment over the slow growth in income caused couples to delay or cancel plans to have children. Another theory based on earning power was proposed by William Butz and Michael Ward (Russell,1982). Their theory is that the number of children per family is a function of the husband's income and also the wife's earning potential. When the husband's income is high the couple is likely to have more children but the wife's earning power influences the number and timing of births. If the wife has high earning potential the cost of her exiting the labor force is large and the couple will have fewer children. When there are few women in the labor force the husband's income dominates the family size decisions. As rising real wages drew more women into the labor force the birth rate dropped. All three of these theories ably predict the trends of the fertility rate to the present. They have not been tested over a long enough period of time to substantiate their predictive power.

### 3.3.3 Effects on Age Structure of the Population

The trends in the fertility rate have powerful impacts on the age structure of the population. If theories of fertility were robust, planners would better understand future priorities for resources. Are more school teachers needed or medical personnel for older people? The current lower fertility rates have produced an aging population as there are fewer births relative to people living past 65 years of age. The percentage of the population over 65 years old was 4.6 percent in 1920, grew to 9.2 percent in 1960, and increased to 11.3 percent in

1980 (Fuchs,1983). The current projections is for 12.2 percent of the population to be over 65 years old in the year 2000. This growth is mainly due to the decline in fertility and only to a lesser extent to the increase in life expectancy. People are living to an older age. Not until 1900 did three out of ten people reach their seventieth birthday. Currently, seven out of ten people survive until seventy years of age and four out of ten reach their eightieth year. In the last ten years the elderly population have significantly increased their political power in society (Fuchs,1983). They have shown that they have very different concerns than other age groups. Who will pay for escalating health care costs of which Medicare is a large contributor? The rise of special interest group politics over the past twenty years has seen an increase in competition between the generations over their very different needs. If the fertility rate were to increase the balance of power would shift between the generations.

It is unlikely that the fertility rate will substantially increase according to Nathan Keyfitz. Women will not give up the level of equality they have fought to gain and men have not displayed their willingness thus far to significantly increase their contribution to production within the home. For fertility rates to increase women would have to go back to being housewives, give up participation in the labor force, and have more children. This scenario does not seem likely, according to Keyfitz, given the level of economic independence women have gained over the past several years. This measure of independence has given more options to wives who are in unhappy marriages. A stronger committment to the home would mean that

unhappy marriages. A stronger commitment to the home would mean that women would be more willing to give up the alternative of divorce when they are in an intolerable marriage.

### 3.4 Women and Work

Women have been entering the labor force in record rates (Fuchs,1981). The lower fertility rate is a major correlate with this phenomenon. Once again, the causal direction is difficult to assess. Which comes first the decision to have smaller families or for the wife to be in the labor market? In general, women have determined some idea of their work aspirations before marriage given that the current average age of marriage is above 22 years of age. This is to suggest the validity of the Butz and Ward theory of the impact of wife's earning potential on the couple's decision on family size and timing of births. The couple is less likely to forego having children and have the wife work if she will not derive satisfaction, either personal or financial, from being in the labor force. Of course, there are other reasons couples have no or small number of children. The issue of women entering the work force and its relationship to family size is of particular relevance today when so many women are beginning careers.

Currently, 59 percent of women from 35 to 64 years of age are working or looking for work and 70 percent of women from 20 to 34 years of age are a part of the labor force (Robey and Russell,1984) In 1890 the labor force participation for women 25 to 44 years of age was 15 percent while in 1980 it was 60 percent (Fuchs,1983). Since

1900 the increase in female labor force participation has been 3 percentage points per decade, except during the second World War when there was an upward spike. Since 1950 the rate of increase has been 9 percent per decade.

#### 3.4.1 Married Women in the Labor Force

The biggest increase in female labor force participation is for married women with husband and children present in the household. For single women, age 25 to 44, four out of five are currently in the labor force which is about the same proportion as in 1950 (Fuchs, 1983). The female headed household has shown a slight increase in the past thirty years but not of the same significance as for married women. The percentages are larger for wives with children between 6 and 17 years of age than for wives with children less than 6 years old but the rate of increase is almost a mirror image.

#### 3.4.2 Causal Factors of Female Employment Trends

The reason for this increase in female labor force participation is probably not due to social forces given that the rate of increase began in the early 1950s. The start of the latest wave of feminism is generally placed at 1965 with Betty Friedan's The Feminine Mystique. Government policies of affirmative action also began in the mid to late 1960s. Some people have argued that time saving devices in home production, such as improved appliances, supermarkets and inexpensive "fast foods", allowed women to enter the job market. Many people would argue that such time saving methods allow increased home

production rather than maintain past standards in less time (Fuchs,1983).

The economic reasons already discussed are compelling. The baby boom generation received more years of schooling than any generation before it (Robey and Russell,1984). This higher level of education was particularly significant for women. This level of education increased women's earning potential. In turn women have shown more interest in full time, year round employment in professional fields than past generations of women. The lure of higher paying work has increased their participation. Besides the rewards of higher income women have found more satisfaction in career-oriented jobs.

Victor Fuchs (1983) has argued that the growth of service sector jobs during this period is an additional attraction for women thinking of working. In the past, the service sector has been the most likely sector in which women have found work and this sector has expanded enormously. From 1947 to 1980 employment in the United States expanded by 39 million jobs. The service sector accounted for 33 million of these jobs. A reason for expansion in this sector relative to the other sectors is that productivity increased rapidly in these other sectors. The increased output per worker limited employment expansion. As real income increased so has demand for service sector products. The service sector includes the retail trades, financial services, education, health care and public administration. Many service sector jobs offer flexible hours, are part-time or are not year-round, such as teaching. These type of jobs have more appeal for many women who maintain the primary responsibility for the home.

Another factor contributing to the increase labor participation by women is the improvement in birth control over the last three decades. Couples and women are better able to plan the timing and number of children they wish to have. Not only does this give women more job security but also allows employers to give more responsibilities to female workers and participate more fully in the career latter.

### 3.5 The Changing Nature of Conjugal Relations

The vast majority of individuals in our society do marry at some point in their lives. Currently, the probability that they experience a divorce are at record high level. (Norton,1983). The current pattern is that young people delay entering marriage, are more likely to seek a divorce, and will remarry within a few years of the divorce. The institution of marriage appears to be as prevalent as ever statistically but is the function of marriage changing in our society? The lifetime committment of the individual toward his or her marriage partner appears to be weaker in today's society. Women have fought for greater equality of opportunity and found greater personal independence. There are fewer societal pressures placed on men to marry and raise a family than the generation which came of age in the 1950s.

The delay of marriage is an important element in the changing role of one's marital status. Young people, by waiting before they marry, are developing their own set of interests and values before taking on marital responsibilities. When they do marry they have

developed interests which must be negotiated within the couple's mutual set of concerns. Women have often received degrees of higher education and begun careers before marriage. Decisions of where to live are complicated by considerations of different employment sites. By marrying at a latter age couples have reduced the number of child bearing years for the women. The reduced time for child bearing and the development of outside interests will result in smaller families.

### 3.5.1 Divorce Rates

Much of the concern over the state of marriage in our society is based on the increase in divorce. The divorce rate doubled between 1965 to 1975 (Norton,1983). The rate of increase has slowed over the following ten years. It is projected that one half of all men and women who were between the ages of 25 and 34 in 1980 will end their first marriage in divorce. For those between the ages of 65 and 74 in 1980 only 15 percent ended their first marriage in divorce. One half of all divorces occur before the seventh year of the marriage. The longer a couple remains together the chances of divorce lower. One reason is that,over time, the couple makes mutual investments in children and property which would be painful to divide.

### 3.5.2 Contraceptives and Sexuality

Since the early 1960s technological advancements have been achieved within the field of family planning. Contraceptives are more reliable and inexpensive to purchase. Many agencies have been established within our communities to provide education on family

planning. The public schools have played a larger role in sex education over the past twenty years. Though improved techniques of contraceptives have not been the cause of the reduction of sexual inhibitions within society it has supported the changes in our sexual values. The ability to have greater control over pregnancy has provided greater freedom for couples but it has also increased the possibility of sexual relations outside the marriage. Improvements in family planning have aided couples wishing to have fewer or no children. Couples with fewer children have less impediments if they decide to divorce than if they have large families. The reduced risks of extramarital sexual relations and the fewer mutual investments made in children can lead to tensions within a marital relationship which may result in divorce.

### 3.5.3 Social Attitudes toward Divorce

The process of divorce is emotionally painful for those involved but the act itself has found greater acceptance. Divorce no longer carries the stigma which society placed on it as recently as twenty years ago. In part, the social institutions which have traditionally sought to prevent marital separations have themselves been weakened in our society. Religious institutions have a less prominent role in the individual's life than they did twenty years ago. Most churches have frowned upon or forbid the act of marital dissolution. The strengthening of secular society has relaxed moral codes which in the past made a divorce hard to obtain. The role of the extended family has been decreasing in our society. Parents have less influence over



the decisions made by their adult children than in the past. Relatives used to play an active role in maintaining the marital stability of those within the family. In recent times, individuals usually seek greater independence from their extended families and would not accept their involvement in resolution of marital problems. The changing social attitude has been reflected in our laws on divorce. There has been a liberalization of divorce laws in the last twenty years. Many states have enacted "no fault" divorce which greatly reduces the emotional stress involved in obtaining a divorce.

Barbara Ehrenreich (1982) has argued that most men have reduced their commitment to marriage as societal attitudes have changed. The male bachelor in his thirties was suspect by his peers of being immature or worse as recently as the early 1960s. The rise of different visions of the male role, such as in the "Playboy Philosophy" or by the counterculture of the 1960s, has shattered the image of men as the sole provider and protector of the home. The increased prosperity of the 1960s strengthened the consumer culture. The focus on material pleasures may have reduced men's willingness to commit themselves to familial responsibilities.

#### 3.5.4 Economic Independence of the Wife

Women's changing role in this society has also created new patterns within marriages. Married women have entered the labor market in record numbers. The reasons are many and include increasing income available to the family and enriching their lives through pursuit of a career or commitment to a cause. They have established to

a greater degree than in the past their economic independence from their husbands. One result for many wives has been a lower tolerance for a bad marriage. If a woman is dependent on a husband for financial support and sees no options for herself and her family it is very hard to view divorce as an option. Today women have more alternatives to marriage and are less threatened by the prospects of divorce. One option is to seek government assistance, though this would only provide for a poverty level of income.

#### 3.5.5 Divorce Rates Stabilize

Though the various factors which have contributed to the high level of divorce in our society remain prominent, the rate of increase in divorce has declined. One reason is that these factors are stabilizing in their rate of change. Family size will continue to decline but at a slower pace than has recently been experienced. The level of education will not dramatically increase since it has already reached very high levels. The rate of women entering the work force will also stabilize after the rapid growth of the past thirty years. The reduced rate of increase in these trends is related to the cohort size of the baby boom generation. The cohorts now entering their college years and the work force are much smaller than the generation before them. The already high rates of these trends and the reduced number of people about to enter the family formation phase will stabilize changes occurring to family size and women's participation in the work force.

### 3.5.6 Remarriage Rates

As divorce has become more common so has remarriage. In 1980 one out of three marriages in America involved at least one partner who had previously been married (Norton,1983). The blended family has become a common phenomenon in our society. Many children today feel that they have more than one set of parents as they are raised by one natural parent and one "parent-in-law" and visit their other parent and new spouse. As discussed above the rates of remarriage are higher for men than for women. In essence, men have had a larger pool of potential partners since they tend to marry younger women which includes more people who have never been married. While remarriage is common, the rate of occurrence has been decreasing. In 1972, 229 out of 1000 divorced men were remarried and in 1979 166 out of 1000 divorced men remarried (Glick,1984). It may be that as divorce has become more common it has also become easier for people to make the transition into this different phase of their lives. Services catering to the specific needs of single people reduces the desire to look for a new mate, for many divorced individuals.

### 3.5.7 Single Parents

The result of high divorce rates and declining remarriage rates is the increase in single parents. In 1950 one out of ten children under the age of eighteen was raised by one parent, while in 1980 this figure had increased to almost one in four. The projections for 1990 is that only 69 percent of all children will be raised by both parents and 27 percent by one (Glick,1984). The rate of increase in one parent

families is forecasted to be 33 percent between 1981 and 1990. Currently, 90 percent of single parents are women. Female single parents have a greater probability of being in poverty. Currently, 44 percent of female headed households are in poverty compared with the average of 16 percent of all households (Norton,1983). Single parenthood is especially common for black households where 30 percent of all black households are single parent ones.

Within the single parent category, unmarried parents have also risen dramatically. In 1960, 5 percent of all children born were to unmarried parents and in 1980 it was 18 percent (Glick,1984). One factor is that young women are exposed to the risk of pregnancy for a longer time since marriage is delayed. Even with the advances made in contraceptives in this time period it has not affected this trend. Unmarried or formerly married mothers are more willing to raise their children without a spouse in the household. The larger number of employment opportunities has given these women a better chance for economic independence. The existence of government programs which assist single parents have helped to increase their options. This assistance is very limited in scope and only provides support to live at the established poverty level of income. While much of the stigma of being a single parent has been eliminated the risks of living in poverty are much greater. Most families headed by a single parent will have very limited budgets for housing since financial resources must serve diverse needs.

### 3.6 Conclusions

Many of the elements in today's household structure are recent developments in our society (Wachs,1981). The high percentages of single member and single parent households have existed for less than twenty years (Masnick and Bane,1980). The increase in real income has created the environment for such changes. Other changes are related to other historical developments. Cohort size may have an impact on the number of births in following generations. Are some of these changes specific to one generation and likely to fade in importance? The size of the baby boom born in the 1950s is not likely to be repeated soon in this country, though others will argue with such an assessment. Easterlin's theory suggests that another baby boom will occur in the 1990s when the next smaller cohort comes of age. Fuchs would add that if growth in real wages is relatively large then this baby boom will also be large. Changes occurring to the relative importance of marriage and family for the individual may stall such a new baby boom.

#### 3.6.1 Prediction in Household Composition

The majority of households in America will continue to consist of a married couple. The probabilities are that there will be only one or no children in the household and that it is not the first marriage for one of the spouses. There is heated debate as to whether the conjugal family is fading in importance in America. It is clear that the role of the nuclear family has been changing. On the one hand, the nuclear family has increasingly resisted involvement or

interference from the extended family. And on the other hand, a child spends a smaller percent of his life under the influence of the nuclear family.

"As the age-sex structure of the population resembles less and less the age-sex composition of the nuclear family, and the population contains more and more adults who are dissociated from such families, the nuclear family as it is now constituted, and is now 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 of adults will be living in families. The rest, if current trends continue, will live alone" (Korbin, p.137).

This projection of extreme atomization of society may be dramatized but the direction is true. To forecast the future based on current trends always assumes that the current social conditions remain relatively similar. The largest unknown is the future economic conditions at any point in time. State programs have proliferated to cushion the individual from economic fluctuations. This role used to be played by other social institutions, such as the church or the extended family. The depersonalized assistance of the government tends to heighten rather than relieve emotional stress. The nuclear family's major continuing role is to provide personal support for its members. There appears to be a large gap developing in provision of emotional support for the individual. How will our marital relations adjust to the changing climate? The tensions are generally greatest during the early stages of the transition.

Over the long term the family and the household size will continue to decline. The aspirations of many women are no longer centered on the home. While women's desires to become mothers will

remain strong, it will be one of many competing needs. Many women will balance their maternal needs with other objectives by limiting their fertility to one child. Men have adapted to these changes slowly and with vary degrees of resistance. The husband may also wish to limit family size if the rearing of children requires payment to non-relatives.

Young couples today face less societal pressure to have children than their parents encountered. The motivations for raising children center on the personal choices of the couple and not from the expectations of others. Couples will tend to delay having children if there is a high degree of uncertainty about their economic future (Easterlin,1980). Increasingly, both members of a married couple are employed creating time constraints for the rearing of children. Young couples may view the role of parents as a very frustrating job. Parents seem to have less control over their children as competition increases for their offspring's attention. To the parent it appears that they barely see their children with their time spent in school, in after school extra curricula, in entertainment activities, and with their peers. The result of these various constraints on being a parent is that couples have greater uncertainty about making the sacrifices required when raising children. If they decide to become parents, couples are likely to try to find a balance between their own needs and those of their children.

The consequence of these various trends is greater variety of household types. The typical family of the past, father as sole breadwinner, mother as homemaker and children, is not the dominant

breadwinner, mother as homemaker and children, is not the dominant type of household today. "Although most Americans still live in conventional nuclear families sometime during their lives, traditional families are a small minority of all households at any given time. Other types of households - two worker families, single-parent families, and men and women living alone - are proliferating and are becoming an increasing segment of household overall" (Masnick and Bane,1980,p.110). The urban planner must consider the impacts of this growing diversity of household types. Models which forecast the population's need for public services cannot assume the household structure to be a constant term.



## IV. RELATIONSHIP OF HOUSEHOLD STRUCTURE TO RESIDENTIAL LOCATION

### 4.1 Hypotheses on Impact of Household Structure

- \* Different types of household structures have dissimilar preferences for housing attributes.
- \* Households of similar composition have comparable housing needs, though different levels of income and education broaden the range of their choices.
- \* Types of housing, measured by attributes such as dwelling units per building, will be segregated into distinct residential areas.
- \* If the above are true then household structure will be correlated with residential location.

The first hypothesis is the fundamental issue addressed in this thesis. The greater diversity in household types has increased the range of preferences according to the household structure. The type of household structure should prove useful in modelling choice of housing attributes though limitations exist due to the difference in other relevant factors. Household structure should be correlated to residential location if residential areas have houses with similar characteristics. If residential areas are heterogenous then the various types of household structures are more likely to find housing that satisfies their specific needs. In this case household structure will not be correlated with residential location.

The next two sections present speculations on the effects of demographic trends on residential location. This effort attempts to link the importance of changing household structure to the spatial

patterns of residential development. The following four hypotheses can serve as a reference point in determining the relevance of household structure to the residential density found in a metropolitan area.

#### 4.2 Hypotheses on Future Preferences for Residential Location

- \* Greater flexibility in choice of location due to fewer members in the household.
- \* Growth in popularity of attached housing as non-family households increase.
- \* The decline of the suburban single family house as the prototype for the American Dream Home.
- \* The growth of bedroom communities into self-contained towns.

#### 4.3 Impact of Demographic Trends on Residential Location

The small size of the family will allow it greater flexibility in determining where to live. With few children the family will have reduced demand for housing space. The members may also be more willing to move to adjust the space and location as children grow older or one person's employment site changes. Decisions of residential location will be complicated by the likelihood that both husband and wife have full time jobs. Location decisions may be influenced more by leisure time activities, though this may depend on education and income levels. For many leisure will be primarily centered within the home. People will continue to prefer to live in areas with characteristics which reflect their own life styles.

Non-family households will tend to seek attached housing units because cost and time required for maintenance of detached single family homes will be prohibitive. Diverse architectural styles of multi-family homes will serve the needs of this growing market segment. Apartments located in the inner suburbs of a metropolitan region will remain as highly desirous locations. "Horizontal" condominiums, row housing maintained by a hired firm, should become popular with this group. Being close to the employment site will remain important for these households, but as income increases this constraint will continue to diminish. As the non-family households have increased, the services specifically oriented towards them have also increased.

Households with married couples will continue to be the largest percentage of household structure type. Their preferences will be even more diversified than they are now. The delay by today's couples in marriage and with having children may affect their future housing choices. The desire to raise children is one of many competing alternatives for young married couples. Their housing preferences will be shaped by the options they choose. Local schools are not a factor in residential choice for a couple who has decided to remain childless. Optimal location between two different work sites is a major concern for a growing number of couples.

As housing demand diversifies into a wide array of alternatives, the suburban house will no longer be considered the typical home. The desire for privacy offered by the single family, detached house will make its decline long and gradual. The benefits of the suburban house

with its large, private outdoor space and isolation from neighbors, will have less appeal to a growing number of households. The high price tag to gain the privacy offered by the suburban house will be weighed carefully against other needs. Attached housing may become more popular with families when additional housing space is not the highest priority. As the composition of households changes so will their perceived needs.

The gradual decline of the suburban dream house will not mean another migration to the large cities. The prediction is for the growth of towns and small cities as people search for reduced housing space at lower costs in an environment which provides a sense of security from criminal acts. Many communities which have primarily been residential in nature will develop a broader base of retail services and employment opportunities in character with the area. The location of employment away from the center of large cities will make this trend possible.

Communities will become more highly segmented as people seek greater homogeneity in the character of their neighborhood. As population density of residential areas increases due to construction of multi-family homes, people will seek assurances that local preferences match their own. Though laws against discrimination may hamper this trend, they will not keep this segmentation from occurring. Suburban communities will grow into towns and some towns will mature into very small cities. Such areas will house the middle class of America.

#### 4.4 Methods of Examining the Relationship of Household Structure to Residential Location

The choices a household makes in its living accommodations is related to the characteristics of that household. Certainly, the number of members in a household affects its demand for housing space. The income of the household determines its range of options. For many years transportation planners have primarily used these two variables, household size and income, to reflect a household's demand for housing (McDonald and Stopher, 1983). Do these two variables adequately reflect demand for housing space for planning purposes? There is a positive correlation between housing space with both income and household size. A third variable often used, but of secondary importance, is the age of the household members. The relationship between housing space and age of the occupants is not as clear as the first two factors. As a person's age increases he will likely demand more housing space as the probability increases that he will have a higher income and a family. After a certain age his demand will decline with increasing age as household size decreases and income remains stable or diminishes. There are inter-relationships between these three variables which are hidden when the variables remain separated.

Another approach to examining the relationship between characteristics of the household members and their demand for housing is to use household structure. The marital status of the head of household and the relationships of its members are the factors used to create household structure categories. The most basic division is

between family and non-family households. Approximately 90 percent of non-family households are composed of one person and the remaining consist of unrelated individuals. There are three basic types of family households. They are based on marital status and presence of children. Married couple is the most common type of household and is divided into the two categories of nuclear family and married couple without children. The nuclear family consists of the couple and at least one child. As commonly defined the nuclear family also excludes other relatives from the extended family. The third family type is the single parent household, of which 90 percent are headed by the mother. The housing attributes sought by a group of five unrelated persons will differ from a five member nuclear family. The needs of a single parent are very different from those of a single member household. The question to be addressed is whether household structure provides relevant information on the demand for housing attributes and choice of residential location.

The third approach to modelling housing demand is the use of lifecycle stages. These stages combine household structure and age to model the phases of a typical individual. There are seven stages, though some will not apply to every person. Beginning when a person first moves away from the parents home is the non-family household composed of young persons, often just one member. The young married couple with no children is the second stage. The next two stages consist of the nuclear family divided into those with young children and those with at least one older child. The age for division is commonly placed at six years old for the child since this is the age

when children usually enter school. The fifth stage consists of single parent households, male or female headed. Older married couples without children is the next stage. The age of division is often placed at forty-five years and older for the head of household. The final stage is the non-family household composed of older individuals, again, with forty-five years or older as the dividing point. The age for making this division between younger and older heads of household is based on the change in needs for the couple or the individual. Setting one age as the point for division is arbitrary to a degree. Young couples are still considering having children and the tradeoffs to be made between careers and families. Older couples are considering other decisions than starting a family. They may be concerned with adjusting their current housing needs with their current housing space.

The lifecycle stages as presented above do not distinguish between non-family households with one member and those with two or more members. This difference with the household structure approach weakens the use of the lifecycle stages for modelling housing choices. The strength of the lifecycle approach is the inclusion of age which helps to distinguish different needs of specific household types. The definitions of household structure and lifecycle stages as presented above are generally the standard approaches, though debate does exist on particular divisions of age and groupings. Some researchers would divide the groups by age range of ten or fifteen years apart rather than making one break at forty-five years of age. Others might separate single parents into categories by gender.

The lifecycle stages may have more significance with the changes in demographic trends. The delay of marriage lengthens the period an individual is in the young, non-family household stage. More couples never enter the nuclear family stage as they decide not to, or are unable to, have children. Increasing life expectancies have lengthened the stages which include older members in the household. Older couples without children in the household are a larger percentage of households as the population ages and lives longer. These factors have also increased the older, non-family households. Many of these households consist of women who have lived longer than their spouse and now live alone. The increase in significance of these stages demonstrates the greater diversity in the composition of households.

#### 4.5 Impacts of Other Factors

Household structure or lifecycle stages will not accurately predict housing choices if used alone. These categories act as indicators of the range of attributes the household members would wish to have. The most obvious constraint is income which determines the set of choices which are affordable. Economic theory has extensively developed different concepts for measuring individual choice based on the person's resources. The tradeoff made between consumption of housing space with travel time and travel cost is one concept which was reviewed in Chapter II. Economists examine individuals' choices by comparing their price elasticity of housing with their elasticity of commuting cost. To explain the residential movement from city to



suburbs can be viewed as the difference between these two elasticities. One theory is that people are price sensitive to housing costs while they are inelastic in their use of transportation. The added costs of a longer commute from the suburbs is not as woeful as the additional benefits gained by the added housing space per dollar expended. Other social scientists would argue that added housing space is only one of a number of attributes considered in the choice of housing and not necessarily the most important. The decision maker may be more concerned with crime rates or quality of the schools. In reality a person is likely to consider a number of factors as part of one package, such as neighborhood quality. Separating these into individual factors is difficult but is attempted in order to model the choice.

When the factors influencing the choice of a specific housing site move beyond housing attributes; quantitative measures, such as household space used for an attribute, become imprecise. The capital spent per pupil may be considered a measure of the quality of the school system. However, this does not consider the productivity of that allocation (Weisbrod, Lerman and Ben-Akiva, 1980). The city of Boston outspends the neighboring communities in this measure but is regarded as having inferior schools compared to these towns. Low crime statistics for a town may not reflect the psychological impact to the community of one gruesome homicide. People will examine the location of a residential site for the neighborhood quality. Most people want to live in a locale with people of similar status. Though the class system in America does not have fixed boundaries, people

still recognize the distinctions between working and middle class residential areas. The three primary components used to predict class of an individual are education, income, and background of the parents. In America the status of one's occupation is probably the single best indicator of class. Income is not a very accurate indicator used alone. Many factory workers earn more than most school teachers but the distinction between the first job as a working class one and the other as middle class is generally acknowledged. Education is a more powerful indicator than income in predicting the class a person considers himself to be a member.

There are many other characteristics which relate to the individual's choice of housing attributes. These include employment status of each household member and access to a private vehicle. An analytical model will not contain every factor which affects the housing choice. It should include the most important variables if the model is to accurately forecast the choice.

An important consideration in choice of residential site is the employment location. Urban economists have focused on this relationship. Its relative importance may be diffused as employment moves away from the center of the city. John Kain's work, discussed in Chapter II, showed that the expected relationship between residential and employment locations weakened in his survey of Detroit residents as the work site is farther from the Central Business District. Does the household structure influence the importance of this relationship? The weight given to various factors by a married couple with two young children in making their housing choices will be

considerable different than by a young single person beginning an entry level position in a professional field. It is not clear that the difference between household structures is a more powerful factor than other variables such as income or education level.

The number of workers in a household has become a more important consideration since married women have entered the labor force in very high percentages over the past twenty years. The complicating factor is not whether the wife works but the nature of her work. In past years, the second earner in a home usually found employment after deciding on a residential location. In most cases, this person's commute to work was much shorter than for the primary worker and this affected the range of possible jobs. The probability is increasing today that both husband and wife have career-oriented jobs for which they work full time. Determining the residential location is more complex when job sites are determined before the housing decision is made and both workers wish to optimize their work commute.

Theoretical work on this issue has only recently begun as the prevalence of this situation is increasing rapidly (Curran, Carlson and Ford,1982).

An important issue is whether the significance of these factors is greater because of the prominent changes which have been occurring in household structure. The use of the structure categories may be of greater relevance during a period of tranistion when single parent and single member households are increasing at a rapid rate than during a time when the percentages of each category is relatively stable. The impetus for this study is the recognition that the growth rates of the

various household types have been dramatically different over the past fifteen years. Whether the relative importance of household structure has changed over time as a factor in determining residential location is an interesting question but is not examined in this thesis.

## V. EMPIRICAL ANALYSIS

### 5.1 The Data Set

The data set used in this study is from the 1980 Bureau of the Census of Population and Housing. It is taken from the Public-Use Microdata Sample of the Boston Standard Metropolitan Statistical Area. The data was retrieved from the one in one thousand person sample. The file used is a stratified subsample (19.4 percent of all households) of the full census sample that received census long form questionnaires. "A stratified systematic selection procedure with probability proportional to a measure of size was used to select each public-use microdata sample" (Bureau of Census,1983,p.40). A maximum of two person records were extracted from each household. This provides coverage of the main decision makers in the household. The Public-Use Microdata Sample is hierachically structured with the household record above the information on each member of the house. The records were restructured to be non-hierachical with housing and person information in one row. This restructuring resulted in a total sample size of 1803 observations. In all model runs the records were restricted to only those for the head of household and the spouse which reduced the sample size to 1515 observations. This restriction was used to include only the main decision makers in the model. In some cases it would be appropriate to include the second person in a household with unrelated members but it is very difficult to determine those specific households.

## 5.2 Method of Empirical Analysis

The significance of household structure in choice of housing attributes is tested using the technique of multivariate regression analysis. A model specification is developed with six categories of household structure. The model is used to predict three different aspects of residential location. The areas of concern are housing attributes, distance from employment, and the status of the residential location. One major difficulty in modelling residential location is determining appropriate measurements for the dependent variables. Either the actual variable required is elusive to quantify or it is unavailable in the data used. Proxies are developed to serve as measures for the variable of concern.

The theoretical foundation of this residential choice model is based on a five stage hierarchy. The first two stages are taken as external factors to the model. These two stages are, first, the employment location for the household member, and second, the tenure decision of owning or renting the residence. The third stage, and first to be modelled, is the decision to move or stay in the existing residence. The choice of specific housing attributes is the fourth stage. The final stage is the decision of where to locate. This model assumes that housing decisions are made after employment is determined.

### 5.3 Dependent Variables

The five measures used as dependent variables in the models are:

1. Relocation of households in the past five years.
2. Number of rooms in dwelling unit.
3. Number of dwelling units in building.
4. Travel time to work.
5. Class of residential area.

The decision of whether to change housing location was measured for the past five year period. In this case the time span covers 1975 to the end of 1979. Hypothetically, a household which moves is attempting to optimize housing attributes to their current needs. A couple with an infant child may have moved to gain additional space. An older couple might move to a smaller residence to reduce necessary upkeep costs. Households which do not move during this time period may not have experienced substantial changes in their housing needs. They may have also been constrained from moving for lack of resources, or they may have given priority to maintaining a stable environment for their children.

It is difficult to capture housing attributes in one variable. Two characteristics are chosen in this model. They are housing space and housing type. The number of rooms is used to approximate the housing space. This measurement is not as accurate as square footage of living space. Using the number of rooms assumes that the rooms in different residences have the same area. While this is a simplifying assumption, the number of rooms gives an approximate measurement of available living space. The advantage to using the number of rooms is

that it is more likely to be reported accurately than is the square footage of living space. The other housing characteristic predicted is housing type which is measured by number of residences in the dwelling unit. The dominant type of house in this country is the single unit residence. In this sample 61 percent of the individuals live in buildings with one unit. This measurement also serves to indicate the residential density. A one unit dwelling requires more land per person than a high rise apartment building. A problem with this measurement is the lack of distinction between detached and attached single family homes. This is not a major problem in that the actual number of units in a house gives a good indication of the dwelling type. The advantage of this measurement is that it is easily quantified and accurately measured.

Though housing space and type are only two attributes of many a family or individual considers, they serve to classify the nature of the residential space. It is very difficult to quantify the internal condition or appeal of a housing unit. Usually the housing space will match the external environment of the neighborhood. This still leaves a wide range of possible conditions of the internal space. The status of the surrounding community, which will be modelled, serves as an indicator of the appeal of a specific dwelling unit.

The relationship between residential location and work site has increased in complexity as employment is more dispersed over a metropolitan area. In general, household structure gives an indication of the variety of factors determining the relationship between residence and work site. The single member household has the independence to choose a site based on one person's set of



constraints. A couple considers each other's needs while a nuclear family takes account of their children's needs. The impact of household structure may be negated by the correlations between age and household structure and that of age and income. As a woman ages, through her years of fertility, so does the probability of marriage and the presence of children in the household. The individual's income also rises with age though the rate depends on type of occupation. If this were the case for everyone, then age and income would capture the effects of household structure.

The relation between residential and employment location in this model is determined by travel time. Travel time is partially dependent upon the mode used and the congestion in the network experienced by the worker. The impact of household structure on residential location should be evidenced through a correlation between household structure and travel time to work.

Determining the status of the residential area presents even greater challenges than the above dependent variables. In part, this is a factor of the data used. Only the county groups of each resident are provided. This group includes from one to twelve towns. It is a simplification to assess the residential status as an aggregate measure of one or more communities. It would be preferable to have a smaller zone for judging the nature of the residential area. Extra attention was given to measurement in an effort to reduce the level of error involved with this aggregation.

Table 1 gives the minimum value, the maximum value, and the sample mean for each of the dependent variables used in this study.

#### 5.4 Independent Variables

The specification used in all the models is based on six categories of household structure and includes an element of the lifecycle concept. These categories were also used in combination with home ownership, length of occupancy, and a variable combining both tenure and length of occupancy. Six different socio-economic variables were included in the base specification. Several employment characteristics were also included. Though most models contain the same independent variables there is a range between twenty-two and thirty-three independent variables depending on the particular residential factor being modelled.

The six categories of household structure are mutually exclusive and form a complete set of all persons included in the model. The one group not included in the estimation process is those living in group quarters, which includes prisoners, patients in mental health facilities, and students in dormitories. The residential location for these individuals is predetermined by factors not considered in this exercise. The six categories included are:

1. Households with unrelated members
2. Nuclear families
3. Single parents
4. Younger married couples without children
5. Older married couples with no children
6. Households with only one member

Married couples are divided by the age of the head of household. Those with heads under forty-five years of age are included as younger

couples while those with heads forty-five years of age or older are listed as older couples. This separation reflects the difference in needs of the two groups. Young couples may be considering to have children. Older couples may have completed their children-rearing phase and have very different needs than younger couples. The high likelihood that these two groups have very different housing needs would create large variances in the coefficients of the independent variables and lower the variables' significance if both couple types were included as one group. The other four classifications of household structure are the same as previously discussed.

Three sets of interactive variables were created to examine the relationship between household structure with tenure and length of residency. A household which owns its home had a different set of factors influencing their choice than those who rent their homes. Generally, people will not buy a home unless they plan to live in it for a minimum of several years. Access to financial resources is obviously a major consideration in the tenure decision. The household which rents will reflect its current needs while home owners may be anticipating future needs or they may be reluctant to relocate because of various costs. Home owners are divided into the six household structure categories.

A household which has moved in the past five years is the basis for another set of interactive variables. When a household moves it is expressing the desire to satisfy a new set of needs. Their employment situation might have changed, a new family member may have been introduced, or a change in income are among the many factors which can influence people to change residences. The basic assumption

is that people move in order to optimize their residential demands with their available resources. Those households which have moved in the past five years from the survey date are divided into the household structure categories except for the unrelated member household group. The correlation between the full set of unrelated member group with those who have moved is over 90 percent. Household with unrelated members which have moved are omitted from the specifications.

The third set of interactive variables incorporate the first two variables. It consists of renters who have moved in the past five years. Since renters have greater flexibility, it is desirous to examine how renters who move optimize their residential needs. Again, renters who have moved are divided by the six household structure categories. In most of the model specification households with unrelated members who rent and have moved are omitted due to the high correlation with the full set of this household type.

The remaining independent variables include socioeconomic measures and employment location. The socioeconomic variables include household size, household income, and the household member's age, education, race, and labor force participation. Employment is divided into two variables. One measures if the person is currently employed. The second variable is a subset of the first. It determines if the person is a second worker, defined as a spouse to the head of the household who is currently employed. Another variable included is the length of residency at the present location. Though similar to the interactive variable of moved and household structure described above, the length of residency is a continuous variable rather than a

discrete one. It measures the commitment a household has made to that particular site. Several of the models included the consideration of housing cost per room. This factor is divided into two variables by the tenure status. The employment location is also divided into two variables. One is for those whose place of work is in the city, Boston in this case, and the other is for those who work outside of the city. These two variables do not consist of the full set of possible work sites since some people work outside of the Boston SMSA.

Table 2 gives the minimum value, the maximum value and the sample mean for each of the independent variables. Table 3 defines the numerical values of variables which are coded in a range of values.

## 5.5 Estimation Results

The household structure category serves as the constant term for each of the regression runs. The six categories are a complete set of all possible types of households. Since each variable is one only if that household is of the specific category the set of six household types serves as the initial constant term in each of the regression equations. The t-statistic for each independent variable is tested at the 95 percent level of confidence that the coefficient of that variable is significantly different than zero.

### 5.5.1 The Relocation Model

Estimating if a household has moved in a five year period is performed as a binary discrete choice model using ordinary least squares as the regression technique. Use of maximum likelihood methods is generally preferable in this situation but was not deemed

necessary given the exploratory nature of this study. Whether a household has relocated over the five year period of interest is modelled as a function of household structure, tenure of that household, number of persons in the household, age, education, race, labor status, and housing costs. The model specification also includes variables for total income and place of work.

The results of this specification show little variation between the household structure categories (See Table 4). The coefficient value for younger couples is only 13 percent greater than the coefficient for older couples, the two household types with the largest difference in coefficient values. Home ownership decreases the probability that the household has moved, especially for single member home owners and older couples. Home ownership is not significant for households with unrelated members in the decision to move. As household size and age increase the household is less likely to relocate. The education coefficient is significantly different from zero in this model, with a negative value. Non-whites and employed individuals have a lower probability of moving but the t-statistics are just below the value to consider them significantly different from zero. Income, second worker and place of work are not significant factors in the decision to move according to this model.

This model supports the idea that people with fewer commitments have a higher probability of moving. Relocation becomes more difficult as one becomes older, has responsibilities for a larger household, and the commitment of a home mortgage. It would be revealing to research how the relative weight of the significant variables have changed in the past thirty years. Household structure

is not correlated with the decision to move according to the results of this model.

#### 5.5.2 The Housing Space Model

The model specification to forecast the household's number of rooms includes the three sets of interactive variables. These variables are the household type combined with factors of relocation and home ownership. The first variable measures whether the household has moved in the past five years, the second if they own their home, and the third whether the household both rents and has moved in the past five years. Three regression runs were performed. One includes variables for the housing cost per room, another excludes these variables, and the third excluded all the variables which incorporate household structure. The other independent variables which have significant coefficients include household size, household income, age, education and, in one specification, the length of residency. The sample mean number for housing space in this survey is 5.63 rooms. The specification which excludes the housing costs variable will be discussed first. (See Table 5.1)

Housing space is a function of household structure type, home ownership, household size, household income, age, education and length of residency. The six household structure categories serve as the constant term in this model since they form a complete set with each term being mutually exclusive. The coefficient term for these constants indicate the number of rooms for each household type before considering the other independent variables in this model. The

household category with the most number of rooms indicated by the constant coefficient is the older married couple group with 3.18 rooms. The order following the older couple category is single parent, unrelated member households, nuclear families, single member households, and young married couples. The coefficient for households which have moved is only significant for the single person category. One member households which have moved have 1.15 fewer rooms from the above constant terms. Households who own their residence add more rooms to the initial constant term. Young married couples with no children and unrelated member households who own their homes both add more rooms than the other four categories. Renters who have moved did not have coefficients significantly different from zero. Each additional member of the household added slightly more than a fifth of a room to the total housing space in this model. Higher income also meant additional rooms as did a higher level of education. The older the person's age the fewer the number of rooms in his house which contrasts with the coefficient for the older couple category. Households which have lived in their homes for a longer period of time are likely to have additional rooms, though the t-statistic for this variable is near the value which would make the coefficient insignificant. All the significant variables, except for age and single person households who moved, increased the housing space to the constant term.

When two variables for housing costs are added to the above model some changes do occur (See Table 5.2). The additional variables are rent per room and owner cost per room. One noticeable difference is that there is less variance between the constant terms for the



household categories. In the first specification the constant term for older couples was almost 100 percent greater than the value for the younger couples group. In the second specification these two household types are separated by about 20 percent. Households with unrelated members have the largest constant term at 4.01 rooms. Home ownership is no longer significant for younger or older couples in this model specification. Nuclear families and single persons who rent plus have moved have coefficients significantly different from zero in this specification. The length of residency is not significant in this regression run. As rent per room increases renters have fewer rooms. However, as owner costs per room increase home owners have more rooms. This is an unexpected result. It may be that homes purchased have more bundled amenities which are given more consideration than is the case for renters. Larger homes are on bigger plots of land, they tend to be in higher status communities with the higher costs associated. The higher cost per room may not reflect simply additional space but a higher value of bundled amenities. This specification has a higher R-squared value at 0.63 compared to 0.58 for the first one.

These two model specifications, as do all the models in this study, assume that the impact of the independent variables that are not related to the household types have the same effect on each of these household structure categories. The impact of additional income is assumed to be the same whether the household is a nuclear family or a single member type. Further work is required to test if this assumption is justified.

This assumption makes it difficult to compare the coefficient in

this housing space model for the various household categories. For instance, adding the coefficients of the constant terms and the interactive term for home ownership yields a set of numbers for comparing the household groups who own their homes. Such a comparison shows that unrelated member households have 5.4 rooms while nuclear families have only 4.6 rooms. The problem with such a comparison is it assumes the household size, income, and other relevant factors are equal. The sample mean for household size in nuclear families is 4.5 and for unrelated member households it is 2.3. Similarly, the sample mean for household income is \$28,899 for nuclear families and \$22,105 for households with unrelated members. The sample mean for number of rooms for unrelated member households is 5.2 rooms and 6.7 rooms for nuclear families. Examination of the coefficients' values must be done with care before conclusions can be drawn.

A third model specification which excludes the household structure variables is used to test the explanatory power of the first specification. (See Table 5.3) The R-bar squared values are compared in order to test the value of household types in raising the goodness of fit for the model. All other independent variables in this third specification are the same. The R-bar squared value in the first specification is 0.57 and in this new one it is 0.55. A Chow Test was performed which compares the sum of squared errors and examines the result using an F-test. The measure derived from this Test showed that the household structure variables improved the summary test statistics from the constrained model which omitted these variables.

As expected, household size and income are positively correlated with the consumption of housing space. The household structure

variables do provide some insights, particularly with the first specification. The fact that young married couples who own their homes increase their housing space indicates they may be planning to have children. Use of household structure groups can help to forecast future household needs. People living alone tend to move into smaller homes. These people may be moving from family situations into their own quarters, such as young adults leaving their parents' home or a widowed wife leaving the family home. There are many possible factors which may cause such a reduction in housing space. It is not surprising that single people prefer less space. It is revealing that people who have recently moved are likely to be moving into smaller spaces, as reflected by the variable for length of residency. It is clear that as household size decreases the demand for additional housing space will also diminish.

### 5.5.3 The Housing Type Model

The dependent variable for the housing type model is based on the number of separate residences in a building. The independent variables are the same as used in the housing space model, though housing costs are not used. Four different dependent variables are used in this model. The first one uses a continuous variable for the number of units per building. A value of one for the dependent variable indicates one family per house, two means two families per house, up to ten which means ten or more households at that address. A negative coefficient in this model means that the independent variable predicts the structure will contain fewer residential units. The other three models use a binary discrete choice variable based on

the residence being a one household residence, a two or three household dwelling, or more than three household residence. The model using the continuous dependent variable is discussed first.

It was expected that the type of household would make a significant difference in the type of dwelling unit. (See Table 6.1) The constant terms for the model with the continuous dependent variable have a wide variance between the six household types. The constant for young married couples has a coefficient of 7.4, the highest of the six household categories. Nuclear families and older married couples have the lowest constant values at 2.9 and 2.7, respectively. Single member households have the second highest coefficient. These are expected results since families with children tend to live in single family homes where as single people and young couples do not require as much space as families. Older married couples are very often people whose children have grown and moved out of the house. Perhaps the most interesting result of this model is that older couples who rent and have moved go to buildings with 3.4 more households per residence. This indicates a preference by older people for larger buildings which have reduced maintenance responsibilities than does a single family home. The interactive variable for moving has a coefficient significantly different from zero only for single member households, with a positive coefficient of 1.5. This result suggests that single people tend to move to larger apartment buildings. As expected the home ownership variables have negative coefficients which when added to the constant terms reduce their value close to one. Eighty-six percent of the homes which are owned are of the single family type. The coefficients for renters who

have moved were only significant for the two types of married couple households. Whereas it increased the number of units per dwelling for older couples, as discussed above, the opposite is true for younger married couples. Young couples who move tend to favor single family homes. This model demonstrates the differing needs of couples of different ages. Younger couples are desirous of greater privacy in their housing when they moved, perhaps in anticipation of starting a family. Older married couples are moving into larger buildings in an effort to reduce the effort required in maintaining a home.

Of the remaining ten independent variables five have significant coefficients. These include household size, age, race, employment status and length of residency. It is interesting that the coefficients of income and education are not significantly different from zero. Increasing household size and participation in the labor force tend to place households in single family homes. Age had the opposite impact of placing people in apartment buildings, supporting the conclusions drawn from the difference between younger and older couples. Persons who are not white tend to live in buildings with more units. The longer length of time a household has been in a residence the greater the tendency for it to be a single family house.

Use of the discrete choice variables in modelling housing type assist in the analysis of several of the independent variables. The model for choice of a one unit per house has different significant variables than the continuous dependent variable model discussed above. (See Table 6.2) Of the four sets of household structure categories, only the interactive terms with home ownership is

significantly different from zero. It is difficult to establish the significance of the household structure groups from these variables since there is a very high correlation between homes which are owned and one unit residences. Though young couples who own their homes have the largest coefficient in this group of variables it cannot be stated that young couples are most likely of the six groups to live in one unit homes. In this model, unlike the first one, household income and education have significant coefficients. Both are positively correlated with a household living in a single unit house. Age in this model is not significant. The variable for place of work in the city falls just below the significance test. It has a negative coefficient value, indicating a reduced probability of living in a one unit residence when a household worker is employed in Boston.

The model for two and three family houses has low test statistics which is not surprising for the R-squared value since few houses in this survey are of this type. (See Table 6.3) Two and three family houses were considered as a separate group because they share characteristics with both single family homes and apartment houses. Often two and three family homes are converted single family homes with shared utilities, such as the heating furnace. In this model the household groups have significant coefficients. The older couples variable has the highest value, indicating this group is most likely to live in a two or three family home. Of the households who own their home, three types have coefficients significantly different from zero, each of which has a negative value. Nuclear families, single parents, and older couples who own their homes are less likely to live in a two or three unit residence. Older couples who rent and have

moved are also less likely to live in a two or three family home. Household size, income, age, education, and working outside the city are all negatively correlated with residence in a two or three unit house. Being in the labor force and the length of residency are positively correlated to this dependent variable.

The model for choice of apartments, considered four or more units per dwelling, has much stronger test statistics than did the model for two to three units per house. (See Table 6.4) The household structure variables are significantly different from zero, except for older couples. The nuclear family group is just above the significance level with a positive value. Young couples and single persons are most likely to live in apartment houses. Only single person households have a significant coefficient value among households which have moved. This coefficient is positive but is contrasted by the negative coefficient for single persons who rent and have moved. When the three variables for single member households are combined, it shows a preference for apartments by this group. Older couples who rent and have moved is the other significant coefficient in this group of variables. As in the original model of housing types, older couples who move show a preference for apartment buildings. This same trend is shown in the positive coefficient for age. Two unexpected results are the positive correlation of living in an apartment with education and with working outside of Boston. Young people who are more likely to be in single member or couple households, are also likely to be better educated. The positive correlation with the variable for place of work outside of Boston is difficult to explain. It may be an indication of how many apartment houses are located outside of Boston.

The household structure groups help to reveal a segmentation in the housing market. Family households are more likely to live in single family homes, especially when children are members of the household. Young married couples without children tend to live in apartments but many are preparing to move into single family homes which have more space. Older couples who have been living in single family homes, prefer to move into residences requiring less effort to maintain. Single member households live in apartments, since their space requirements are not matched with existing single family homes. Most single member households are composed of adults on either side of the age spectrum. Older and younger individuals living alone do not need the space of a single unit residence and they usually cannot afford to pay for the luxury of additional housing space. Given the rapid increase in people living alone, it remains to be seen how the construction industry will adapt to changing demand. Will more apartment complexes simply be erected or will adaptations be made in the designs of single family homes to accomodate people living alone?

#### 5.5.4 Travel Time to Work Model

The travel time model included less than one third of the observations of the other models. Place of work and travel time to work information appear in the Pulic Use Sample file for only one half of the sampled households. Of the remaining number of observations this model incorporates those who are employed, including those who work at home. The sample size for this model is 425 observations. This means many of the interactive varaibles must be excluded since they are collinear with the base variables of the household structure



categories. Two model specifications are used. The first includes the interactive variables used in the previous models plus variables for housing costs. The other specification used new interactive variables between the household structure groups and the mode of travel used to commute to work.

The F-statistic for the model using the first specification is low though it does pass the significance test (See Table 7.1) Of the twenty-six variables included in this model nine have coefficients which are significantly different than zero. The six household structure categories are among these nine variables. The difference in the values of these coefficients is revealing. The three groups which include married couples have much greater travel times than do single parents or single member households. Even the coefficient for households with unrelated members, which has a minimum of two people, is ten minutes lower than the households with older or younger couples. The three categories which include married couples represent people who may be close to having children, who have a family, or who may have had children but are now in the empty nest stage. Not surprisingly, these groups display a willingness to have a longer commute in exchange for more housing space and a single family home. None of the coefficients for the interactive variables with tenure status or relocation are significantly different than zero.

Two of the nine variables with coefficients significantly different than zero are very revealing in the consideration of multiple worker households. The second worker variable has a coefficient of -6.2, indicating that the spouse who works has a shorter commute than the head of household who works. The vast

majority, 91 percent, of second workers are women. The shorter commute for these workers indicates that they are limited in their employment options to locations which are closer to the home than are primary workers. A time series analysis is required to test if this difference between commute times for primary and secondary workers is becoming smaller as suggested earlier in this chapter. A new independent variable is introduced into this model which indicates if both members of a couple are currently employed. This variable for two worker households has a coefficient value of -4.7 which indicates that the travel time of two worker homes is almost five minutes less than single worker households. The two worker variable is applied only to married couples and excludes homes where the second worker is a child. The negative value of this coefficient is an indication that two worker homes give greater attention to the relationship between residential location and their employment sites. Clearly, further research is required before confirming this relationship. The two worker household variable is correlated with the second worker variable though not perfectly. Some of the second workers are actually the only working member in a household since the head of household may be unemployed. An expected result is that workers commuting to the city of Boston have a longer commute, by about 8 minutes according to the model, than do other commuters.

The second specification tests for the effects of travel mode to work and of characteristics of the two worker household. (See Table 7.2) Eleven interactive variables are used which combine household type with use of a private vehicle or use of public transit to commute to work. The single parent who rides transit was omitted because only

one observation exists in this category. Two new variables were used which are based on two worker households. Two worker households which have moved in the past five years was included to test if this group has reduced their commuting time. The head of household in a two worker family was separated as an independent variable to examine the difference between the first and second workers in a household. The summary statistics for this second specification are considerably better than the first. The main reason is largely due to the inclusion of travel mode which has a major impact on travel time.

The household structure categories, which serve as a constant term in the model, have coefficients significantly different than zero except for the single parent group. The relationship of the coefficients' values are different than in the first specification. The coefficients for nuclear families and older couples have lower values than do younger couples and unrelated members. This difference may be due to the effects of modes of travel other than driving or public transit which are part of this model specification. Such modes include walking and taxi. The coefficients for the interactive variables of household type and drive to work have similar values, except for the unrelated members category which is not significantly different from zero. All of the coefficients for the interactive variables of household type and public transit are significantly different than zero. These coefficients for transit time have very different values according to the household type. Older couples who use transit have twice the travel time as do members in unrelated households according to these coefficient values. The coefficients for nuclear families, younger couples and single member households

have similar values at the lower end of the range of travel times. In this sample 12 percent of the commuters use public transit. Though the differences in transit times are interesting, the small cell size for each household type using transit, e.g. ten people from the older couple category use transit in this sample, makes it difficult to draw generalizations from these results.

The coefficients of the two worker household variables have negative values, as expected. The coefficients of the variables for second worker and two worker households that have moved are significantly different than zero. The coefficient of the variable for head of household who works in a two worker family does not pass the t-test for significance. The reduction in travel time for two worker households appears to result mainly from the second worker having employment closer to the home than the head of household worker.

#### 5.5.5 Class of Residential Location Models

The survey of the Boston SMSA includes fifteen county groups. A binary discrete choice regression was run for each of these groups in order to determine an appropriate clustering of the groups. The clustering was primarily based on the results of three factors. These are household income, education, and housing costs which is divided into two variables, rent and owner costs. Four groups, termed upper class, middle class, working class, and poor, were created with a range of one to eight county groups in each class.

After the regression results of the individual county groups were

obtained, a table was developed to compare the significant variables. Since many of the communities have less than 100 observations out of the total of 1803, the test statistics were generally very low. The exception is Boston which has over 380 observations. Brief descriptions were written to develop an initial picture of the community without knowing the name of the area. For instance, the upper class community is described as high income, high level of education, high housing costs, and smaller household size. The poor area is described as nonwhite, low cost housing, work in Boston, do not drive to work, low level of education, and not home owners. The two classes in the middle required finer distinctions. In most cases a relatively significant positive value for income placed the county group in the middle class category. A negative value for income placed it in the working class or poor. The value of significant education coefficients were examined next, followed by housing costs. One community which did not have a significant coefficient for income is placed in the middle class since it has the highest coefficient value for owner costs which is an indication of value. (See Table 8 for the listing of communities.)

After examining the communities listed in each class the problem of aggregation into county groups is evident. Marblehead is listed as a working class town since the city of Peabody tends to dominate this group. Many people would consider Lexington and Lincoln as upper class communities but Arlington and Woburn broadened the variances of the relevant variables which brought this county group into the middle class category. Newton, Needham, Weston, and Wellesley are listed in one county group. The coefficient values of the relevant variables

shows this group as an upper class area.

Binary discrete choice regressions were performed for each classification of residential area. The four regressions of residential location provide revealing insights into the preferences of residents in each cluster of county groups. (See Table 9.1, 9.2, 9.3 and 9.4) Though the summary test statistics are weak for three of these regressions, they do pass the tests for significance and enable us to make comparisons. The four regressions are analyzed as one group rather than separately. The group of four make up a complete choice set of residential locations for the Boston SMSA, as provided by the Public Use Sample file, and reveal preferences of various segments.

The six household categories, which serve as constant terms, are difficult to analyze. As a group they show that all households have a preference to live in upper or middle class communities. There is very little difference between the coefficient values of the household structure categories within each of the four models. The only coefficients significantly different from zero in the group of households which have moved are in the young couple category. Younger couples are not likely to move into upper class communities and are likely to move into the poor community, which is Boston. Home owners who are in the unrelated members group or single parents are likely to be in Boston or a working class community and not likely to live in a middle or upper class town. Nuclear families who own their home prefer middle class towns to the city which is classified as poor. The only coefficient significantly different from zero for young couples who own their home shows that they are not likely to live in

middle class communities. Older couples who own their homes have no significant coefficients. Home owners who live alone are most likely to live in Boston and not in the two higher class areas. There are only a few cases where the coefficient for renters who have moved is significantly different from zero. Nuclear families and older couples in this category are more likely to move to middle class communities and not to Boston. Not suprisingly, single parents who are renters are not likely to move into the upper class areas. Single member households who rent are not likely to move into middle class communities. With the rapid increase in people living alone, it will be likely that more rental opportunities will become available for this type of household in middle class areas.

The remaining independent variables help to give a better picture of the four classes of areas. Households with more members are likely to live in middle class areas and not working class ones. As the individual is older, he has a greater probability of residing in one of the two upper class areas. People who are not white are most likely to live in a poor community yet they also have a small probability of living in the upper class area. They are strongly shunned from the working class communities. These coefficient values support, unfortunately, the generalization that working class communities are segragated while middle class areas have fewer barriers to nonwhites. Participation in the labor force does not ensure upward mobility. The positive coefficient value for workers is in the two lower classes while the two upper classes have negative coefficient values for employment. It is also interesting that the coefficient for working in the city is positive for people who live in

the city or commute from the upper class communities. The working class communities do not work in Boston but rather outside of the city. The poor and working class have lived in their residences for a longer period of time than the upper classes. The upper and middle class areas have negative coefficient values for length of residency. Most of the results are expected. It was not anticipated that the upper and middle class areas have more transient residents than the working class and poor areas. This result helps to create a picture of upwardly mobile households striving to climb higher on the status ladder by moving to prestigious homes.

All four models contain the predicted values from the housing space and housing type models. Preference for housing attributes affect the choice of residential area. In each of the residential location models the coefficients for these two predictors are significantly different from zero. The importance of household structure in the housing space and type models contributes to the significance of the predictors in these residential location models. The coefficients for the housing type predictors have expected values. The housing structure in upper and middle class areas tend to be of the single family type. Conversely, buildings in working class and Boston are likely to contain multiple dwelling units. The predictor from the housing space model does not have the expected values. The model predicts that as the number of rooms increase the household is less likely to live in an upper or middle class area and more likely to live in Boston or a working class area. There is a problem with using the predicted values from a linear probability model. The actual values of these variables of a minimum of one while the



predicted values for rooms and number of units are negative in some cases (See Table 2). This fact may decrease the validity of the coefficients of predicted values from the housing attributes models.

The coefficients of the income and education variables are also problematic to interpret. The signs of the coefficients are in the expected direction by definition since these two variables were prominent in creating the groupings. The values of the coefficients of these variables are the reverse of the results expected. The coefficient of the income variable for the upper class community is less than the value for the middle class income coefficient. The same is true for the education coefficients of these two classes. A higher income or education level increases the probability of living in the middle class communities at a faster rate than for the upper class community. Other factors must be more important in distinguishing the two groups, such as household size. A similar pattern is present between the poor and working class communities with their income and education variables. Higher income reduces the probability of living in a working class area at a faster rate than for the poor community. The same is true for the education coefficients. The difference may result from the fact that Boston has many specialized amenities offered by a large city and not found in working class communities. A higher percentage of wealthy, well educated people will live in the center of a metropolitan area than in the working class areas. This phenomenon will affect the slope of these variables in the model.

In most cases these models confirm generalizations made about a residential area. This is due in part from aggregating the data into groups containing many communities. It is impossible to examine the

finer details of neighborhood composition with this data set. Still, the variables do reveal a broad picture. The independent variables describe the residents of Boston as poor, not well educated, and composed largely of minorities. These are stereotypes of the urban resident. The model's true value is providing relative information on the status of different areas. The population in Boston is not predominately composed of black people. The model reveals the extent to which minorities are excluded from living in other nearby communities.

The values of the independent variables indicate that a person's living environment can be better predicted by socioeconomic factors than by their household structure. The composition of the household provides information on what their preferences are. It will not reveal what the household's resources are. The age variable helps to link the household and economic variables. It is interesting that age is positively correlated with upper class residence. Though older people may have reduced needs for large living areas, they also desire comforts to ease the burdens of age. Elderly people may wish to live in less demanding housing space, such as a condominium but they will resist a move that lowers the prestige of their surroundings. Perhaps the division between rich and poor becomes most dramatic with age. The struggle to sustain oneself on a fixed income will tend to lower the standard of living unless one's income ceiling is high.

## 5.6 Summary

The household structure categories provide information on the preferences of the household beyond what is revealed by household size and household income variables. For instance the income variable is positively correlated with households living in single family homes and in apartment buildings. The household categories show a preference for single unit houses by nuclear families and older couples. But older couples are not necessarily in the optimal housing space of their choice. When older couples, who rent, relocate they tend to choose apartments buildings. The relocation model showed that older people tend not to move. The class of residential location models showed that when older couples do move it is to middle class areas and not into the city. A similar type of analysis can be applied to young couples. This group tends to move to apartments in Boston. If they own their home it is likely a single unit structure with more space than if they rent. Young couples prefer the amenities offered by urban living. If they are going to have children they will likely seek more housing space. The models for the class of the residential area do not provide clear results as to where young couples who own their home are likely to settle, except that they are not likely to live in the middle class areas. The results obtained using the older couple and younger couple categories are intuitively logical. That the preferences of older and younger couples are distinct is not surprising. The usefulness of the six household categories is that they assist in defining the preference for each type of household.

## V. CONCLUSIONS

Life in a family, whether joyful, sorrowful or frustrating, is a common element of the human experience. Our memories house warm sentiments as well as traumatic moments. Every culture shapes a collective image of the common family. In our society the paintings of Norman Rockwell set the nostalgic tone for the visual picture of the American family. It is difficult to conceive that our perception of the typical family is no longer the average household. In fact, there is no average household in our society, but rather a wide range of family and non-family living arrangements. Even though the majority of households contain married couples, the marital status only partially defines the household. This study has divided married couples into three groups: older and younger couples without children, and those with children, called nuclear families. The results of the models show they each have distinct preferences.

The household structure categories have contributed to the estimation of preferences for housing attributes. The number of persons in a household and their income are very correlated with the amount of housing space used. The type of household adds additional explanatory power to predictions of desired housing attributes. Whether these categories have distinct preferences becomes a valuable issue as the diversity of living arrangements increases in our society. Planners should not assume the existence of a typical

household which can be treated as a constant term in forecasting the future needs of a region.

The ability to distinguish preferences for housing attributes does not necessarily assist in predicting the residential location of households. In recent years metropolitan areas have become more complex in the patterns of residential density. The market is less segmented by housing type, such as apartment buildings in the central city, triple-decker houses on the edge of the urban area, and single family homes in the suburbs. The working class "cottage" built in towns such as Cambridge sixty years ago is now highly prized by young middle class couples. Older couples who move to apartment buildings tend to remain in middle class areas as shown in the models for residential location. Luxury apartments are built in the suburbs to provide for older people who wish to remain in the same community as was their single family house but seek to reduce their maintenance costs. Single member households tend to live in apartment buildings with units that suits their housing space needs. Many of these people may wish to live in different types of housing, such as a single family home, but are unable to find suitable structures. There may be a latent demand for a wider variety of housing types to suit the greater diversity of household structures. Predicting where these structure types will be desired, let alone constructed, is a difficult task.

The residential location models developed by urban economists have been attempting this job for the the past twenty-five years. The theories proposed have mainly explored the tradeoff between the demand

for housing and the cost of transportation. The relationship of the location of the home to the employment site is the manifestation of this tradeoff. The models have given predictions of residential density and location of households according to level of income. The assumptions of these models present a static picture of the city where employment is neatly located in the center. The reality of city life is not stationary. Just as people respond to lower land prices, reduced highway congestion, and lower taxes so have firms relocated outside of the core of the urban area. The early efforts in urban economics, such as by Alonso (1964), to establish a general equilibrium solution for the location of both residents and firms proved to be mathematically intractable. Separating the task into components is necessary. The study by Grubb (1982) begins to give definition to research priorities in the field of residential location. Employment, as well as population, must be modelled.

Many of the issues examined in past analyses of residential location should be restudied in light of changes in employment and household structure. It is clear that a single member household has different constraints than a nuclear family though not necessarily more choices. Single people may face tradeoff between employment in the suburbs and social amenities in the city. It is possible that research would expose this tradeoff as a marginal issue. The delay in having children by young couples should give them greater flexibility in choice of where to live. Their decision may be complicated if both members work in different areas. The issue of preferences for two worker households deserves greater attention. The model results in

this study support the idea that two worker households give greater weight to their commuting time than do one worker households. These findings are very preliminary and required more detailed analysis.

Further research is necessary on whether changing household structure is a reflection of changing life cycle patterns. The initial impression from this research is that the nuclear family is receding as the central institution of family life. Is the role of parenting being altered in a fundamental way? As people live longer and have fewer children, the percentage of their life spent as parents decreases. Does this knowledge affect their long term choices, such as the purchase of a home? Having a child is one of the few times when a person is likely to consider the detailed implications of his or her decision in a time frame of twenty or more years. Is the time reference different for today's potential parents and how does it affect their choices?

Examining household composition is similar to gazing at the sea. The trends lay on the surface open to view but the more fundamental causes of change occur beyond the statistics which are easily measured. The most apparent trend in household structure is the decline in household size, of which the increase in single member households is the most dramatic. The driving forces behind this trend are related to social and economic factors. The reason for the sharp rate of the increase in people living alone is the convergence of a number of factors at one time. Some of the factors are not fundamental causes but circumstantial. The phenomenon of wives living longer than their husbands is such a factor. Another is the aging of

the baby boom generation into young adults, the period of establishing their own households. Higher real income has enabled more people to choose the luxury of residential privacy. The individual's preference for living alone is not caused by greater wealth but by social forces such as the loosening of ties between the individual and family. Separating the effects of demographic trends from changes in preferences and values will assist us in our efforts to forecast future demand.

To understand the causal relationships of any phenomenon we must carefully test our assumptions. The assumptions must be challenged and altered if the results of research is to be of value to society. This thesis has attempted to challenge assumptions on the existence of a typical household. The theoretical base of a model is built on the ability to make simplifying assumptions. The strength of any model is directly related to the appropriateness of these assumptions. For instance, it is wrong to assume that single member households will live close to the center of the city to be near various services they prefer. This is similar to the assumption that employment is located in the center of the city. Both assumptions depend on the location of the vital attractions to be in a fixed geographic location. Spatial patterns in a city are continuously evolving. As our assumption weaken so does the validity of our model. If we are to anticipate and plan for our future needs in the provision of public services, our simplifying assumptions must withstand the test of empirical analysis.



TABLE 1

## STATISTICS OF DEPENDENT VARIABLES

<u>VARIABLE</u>	<u>MINIMUM</u>	<u>MEAN</u>	<u>MAXIMUM</u>
Moved	0.000	0.439	1.000
Rooms(number)	1.000	5.627	9.000
Units in Building (number)	1.000	2.635	11.000
One Unit/Building	0.000	0.612	1.000
Two Units/Building	0.000	0.212	1.000
Multiple Units/Building	0.000	0.172	1.000
Time (minutes)	0.000	22.402	90.000
Upper Class	0.000	0.548E -1	1.000
Middle Class	0.000	0.298	1.000
Working Class	0.000	0.449	1.000
Poor Class	0.000	0.199	1.000

TABLE 2  
STATISTICS OF INDEPENDENT VARIABLES

<u>VARIABLE</u>	<u>MINIMUM</u>	<u>MEAN</u>	<u>MAXIMUM</u>
<b>1. Household Structure</b>			
Unrelated Members	0.000	0.323E -1	1.000
Nuclear Family	0.000	0.347	1.000
Single Parent	0.000	0.891E -1	1.000
Younger Couple	0.000	0.7239E -1	1.000
Older Couple	0.000	0.278	1.000
Single Member	0.000	0.178	1.000
<b>2. Moved</b>			
Nuclear Family	0.000	0.168	1.000
Single Parent	0.000	0.376E -1	1.000
Younger Couple	0.000	0.633E -1	1.000
Older Couple	0.000	0.409E -1	1.000
Single Member	0.000	0.103	1.000
<b>3. Home Owner</b>			
Unrelated Members	0.000	0.528E -2	1.000
Nuclear Family	0.000	0.265	1.000
Single Parent	0.000	0.409E -1	1.000
Younger Couple	0.000	0.257E -1	1.000
Older Couple	0.000	0.218	1.000
Single Member	0.000	0.468E -1	1.000
<b>4. Renter*Moved</b>			
Unrelated Members	0.000	0.231E -1	1.000
Nuclear Family	0.000	0.620E -1	1.000
Single Parent	0.000	0.284E -1	1.000
Younger Couple	0.000	0.462E -1	1.000
Older Couple	0.000	0.237E -1	1.000
Single Member	0.000	0.944E -1	1.000
Household Size	1.000	2.972	10.000
Household Income(\$)	-1500.000	23565.000	75000.000
Age	19.000	47.552	90.000
Education	0.000	14.839	22.000
Nonwhite	0.000	0.680E -1	1.000
Worker	0.000	0.587	1.000
Lenght of Residency	1.000	3.115	6.000
Second Worker	0.000	0.158	1.000
Work in City	0.000	0.772E -1	1.000
Work outside of City	0.000	0.182	1.000
Rent per Room(\$)	0.000	29.952	450.000
Owner Cost per Room(\$)	0.000	31.619	400.000
Home Owner	0.000	0.6026	1.000
Moved	0.000	0.439	1.000
Renter*Moved	0.000	0.278	1.000
Two Worker Home	0.000	0.314	1.000
Pred. in Rooms Model	-0.712	5.627	9.668
Pred. in Units Model	-1.305	2.635	10.604

Sample Size: 1515

TABLE 2 (Continued)  
 STATISTICS OF INDEPENDENT VARIABLES  
 (Travel Time to Work)

<u>VARIABLE</u>	<u>MINIMUM</u>	<u>MEAN</u>	<u>MAXIMUM</u>
<b>1. Household Structure</b>			
Unrelated Members	0.000	0.541E -1	1.000
Nuclear Family	0.000	0.423	1.000
Single Parent	0.000	0.8612E -1	1.000
Younger Couple	0.000	0.118	1.000
Older Couple	0.000	0.191	1.000
Single Member	0.000	0.153	1.000
<b>2. Moved</b>			
Nuclear Family	0.000	0.216	1.000
Single Parent	0.000	0.165E -1	1.000
<b>3. Home Owner</b>			
Younger Couple	0.000	0.329E -1	1.000
Older Couple	0.000	0.167	1.000
Single Member	0.000	0.353E -1	1.000
<b>4. Renter*Moved</b>			
Unrelated Members	0.000	0.423E -1	1.000
Nuclear Family	0.000	0.682E -1	1.000
Single Member	0.000	0.918E -1	1.000
<b>5. Drive to Work</b>			
Unrelated Members	0.000	0.235E -1	1.000
Nuclear Family	0.000	0.365	1.000
Single Parent	0.000	0.494E -1	1.000
Younger Couple	0.000	0.965E -1	1.000
Older Couple	0.000	0.143	1.000
Single Member	0.000	0.823E -1	1.000
<b>6. Public Transit to Work</b>			
Unrelated Members	0.000	0.188E -1	1.000
Nuclear Family	0.000	0.306E -1	1.000
Younger Couple	0.000	0.118E -1	1.000
Older Couple	0.000	0.236E -1	1.000
Single Member	0.000	0.329E -1	1.000
Household Size	1.000	3.108	9.000
Household Income(\$)	-1500.000	28169.000	75000.000
Age	19.000	40.845	81.000
Education	0.000	15.920	22.000
Nonwhite	0.000	0.682E -1	1.000
Lenght of Residency	1.000	2.845	6.000
Second Worker	0.000	0.268	1.000
Work in City	0.000	0.275	1.000
Work outside of City	0.000	0.649	1.000
Rent Costs(\$)	0.000	117.19	634.000
Owner Costs(\$)	0.000	235.68	2000.000
Two Worker Household	0.000	0.541	1.000
Two Worker Hh.*Moved	0.000	0.313	1.000
Primary Worker in a			
Two Worker Household	0.000	0.303	1.000

Sample Size: 425

TABLE 3

EXPLANATION OF VARIABLES WITH A RANGE OF VALUES

Age (years): Sample is restricted to heads of households and spouses, therefor youngest household member is nineteen.

Household Income (\$): Includes self employed persons and is possible to have a net loss in a year.

Education (highest grade attended):

00: none	High School
01: Nursery School	11: Ninth grade
02: Kindergarten	12: Tenth grade
Elementary	13: Eleventh grade
03: First grade	14: Twelfth grade
04: Second grade	College
05: Third grade	15: First year
06: Fourth grade	16: Second year
07: Fifth grade	17: Third year
08: Sixth grade	18: Fourth year
09: Seventh grade	19: Fifth year
10: Eighth grade	20: Sixth year
	21: Seventh year
	22: Eighth year or more

Length of Residency (year moved into unit):

- 1: 1979 to March 1980
- 2: 1975 to 1978
- 3: 1970 to 1974
- 4: 1960 to 1969
- 5: 1950 to 1959
- 6: 1949 or earlier

TABLE 4

## THE RELOCATION MODEL

<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
<b>1. Household Structure</b>		
Unrelated Members	1.216	11.886
Nuclear Family	1.263	13.391
Single Parent	1.173	12.446
Younger Couple	1.309	14.048
Older Couple	1.135	11.627
Single Member	1.251	14.964
<b>2. Home Owner</b>		
Unrelated Members	0.223	1.396
Nuclear Family	-0.205	-3.229
Single Parent	-0.181	-2.320
Younger Couple	-0.127	-1.395
Older Couple	-0.242	-3.948
Single Member	-0.310	-4.893
Household Size	-0.463E -1	-4.179
Household Income	-0.753E -7	-0.968E -1
Age	-0.106E -1	-11.861
Education	-0.642E -2	-1.867
Nonwhite	-0.793E -1	-1.894
Second Worker	-0.359E -1	-1.329
Rent Costs	0.548E -3	4.200
Owner Costs	0.223	4.989
Work in City	0.253E -1	0.618
Work outside of City	0.355E -1	1.202

Sample Size= 1515

R- squared= 0.39      R-bar squared= 0.38

F Statistic ( 21, 1493)= 42.63      Standard Error of Regression= .39

TABLE 5.1

## THE HOUSING SPACE MODEL

## Specification 1.

<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
<b>1. Household Structure</b>		
Unrelated Members	3.010	9.671
Nuclear Family	2.732	7.223
Single Parent	3.105	8.527
Younger Couple	1.819	2.105
Older Couple	3.187	9.159
Single Member	2.501	7.655
<b>2. Moved</b>		
Nuclear Family	0.654E -1	0.435
Single Parent	0.203	0.511
Younger Couple	0.290	0.670
Older Couple	-0.238	-0.847
Single Member	-1.154	-2.794
<b>3. Home Owner</b>		
Unrelated Members	2.373	4.922
Nuclear Family	1.862	7.672
Single Parent	1.521	5.186
Younger Couple	2.379	2.991
Older Couple	1.104	5.918
Single Member	1.922	8.061
<b>4. Renter*Moved</b>		
Nuclear Family	0.340	1.175
Single Parent	-0.098	-0.206
Younger Couple	0.431	0.510
Older Couple	-0.229	-0.624
Single Member	0.665	1.539
Household Size	0.239	6.775
Household Income	0.228E -4	9.496
Age	-0.002	-2.045
Education	0.047	4.447
Nonwhite	0.190	1.450
Worker	-0.043	-0.505
Length of Residency	0.076	1.768
Secondary Worker	-0.015	-0.150
Work in City	0.047	0.370
Work outside of City	-0.226E -2	-0.028

Sample Size: 1515

R-squared: 0.58 R-bar squared: 0.57

F-statistic( 31, 1483): 66.72 Standard Error of Regression= 1.23

TABLE 5.2

## THE HOUSING SPACE MODEL

Specification 2.

<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
<b>1. Household Structure</b>		
Unrelated Members	4.012	13.297
Nuclear Family	3.420	9.516
Single Parent	3.795	10.955
Younger Couple	3.330	4.534
Older Couple	3.999	12.011
Single Member	3.492	11.047
<b>2. Moved</b>		
Nuclear Family	-0.060	-0.427
Single Parent	-0.427E -3	-0.114E -2
Younger Couple	0.180	0.442
Older Couple	-0.373	-1.411
Single Member	-1.413	-3.631
<b>3. Home Owner</b>		
Unrelated Members	1.117	2.415
Nuclear Family	0.959	4.013
Single Parent	0.689	2.427
Younger Couple	0.429	0.563
Older Couple	0.154	0.812
Single Member	0.843	3.537
<b>4. Renter*Moved</b>		
Nuclear Family	0.684	2.499
Single Parent	0.226	0.501
Younger Couple	-0.126	-0.159
Older Couple	0.155	0.447
Single Member	1.146	2.808
Household Size	0.236	7.078
Household Income	0.226E -4	9.968
Age	-0.641E -2	-2.239
Education	0.058	5.716
Nonwhite	0.090	0.732
Worker	0.465	0.581
Length of Residency	0.043	1.064
Secondary Worker	-0.038	-0.407
Work in City	0.033	0.277
Work outside of City	-0.217	-0.246
Rent per Room	-0.014	-13.382
Cost per Room	0.297	3.290

Sample Size: 1515

R-squared: 0.63 R-bar squared: 0.62

F-statistic( 31, 1483): 76.58 Standard Error of Regression= 1.16

TABLE 5.3  
THE HOUSING SPACE MODEL

Specification 3.

<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
Constant	2.554	8.408
Home Owner	1.480	12.906
Moved	0.107	0.761
Rent*Moved	-0.315	-2.124
Household Size	0.362	14.735
Age	-0.672E -2	-2.456
Education	0.046	4.332
Nonwhite	0.184	1.401
Worker	-0.087	-1.017
Lenght of Residency	0.101	2.391
Second Worker	-0.020	-0.205
Work in City	0.033	0.252
Work outside of City	0.126	0.133

Sample Size: 1515

R-squared: 0.56

R-bar squared: 0.55

F statistic( 13, 1501): 146.091

Standard Error of Regression= 1.26



TABLE 6.1  
THE HOUSING TYPE MODEL

Dependent Variable: Units in Dwelling

<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
<b>1. Household Structure</b>		
Unrelated Members	4.633	4.25
Nuclear Family	2.875	4.078
Single Parent	4.643	6.826
Younger Couple	7.454	5.216
Older Couple	2.732	4.193
Single Member	5.290	8.646
<b>2. Moved</b>		
Nuclear Family	-0.250	-0.895
Single Parent	-0.204	-0.277
Younger Couple	0.192	0.241
Older Couple	0.127	0.243
Single Member	1.467	1.910
<b>3. Home Owner</b>		
Unrelated Members	-3.453	-2.782
Nuclear Family	-1.123	-2.493
Single Parent	-3.254	-5.975
Younger Couple	-5.646	-3.826
Older Couple	-1.206	-3.481
Single Member	-3.884	-8.771
<b>4. Renter*Moved</b>		
Unrelated Members	0.756	0.732
Nuclear Family	0.692	1.288
Single Parent	-0.269	-0.303
Younger Couple	-2.681	-1.712
Older Couple	3.402	4.979
Single Member	-1.222	-1.524
Household Size	-0.113	-1.726
Household Income	-0.659E -5	-1.479
Age	0.178E -1	3.136
Education	0.191E -1	0.965
Nonwhite	0.515	2.114
Worker	-0.450	-2.854
Length of Residency	-0.195	-2.414
Second Worker	-0.577E -1	-0.314
Work in City	0.191	0.794
Work outside of City	0.194	1.120

Sample Size= 1515

R-squared= 0.42 R-bar squared= 0.42

F Statistic( 32, 1482)= 33.15 Standard Error of Regression= 2.29

TABLE 6.2

## THE HOUSING TYPE MODEL

Dependent Variable: One Unit in Dwelling

<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
<b>1. Household Structure</b>		
Unrelated Members	-0.338E -2	-0.193E -1
Nuclear Family	0.961E -1	0.853
Single Parent	-0.115	-1.056
Younger Couple	-0.311	-1.363
Older Couple	0.385E -1	0.370
Single Member	-0.864E -1	-0.885
<b>2. Moved</b>		
Nuclear Family	-0.277E -1	-0.621
Single Parent	-0.150E -1	-0.128
Younger Couple	0.530E -1	0.413
Older Couple	-0.952E -1	-1.143
Single Member	-0.139	-1.140
<b>3. Home Owner</b>		
Unrelated Members	0.385	1.940
Nuclear Family	0.400	5.566
Single Parent	0.642	7.385
Younger Couple	0.769	3.265
Older Couple	0.473	8.551
Single Member	0.544	7.695
<b>4. Renter*Moved</b>		
Unrelated Members	-0.175	-1.064
Nuclear Family	-1.458	-1.458
Single Parent	0.171	1.204
Younger Couple	0.143	0.571
Older Couple	-0.126	-1.158
Single Member	0.146	1.138
Household Size	0.338E -1	3.228
Household Income	0.183E -5	2.540
Age	0.113E -2	1.247
Education	0.103E -1	3.244
Nonwhite	-0.897E -1	-2.305
Worker	0.227E -1	0.902
Lenght of Residency	-0.350E -2	-0.271
Second Worker	-0.120E -1	-0.444
Work in City	-0.624E -1	-1.625
Work outside of City	0.254E -1	0.917

Sample Size= 1515

R-squared= 0.45 R-bar squared= 0.44

F Statistic( 32, 1482)= 37.61 Standard Error of Regression= 0.36

TABLE 6.3

## THE HOUSING TYPE MODEL

Dependent Variable: Two or Three Units in Dwelling

VARIABLE	COEFFICIENT	T-STATISTIC
<b>1. Household Structure</b>		
Unrelated Members	0.694	3.811
Nuclear Family	0.732	6.261
Single Parent	0.717	6.353
Younger Couple	0.667	2.812
Older Couple	0.825	7.634
Single Member	0.561	5.531
<b>2. Moved</b>		
Nuclear Family	0.767E -1	1.653
Single Parent	0.438E -1	0.358
Younger Couple	-0.734E -1	-0.551
Older Couple	0.101	1.249
Single Member	-0.875E -1	-0.687
<b>3. Home Owner</b>		
Unrelated Members	-0.874E -2	-0.434E -1
Nuclear Family	-0.262	-3.510
Single Parent	-0.234	-2.586
Younger Couple	-0.158	-0.646
Older Couple	-0.361	-6.102
Single Member	-0.130E -1	-0.177
<b>4. Renter*Moved</b>		
Unrelated Members	0.413E -1	0.241
Nuclear Family	0.936E -1	1.051
Single Parent	-0.109	-0.743
Younger Couple	0.123	0.474
Older Couple	-0.305	-2.688
Single Member	0.107	0.803
Household Size	-0.227E -1	-2.088
Household Income	-0.144E -5	-1.940
Age	-0.354E -2	-3.768
Education	-0.152E -1	-4.620
Nonwhite	0.334E -1	0.829
Worker	0.489E -1	1.871
Length of Residency	0.344E -1	2.568
Second Worker	0.155E -1	0.507
Work in City	0.286E -1	0.718
Work outside of City	-0.732E -1	-2.423

Sample Size= 1515

R-squared= 0.15 R-bar squared= 0.15

F Statistic( 32, 1482)= 8.24 Standard Error of Regression= 0.38

TABLE 6.4  
HOUSING TYPE MODEL

Dependent Variable: More than Three Units in Dwelling

<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
<b>1. Household Structure</b>		
Unrelated Members	0.306	2.119
Nuclear Family	0.157	1.687
Single Parent	0.339	4.324
Younger Couple	0.641	3.393
Older Couple	0.124	1.444
Single Member	0.517	6.402
<b>2. Moved</b>		
Nuclear Family	-0.422E -1	-1.140
Single Parent	-0.170E -1	-0.175
Younger Couple	0.318E -1	0.300
Older Couple	0.124	1.444
Single Member	0.518	6.402
<b>3. Home Owner</b>		
Unrelated Members	-0.374	-2.282
Nuclear Family	-0.143	-2.411
Single Parent	-0.417	-5.802
Younger Couple	-0.626	-3.206
Older Couple	-0.128	-2.805
Single Member	-0.554	-9.462
<b>4. Renter*Moved</b>		
Unrelated Members	0.136	0.997
Nuclear Family	0.703E -2	0.990E -1
Single Parent	-0.693E -1	-0.590
Younger Couple	-0.280	-1.352
Older Couple	0.370	4.105
Single Member	-0.281	-2.653
Household Size	-0.852E -2	-0.982
Household Income	-0.388E -6	-0.658
Age	0.243E -2	3.245
Education	0.459E -2	1.755
Nonwhite	0.290E -1	0.900
Worker	-0.677E -1	-3.302
Length of Residency	-0.281E -1	-2.634
Second Worker	0.583E -3	0.239E -1
Work in City	0.289E -1	0.911
Work outside of City	0.480E -1	2.091

Sample Size= 1515

R-squared= 0.37      R-bar squared= 0.36

F Statistic( 32, 1482)= 27.23      Standard Error of Regression= 0.30

TABLE 7.1  
TRAVEL TIME MODEL

Dependent Variable: Travel Time to Work

<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
<b>1. Household Structure</b>		
Unrelated Members	22.77	2.337
Nuclear Family	26.591	3.508
Single Parent	19.946	2.576
Younger Couple	33.032	4.742
Older Couple	32.859	3.787
Single Member	18.739	2.267
<b>2. Moved</b>		
Nuclear Family	-3.809	-1.331
Single Parent	-6.451	-0.963
<b>3. Home Owner</b>		
Younger Couple	-5.784	-1.034
Older Couple	-2.950	-0.544
Single Member	6.152	0.129
<b>4. Renter*Moved</b>		
Unrelated Members	4.691	0.590
Nuclear Family	-0.163	-0.345E -1
Single Member	3.583	0.665
Household Size	0.229	0.288
Household Income	0.287E -4	0.517
Age	-0.488E -1	-0.521
Education	-0.713E -2	-0.288
Nonwhite	-0.715	-0.245
Length of Residency	-0.838	-0.947
Second Worker	-6.044	-3.273
Work in City	9.944	3.354
Work outside of City	1.235	0.450
Two Worker Household	-4.744	-2.541
Rent Costs	-0.703E -2	-0.805
Owner Costs	0.541E -2	1.564

Sample Size= 425

R-squared= 0.19

R-bar squared= 0.18

F Statistic ( 26, 398)= 3.53 Standard Error of Regression= 14.44

TABLE 7.2  
TRAVEL TIME MODEL

Dependent Variable: Travel Time to Work

<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
<b>1. Household Structure</b>		
Unrelated Members	20.792	2.465
Nuclear Family	15.671	2.129
Single Parent	10.683	1.283
Younger Couple	23.549	2.530
Older Couple	17.091	2.290
Single Member	10.911	1.684
<b>2. Drive to Work</b>		
Unrelated Members	6.326	0.862
Nuclear Family	12.786	3.126
Single Parent	12.081	1.809
Younger Couple	11.314	1.606
Older Couple	13.513	2.934
Single Member	12.643	3.075
<b>3. Public Transit to Work</b>		
Unrelated Members	18.497	2.408
Nuclear Family	20.173	3.684
Younger Couple	20.062	2.224
Older Couple	36.993	6.115
Single Member	21.750	4.384
Household Size	0.225	0.310E -2
Household Income	0.512E -4	1.014
Age	0.260E -1	0.312
Education	-0.713E -2	-0.288
Nonwhite	-0.148	-0.554E -1
Length of Residency	-1.173	-1.563
Second Worker	-6.044	-3.273
Work in City	4.643	1.651
Work outside of City	-1.624	-0.634
Second Worker	-7.816	-3.758
Two Worker Household		
Which Moved	-5.314	-2.277
Primary Worker in		
Two Worker Household	-2.273	-1.094

Sample Size= 425

R-squared= 0.32      R-bar squared= 0.30

F Statistic ( 26, 398)= 6.87      Standard Error of Regression= 13.42

TABLE 8

COUNTY GROUP COMMUNITIES BY CLASS

Upper Class	Middle Class	Working Class
County Group 21 Newton City Weston Town Needham Town Wellesley Town	County Group 25 Braintree Town Cohasset Town Weymouth Town Norwell Town Scituate Town Hingham Town Hull Town	County Group 16 Medford City Malden City 1 Everett City
Middle Class		County Group 19 Somerville City Cambridge City
County Group 15 Lexington Town Carlisle Town Lincoln Town Acton Town Wilmington Town Winchester Town Woburn City Arlington Town Bedford Town Boxborough Town Burlington Town Concord Town	Working Class	County Group 23 Balance of Norfolk County
	County Group 12 Beverly City Topsfield Town Peabody City Salem City Wenham Town Manchester Town Marblehead Town Hamilton Town Middleton Town Boxford Town Danvers Town	County Group 24 Randolph Town Milton Town Quincy City
County Group 17 Brookline Town		County Group 26 Balance of Plymouth County
County Group 20 Watertown Town Belmont Town Waltham City	County Group 13 Nahant Town Saugus Town Swampscott Town Lynn City Lynnfield Town	Poor Class
County Group 22 Framingham Town Holliston Town Ashland Town Natick Town Sherborn Town Sudbury Town Wayland Town Dover Town	County Group 14 Melrose City Wakefield Town Stoneham Town North Reading Town Reading Town	County Group 18 Balance of Suffolk County (Boston)

TABLE 9.1  
STATUS OF RESIDENTIAL LOCATION MODEL

Version A.

Dependent Variable: Upper Class

<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
<b>1. Household Structure</b>		
Unrelated Members	0.6728	2.176
Nuclear Family	0.4192	1.909
Single Parent	0.643	2.185
Younger Couple	0.7271	2.018
Older Couple	0.4568	1.982
Single Member	0.632	2.154
<b>2. Moved</b>		
Nuclear Family	0.327E -2	0.117
Single Parent	0.113	1.585
Younger Couple	-0.201	-2.529
Older Couple	0.502E -1	0.988
Single Member	0.112E -1	0.146
<b>3. Home Owner</b>		
Unrelated Members	-0.310	-2.779
Nuclear Family	0.398E -1	0.696
Single Parent	-0.174	-2.056
Younger Couple	-0.154	-0.816
Older Couple	-0.215E -1	-0.581
Single Member	-0.185	-2.123
<b>4. Renter*Moved</b>		
Nuclear Family	0.802E -1	1.247
Single Parent	-0.149	-1.708
Younger Couple	0.665E -1	0.388
Older Couple	-0.215E -1	-1.529
Single Member	-0.397E -1	-0.492
Household Size	-0.375E -2	-0.440
Household Income	0.309E -5	3.907
Age	0.182E -2	2.663
Education	0.131E -1	4.160
Nonwhite	0.634E -1	1.827
Worker	-0.719E -1	-3.033
Length of Residency	-0.224E -1	-2.465
Second Worker	-0.404E -1	-2.465
Work in City	0.348E -1	1.395
Work outside of City	0.131E -1	0.718
Pred. from Rooms Model	-0.757E -1	-1.952
Pred. from Units Model	-0.994E -1	-2.733

Sample Size= 1515

R-squared= 0.07 R-bar squared= 0.07

F Statistic ( 33, 1481)= 3.35 Standard Error of Regression= 0.22



TABLE 9.2  
STATUS OF RESIDENTIAL LOCATION MODEL

Version B.

Dependent Variable: Middle Class

<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
<b>1. Household Structure</b>		
Unrelated Members	2.665	4.269
Nuclear Family	1.892	4.282
Single Parent	2.568	4.339
Younger Couple	2.671	3.685
Older Couple	2.078	4.375
Single Member	2.560	4.338
<b>2. Moved</b>		
Nuclear Family	-0.185E -1	-0.328
Single Parent	-0.195	-1.362
Younger Couple	0.158	0.929
Older Couple	-0.152	-0.166
Single Member	0.152	0.984
<b>3. Home Owner</b>		
Unrelated Members	-0.524	-2.331
Nuclear Family	0.259	2.255
Single Parent	-0.478	-2.808
Younger Couple	-0.734	-1.930
Older Couple	-0.516E -1	-0.694
Single Member	-0.516	-2.945
<b>4. Renter*Moved</b>		
Nuclear Family	0.279	2.157
Single Parent	-0.103E -1	-0.586E -1
Younger Couple	-0.418	-1.204
Older Couple	0.857	3.199
Single Member	-0.305	-1.882

Household Size	0.540E -1	3.154
Household Income	0.945E -5	5.928
Age	0.571E -2	4.131
Education	0.303E -1	4.799
Nonwhite	0.379E -1	0.543
Worker	-0.101	-2.113
Length of Residency	-0.568E -1	-3.108
Second Worker	-0.514E -1	-1.417
Work in City	-0.323E -1	-0.644
Work outside of City	0.157E -1	0.427
Pred. from Rooms Model	-0.344	-4.404
Pred. from Units Model	-0.311	-4.254

Sample Size= 1515

R-squared= 0.07 R-bar squared= 0.07

F Statistic ( 33, 1481)= 3.25 Standard Error of Regression= 0.45

TABLE 9.3

## STATUS OF RESIDENTIAL LOCATION MODEL

Dependent Variable: Working Class		
<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
<b>1. Household Structure</b>		
Unrelated Members	-1.113	-1.661
Nuclear Family	-0.589	-1.241
Single Parent	-1.074	-1.691
Younger Couple	-1.114	-1.431
Older Couple	-0.745	-1.498
Single Member	-1.068	-1.686
<b>2. Moved</b>		
Nuclear Family	-0.526E -1	-0.869
Single Parent	0.613E -1	0.397
Younger Couple	-0.207	-1.201
Older Couple	-0.565E -1	-0.515
Single Member	0.150E -1	0.910E -1
<b>3. Home Owner</b>		
Unrelated Members	0.481	1.993
Nuclear Family	-0.908E -1	-0.735
Single Parent	0.296	1.616
Younger Couple	0.482	1.182
Older Couple	0.102	1.276
Single Member	0.434	3.164
<b>4. Renter*Moved</b>		
Nuclear Family	-0.622E -1	-0.448
Single Parent	0.151	0.806
Younger Couple	0.461	1.236
Older Couple	-0.362	-1.257
Single Member	0.196	1.128
Household Size	-0.535E -1	-2.912
Household Income	-0.808E -5	-4.728
Age	-0.332E -2	-2.236
Education	-0.239E -1	-3.533
Nonwhite	-0.444	-5.923
Worker	0.861E -1	1.681
Length of Residency	0.481E -1	2.454
Second Worker	0.105	0.269
Work in City	-0.165	-3.024
Work outside of City	0.997E -1	2.526
Pred. from Rooms Model	0.253	3.025
Pred. from Units Model	0.181	2.304
Sample Size=	1515	
R-squared=	0.09	R-bar squared= 0.09
F Statistic ( 33, 1481)=	4.54	Standard Error of Regression= 0.48

TABLE 9.4

## STATUS OF RESIDENTIAL LOCATION MODEL

Dependent Variable: Poor Class		
<u>VARIABLE</u>	<u>COEFFICIENT</u>	<u>T-STATISTIC</u>
<b>1. Household Structure</b>		
Unrelated Members	-1.225	-2.505
Nuclear Family	-0.723	-2.089
Single Parent	-1.137	-2.453
Younger Couple	-1.284	-2.263
Older Couple	-0.739	-2.037
Single Member	-1.124	-2.432
<b>2. Moved</b>		
Nuclear Family	0.678E -1	1.563
Single Parent	0.209E -1	0.187
Younger Couple	0.249	1.991
Older Couple	0.233E -1	0.291
Single Member	-0.178	-1.476
<b>3. Home Owner</b>		
Unrelated Members	0.353	2.009
Nuclear Family	-0.208	-2.315
Single Parent	0.357	2.676
Younger Couple	0.406	1.363
Older Couple	-0.288E -1	-0.401
Single Member	0.434	3.164
<b>4. Renter*Moved</b>		
Nuclear Family	-0.297	-2.933
Single Parent	0.760E -2	0.554E -1
Younger Couple	-0.109	-0.401
Older Couple	-0.699	-3.334
Single Member	0.148	1.169
Household Size	0.326E -2	0.243
Household Income	-0.445E -5	-3.570
Age	-0.422E -2	-3.902
Education	-0.194E -1	-3.927
Nonwhite	0.342	6.266
Worker	0.866E -1	2.318
Length of Residency	0.311E -1	2.170
Second Worker	0.449E -1	1.582
Work in City	0.163	4.149
Work outside of City	-0.128	-4.465
Pred. from Rooms Model	0.166	2.716
Pred. from Units Model	0.229	4.010
Sample Size= 1515		
R-squared= 0.25 R-bar squared= 0.24		
F Statistic ( 33, 1481)= 14.89 Standard Error of Regression= 0.35		

TABLE 10.1

## HOUSEHOLD STRUCTURE GROUPS AND STATUS OF RESIDENTIAL LOCATION

## Household Type by Class (Households)

	Upper Class	Middle Class	Working Cl.	Poor Class	Total
Unrelated Members	2	12	19	16	49
Nuclear Family	26	174	252	74	529
Single Parent	10	33	58	34	135
Younger Couple	7	34	41	30	112
Older Couple	29	130	199	64	422
Single Member	9	68	111	83	271
Total	83	451	680	301	1515

TABLE 10.1

## Household Type by Class (Percentage)

	Upper Class	Middle Class	Working Cl.	Poor Class	Total
Unrelated Members	2.41	2.66	2.79	5.32	3.2
Nuclear Family	31.33	38.58	37.06	24.58	34.7
Single Parent	12.05	7.32	8.53	11.30	8.9
Younger Couple	8.43	7.54	6.03	9.97	7.3
Older Couple	34.94	28.82	29.26	21.26	27.8
Single Member	10.84	15.08	16.32	27.57	17.8
Total	100.0	100.0	100.0	100.0	

TABLE 10.3

HOUSEHOLD STRUCTURE GROUPS AND STATUS OF RESIDENTIAL LOCATION  
Class by Household Group (Percentages)

Part C.

	Upper Class	Middle Class	Working Cl.	Poor Class	Total
Unrelated Members	4.08	24.49	38.78	32.65	100.0
Nuclear Family	4.94	33.08	47.91	14.07	100.0
Single Parent	7.41	24.44	42.96	25.19	100.0
Younger Couple	6.25	30.36	36.61	26.79	100.0
Older Couple	6.87	30.81	47.16	15.17	100.0
Single Person	3.32	25.09	40.96	30.63	100.0
Total	5.48	29.77	44.88	19.87	

## BIBLIOGRAPHY

Alonso, William, Location and Land Use: Toward A General Theory of Land Rent, Harvard University Press, Cambridge, Massachusetts, 1964.

Brown, Babara J., "How the Baby Boom Lives", American Demography, May 1984, pp. 35-37.

Bureau of the Census, Census of Population and Housing, 1980: Public Use Microdata Samples Technical Documentation, U.S. Department of Commerce, Washington, D.C., 1983.

Curran, Christopher, Carlson, Leonard A. and Ford, David A., "A Theory of Residential Location Decisions of Two-Worker Households", Journal of Urban Economics, July 1982, pp. 102-114.

Easterlin, Richard A., Birth and Fortune: The Impact of Numbers on Personal Welfare, Basic Books, New York, 1980.

Ehrenreich, Barbara, The Hearts of Men: American Dreams and the Flight from Commitment, Anchor Press/Doubleday, Garden City, New York, 1983.

Firey, Walter, Land Use in Central Boston, Greenwood Press, New York 1947.

Follain, James R. and Malpezzi, Stephen, "The Flight to the Suburbs: Insights Gained from an Analysis of Central-City Vs. Suburban Housing Costs", Journal of Urban Economics, May 1981, pp. 381-398.

Freiden, Bernard J. and Solomon, Arthur P., The Nation's Housing: 1975 to 1985, The Joint Center for Urban Studies, Cambridge, Massachusetts, April 1977.

Fuchs, Victor R., How We Live, Harvard University Press, Cambridge, Massachusetts, 1983.

Glick, Paul C., "How American Families Are Changing", American Demography, January 1984, pp. 22-25.

Grubb, W. Norton, "The Flight to the Suburbs of Population and Employment, 1960-1970", Journal of Urban Economics, May 1982, pp. 348-367.

Ingram, Gregory K., Kain, John F. and Ginn, J. Royce, The Detroit Prototype of the NBER Urban Simulation Model, National Bureau of Economic Research, New York, 1972.

Ingram, Gregory K. (ed.), Residential Location and Urban Housing Markets, Ballinger Publishing Company, Cambridge, Massachusetts, 1977.

Kain, John F., Essays on Urban Spatial Structure, Ballinger Publishing Company, Cambridge, Massachusetts, 1975.

Kain, John F. and Quigley, John M., Housing Markets and Racial Discrimination: A Microeconomic Analysis, National Bureau of Economic Research, New York, 1975.

Kern, Clifford R., "Upper-Income Renaissance in the City: Its Sources and Implications for the City's Future", Journal of Urban Economics, January 1981, pp. 106-124.

Keyfitz, Nathan, "Population Appearances and Demographic Realities", Population and Development Review, March 1980, pp. 44-64.

Korbin, Frances E., "The Fall in Household Size and Rise of Primary Individual in the United State", Demography, February 1976, pp. 127-138.

Kostyniuk, Lidia and Kitamura, Ryuichi, "Household Lifecycle: Predictor of Travel Expenditure", in Behaviorial Research for Transport Policy, The 1985 International Conference on Travel Behaviour, April 1985

Leroy, Stephen F. and Sonstelie, Jon, "Paradise Lost and Regained: Transportation Innovation, Income, and Residential Location", Journal of Urban Economics, January 1983, pp. 67-89.

McDonald, Kathie G. and Stopher, Peter R., "Some Contrary Indicators for the Use of Household Structure in Trip-Generation Analysis", Transportation Research Record 944, Transportation Research Board, Washington, D.C., 1983.

Masnick, George and Bane, Mary Jo, The Nation's Families: 1960-1990, The Joint Center for Urban Studies of MIT and Harvard University, Cambridge, Massachusetts, 1980.

Muth, Richard, Cities and Housing: The Spatial Pattern of Urban Residential Land Use, The University of Chicago Press, Chicago, 1969.

Norton, Arthur J., "Keeping Up with Households", American Demography, February 1983, pp. 16-21.

Perin, Constance, Societal Trends and Urban Transportation: Some Key Policy Implications and Suggested Research Directions, U.S. Department of Transportation, Transportation Systems Center, Cambridge, Massachusetts, 1980.

Riche, Martha Farnsworth, "Is the Family Dying?", American Demography, April 1982, p.4.

Robey, Bryant and Russell, Cheryl, "The Year of the Baby Boom", American Demography, May 1984, pp. 19-21.

Russell, Louise B., The Baby Boom Generation and the Economy, The Brookings Institution, Washington, D.C., 1982.

Salomon, Ilan, Lifestyle as a Factor in Explaining Travel Behavior, Phd. Thesis, Unpublished, Department of Civil Engineering, MIT, November 1980.

Skolnick, Arlene S. and Skolnick, Jerome H., Family in Transition: Rethinking Marriage, Sexuality, Child Rearing, and Family Organization, Little, Brown and Company, Boston, 1983.

Spengler, Joseph J., Population and America's Future, W.H. Freeman and Company, San Francisco, 1975.

Straszheim, Mahlon R., An Econometric Analysis of the Urban Housing Market, National Bureau of Economic Research, New York, 1975.

Swedlow, Amy, Bridenthal, Renate; Kelly, Joan and Vine, Phyllis, Household and Kin: Families in Flux, The Feminist Press, Old Westbury, New York, 1981.

Wachs, Martin, "Social Trends and their Implications For Transportation Planning Methods", Resource Paper for the Transportation Research Board Conference on Transportation Planning Methods, Warrentown, West Virginia, 1981.

Warner, Sam Bass, Streetcar Suburbs: The Process of Growth in Boston 1870-1900, Harvard University Press, Cambridge, Massachusetts, 1962.



Weibrod, Glen E., Lerman, Steven R. and Ben-Akiva, Moshe, "Tradeoffs in Residential Location Decisions: Transportation versus Other Factors", Transport Policy and Decision Making, Volume 1, Number 1, 1980, pp. 27-46.

Weicher, John C., Yap, Lorene and Jones, Mary S., Metropolitan Housing Needs for the 1980s, The Urban Institute Press, Washington, D.C., 1982.

Westoff, Charles, "Some Speculations on the Future of Marriage and Fertility", American Demographics, February 1979, pp. 16-19.

Wingo, Lowdon, Transportation and Urban Land, Resources for The Future, Washington, D.C., 1961.

Zimmerman, Carol A., "The Lifecycle Concept As a Tool for Travel Research", Transportation, Number 11, 1982, pp. 51-69.