THE MOBILITY OF THE URBAN POOR

by

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THE MOBILITY OF THE URBAN POOR

ABSTRACT

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The ability to travel from one's residence to possible sources of work is a necessary but not sufficient condition of employment. This research has focussed on the situation in which all requirements for employment were fulfilled except that the job was not accessible to the individual because of transportation difficulties. The purpose of this study was thus to prove (or reject) a relationship between a low level of mobility and poverty.

Few authors have previously been concerned with this issue, and their analyses are largely unsupported by factual evidence. Therefore, the following hypotheses were formulated to empirically test the present and future importance of low mobility as a causal factor of poverty: (I) Employment opportunities are being missed, thus leading or contributing to poverty because of a lack of mobility. (II) Persons of low income are restricted in their choice of residential location to areas that are either within the service area of public transportation or within walking distance of their work. (III) While low-income jobs are centrally located, more productive jobs are located beyond the range of public transportation, which means that an individual would find it difficult to rise out of his low-income status because of mobility problems. (IV) The consequences of low mobility will be much more drastic in the future because job opportunities are being relocated beyond the range of public transportation, which will make it more difficult for the poor to get to a low-skilled job or change to a higher-skilled job.

The available data suggested that the first three propositions were not true for the Boston region at this time. In other words, low-mobility is not a major cause of poverty, does not significantly restrict choice of residential location, and does not markedly curtail opportunities for occupational advancement. On the other hand, data from Los Angeles indicates that the conclusions drawn from the Boston study cannot be considered as generally applicable to metropolitan areas throughout the country. Our analysis of trends in industrial and commercial location suggested that low mobility would restrict all types of opportunities to a great extent in the future, at least greater than at present. Technological improvements in mass transportation could best meet these future needs; at the moment the most attractive proposal to increase the mobility of low-income persons is job jitney.
One of the major efforts of this research was to test the ability of existing data sources to explicitly prove and define a relationship (or lack thereof) between a low level of mobility and poverty. The primary data source examined was the home interview surveys of the Boston (now Eastern Massachusetts) Regional Planning Project, which had been stored on computer tapes at M.I.T. For our purposes, this was an inadequate data source for all but a general view of the problem; because of the omission of some information and difficulties in making full use of the rest, precise results could not be obtained.

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I. INTRODUCTION:
THE IMPORTANCE OF MOBILITY
"The process of development has many components and no one is sufficient in itself to bring about the improvement in living conditions that people and nations are everywhere striving to achieve. But transport has special significance because of the pervasive role of mobility in fostering other objectives. Transport is a necessary ingredient of nearly every aspect of economic and social development. It plays a key role in getting land into production, in marketing agricultural commodities, and making forest and mineral wealth accessible. It is a significant factor in the development of industry, in the expansion of trade, in the conduct of health and education programs, and in the exchange of ideas."

Wilfred Owen,
Strategy for Mobility

INTRODUCTION

The pervasiveness of mobility has now been recognized to the extent that transport is identified and sometimes used as a tool for attacking some of the large-scale problems of our urban society. The addition of urban transportation programs to the "war on poverty" is the most recent instance of an attempt to obliquely solve a pressing problem through the medium of transportation technology. Is there really an important relationship between mobility and poverty? While it appears obvious that, as is the case with other economic goods, those persons not capable of paying very much for transportation can command less in quality and quantity than persons
able to pay more, it is not immediately apparent that the converse is true - that the lack of mobility is a causal factor in their inability to pay. The proposition to be examined here is the latter, restated in the following form: to what extent is a lack of mobility a cause of the poverty of certain individuals and families within our urban areas?

Before determining the size of our slice, it may be worthwhile to examine the whole pie for a moment. The total transport picture was structured in the following manner by a group in Britain:

"The demand for transport is composed of demand for the movement of goods and demand for the movement of people along particular routes and in particular areas. As with demands for other services, the quantity demanded may depend on the price the consumer has to pay and the standard of the service he is offered... three separate problems are recognized:

(a) transport between major centres of population and industry, (or 'inter-urban transport);
(b) transport within cities and towns and especially within the conurbations (..'the urban problem');
(c) transport in small towns and rural communities...
The demand for transport, both inter-urban and urban, is affected by:

(a) the volume, location, and pattern of production...
(b) the size and location of population and levels of personal incomes, which, together with people's social habits and the price of motoring determine the ownership of private cars and the propensity to use them, as well as the usage of public passenger transport.

To reach any judgement about the transport policies that should be followed and the desirable scale of investment in transport, it is necessary to establish:

(a) what the total demand for transport will be and where it will arise;
(b) by which form of transport goods and people may be expected to move;
(c) the extent to which the facilities now available may be expected to deal with the loads falling on each form of transport; and
(d) which form of transport in particular circumstances minimizes the call on community resources. 

This organization is felicitous for it allows us to pinpoint the position of this study in terms of the overall context of transportation requirements, much of which cannot be discussed here. The focus for this research will include only these aspects of the total picture:

(1) Transportation within urbanized areas; (2) the relationship between levels of personal income and levels of mobility; and
(3), the extent to which transportation facilities serve (and should serve) the demands of the low-income urban residents.

We have mentioned two possible approaches to the analysis of how low-income people get around in cities; we should explain the reasons for our particular choice. One could ask how a person's level of income determines his level of mobility, or, alternatively, how his level of mobility determines his income. In other words, does poverty cause low mobility or does low mobility cause poverty? Analysis of the former would depend upon our ability to demonstrate that mobility varies according to level of income. This has already been done well by several authors who have shown that the urban poor are impoverished in the extent and quality of their mobility, as well as in other aspects.
of their lives. But once having demonstrated this fact, we are at a loss as to how to proceed. If a person lacks medical aid, we can predict certain consequences; what follows from the fact of a lack (or a low level) of mobility?

By definition, a person of low mobility could not travel very far, very fast, or very often. In other words, he might not be able to get to some places without a great deal of difficulty, if at all. For example, he might not be able to get to a Saturday night movie. This situation is unfortunate, but it is doubtful that it would do him great harm. In any case, it would be exceptionally difficult to show what harm was specifically attributable to missing the movie. But consider the person who cannot get to a job - or to any job. This situation is more than unfortunate; it is quite harmful because it depresses his income as well as his spirits. The consequences attributable to insufficient or low income in terms of health, family structure, outlook on life, and a number of other factors have been well documented.  

Policy proposals are also evident: if the elimination of poverty is one of the goals of our society, an important method of attack would be to raise the level of mobility of low-income persons. Because of the possible rewards, a study of the relation of mobility to income - not vice versa - seems more promising.

In short, to understand the significance of the proven results to the first question - does poverty cause low mobility? - we must
determine what the consequences of low mobility are. Does low mobility reduce or eliminate job opportunities, thereby causing poverty? Before empirically testing this relationship, we need to examine the phenomenon of poverty in America in order to be able to indicate the importance of mobility as a contributing factor.

**THE CONCEPT OF POVERTY**

The phenomenon of relatively severe deprivation in relation to this nation's general affluence has recently become a prime focus of concern and governmental action. How one defines poverty has been a widely argued topic. The specific income level below which a person can be considered to be living in a state of poverty depends on the source of information used, but the figure of $3,000 per year for a family is generally accepted as "the poverty line." That the poverty line has risen substantially since Robert Hunter suggested as a definition $460 for a family of three in 1904 suggests not only the effects of inflation and an increase in buying power, but also the rising scale of "needs" for the average family. The Council of Economic Advisors has suggested that a more appropriate definition of poverty would be "those who are not now maintaining a decent standard of living - those whose basic needs exceed their means to satisfy them." This definition would seem to call for a variable income level, dependent upon such factors
as family size, family composition by age and sex, and location of the family unit. For example, in the San Francisco Bay Area, it is estimated that $6,638 per year is needed to maintain a "decent" standard of living for a family of four who own a house. 7

"What is particularly striking is that this flexible poverty line yields substantially the same estimate of the number of needy persons in 1963 (34.6 million) as did the single standard applied by the Council of Economic Advisors (33.4 million). But there are significant differences in the composition of the poverty group according to the two estimates. In particular, the flexible standard gives substantially lower estimates of the number of rural and aged poor and substantially increases the estimated number of children in the poverty group. Whichever of these methods of estimation we use, we come up with the bald fact that nearly a fifth of the American population is poverty stricken..." 8

Who are these poor people?

"The majority of low income families are white, non-farm and headed by a male between 25 and 65 years old. Compared with the general population, however, poor families tend to include more non-whites, fewer earners, more families with female heads, larger families, and more old or young persons. The poor more often reside in rural farm areas or in cities (and less often in rural non-farm or suburban areas). Above all, poor people have completed fewer years of schooling than the rest of the population." 9

For the purposes of this study, reclassifying these persons into the following two categories is useful:

"... those where the causes of poverty could be remedied, given adequate employment opportunity, education, job training, health and other social services; and those where the causes are not subject to remedy. The first group includes those who are unemployed or underemployed and those who are temporarily ill, handicapped, or suffer from emotional disturbances for which there is considerable potential for
rehabilitation or recovery. In the second category fall the low income elderly, the chronically ill, and those who are seriously handicapped or emotionally disabled to the degree that rehabilitation seems unlikely.¹⁰

This study is concerned only with the members of the first group, those who could rise out of their poverty given adequate opportunity. These persons may be a relatively small proportion of those considered impoverished: a recent federal study showed that of the more than 7,3 million now receiving welfare payments, only about 50,000 - less than one per cent - are fathers capable of self-support if given vocational training.¹¹ Adding wives and children to these potential employees, we still have allocated only twenty per cent of the total welfare cases to the group whose poverty could be remedied. Within this category, an increase in mobility might prove significant (that is, necessary but not sufficient for employment) for some individuals. Just how significant this might be to how many persons will be discussed later.

RELATIONS BETWEEN MOBILITY AND POVERTY

A few authors have suggested that there is, in fact, a causal relationship between low mobility and low income. For the most part, these statements have been unsupported assertions that one could accept or reject on the basis of the expertise of the author. This section attempts to collect these suggestions and
assertions, and to reformulate them as testable hypotheses that we might examine in the following chapters.

Charles M. Haar, Assistant Secretary for Metropolitan Development of the U.S. Department of Housing and Urban Development feels that "without effective public mass transportation, relief for the conditions of the ghetto is unlikely." Mr. Haar is in a position to act on this opinion, and H.U.D. now has seven mass transportation demonstration projects underway to prove that additional mobility can significantly benefit poor people. The major focal points of these demonstrations have been increased access to jobs and to health services.

The thoughts of the industrial unions on the issue of adequate transportation between one's place of residence and place of work have been enunciated by I.W. Abel, President of the United Steel-workers of America:

"... we believe that workers should be able to live where they want to live and should not be confined to a certain area because of transportation problems. Unfortunately, too many people are forced to select a place to live on the basis of the nearest bus or trolley line... While transportation is no problem for the affluent, it remains a curse for the average worker and those, who by force of circumstances, must rely on public transportation for getting to work, to the shopping center or the doctor's office."

That transportation is a "curse" for the "average worker" seems doubtful; we could better evaluate Mr. Abel's proposition if we had some idea of the wage scale of his average worker. If this person
earns slightly over $3.00 per hour (about $6,000 per year), the probability that he will own a car is .73 if he lives in the Boston Metropolitan Area.\textsuperscript{15} We would expect the average car ownership in other metropolitan areas to be higher than that of the Boston area, which has a very high population density (2,672 persons per square mile, the third highest SMSA density in the country\textsuperscript{16}) and very high auto insurance rates; this would suggest that the damnation imposed by this curse touches only a minority of workers. (We shall try to actually measure this group later.) For those affected, however, the restrictions on home and job locations may be severe, as Mr. Abel contends.

Two social scientists posed the problem in the following manner:

"... our present dual system of transportation (either private auto or mass transit)... keeps poor people close to central interchanges of cheap transportation; this is still close to the central business district, which continues (at a decreasing rate, however) to serve as a source of jobs; this situation makes it difficult for the poor to take jobs in newer, more productive industries which locate on the outskirts, away from mass transit."\textsuperscript{17}

Professor John T. Howard has viewed the problem of low mobility in a similar fashion:

"The urban poor, in large proportions, are cut off from access to many jobs and other opportunities because (a) they do not drive or have no cars, and (b) low-cost public mass transportation does not serve these destinations.... this constitutes a severe deprivation of economic opportunity......."
This situation deserves attention because it contributes to the physical -- and hence to the psychological -- isolation of the segregated poor, who are often also Negro..."18

He also notes the historical change in mobility differentials, which in the end may become a more explosive issue than mobility per se:

"Half a century ago the poor lived in ghettos, but they were within walking or cheap transit distance of most jobs, which were concentrated intown. They could work, mix, and learn with other kinds of people; upward social and economic mobility were facilitated... Industry, shopping centers, and other urban job-producers have... been freed from intown locations by the truck and the auto, and have moved to the suburbs. But they are not served by cheap public transit from the in-city poverty areas. The result is to deprive many low-income, low skilled potential workers of access to jobs that used to be within their reach..."19

Common themes run through these analyses of the effect of mobility on income, but throughout all the issues presented, the pervasive influence of uncertainty is felt. The untested themes asserted here need to be measured and evaluated. The first step is to re-state the asserted relations in terms of testable hypotheses, which will enable us to discuss the mobility-poverty interaction as it exists today (propositions I - III) and as it may be in the future (proposition N.). Through the tests proposed, we expect to be able to say what is the nature and extent of the restrictions that low mobility places on individuals in urban areas, particularly with reference to their ability to obtain satisfactory employment.
Proposition I: Employment opportunities are being missed, thus leading or contributing to poverty, because of a lack of mobility. To prove this requires that we demonstrate the following:
(a) Employment opportunities requiring a certain level of skills (including unskilled labor) are not being filled even though there are persons in the metropolitan area who are unemployed or employed at a skill level lower than their capacity. (b) The reason that such persons have not taken these vacant jobs is that they cannot travel to them.

Proposition II: Persons of low income are restricted in their choice of residential location to areas that are either within the service area of public transportation or within walking distance of their work. This proposition could be proved if we show that:
(a) Low-income persons are "forced" to live in areas of the Boston region served by public transportation in order to work, shop and carry on other activities. (b) Where mass transportation is not available, low-income families live only in high-density areas where many opportunities are available within walking distance. (c) If low-income persons live in low-density areas without mass transit service, they must live within walking distance of their work.

Proposition III: While low-income jobs are centrally located, more productive jobs are located beyond the range of public transportation, which means that an individual would find it
difficult to rise out of his low-income status because of mobility problems. This proposition may be disproved by demonstrating that: (a) Low-income persons cannot change their occupational status. (b) The reason for their occupational immobility is that they cannot travel to higher-skilled jobs because these jobs are not centrally located or served by public transportation.

Proposition IV: The consequences of low mobility will be much more drastic in the future because job opportunities are being relocated beyond the range of public transportation, which will make it more difficult for the poor to get a low-skilled job or change to a higher-skilled job. This proposition could be proved by showing that: (a) Low-skilled jobs are being relocated beyond public transportation. (b) Highly skilled jobs are being relocated beyond public transportation. (c) Low-cost housing is not being built within walking distance of the new suburban jobs. (d) Mass transit is not being extended to the new job opportunities. (e) Unemployment and other deprivations are greater among lower income persons than they were before. (f) Suburban firms must pay higher wages than comparable central city firms to low-skilled workers to help defray their transportation expenses.

Propositions I - III are meant to describe the seriousness of present conditions. If these three propositions can be disproved, we would have cause to maintain that no portion of the poverty problem could be remedied by improvements in the mobility of the
urban poor. On the other hand, the details of a proof of these propositions should indicate the efficacy of various transportation policies designed to alleviate or eliminate poverty. These propositions will be considered in Chapter II. Disproving proposition IV would indicate that a lack of mobility would not be more significant as a cause of poverty in the future than it is now. Chapter III tests proposition IV.

NOTES ON THIS STUDY

The Boston Metropolitan Area was chosen as the locale in which these propositions would be tested. There were two reasons for this choice: the area was close at hand, and there was an unusually large data source on the travel patterns of the area available. This was the origin-destination survey conducted by Wilbur Smith and Associates for the Boston (now Eastern Massachusetts) Regional Planning Project in 1963. The data from these BRPP studies had been placed on computer tapes, which allowed a high degree of flexibility and precision in computation. Other data sources were used to supplement the BRPP information where applicable.

Within the BRPP study area, the town of Framingham was chosen for special study because (1) it contains older, moderate-density areas as well as new low-density developments, (2) it
shows a similar variety of housing costs and conditions, (3) there exist several major centers of employment, representing a variety of skills, and (4), the town is the focal point of one of the most rapidly expanding subregions in the Boston Metropolitan Area. In some sense, therefore, Framingham could be considered a microcosm of the entire region and of the central city also. This town was compared to the city of Boston to point up the differences in trip-making behavior between the poor persons of a suburban community and those of the central city.
NOTES TO CHAPTER I:

1. Hall, The Transport Needs of Great Britain in the Next Twenty Years, p. 1

2. See Chapter II, especially the discussion of tables 2.1 and 2.2 which present the work of Lowry and of Lapin; also see Oi and Shuldiner, An Analysis of Urban Travel Demands pp. 158-169; Martin, Memmott and Bone, Principles and Techniques of Predicting Future Demand for Urban Area Transportation, pp. 39-59

3. See, for example, Ferman, Kornbluh and Haber (ed.), Poverty in America, especially chapters 2, 5 and 6; Irelan and Besner, "Low Income Outlook on Life," in Irelan (ed.), Low Income Life Styles


5. Loc. cit.

6. Ibid, p. 5

8. Gordon, *op. cit.*, pp. 5-6


10. Philadelphia Housing Association, Committee on Low-Income Housing, *Housing Grants for the Very Poor*, p. 4


15. Boston Regional Planning Project survey results


17. Emerson and Campbell, "Social Effects," *Project METRAN*, p. 36

II. PRESENT DEPRIVATIONS DUE TO LOW MOBILITY
"...the fundamental problems of poverty in Watts, which are the same here as in the cities which were racked by the 1964 riots, are intensified by what may well be the least adequate network of public transportation in any major city in America."

Governor's Commission on the
Los Angeles Riots, Violence in the City -- An End or A Beginning?

INTRODUCTION

We should like to be able to prove or disprove the proposition that there is a causal relationship between level of mobility and poverty. Specifically, our most important hypothesis is that certain persons have missed existing opportunities for employment or better employment than they now have only because they cannot travel (within a reasonable time or at a reasonable cost) to the place of work. The distinction between this proposition and the one that certain persons are poor because there is no work that they can do (that is, employment opportunities are missing) should be carefully noted, especially with respect to policy proposals designed to eliminate poverty. If we can show that one's level of mobility contributes significantly to one's income level, then the poverty of some persons might be eliminated by extensions of public transit service or by subsidies for private auto ownership. If, instead, we can prove that there is no causal relationship between mobility and poverty, policy proposals designed to eliminate poverty need
not contain programs involving transportation improvements.

POVERTY AND THE JOURNEY TO WORK

Before we can attempt an explanation of the relationship between mobility and poverty, we need a concise explanation of trip-making behavior. While it has been shown that poor people travel relatively short distances for shopping trips and tend to shop at small, often overpriced, neighborhood stores, it would seem that shopping and other non-work trips (representing expenditures) would play a very small role as causal factors of poverty as compared to the work trip (the source of income). For this reason, we shall concentrate mainly on the work trip in this analysis.

We may think of the journey to work as influenced by three factors: the location of the home (the origin), the location of the employment (the destination), and their separation (the journey). Constraints on each of these factors operate to limit the number of relevant possibilities for each individual or family group. Concerning the housing stock, the most relevant constraint is probably that of the cost of the dwelling unit. Secondly, there would be a whole range of characteristics that would describe the type of dwelling unit. Thirdly, the accessibility of the unit to other places (we omit accessibility to work places for the moment since we wish to consider this separately) would be important. Finally, patterns of ethnic
segregation constitute severe constraints on the choice of a dwelling unit for some minority groups.

With respect to all possible employment destinations, by far the most important constraint would be the type of job opportunities available (by occupation). Other characteristics of the job (such as salary and fringe benefits, personnel relations, and amenity features of the work environment) would provide finer shades of distinction in job choice.

We would expect that there is a definite limit to the extent of the journey that will be taken for work. Since we have restricted ourselves in this study to daily travel patterns alone, we can discount seasonal or weekly migrations of workers to jobs and concentrate on the greatest extent that a person will travel each day to get to his job. This limit, which Zettel has called the "range of effective choice," could be described in one or more of the following terms: cost, time, distance, or effort.

The interaction of these constraints on origin, journey, and destination produce behavior patterns comprised of the following components: (1a) A person will choose a home within a certain radius (defined by any of the four dimensions) of his job, or (lb) a person will choose a job within a certain radius of his home. In addition, (2a) a limit on housing choice (for example, ethnic segregation) would decrease the proportion of jobs of the metropolitan area within the normal radius of travel from home, or
(2b) a limited choice of job locations would increase the demand for available housing within the acceptable radius from the jobs. Finally, (3a) those persons who are most often unemployed and those who change jobs most often would locate where the total number of jobs within the above radius is the greatest, or (3b) those firms relying on part-time, low-skilled labor would locate where the supply of such persons is the greatest.

We can now proceed to quantify some of these relations. First, we note that the number of "opportunities" (for example, jobs) is a function of the radius from the origin and the density of opportunities in the intervening area. (We will speak of the radius in terms of distance for the moment.) This function may then be written as:

\[ N = \delta \pi R^2, \]

where \( N \) = number of opportunities, \( \delta = \) opportunities per sq. mile, \( R = \) distance from origin (miles).

Noting that distance can be written as speed of travel times time spent travelling, we substitute in the above equation to get:

\[ N = \delta \pi (st)^2, \]

where \( s = \) speed (miles per hour), \( t = \) time (hours).

There is some evidence to indicate that "average" travel times to work have not changed substantially in the urban areas of the world over the past century, but that the influence of increased technological capabilities for speed have increased the size of the urban area instead.⁴ As a first guess, then, we might set time travelling, \( t \), equal to some constant (say 40 minutes)⁵ and concentrate on the
effects of speed alone.

It is immediately obvious that speeds vary widely with existing modes of travel. The average person can sustain walking speeds from two to three miles per hour. In our central cities, mass transportation averages about fifteen to twenty miles per hour and automobile travel averages a little less than thirty miles per hour. If we assume that the time spent travelling by each of these modes is roughly the same, then we see that, starting from the same point, the number of opportunities within "commuting time" depends greatly on the mode of travel.

We could rewrite this "opportunities equation" in terms of effort, cost, or time if we wished to do so. We would guess that the most useful of these dimensions would be that of cost; whichever dimension is used, the choice of a particular mode of transportation (with its characteristic speed) greatly influences the number of opportunities within a given area.

The significance of this line of argument should be readily apparent: since poor persons are much less likely to own automobiles than are persons of higher income, the extent of their travel is restricted to a much smaller area than that of persons

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* Figure 2.1 shows that as income level rises, a family is much more likely to own one or two cars than no cars. These curves also show that at any given income level, car ownership is higher in the suburbs than in the central city. For example, at an annual family income level of $5,000, 81 per cent of these families own at least one car in Framingham, while the corresponding figure is only 59 per cent in Boston.
Figure 2.1:
Auto Ownership by Income and Residence

Source: BRAP

Two Cars

One Car

No Car

Per cent of income group with indicated number of cars

Annual family income ($1,000)
of higher incomes. This restriction would automatically lead to persons of low income having correspondingly low levels of opportunities, were it not for two important facts. First, time spent in travelling is not a constant. Poor people can extend their range of opportunities by spending more time in travel. It would seem logical that a person might travel for a long time if this journey meant the difference between eating and not eating. In fact, some poor people travel for extraordinarily long times: the Transportation-Employment Project in Los Angeles found some individuals travelling up to two and one-half hours each way (five hours a day!) from their homes in South Central Los Angeles (Watts and similar neighborhoods) to their jobs. Are such cases exceptional, or do poor persons tend to spend more time travelling? While five hours a day is unusual, figures by occupational group in Philadelphia point to the fact that the poor do travel longer than others with respect to time (see Table 2.1). This table shows that persons at the low end of the skills ladder travel longer (by 50 per cent) to get to work than the members of more lucrative occupational groups. The figures for income group are even more striking than those for occupational group. Data from the Boston Regional Planning Project shows the distribution of trip length time by income for those persons living in Boston and in Framingham (using these towns as the origins of the trips). These figures show conclusively that the poor do travel for longer amounts of time than do their better-off fellow-travellers.
(see Appendix B for a complete discussion of this finding).

**TABLE 2.1:**

MEDIAN TIME-LENGTH OF HOME-TO-WORK TRIPS BY
EMPLOYED HOUSEHOLD HEADS, BY OCCUPATIONAL GROUP \(^8\)

<table>
<thead>
<tr>
<th>Occupational Group</th>
<th>Median trip (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Philadelphia</td>
</tr>
<tr>
<td>Clerical</td>
<td>35</td>
</tr>
<tr>
<td>Craftsmen, Foremen, etc.</td>
<td>33</td>
</tr>
<tr>
<td>Sales</td>
<td>32</td>
</tr>
<tr>
<td>Operatives</td>
<td>30</td>
</tr>
<tr>
<td>Other Labor</td>
<td>28</td>
</tr>
<tr>
<td>Service</td>
<td>27</td>
</tr>
<tr>
<td>Technical and Professional</td>
<td>23</td>
</tr>
<tr>
<td>Proprietors, Managers, etc.</td>
<td>21</td>
</tr>
</tbody>
</table>

The second way that poor persons can make up for restrictions in opportunity due to their lack of mobility is by choosing their place of residence within an area that has a high density of employment opportunities when residences are, in fact, available to them within such areas. (The assumption that opportunity density, particularly that of employment, varies significantly throughout the metropolitan area is not true for all cities; in fact, it may not be true for most cities in the future if trends toward dispersal continue. Even if employment density does vary significantly, low-income residential
areas may not continue to be contiguous to major employment centers, as they have been in the past. These possibilities are discussed in Chapter III.) To what extent do these two substitutions - greater time in travel (to increase the area of opportunities) and selective residential location (to increase opportunity density) - make up for the much slower modes the poor most often use? This will be one of our major areas of concern.

Other authors have gone to great lengths in search of a theory to explain the dynamic relation between house location, job location, and the mode of travel used for the journey to work. Lowdon Wingo and William Alsonso, working concurrently but independently, achieved much the same result in their separate attempts to formulate an economic "model" of residential location. Both authors described the total expenditures of a household in terms of housing costs, transportation costs (to work), and all other expenditures. Wingo felt that "other expenditures" consumed a fixed share of the annual income (making location and transportation costs complementary), while Alsonso treated all three terms as mutually interdependent variables. Wingo's hypothesis was that if a large proportion of the budget is spent for housing, very little will be left to be spent on travelling to work, and vice-versa. In other words, given a certain job location, the choice of a home is limited to those dwelling units that lie below a certain expenditure level for the sum of the cost
of the unit and the cost of travelling to reach it. Alonso, instead
of employing a two-dimensional trade-off between housing and
transportation costs, mapped three-dimensional "indifference
surfaces" such that at any point on the surface, the household
would be equally satisfied by any of the combinations of expenditures
for housing, travel, and other goods.

If one assumes that these abstracted behavior patterns do, in
fact, describe the actual decision-making involved in residential
location, certain implications are clear. For our purposes, the
most important of these is that low-income persons, spending
proportionally greater amounts than higher-income persons on sub-
sistence commodities such as housing and food, have proportionally
less to spend on transportation. This implication is borne out by
actual studies. For many poor people, housing expenditures
are a constant in that the chances of finding anything cheaper are
very small, and a large proportion of the "other" expenditures
are also determined at some minimal level. Since these two factors
are "determined", transportation expenditures are also fixed at a
certain (low) limit, according to the theory. When travelling
expenses would exceed this limit, they are reduced because there
is no other source from which to re-allocate resources to trans-
portation due to the fact that both of the other types of expenditures
have been pared to the bare minimum; the poor have few elasticities
in their budget.
We would expect to find from this theory that the poor would purchase less transportation than those of a higher economic group. Data from the Pittsburg Area Transportation Study substantiates the idea that poor people travel less than other persons; using the PATS data, Ira Lowry\textsuperscript{11} found that persons of lower socio-economic status travelled shorter distances than those of higher status. The differences are shown in Table 2.2 and in Figure 2.2. Table 2.1 showed that the poor travel for greater times over what Table 2.2 shows to be shorter distances than those travelled by more affluent people. In other words, the major effect of their poverty is to relegate them to much slower modes of travel.

\begin{table}
\centering
\caption{TRIP DISTANCE BY SOCIO-ECONOMIC GROUP\textsuperscript{12}}
\begin{tabular}{lll}
\hline
\textbf{group} & \textbf{a} & \textbf{-x} \\
\hline
Managerial and professional & 35.69 & 1.080 \\
Clerical and sales & 37.16 & 1.125 \\
Craftsmen and operatives & 48.47 & 1.470 \\
Laborers, domestic, and service & 60.08 & 1.850 \\
\hline
\end{tabular}
\end{table}

These figures, \(a\) and \(-x\), are the fitted parameters in the equation

\[ \frac{dP}{dr} = ar^{-x} \]

where \(dP/dr\) is the relative frequency (probability distribution) of trip-ends by distance from the origin and \(r\) is the distance from the origin.
An interesting challenge to the theories of aggregated consumer behavior is contained in the work of Lansing and Mueller.\textsuperscript{13} Studying actual behavior in residential location, they found that almost half of those interviewed were not concerned with the nearness to work as a factor in finding a new home. On the other hand, 69 per cent of those actually living less than one mile from work reported that this was a "very important factor" in their choice of a house.\textsuperscript{14} (At distances over one mile, few people walk to work; under one mile, 25 per cent of all workers walk.\textsuperscript{15}) In other words, only for some persons is nearness to work an important factor, but for them it is critical. We would suspect that these persons would be of low-income status; unfortunately, Lansing and Mueller did not test out this proposition.
Two of their other findings raise grave doubts about the applicability of the model offered by Wingo and Alonso: first, that 73 per cent of those who drive cars have not estimated the cost of driving, and secondly, that of those who have estimated the cost and found the cost of driving higher than the cost of public transit, 80 per cent drove although they could have taken mass transportation. Therefore, only for persons of low income could Alonso's and Wingo's theories possibly be substantiated: poor persons tend to live closer to their place of work than more wealthy persons and of all persons living within one mile of their workplace, (1) 69 per cent said proximity to the workplace was very important, and (2), 25 per cent walked to work. In addition, of those households with incomes under $4,000 per year, 52 per cent of those using mass transit for the journey to work had a car available for the trip and did not use it. If the reason they did not use the car was higher cost, the Wingo and Alonso theory would be validated; however, the reason for not using the car was not determined.

All in all, it appears that there is no clear-cut explanation of the relation between the costs involved in household location, job location, and the mode of travel for the journey to work. The explanation offered by Wingo and Alonso appears too simplistic for all persons but the poor, especially in light of the higher substitutabilities available to upper-income families. But at the
moment, we only care about those in a state of poverty. Therefore, while lacking a general theory of urban trip-making behavior, we can now proceed to the analysis of the relationship of mobility to poverty.

I: MISSED OPPORTUNITIES

That someone has missed certain opportunities (because of a lack of mobility, or for any other reason) constitutes a relatively grave situation: specific opportunities have a quality of appearing rarely and disappearing quickly, so that once missed, they are lost. The loss of an employment opportunity is the most serious consequence of a lack of mobility; propositions II, III, and IV deal with other deprivations in a descending scale of seriousness.

What are the ways in which opportunities can be missed? Concentrating on employment opportunities and stipulating that job vacancies do exist, a person could, first of all, miss an opportunity because he was not aware that a certain job existed; because of his lack of knowledge, he would fail to apply for this job. Secondly, he might learn of a job but find that he was not qualified for it; this opportunity would be missed due to a lack of skills. Thirdly, he

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\[\text{x} \] This appears to be a reasonable assumption for the Boston Metropolitan area; a recent survey concluded that unemployment was attributable to personal factors, not the condition of the overall economy. In other words, jobs are not missing, they are being missed.
may learn of a job for which he is qualified but not be able to travel to that job; a lack of mobility destroys this opportunity. A fourth case is that in which he learns of a job that is within his commuting range but another person is accepted instead of him because of superior qualifications, prejudice and discrimination, or other reasons.

Of these possibilities, it is the third - opportunities missed because of a lack of mobility - that concerns us here. To what specific consequences could this restriction lead? The most severe consequence would be the lack of any job: unemployment. Over an extended period of time, poverty would certainly result. Less serious, but still relatively severe would be the inability to obtain a full-time job. Thirdly, obtaining a full-time but lower-paying job could also be an immediate cause of poverty.

Further consequences of a lack of mobility, while not causing immediate poverty, greatly increase the probability of eventual poverty. The first of these is a job with a low probability of future employment; any of a number of jobs where automation has replaced men with machines would be an example of this situation. Secondly, a person may be limited by mobility to a job that is unique; he would face unemployment or underemployment if this job were for some reason eliminated.

Finally, while not producing or leading to poverty, low mobility could still constrain the job opportunities of some persons
to a very narrow spectrum of choice. This could make the chances of finding a stimulating or even satisfactory job rather small. While an individual in such a situation is certainly deprived, and might even be considered psychologically impoverished, his poverty is less pressing than that of the person without a job. Therefore, in examining the consequences of low mobility, we should start at the low end of the scale with those persons currently unemployed due to low mobility.

The first step in proving the contention that certain persons have missed opportunities for employment due to their inability to travel is to show that employment opportunities of a certain skill level are not being filled even though persons of the required skill level are unemployed. Table 2.3 shows the comparison of jobs available in the Boston area and those persons available to fill those jobs. Fifty-five per cent of the unemployed had the requisite skill level for 27 per cent of the job openings. This disparity points up one of the major causes of unemployment: lack of sufficient employment at the low-skilled end of the scale. But some jobs are available; opportunities are not missing, they are being missed.

To find out if these opportunities are being missed due to problems of mobility, the spatial distribution of those persons not employed, and of the current job openings (both by skill level), and of the transportation links that connect the two groups must be known.
TABLE 2.3:

UNEMPLOYMENT vs. UNFILLED JOBS

<table>
<thead>
<tr>
<th>occupation</th>
<th>Per cent of total unemployed</th>
<th>Per cent of total unfilled job openings</th>
</tr>
</thead>
<tbody>
<tr>
<td>laborer</td>
<td>16.8</td>
<td>9.6</td>
</tr>
<tr>
<td>service worker</td>
<td>19.0</td>
<td>9.5</td>
</tr>
<tr>
<td>operative</td>
<td>19.7</td>
<td>7.9</td>
</tr>
<tr>
<td>white collar</td>
<td>15.3</td>
<td>60.0</td>
</tr>
<tr>
<td>craftsman</td>
<td>5.1</td>
<td>13.0</td>
</tr>
<tr>
<td>never worked</td>
<td>13.1</td>
<td>--</td>
</tr>
<tr>
<td>not reported</td>
<td>11.0</td>
<td>--</td>
</tr>
</tbody>
</table>

a: South End survey area, November 1966
b: Boston SMSA, July 1966

No such compilation of these spatial patterns has been made for the Boston Area.

We can start this process by showing unemployment in Boston. This is done in Figure 2.3 with data from the 1960 Census. The greatest unemployment (over 12.6 per cent of the work force of the Census tract) is in South Boston along the South Bay Canal, extending into Roxbury. Portions of the South End and the North End also have unemployment rates above ten per cent of the tract labor force population. We next need to know the skill level of these unemployed persons. This information is not directly available. However, the South End study quoted in Table 2.3 included most of the major areas of unemployment shown in Figure 2.3, which would lead us to believe that most of the unemployment shown pertains to persons of a low-skilled occupational category.
Figure 2.3:
UNEMPLOYMENT IN BOSTON
PER CENT OF CENSUS TRACT LABOR FORCE

LESS THAN 5.0
5.0 - 7.5
7.6 - 10.0
10.1 - 12.6
12.6 AND ABOVE

SOURCE: 1960 U.S. CENSUS
The second step would be to map the distribution of job
vacancies by skill category. The necessary information for this
task is unavailable. We can, however, say what the distribution
of total jobs is in the immediate area according to the BRPP surveys:

TABLE 2.4:
LOW SKILLED JOBS IN SELECTED TOWNS,
BOSTON METROPOLITAN AREA

<table>
<thead>
<tr>
<th>town</th>
<th>sales</th>
<th>operatives</th>
<th>craftsmen</th>
<th>unskilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boston Proper</td>
<td>79,000</td>
<td>18,600</td>
<td>19,450</td>
<td>2,270</td>
</tr>
<tr>
<td>Brighton</td>
<td>5,450</td>
<td>3,000</td>
<td>3,350</td>
<td>365</td>
</tr>
<tr>
<td>Cambridge</td>
<td>8,970</td>
<td>6,580</td>
<td>6,580</td>
<td>612</td>
</tr>
<tr>
<td>Charlestown</td>
<td>2,790</td>
<td>3,840</td>
<td>6,360</td>
<td>860</td>
</tr>
<tr>
<td>East Boston</td>
<td>2,440</td>
<td>2,540</td>
<td>2,770</td>
<td>464</td>
</tr>
<tr>
<td>Fenway - Jamaica</td>
<td>8,920</td>
<td>6,800</td>
<td>4,990</td>
<td>562</td>
</tr>
<tr>
<td>Plain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roxbury</td>
<td>3,260</td>
<td>5,500</td>
<td>3,450</td>
<td>428</td>
</tr>
<tr>
<td>South Boston</td>
<td>6,050</td>
<td>7,070</td>
<td>6,580</td>
<td>1,410</td>
</tr>
<tr>
<td>Totals</td>
<td>116,880</td>
<td>53,930</td>
<td>53,430</td>
<td>6,969</td>
</tr>
</tbody>
</table>

Some of these 230,000 jobs draw applicants from the entire metrop-
olitan area, which increases the competition for them. Still,
when job vacancies are added to this figure, there could be 240,000
low-skilled jobs within two to three miles of the 7,404 unemployed
persons shown in Figure 2.3, 55 to 75 per cent of whom would be
in the low-skilled category, according to the South End survey.
We would thus have 4,500 unemployed persons within a few miles of approximately 240,000 jobs of their skill level.

The third portion of the task of matching unemployed workers and unfilled jobs is to specify the transportation links between them. Since we have been unable to find the specific person (by skill level) for a specific job, we cannot describe actual links, but the general pattern of the public transportation system is worth examining in lieu of the more precise data. Figure 2.4 shows the bus, trackless trolley, streetcar, and subway routes of the Massachusetts Bay Transportation Authority in the center of the Boston Metropolitan Area. How is this transportation network related to the unemployment pattern? Figure 2.5 shows the areas of high unemployment in relation to the accessibility of the transportation network (good accessibility defined as a subway or elevated stop or a bus route within one-quarter mile walking distance of one's home). This figure indicates that the high unemployment areas in Boston have very good public transportation; there are very few areas of high unemployment more than one-quarter mile (and none more than one-half mile) from a rapid transit stop or a bus line.

These rather incomplete data suggest that since (1) the areas of highest unemployment in Boston are very close to a large number of unskilled jobs, and (2) public transportation service in the areas of high unemployment is quite good, lack of accessibility to work is not a causal factor of unemployment in the city of Boston.
FIGURE 2.4:

MBTA TRANSIT SYSTEM

- rapid transit and streetcar lines
- rapid transit stations
- bus and trackless trolley lines

Source: MBTA System Route Map
FIGURE 2.5:

AREAS OF HIGH UNEMPLOYMENT
IN RELATION TO TRANSIT SERVICE

- Census tracts with over 10 per cent of work force unemployed
- High unemployment areas within 1/4 mile of transit service
Can this finding be applied to other areas? Our other test area, Framingham, does not help to answer this question because the unemployment rates are so very low (ranging from 1.0 to 2.9 per cent of the work force in the town's five Census tracts, a total of only 203 persons), but a West Coast study that is currently in progress should answer some of these questions on mobility and unemployment.

The Transportation-Employment Project in the south central area of Los Angeles has just completed a survey of job opportunities in the metropolitan area and of the skill levels of those seeking employment from the project area. This survey indicates that eight of the seventeen major employment centers in Los Angeles are within ten miles (but generally more than five miles) of the project area; there are few jobs within or contiguous to the area. Ten years ago, the average transit speed in Los Angeles during the rush hour was 17 miles per hour, which would place South Central Los Angeles within reasonable commuting time of half of the major work places of the metropolitan area if adequate transit connections were available. The evidence is that they were not. Nine months after the addition of a bus line through the area connecting to two major employment centers, 35 per cent of the riders stated that the new line had enabled them to find jobs. The critical question would appear to be what proportion of the project area work force, not of the bus riders, obtained jobs due to the new bus line. The
actual location, number, and type of job placements that could
be attributed to the inauguration of the bus line is still unknown,
and must be found before the impact of this additional mobility can
be accurately assessed.

These data suggest that mobility is a causal factor of un-
employment and poverty in Los Angeles, even though a role of this
importance could not be assigned to mobility in Boston. What is
the reason for this disparity? It would appear that the foremost
factor would be that of transit accessibility. We found the level
of service of public transportation quite high in Boston, while it
was evidently quite low in Los Angeles. In addition, transit fares
in Los Angeles are more than double those in Boston. Another
contributing factor is undoubtedly the density of development of the
metropolitan area. Densities in Boston are 2,670 persons per
square mile for the entire SMSA and 14,600 for the central city;
it is reasonable to assume that job densities are also quite high,
meaning that walking to many jobs is still feasible. In contrast,
the population density of the Los Angeles SMSA is 1,393 persons per
square mile, one-half that of the Boston region. The conclusion
to be drawn from the discussion of these three factors - transit
service, transit fares, and density - is that the poor in Los Angeles
are relatively worse off than those in poverty in Boston with respect
to job accessibility, according to the opportunities equation
formulated on page 21. Obviously, other cities have to be studied
before factors such as the availability of transit and the efficacy
of walking can be assigned a specific weight in the description
of the opportunities of the poor. The comparison between Boston
and Los Angeles does, however, imply that certain trends in urban
location may create a much more prevasive role for mobility as
a cause of poverty in the future. These trends are discussed in
Chapter III.

An alternative procedure to that of mapping the locations of the
unemployed and relevant job opportunities is to ask unemployed
persons why they think they cannot find work. Such a question was
included in the survey recently conducted in Boston's South End.
This survey found that 3 out of the 137 unemployed persons interviewed
(representing 33 out of the 1507 persons, according to the sampling
techniques used), attributed their employment problems to trans-
portation. This survey sample is too small to give precise results,
but the proportion of those with transportation difficulties in Boston
(2.2 per cent) is the same as (or greater than) in the other cities
across the country in which similar surveys were conducted. The
major fault of this method is that it assumes a knowledge of
available jobs on the part of the subject; such is usually not the case.

These two methods would be used to determine the extent to
which the sub-employed, the under-employed, and the marginally
employed have missed employment opportunities due to low mobility.
We find that the major problem here is the identification of the members of the respective groups.

The sub-employed are defined as those who are (1) out of work and looking for a job, (2) employed on a limited or part-time basis, (3) earning a very low salary (less than $60 per week), (4) the "labor force drop-outs" - those not looking for work, and (5) the "invisible" individuals in society, who may make up as much as 20 per cent of the population of slum and skid-row areas. The first of these sub-groups constitutes the unemployed, whom we have already discussed. The second and third sub-groups could be analyzed as were the unemployed in relation to job openings at a certain skill level. Special surveys by the Bureau of Labor Statistics seem to be the best way of identifying the fourth sub-group; experiments such as that now underway in Los Angeles could have special relevance here by showing or disproving an increase in labor force participation rates in areas where transportation facilities have been added. The second, and to some extent, the fourth sub-group, can be identified in the Census data. As written, the Census tables do not allow the first group to be separated from the third; this problem could be resolved by making the data available on computer tapes, which would facilitate cross-tabulation of such characteristics as weeks worked versus income level. (This has already been done for the "1/1000 Special Census Survey," which does not, however, enable one to determine the residential location
or even the metropolitan area of the respondent.) The fifth sub-group - those persons "invisible" to regular surveying methods - must be omitted from our study due to the inability to identify or locate them.

The recent special census in the South End of Boston sought to enumerate the extent of sub-employment in that area. This survey showed that whereas 6.8 per cent of the labor force could be classified as unemployed, 24.4 per cent were sub-employed. The report contends that the figure for sub-employment in this part of Boston is higher than in any other part of the metropolitan area. Is the sub-employment problem in the South End caused by a lack of mobility? It appears that it is not, for the South End study area contains most of the Census tracts of high unemployment shown in Figure 2.3; Figure 2.5 showed that these areas have good public transportation service.

It is particularly difficult to locate persons who have missed employment opportunities but are not unemployed or sub-employed. Such persons would be classified, according to our discussion on page 32, as under-employed, marginally employed, or unsatisfactorily employed. One way to define the dimensions of the under-employed group would be to consider all those workers in industries that are low-paying or have low prospects of future work as members of this group. This situation is particularly serious for those workers over 45 years of age. To these under-employed we would add those
persons who are in a low-paying occupational group within a viable industrial or commercial enterprise. Intensive surveys of business establishments would be necessary to identify these people. The marginally employed are those who would be unemployed or under-employed if their present job were terminated. As with those persons unsatisfactorily employed, there appears to be no means of adequate measurement of this group other than by intensive home interviews.

Once having identified these groups, we would match their spatial distribution with the distribution of jobs of the relevant skill level and describe the connecting transportation links. Because of our inability to describe the spatial distribution of these groups with existing data sources, these correlations cannot be made here. It would appear from our discussion of the most deprived groups - the unemployed and the sub-employed - that inadequate transportation makes only a miniscule contribution to their deprivation (in the Boston Metropolitan Area). This conclusion could probably apply to the other individuals who can also be said to have missed employment opportunities, although not with such severe consequences as unemployment and sub-employment.

In short, available data indicates that low mobility is not a significant factor in the situation of missed employment opportunities in the Boston Metropolitan Area. Low mobility thus does not cause the greatest deprivation that it might in this area. Propositions
II and III test the current role of mobility as a possible cause of other less severe deprivations.

II: POOR NEIGHBORHOODS AND MOBILITY

We have shown that low mobility is not important as a causal factor of unemployment or sub-employment in the Boston region, and have suggested that low mobility does not significantly contribute to the other possible effects of missed opportunities. A less severe consequence of low mobility than missed opportunities would be restrictions on choice of residential location. One possible restriction would be that persons of low income are "forced" to live in areas served by public transportation in order to work, shop, and carry on other activities. This proposition could be proved if we could show that low-income persons live only in areas served by public transportation.

The first step is to show where low-income persons live in the region. This has been done by town of residence in Table 2.5 and Figure 2.6, which rank the BRPP towns according to the percentage of their population reporting family incomes of under $5,000 per year. Of those six towns with over 30 per cent of the population in this income group, two of them were in the center of the metropolitan region, while the other four were at least eighteen miles from the core. Of the three towns in which more
### TABLE 2.5:

**DISTRIBUTION OF LOW-INCOME PERSONS IN BOSTON**

**METROPOLITAN AREA BY TOWN OF RESIDENCE**

**A. Per Cent of Town Population with Under $5,000 Per Year Family Income**

<table>
<thead>
<tr>
<th>town</th>
<th>Per Cent of Town Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no answer</td>
</tr>
<tr>
<td>Gloucester</td>
<td>9.92</td>
</tr>
<tr>
<td>Roxbury</td>
<td>16.93</td>
</tr>
<tr>
<td>Middleton</td>
<td>18.16</td>
</tr>
<tr>
<td>Dunstable</td>
<td>6.78</td>
</tr>
<tr>
<td>East Boston</td>
<td>9.81</td>
</tr>
<tr>
<td>Ayer</td>
<td>6.83</td>
</tr>
<tr>
<td>Hanson</td>
<td>20.60</td>
</tr>
<tr>
<td>Clinton</td>
<td>4.85</td>
</tr>
<tr>
<td>South Boston</td>
<td>20.92</td>
</tr>
<tr>
<td>Blackstone</td>
<td>24.35</td>
</tr>
<tr>
<td>Rockport</td>
<td>13.03</td>
</tr>
<tr>
<td>Berlin</td>
<td>0.</td>
</tr>
<tr>
<td>Methuen</td>
<td>12.06</td>
</tr>
<tr>
<td>Foxborough</td>
<td>8.85</td>
</tr>
<tr>
<td>Harvard</td>
<td>35.95</td>
</tr>
<tr>
<td>Boston</td>
<td>17.11</td>
</tr>
<tr>
<td>Newburyport</td>
<td>24.94</td>
</tr>
<tr>
<td>Chelsea</td>
<td>7.64</td>
</tr>
<tr>
<td>Malden</td>
<td>22.08</td>
</tr>
<tr>
<td>Lawrence</td>
<td>13.48</td>
</tr>
<tr>
<td>Pepperell</td>
<td>7.69</td>
</tr>
<tr>
<td>Fenway-Jamaica</td>
<td>24.07</td>
</tr>
<tr>
<td>Plain</td>
<td></td>
</tr>
<tr>
<td>Cambridge</td>
<td>8.23</td>
</tr>
<tr>
<td>Upton</td>
<td>2.14</td>
</tr>
<tr>
<td>Bellingham</td>
<td>27.09</td>
</tr>
</tbody>
</table>
TABLE 2.5 (contd.):

B. Number of Poor Persons in Towns with the Highest Percentage of Poor

<table>
<thead>
<tr>
<th>town</th>
<th>approximate population&lt;sup&gt;a&lt;/sup&gt;</th>
<th>per cent under $5,000/year&lt;sup&gt;b&lt;/sup&gt;</th>
<th>number under $5,000/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloucester</td>
<td>25,780&lt;sup&gt;c&lt;/sup&gt;</td>
<td>37.53</td>
<td>9,800</td>
</tr>
<tr>
<td>Roxbury</td>
<td>79,500</td>
<td>35.15</td>
<td>28,000</td>
</tr>
<tr>
<td>Middleton</td>
<td>3,280</td>
<td>34.83</td>
<td>1,140</td>
</tr>
<tr>
<td>Dunstable</td>
<td>856</td>
<td>32.20</td>
<td>275</td>
</tr>
<tr>
<td>East Boston</td>
<td>68,000</td>
<td>30.70</td>
<td>20,905</td>
</tr>
<tr>
<td>Ayer</td>
<td>3,680</td>
<td>30.20</td>
<td>1,105</td>
</tr>
<tr>
<td>Hanson</td>
<td>6,250</td>
<td>29.00</td>
<td>1,810</td>
</tr>
<tr>
<td>Clinton</td>
<td>11,640</td>
<td>27.69</td>
<td>3,220</td>
</tr>
<tr>
<td>South Boston</td>
<td>55,000</td>
<td>26.66</td>
<td>14,620</td>
</tr>
<tr>
<td>Blackstone</td>
<td>4,850</td>
<td>24.50</td>
<td>1,190</td>
</tr>
<tr>
<td>Rockport</td>
<td>5,900</td>
<td>24.28</td>
<td>1,435</td>
</tr>
<tr>
<td>Berlin</td>
<td>1,750</td>
<td>24.00</td>
<td>420</td>
</tr>
<tr>
<td>Methuen</td>
<td>28,114&lt;sup&gt;c&lt;/sup&gt;</td>
<td>23.87</td>
<td>6,700</td>
</tr>
<tr>
<td>Foxborough</td>
<td>11,900</td>
<td>23.19</td>
<td>2,760</td>
</tr>
<tr>
<td>Harvard</td>
<td>6,120</td>
<td>22.19</td>
<td>1,350</td>
</tr>
<tr>
<td>Boston</td>
<td>55,700</td>
<td>21.96</td>
<td>12,220</td>
</tr>
<tr>
<td>Newburyport</td>
<td>13,900</td>
<td>21.70</td>
<td>3,030</td>
</tr>
<tr>
<td>Chelsea</td>
<td>33,749&lt;sup&gt;c&lt;/sup&gt;</td>
<td>21.56</td>
<td>7,300</td>
</tr>
<tr>
<td>Malden</td>
<td>57,676&lt;sup&gt;c&lt;/sup&gt;</td>
<td>21.34</td>
<td>12,100</td>
</tr>
<tr>
<td>Lawrence</td>
<td>70,933&lt;sup&gt;c&lt;/sup&gt;</td>
<td>21.13</td>
<td>15,000</td>
</tr>
<tr>
<td>Pepperell</td>
<td>4,000</td>
<td>20.98</td>
<td>840</td>
</tr>
<tr>
<td>Fenway-Jamaica Plain</td>
<td>113,500</td>
<td>20.87</td>
<td>23,700</td>
</tr>
<tr>
<td>Cambridge</td>
<td>107,716&lt;sup&gt;c&lt;/sup&gt;</td>
<td>20.80</td>
<td>22,400</td>
</tr>
<tr>
<td>Upton</td>
<td>3,600</td>
<td>20.62</td>
<td>740</td>
</tr>
<tr>
<td>Bellingham</td>
<td>6,340</td>
<td>20.60</td>
<td>1,310</td>
</tr>
</tbody>
</table>

a. Found by multiplying the number of interviews by 33.3 for those towns inside Route 128 and by 7.0 for all other towns (see Appendix A, Figure 1). This is not entirely accurate because sampling rates varied substantially from the 3 and 7 per cent reported, the latter being completely erroneous.

b. Per cent reporting this income (see Table 2.5A for %not reporting income).

c. 1960 U.S. Census figures used where the BRPP approximation was greatly in error.
FIGURE 2.6:
PER CENT OF TOWN POPULATION WITH UNDER $5,000 PER YEAR FAMILY INCOME

- under 20 per cent
- 20.00 - 24.99
- 25.00 - 29.99
- above 30 per cent

ATLANTIC OCEAN
than 25 per cent of the population reported incomes less than $5,000 per year, only one could be considered within the center of the region. For those 16 towns where more than 20 per cent of the population reported incomes under $5,000, four were in the center of the region. The figures for these three groups of towns show that towns with a large proportion of poor people are not concentrated in any one portion of the metropolitan area.

Turning from an examination of poor towns to one of poor people, we find that families with incomes under $5,000 per year are concentrated in or near the regional core. Of the 193,370 poor persons in the 25 towns shown in Table 2.5B, 99,445 (49 per cent) live in the five BRPP towns (Roxbury, East Boston, South Boston, Boston, and Fenway-Jamaica Plain) that make up part of the city of Boston. Cambridge and Boston (the above five towns) together house 63 per cent of the poor in these 25 towns. This is a significantly high degree of concentration. For our purposes, the fact that poor persons are concentrated in one portion of the region has more significance than the fact that poor towns are dispersed throughout the region because of our emphasis on the mobility of individuals.

The second step is to determine whether or not towns found to have a high proportion of poor people have transit service. The answer to this question is partially contained in Table 2.6, which indicates that 12.1 per cent of the poor persons in this group of
### TABLE 2.6:

TRANSIT SERVICE IN TOWNS WITH LOW-INCOME POPULATION

ABOVE 20 PER CENT OF TOTAL POPULATION

<table>
<thead>
<tr>
<th>town</th>
<th>per cent of population under $5,000 yearly income</th>
<th>per cent of all persons using mass transit daily within: MBTA service private bus all other area: co. area: towns (poor):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloucester</td>
<td>37.53</td>
<td>3.13</td>
</tr>
<tr>
<td>Roxbury</td>
<td>35.15</td>
<td>27.64</td>
</tr>
<tr>
<td>Middleton</td>
<td>34.83</td>
<td>7.18</td>
</tr>
<tr>
<td>Dunstable</td>
<td>32.20</td>
<td>0.</td>
</tr>
<tr>
<td>East Boston</td>
<td>30.70</td>
<td>23.68</td>
</tr>
<tr>
<td>Ayer</td>
<td>30.30</td>
<td>.79</td>
</tr>
<tr>
<td>Hanson</td>
<td>29.00</td>
<td>3.07</td>
</tr>
<tr>
<td>Clinton</td>
<td>27.69</td>
<td>1.17</td>
</tr>
<tr>
<td>South Boston</td>
<td>26.66</td>
<td></td>
</tr>
<tr>
<td>Blackstone</td>
<td>24.50</td>
<td>0.</td>
</tr>
<tr>
<td>Rockport</td>
<td>24.28</td>
<td>1.44</td>
</tr>
<tr>
<td>Berlin</td>
<td>24.00</td>
<td>3.08</td>
</tr>
<tr>
<td>Methuen</td>
<td>23.87</td>
<td>8.00</td>
</tr>
<tr>
<td>Foxborough</td>
<td>23.19</td>
<td>4.33</td>
</tr>
<tr>
<td>Harvard</td>
<td>22.19</td>
<td>4.71</td>
</tr>
<tr>
<td>Boston</td>
<td>21.96</td>
<td>16.98</td>
</tr>
<tr>
<td>Newburyport</td>
<td>21.70</td>
<td>1.59</td>
</tr>
<tr>
<td>Chelsea</td>
<td>21.56</td>
<td>12.21</td>
</tr>
<tr>
<td>Malden</td>
<td>21.34</td>
<td>12.66</td>
</tr>
<tr>
<td>Lawrence</td>
<td>21.13</td>
<td>4.58</td>
</tr>
<tr>
<td>Pepperell</td>
<td>20.98</td>
<td>0.</td>
</tr>
<tr>
<td>Fenway-Jamaica Plain</td>
<td>20.87</td>
<td>20.69</td>
</tr>
<tr>
<td>Cambridge</td>
<td>20.80</td>
<td>15.70</td>
</tr>
<tr>
<td>Upton</td>
<td>20.62</td>
<td>1.69</td>
</tr>
<tr>
<td>Bellingham</td>
<td>20.60</td>
<td>1.59</td>
</tr>
</tbody>
</table>

Per cent of poor of these towns: 73.0 14.9 12.1

---

a. Includes only Boston, Worcester, and New York, Eastern Massachusetts, Middlesex and Boston, and Plymouth and Brockton street railway companies.
towns have marginal access to public transportation, if any at all. This proportion is significant even though it is small; it indicates that the proposition that poor persons are "forced" to live in areas served by public transportation is too strong; apparently, other substitutions (walking, the purchase of a car, changing one's residential location) can be made to compensate for the loss of public transportation. But while such substitutions are made by some persons, three-fourths of the poor actually live within an area of good mass transportation service.

This analysis is just a first attempt at resolving the issue of a connection between poor neighborhoods and transit. Were we to plot the exact routes of the 20 private bus companies operating in the Boston Metropolitan Area and the routes of MBTA service against the location of poor persons by traffic zone or subzone instead of by town, we would obtain a much clearer picture of the relationship between poor neighborhoods and transit. A further analysis would measure the level of service (particularly frequency) of transit against the locations of the poor. Such analyses are beyond the scope of this project, except for our two "test cases" of Boston and Framingham.

Income distribution within the city of Boston (including the BRPP towns of East Boston, Charlestown, Boston Proper, South Boston, North Dorchester, South Dorchester, Mattapan, Hyde Park, Roslindale, West Roxbury, Fenway-Jamaica Plain, Roxbury, and
Brighton) is sharply differentiated by traffic zone, several of which have as many as 55 per cent of the persons interviewed reporting incomes under $5,000 per year; other traffic zones have no persons in this category. This variation is conclusively not related to variations in public transit service; as indicated in Figure 2.4, transit service is evenly distributed throughout the city, so that almost 100 per cent of the population of most traffic zones is within walking distance (one-quarter mile) of a subway station or bus route. The only exception to this intensive coverage is the southwestern section of the city - Roslindale, Hyde Park, and West Roxbury - where approximately two-thirds of the population is within the specified walking distance to mass transit. In these three towns, the zonal average for per cent of the population answering to incomes under $5,000 per year was 13.34, much less than the city-wide average. 34

Income distribution in the town of Framingham is shown in Table 2.7, which indicates that 80 per cent of those families in Framingham with incomes less than $5,000 per year live in three of the seven BRPP traffic zones in town: Central South, Central North, and Saxonville (see Figure 2.7 for the BRPP zones in Framingham). These particular zones contain the highest residential densities (even though these densities are much lower than those in Boston), the largest proportion of multi-family units, the oldest dwelling units, the greatest proportion of deteriorating
TABLE 2.7:
DISTRIBUTION OF LOW-INCOME FAMILIES IN FRAMINGHAM

<table>
<thead>
<tr>
<th>zone</th>
<th>per cent of persons answering $0-3999</th>
<th>$4,000-4,999</th>
<th>under $5,000</th>
<th>number of persons under $5,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central South</td>
<td>11.05</td>
<td>5.86</td>
<td>16.91</td>
<td>1,175</td>
</tr>
<tr>
<td>Central North</td>
<td>3.96</td>
<td>7.12</td>
<td>11.08</td>
<td>990</td>
</tr>
<tr>
<td>Salem End</td>
<td>1.74</td>
<td>2.60</td>
<td>4.34</td>
<td>130</td>
</tr>
<tr>
<td>Framingham Ctr.</td>
<td>2.70</td>
<td>3.21</td>
<td>5.91</td>
<td>230</td>
</tr>
<tr>
<td>Nobscot</td>
<td>.98</td>
<td>2.79</td>
<td>3.77</td>
<td>170</td>
</tr>
<tr>
<td>Saxonville</td>
<td>.83</td>
<td>1.47</td>
<td>2.30</td>
<td>365</td>
</tr>
<tr>
<td>Shoppers' World</td>
<td>.85</td>
<td>.76</td>
<td>1.61</td>
<td>105</td>
</tr>
</tbody>
</table>

units, and the greatest number of low-cost housing units (see Table 2.8).

Figure 2.8 shows the existing bus routes within Framingham. From this map, the proportion of the population of each zone within one-quarter mile of a bus stop or a route serving intra-town travel (the inter-town bus lines were excluded) was calculated. Table 2.9 and Figure 2.9 compare income level, transit accessibility, and transit usage. There appears to be no correlation between the per cent of low-income families and the per cent using mass transit, nor does there seem to be any correlation between per cent of low-income families and per cent of population within walking distance of transit. (Of course, what we would really like to know is what percentage of the poor were within walking distance of transit. This information was not obtained in the BRPP survey.) There does appear
TABLE 2.8:

DWELLING UNIT CHARACTERISTICS

<table>
<thead>
<tr>
<th>zone or area</th>
<th>d.u./sq.mile</th>
<th>per cent multi-family units</th>
<th>% houses under $10,000</th>
<th>% apts. under $80/mo.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central South</td>
<td>1 010</td>
<td>31.51</td>
<td>8.6</td>
<td>43.2</td>
</tr>
<tr>
<td>Central North</td>
<td>1 600</td>
<td>37.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Framingham Center</td>
<td>1 150</td>
<td>10.00</td>
<td>5.3</td>
<td>39.6</td>
</tr>
<tr>
<td>Shoppers' World</td>
<td>697</td>
<td>2.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salem End</td>
<td>224</td>
<td>2.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nobscot</td>
<td>117</td>
<td>0.00</td>
<td>1.8</td>
<td>6.9</td>
</tr>
<tr>
<td>Saxonville</td>
<td>690</td>
<td>2.75</td>
<td>4.4</td>
<td>35.8</td>
</tr>
<tr>
<td>Framingham total</td>
<td>618</td>
<td>16.2</td>
<td>5.95</td>
<td>41.3</td>
</tr>
<tr>
<td>Boston (city)</td>
<td>14 600</td>
<td>(a)</td>
<td>26.20</td>
<td>52.5</td>
</tr>
<tr>
<td>Boston SMSA</td>
<td>2 672</td>
<td>(a)</td>
<td>11.60</td>
<td>45.4</td>
</tr>
</tbody>
</table>

(a) This information could not be obtained.

to be a definite correlation between transit availability and transit usage, which we would expect to find.
Figure 2.8: Area served by intra-town bus routes
TABLE 2.9:
TRANSIT USAGE IN FRAMINGHAM

<table>
<thead>
<tr>
<th>zone</th>
<th>% under $5,000 yearly income</th>
<th>% within walking distance of transit</th>
<th>% using transit daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central South</td>
<td>16.91</td>
<td>20</td>
<td>2.82</td>
</tr>
<tr>
<td>Central North</td>
<td>11.08</td>
<td>90</td>
<td>3.23</td>
</tr>
<tr>
<td>Salem End</td>
<td>4.34</td>
<td>10</td>
<td>2.47</td>
</tr>
<tr>
<td>Framingham Center</td>
<td>5.91</td>
<td>90</td>
<td>5.26</td>
</tr>
<tr>
<td>Nobscot</td>
<td>3.77</td>
<td>10</td>
<td>.44</td>
</tr>
<tr>
<td>Saxonville</td>
<td>2.30</td>
<td>80</td>
<td>4.94</td>
</tr>
<tr>
<td>Shoppers' World</td>
<td>1.61</td>
<td>55</td>
<td>3.41</td>
</tr>
</tbody>
</table>

**Figure 2.9:**
TRANSIT USAGE IN FRAMINGHAM

*Source: BHPP Surveys*
Great care must be taken in drawing general conclusions from such a small study. Still, this examination of location within Framingham does support the conclusion that the data for the region suggested to us on page 52: that to say that low-income persons are "forced" to live in areas served by mass transit is too strong a statement. This analysis of micro-location in Framingham suggests that the hypothetical connection between poor neighborhoods and transit may not be valid at all; low-cost housing may be a better predictor of the location of poor persons than is the location of public transportation. Low-cost housing often happens to be older housing, which was built before the primary dependence on the automobile and thus was built at densities at which public transportation made good economic sense. Thus, while a correlation exists between poor neighborhoods and transit, it would be illusory to consider this a causal connection. The proposition that poor persons are "forced" to live in areas served by public transportation is not valid.

In our discussion poor neighborhoods and transit, we found a significant proportion of persons (12.1 per cent of the poor in 25 towns selected on the basis of a high proportion of poor persons) having marginal access or none at all to public transportation. How do these persons travel to work, shopping, and recreation? One possible explanation is that in areas where low income jobs are available but there is no mass transit, low income persons must live within walking distance of their work. We will attempt to prove
this proposition by showing that when mass transportation is not available, low-income families live only in high-density areas where many opportunities are available within walking distance or that when they live in low-density areas, low-income persons live within walking distance to work.

Table 2.10 shows the population density of the 25 towns with a high proportion of poor persons. From this table we see that families in poverty do, in fact, live in low-density areas. Comparing this table with Table 2.6, we find that the following towns have population densities less than 5,000 persons per square mile and have very low rates of transportation usage: Dunstable, Ayer, Hanson, Gloucester, Rockport, Berlin, Newburyport, Upton and Bellingham. It is likely that Clinton, Blackstone, and Pepperell would also be included in this category if their population density was known. In other words, 10 per cent of the poor persons of these selected towns live in low-density areas where mass transportation usage (and facilities) are minimal or non-existent. How do these poor persons travel in such areas?

We suggested on page 25 that one method of getting around in such areas would be to choose a residential location such that travel distance would be minimized and walking would be possible. Do poor people actually choose their work and residential locations in low-income areas so that they can walk to work?
### TABLE 2.10:

**POPULATION DENSITY OF TOWNS WITH HIGH PROPORTION OF POOR PERSONS**

<table>
<thead>
<tr>
<th>town</th>
<th>persons under $5,000 income per cent</th>
<th>number</th>
<th>a) population density (persons/sq. mile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloucester</td>
<td>37.53</td>
<td>9,800</td>
<td>unurbanized</td>
</tr>
<tr>
<td>Roxbury</td>
<td>35.15</td>
<td>28,000</td>
<td>10,000 +</td>
</tr>
<tr>
<td>Middleton</td>
<td>34.83</td>
<td>1,140</td>
<td>unurbanized</td>
</tr>
<tr>
<td>Dunstable</td>
<td>32.30</td>
<td>275</td>
<td>unurbanized</td>
</tr>
<tr>
<td>East Boston</td>
<td>30.70</td>
<td>20,900</td>
<td>10,000 +</td>
</tr>
<tr>
<td>Ayer</td>
<td>30.20</td>
<td>1,108</td>
<td>unurbanized</td>
</tr>
<tr>
<td>Hanson</td>
<td>29.00</td>
<td>1,810</td>
<td>unurbanized</td>
</tr>
<tr>
<td>Clinton</td>
<td>27.69</td>
<td>3,220</td>
<td>(n.a.)</td>
</tr>
<tr>
<td>South Boston</td>
<td>26.66</td>
<td>14,620</td>
<td>10,000 +</td>
</tr>
<tr>
<td>Blackstone</td>
<td>24.50</td>
<td>1,190</td>
<td>(n.a.)</td>
</tr>
<tr>
<td>Rockport</td>
<td>24.28</td>
<td>1,435</td>
<td>unurbanized</td>
</tr>
<tr>
<td>Berlin</td>
<td>24.00</td>
<td>420</td>
<td>unurbanized</td>
</tr>
<tr>
<td>Methuen</td>
<td>23.87</td>
<td>6,700</td>
<td>unurbanized</td>
</tr>
<tr>
<td>Foxborough</td>
<td>23.19</td>
<td>2,760</td>
<td>unurbanized</td>
</tr>
<tr>
<td>Harvard</td>
<td>22.19</td>
<td>1,350</td>
<td>unurbanized</td>
</tr>
<tr>
<td>Boston</td>
<td>21.96</td>
<td>12,220</td>
<td>10,000 +</td>
</tr>
<tr>
<td>Newburyport</td>
<td>21.70</td>
<td>3,030</td>
<td>unurbanized</td>
</tr>
<tr>
<td>Chelsea</td>
<td>21.56</td>
<td>7,300</td>
<td>10,000 +</td>
</tr>
<tr>
<td>Malden</td>
<td>21.34</td>
<td>12,100</td>
<td>10,000 +</td>
</tr>
<tr>
<td>Lawrence</td>
<td>21.13</td>
<td>15,000</td>
<td>5,000 - 10,000</td>
</tr>
<tr>
<td>Pepperell</td>
<td>20.98</td>
<td>840</td>
<td>(n.a.)</td>
</tr>
<tr>
<td>Fenway-Jamaica Plain</td>
<td>20.87</td>
<td>23,700</td>
<td>60% 10,000+; 40% 5,000+</td>
</tr>
<tr>
<td>Cambridge</td>
<td>20.80</td>
<td>22,400</td>
<td>10,000 +</td>
</tr>
<tr>
<td>Upton</td>
<td>20.62</td>
<td>745</td>
<td>unurbanized</td>
</tr>
<tr>
<td>Bellingham</td>
<td>20.60</td>
<td>1,310</td>
<td>unurbanized</td>
</tr>
</tbody>
</table>

Per cent of these towns:  
- 5,000 - 10,000: 11.75  
- unurbanized: 18.0  
- 10,000 +: 70.25

---

**Note:**  
- **a)** Source: BRPP surveys and U.S. census  
- **b)** Source: the Boston Regional Survey, Mass Transportation Commission,  
- **c)** A portion of the town (less than 35 per cent) is urbanized at densities less than 5,000 persons per square mile.  
- n.a.: Information not available; these towns not included in percentage calculations.
The data to answer this question was collected in the BRPP surveys but it is not in a usable form. The analysis we should like to make is that of residence versus income level versus mode of travel to work. In other words, in towns where no transit is available, how do low-income persons get to work? It is not possible to examine these three variables simultaneously because they are not contained in the same computer tape. (See Chapter V for a full discussion of this problem.) The best we can do is rather tenuously approximate this analysis.

A first test would be to find the percentage of persons walking to work in the towns identified as being low density, having a high proportion of poor families, and having little or no mass transportation service. Mode of travel by town of work rather than by town of residence was chosen in an attempt to eliminate some (an unknown quantity) of the more wealthy residents of these towns on the basis that poor persons, who travel shorter distances to work than more wealthy persons (see page 28) would be more likely to work in their town of residence than would the more wealthy individuals. Furthermore, it does not seem likely that these towns would attract many workers from outside the town limits. Therefore, Figure 2.10 seems to be a valid indication of how poor persons get around. This figure shows that the poor use modes other than walking to get to work: the per cent of the poor in the town population is greater than the per cent of all persons walking in that town to work in two-thirds of the
WALKING TO WORK IN POOR TOWNS

PER CENT OF POPULATION CLASSIFIED AS POOR

PER CENT OF WORKERS WALKING

% WALKING = % POOR

GLOUCESTER
DUNSTABLE
AYER
HANSON
CLINTON
BLACKSTONE
ROCKPORT
BERLIN
NEWBURYPORT
PEPPERELL
BOSTON
BELLEWILLIAM
towns shown.

Other tests were run, particularly for Framingham, in an attempt to approximate the residence versus income level versus mode to work analysis. Residence versus income level versus trip cost was examined under the assumption that a trip of no cost would be a walking trip. An unusually high percentage of trips (above 85) was found in the no cost category; this led to a re-examination of the assumption that no cost indicated walking trips. It was decided that school bus and most auto passenger trips also involved no out-of-pocket expenses, and this test was therefore rejected. The use of license status was considered as a substitute for income level (there is a close correlation between the two), but was rejected because we want to be sure to identify those poor persons who drive. Another possible test would be to substitute the category "mode" (which pertains to work and school trips only) and analyze residence versus income level versus "mode". The difficulty with this is that walking is not included as a mode of travel in the breakdown of the "mode" category! This method was also rejected.

It is obviously not possible to find out with the present data format how many people walked to work in low-income towns with no transit service. But assuming that people didn't walk, what other mode might they use? Auto driver or auto passenger are two possible modes, and taxi passenger is a third, although improbable, one. Because of the difficulty in determining an accurate modal
breakdown, car ownership was substituted as an approximation of mode under the assumption that those families who owned a car would use it. \(^\text{38}\)

Figure 2.11 shows residence versus income level versus auto ownership (also see Figure 2.1 on page 23). Looking at the Framingham end of the scale, Figure 2.11 clearly shows that persons of a particular income level are more likely to own an auto if they live in low-density areas than if they live in high-density areas. This is just as true for the lowest income level ($0 - 3,999 per year) as it is for the next two highest income levels.

Another method of proving the proposition that persons of low mobility are restricted in their choice of residential location to housing units in areas served by public transportation would be to show that low-cost housing is vacant in areas that lack public transportation. If we could show that this were true, then we could say that this restriction is in force. However, just because low-cost housing is not vacant in areas with no public transportation does not prove that this restriction does not operate; the low-cost housing may be inhabited by persons of moderate incomes or of higher mobility. An alternative test would be to examine the vacancy rates of public housing in areas of varying transportation service since this housing is only open to low-income persons. The problem here is that non-economic factors - political and "image" considerations are particularly important in the
FIGURE 2.11:
AUTO OWNERSHIP
BY INCOME & DENSITY

PER CENT NOT OWNING AUTO

POPULATION DENSITY (1000 PERSONS/ SQ. MILE)

FRAMINGHAM
CENTRAL NORTH
FRAMINGHAM CENTER
CENTRAL SOUTH
SAXONVILLE

BOSTON

$0-3999
$4-4999
$5-5999
suburbs - also operate on the supply side of public housing.

Further research is necessary to control such variables in the test of this proposition.

From this limited analysis, we have found that the restraints on housing choice for persons of low income do not affect all low-income persons. The analysis of public transportation service areas showed that low income persons are not restricted to housing units in areas of mass transportation and we found evidence that the proposition that persons of low income must live within walking distance of their place of work in areas where mass transportation is not available is also not true. We saw that low-income persons use modes other than walking to get to work and that low-income persons living in low-density areas more often own cars than persons of the same income bracket who live in moderate to high-density areas. There appear to be some elasticities in the budgets of the poor after all.

It is difficult to say whether low-income persons living in suburban communities are better or worse off than their more numerous counterparts living in the regional core and depending on mass transportation. In general, the mobility of the former group is probably higher than the latter, but this mobility may well have been purchased at a price they can ill afford to pay. On the other hand, this mobility could be an important factor in eventually overcoming
their poverty. The effects of auto ownership will be discussed further in our examination of alternative policy proposals in Chapter IV.

III. PHYSICAL AND OCCUPATIONAL MOBILITY

In our discussion of the first two propositions, we have not been able to prove that low mobility either causes poverty or restricts residential location for persons within the Boston region. A less serious consequence of low mobility could be that persons of low-income status, while not in poverty, cannot change their low-income status. Our third proposition is that while low-skilled jobs are centrally located, more productive jobs are located beyond the range of public transportation, which means that an individual would find it very difficult to rise out of his low-income status because of mobility problems. To prove this proposition, we must first demonstrate that low-skilled persons cannot change their occupational status, and secondly that this is due to an inability to travel to higher-skilled jobs.

Information on career mobility is not as precise as we would wish, particularly with respect to detailed occupation and residence location of the persons studied. In addition, rates of career mobility seem to depend to a large extent on the region studied and the date of the study. For example, previous studies in career mobility have generally found that no more than 50 per cent of the population moves out of the occupational class in which the first
position was held; one of the most recent studies has found that the rates may be much higher. That this study was done in a rapidly growing industrial region - the "Crescent" area of North Carolina - may have significantly affected the findings of this research. Indeed, the author qualifies his findings by stating that "in an industrially advanced region, where the best jobs require high levels of education or technical training, career mobility tends to give way to inter-generational mobility achieved through education."

What these references imply for the Boston region is that a significant portion of all low-skilled workers in the area (probably over 50 per cent) do not change their low-skilled status. Of those persons that do not change their status, how many of them do not change because of their lack of ability to travel to a job?

For persons of low income, lack of ability to travel to a particular job would mean that the job could not be reached using mass transit facilities, or, where there was no mass transit, by walking from home. Are the higher-skilled jobs of the region beyond the range of public transit?

Many of them are not. Table 2.4 showed that in the center of the region (the BRPP towns of Boston Proper, Brighton, Cambridge, Charlestown, East Boston, Fenway-Jamaica Plain, Roxbury, and South Boston), there were some 224,000 persons employed as salesmen, operatives and craftsmen; if wage data gathered in the BRPP survey is any indication, some of these jobs
should probably be placed in an intermediate skill category. In addition, 113,420 persons had jobs in the highest skill categories - professional, proprietors, and travelling salesmen - in these towns, which comprise about one-half of the area served by the metropolitan transit authority (and account for a much larger proportion of the population and jobs within the MBTA area).

Thus, while poor persons are undoubtedly deprived of the opportunity to travel to some higher skilled jobs in suburban areas, the regional center (which has good transit service) has a great number of higher-skilled jobs. If low-skilled persons cannot change their occupational status, this does not appear due to a lack of mobility but to some other factors.

PRESENT DEPRIVATIONS DUE TO LOW MOBILITY

Low mobility is not presently a significant source of deprivation of opportunity - opportunity to get a job, to choose a house, or to change a job - for persons identifiable at the level of detail of existing data sources of the Boston region. This must be accepted as a tentative conclusion only; much of the data needed to answer the tests of the three propositions we attempted to prove is overly generalized, inappropriately structured, or missing. There is also no evidence that conclusions drawn for the Boston region is generally applicable to the other metropolitan areas in
our country. If not so important now, will low mobility be a more significant cause of deprivation of opportunity in the future? The next chapter attempts to answer this question.
NOTES TO CHAPTER II:

1. Richards, in Irelan, ed., *Low-Income Life-Styles*, pp. 75-76

2. Meyer, Kain, & Wohl, *The Urban Transportation Problem*, Chapter 7, find that ethnic segregation causes most members of minority groups to spend more on housing and less on transportation than they would prefer.


5. Two-thirds of all work trips were less than 40 minutes in length in Philadelphia in 1956 according to Lapin, *Structuring the Journey to Work*, p. 82. The median trip length was 30 minutes in Philadelphia and 27 minutes in the SMSA (p. 80). This limit also includes the great majority of trips in the Boston area (see Appendix B).


8. Lapin, *op. cit.*, p. 80
9. Wingo, Transportation and Urban Land; Alonso, Location and Land Use

10. Richards, op. cit. pp. 71-72; Ferman, Kornbluh and Haber, Poverty in America, pp. 39-42

11. Lowry, A Model of the Metropolis

12. Ibid., p. 67

13. Lansing & Mueller, Residential Location and Urban Mobility

14. Ibid., p. 41

15. Ibid., p. 54

16. Ibid., p. 72

17. Ibid., p. 93

18. Ibid., p. 89


20. Ibid. This Table is indicative of the difficulties one encounters in attempting to gather meaningful data on skill levels of the unemployed and job vacancies. The unemployment figures pertain to the survey area (only a portion of the city of Boston),
while the job vacancies are listed for the entire metropolitan area. The population of the survey area was 58,107 but, of course, not all these persons are in the labor force. Furthermore, these are only the vacancies listed with the Massachusetts Division of Employment Security. Such listings have been shown by survey to represent one-third of the jobs in the metropolitan region. By this figuring 30,000 unfilled jobs are represented in Table 2.3, although it is doubtful that the relative proportions for the 20,000 not directly shown are the same as for the 10,000 jobs directly listed with the D.E.S.

21. The complete definitions of these occupational categories are sales: store and office clerks, salesmen (other than travelling), etc.; operatives: operatives and semi-skilled workers; craftsmen: craftsmen, foremen, skilled laborers, etc.; and unskilled: laborers and unskilled workers.

22. These figures are only approximate because of the difficulty in determining how many persons were represented by one interview in the BRPP survey (see Chapter V). The procedure used was to multiply those surveyed by 33 for persons from those towns inside Route 128. However, the sampling rates varied by town and some unknown members of persons working in the core area came from communities outside Route 128. This low level of accuracy is all than can be obtained with the data in
its present form.

23. U.S. Census

24. Transportation-Employment Project, op. cit., pp. 10-13

25. Ibid., Map 1


27. Governor's Commission on the Los Angeles Riots, Violence in the City - An End or a Beginning?

28. Transportation-Employment Project, op. cit., p. 8


30. Sub-Employment ... op. cit.

31. Ibid., p. 5

32. Ibid., p. 22

33. The figure of $5,000 per year was chosen because a wider range of trip-making behavior could be examined than if only one group were studied. (The Wilbur Smith study for the Boston area listed persons from no income to $3,999 per year in one category.) Furthermore, use of only the lowest income group would not
have given a large enough sample population in one suburban
test area, Framingham.

34. All data concerning demographic characteristics or trip-making
behavior is from the Boston Regional Planning Project surveys
unless otherwise noted.

35. Structural condition data gained from personal work in the
Framingham Community Renewal Program; the results have
not yet been published.

36. Bus routes from Framingham Planning Board (C.E. Downe,
consultant), Traffic Study, Phase II 1962. The routes shown are
those of the Boston and Worcester company.

37. The "per cent of workers walking" is, in fact, the per cent
of workers answering "walk or no answer" to the question
"What was your first mode of travel to work on the previous day?"
This means that the actual per cent walking would be lower than
that shown by some indeterminable amount. This type of coding
for this question is indicative of the unimportance attached to
walking as a mode of travel in transportation studies.

Also, the use of "first mode" instead of major mode of travel
undoubtedly introduces further errors into our analysis. The
magnitude of these errors is also unknown (see Chapter V).
38. There is some evidence (mostly undocumented) that this
   generalization is less true for poor people, for whom a car is
   a status symbol to be parked in front of the house and polished.
   Its use as a machine for transportation is of secondary importance.

39. N. Rogoff, quoted in Simpson, "Occupational Careers and
   Mobility", in Chapin & Weiss (ed.), Urban Growth Dynamics,
   p. 411.

40. Simpson's own work presented in the previous reference.

41. Ibid., p. 417
III. DEPRIVATIONS IN THE FUTURE METROPOLIS
"...not houses finely roofed or the stones of walls well-built... make the city, but men able to use their opportunity."

Alcaeus (611 - 580 BC)

INTRODUCTION

We suggested in Chapter II that the ability to travel was one of the major factors in determining the number of opportunities available to a person, and saw how mode of travel had a direct bearing on this relationship in our present cities. How will mobility influence income in the future? In this chapter we will attempt to identify certain trends that may be projected to suggest possible locational patterns, and from these, requirements for mobility in the future metropolis.

As previously mentioned, the predominant mode of travel exerts a great influence on the size of the metropolitan area. In other words, 100 per cent of the metropolitan area is accessible by the predominant mode of travel. This line of thinking illuminates the concept of differentials in the relationship between mobility and opportunity. In the ancient cities, walking was the predominant mode of travel and everyone, the poor and the rich, had equal access (in terms of mobility) to all the opportunities of the city. The addition of mass transportation to the urban environment created
a distinct division between those who could pay for this transportation and those who could not. For the more fortunate, 100 per cent of the city was still accessible to them. The less fortunate walked; perhaps 75 per cent of all home-job connections were within their means of transportation. The advent of the automobile has led to a great increase in the scale of the metropolis. One hundred per cent of all opportunities are now available to users of this mode, but the distinction between the haves and the have-nots has become severe. In a city that developed before the auto was extensively used (such as Boston), over 50 per cent of all jobs are now accessible by mass transit and many are accessible by foot. In cities that have seen extensive growth since the automobile came into use (such as Los Angeles), few jobs are accessible by transit and by foot.

That poor people are deprived of some opportunities because they cannot afford the costs of the predominant mode of travel is unquestionable. Given current trends in job locations and present methods of financing personal transportation, it is also apparent that this proportional deprivation will increase. Does this mean that a larger per cent of higher paying jobs will be beyond the range of the poor? Does it mean that a larger proportion of lower paying jobs will be beyond their reach? The consequences of each of these situations are quite different. A person in poverty who cannot get to a high-paying job cannot raise his income; if he
cannot get to a low-paying job he will have no income. The latter is clearly the more serious situation. It will be discussed first in this chapter on mobility and poverty in the future metropolis.

GENERAL LOCATIONAL TRENDS IN EMPLOYMENT

The relative dispersion of economic activity that has been taking place in this country is apparently continuing unabated. For example, the New York Times recently quoted a Labor Department survey showing that "62 per cent of industrial construction and 52 per cent of commercial construction in the country's metropolitan areas in the last five years occurred in the Suburbs."\(^2\) Technological advances in power (high voltage electrical transmission), communications (telephones, computers), and transportation (piggyback, containerization) have permitted the dispersion of industrial activity, while positive forces for decentralization have come from technical advances in production (extensive mechanization, the use of heavy machinery, and horizontal assembly techniques). Other social factors (the dispersion of employees' residences and the mobility of capital) have also contributed to the outward push in plant location.

Although several authors have attempted an analysis of locational changes over the past several decades, these studies do not generally include the level of detail in location or occupational
subgroup (apparently no possible interaction has been recognized) needed for this analysis. Creamer notes only that in the period 1947-1958, in which "the real net stock of fixed capital used in manufacturing increased by as much as 40 per cent," the central cities declined in manufacturing employment (by 14 per cent), their suburban areas increased, and all other areas held a constant share of the employment. These trends continued from 1958 to 1961.

These data are shown in Table 3.1

**TABLE 3.1**

RELATIVE SHARE OF MANUFACTURING EMPLOYMENT BY LOCATION

<table>
<thead>
<tr>
<th>type of location</th>
<th>% of Manufacturing Employment</th>
<th>Per cent change in share</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1929</td>
<td>1947</td>
</tr>
<tr>
<td>A ...............</td>
<td>37.0</td>
<td>35.8</td>
</tr>
<tr>
<td>B ...............</td>
<td>3.1</td>
<td>2.6</td>
</tr>
<tr>
<td>C ...............</td>
<td>18.7</td>
<td>21.6</td>
</tr>
<tr>
<td>D ...............</td>
<td>6.3</td>
<td>5.0</td>
</tr>
<tr>
<td>E ...............</td>
<td>1.8</td>
<td>1.6</td>
</tr>
<tr>
<td>F ...............</td>
<td>7.9</td>
<td>10.9</td>
</tr>
<tr>
<td>G ...............</td>
<td>25.3</td>
<td>22.5</td>
</tr>
</tbody>
</table>

The seven types of location are:

A: principal city in industrial area
B: satellite city of 100,000 or more in industrial area
C: remainder of industrial area
D: city of 100,000 or more outside industrial area
E: remainder of county for "D" city
F: important industrial county outside industrial areas having 10,000 manufacturing employees but no city over 100,000
G: all other areas
Meyer, Kain, and Wohl are slightly more helpful. They break down growth in employment between the central cities and suburban areas into four occupational categories, manufacturing, wholesaling, retailing and services. Table 3.2 shows that the growth of the suburbs far exceeds that of the central city, which, in some cases, even registered a decline. It should be noted, however, that the central city still offers many opportunities for employment than do other areas. Data from New York City indicates that the share of employment in central areas in wholesaling, retailing, and services may generally be much greater than the share of manufacturing in the central city. It appears, however, that this

### TABLE 3.2

MEAN ANNUAL PERCENTAGE CHANGES IN POPULATION AND EMPLOYMENT FOR 39 CENTRAL CITIES AND METROPOLITAN RINGS

<table>
<thead>
<tr>
<th>Item</th>
<th>Central city</th>
<th>Metropolitan ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturinga</td>
<td>1.9 -1.7 -0.6</td>
<td>13.2 7.0 15.0</td>
</tr>
<tr>
<td>Wholesaling</td>
<td>0.9 0.2 0.7</td>
<td>25.4 16.8 29.4</td>
</tr>
<tr>
<td>Retailing</td>
<td>-0.6 0.1 -0.4</td>
<td>11.5 13.6 16.0</td>
</tr>
<tr>
<td>Services</td>
<td>1.6 3.9 2.7</td>
<td>18.2 16.8 24.4</td>
</tr>
<tr>
<td>Population</td>
<td>0.2 0.1 0.2</td>
<td>8.8 6.4 9.4</td>
</tr>
</tbody>
</table>

a Manufacturing data pertain to the years 1947-1954 and 1947-1958
Advantage will not continue for long if current trend persist: Meyer, Kain, and Wohl predict that by 1975, the suburban areas will lead the central city in employment in manufacturing and retailing, as well as in total employment; the central city will still have a slight edge in wholesaling and services. Data for the Boston area show that the same trends are in evidence here; suburban areas have gained in manufacturing employment while the core has lost between 1947 and 1959 (see Figure 3.2), and the suburbs are expected to grow at a much faster rate in the future (see Figure 3.1). By 1980, the number of acres of industrial land in the "128 Band" of suburban communities, will nearly equal the acres in the older "Core" communities. The growth in acreage use in these suburbs will be seven times that in the core area.

At this point it would be instructive to consider why, in the face of the advantages possible at a suburban location, more firms do not make the big move from the central city. One of the principal reasons for not moving is the importance of labor to some firms. In a thesis currently underway at M.I.T., a study of 150 firms in the Boston area that moved from 1951 to 1963 to a location on Route 128, David Sussman found that "the prime controlling factor in the move is the availability of labor." The cost of training new personnel was one of the major considerations in selecting a new site, for a company's loss of labor (and, therefore,
FIGURE 3.1:
INDUSTRIAL LAND^2

- 500 ACRES OF INDUSTRIAL LAND, 1960
- 500 ACRES OF LAND TO BE USED FOR INDUSTRY, 1960-80

SOURCE: GBESC INDUSTRIAL LAND STUDY

PREPARED FOR THE MASS TRANSPORTATION COMMISSION
BY THE PLANNING SERVICES GROUP, CONSULTANTS
MANUFACTURING JOBS, 1947-1959

- 10,000 JOBS IN 1947
- 10,000 JOBS GAINED, 1947-1959
- 10,000 JOBS LOST, 1947-1959

SOURCE: GBESC, INDUSTRIAL LAND NEEDS THROUGH 1980

PREPARED FOR THE MASS TRANSPORTATION COMMISSION BY THE PLANNING SERVICES GROUP, CONSULTANTS

THE PREPARATION OF THIS MAP HAS BEEN FUNDAMENTAL IN MATTER INVOLVING MAJOR HIGHWAYS AND THEIR IMPACT ON THE ENVIRONMENT. IT IS PROVIDED FOR USE AND DISCUSSION UNDER THE PROVISIONS OF SECTION 119 OF THE APPROPRIATE ACT.
its retraining cost) was directly proportional to the length of the move. The average length of a move was only ten to fifteen miles. Furthermore, companies tended to move along axes of transportation. Beyond the range of public transportation, all companies reported a shortage of the lowest-paid clerical help. This tended to increase the tendency towards automation and to push up wages for clerical personnel.

Burtt's continuing studies of labor supply characteristics support Sussman's findings. Burtt found evidence of difficulties in recruiting skilled secretaries and female production workers for jobs along Route 128: for example, four firms depending on female production workers in the Lexington-Needham area transferred their operations in whole or in part out of that area. Difficulties in attracting this type of personnel were not as severe, although still troublesome, in other sectors of Route 128. Companies reported great difficulties in hiring unskilled labor: "the combination of labor requirements for unskilled males and low-skilled female production workers was termed 'impossible' by the personnel manager for a firm that was forced to readjust its product line and relocate part of its operation elsewhere to survive."

Burtt's figures also show that loss of employees is proportional to the distance moved. All employees are included in Table 3.3; we would suspect that the loss of low-skilled workers would be much greater than that of other personnel. A close
examination of the two surveys indicates that this assumption may be valid. Table 3.3 shows that this relationship has changed over

**TABLE 3.3:**

AVERAGE LABOR FORCE LOSS PER MOVE BY DISTANCE FOR ELECTRONICS FIRMS IN BOSTON METROPOLITAN AREA

<table>
<thead>
<tr>
<th>Distance of move (in miles)</th>
<th>Per cent of labor force lost</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 5</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>5.1 - 10</td>
<td>2.1</td>
<td>4.6</td>
</tr>
<tr>
<td>10.1 - 14.9</td>
<td>3.9</td>
<td>14.4</td>
</tr>
<tr>
<td>15 and over</td>
<td>5.6</td>
<td>14.4</td>
</tr>
<tr>
<td>Average</td>
<td>3.7</td>
<td>7.7</td>
</tr>
</tbody>
</table>

time. Burtt emphasizes transportation as a major reason for this.

"In the previous study, all but two of the 21 relocations involved a shift from the core of the Boston Metropolitan Area (largely Boston and Cambridge) to the Route 128 area. In the present study, only six of the eleven engaged in such relocations. The other five were relocations within the middle and outer bands of Metropolitan Boston. The latter type of relocation is less likely to require a reorientation in modes of transportation—in other words, a shift from mass transportation to the private auto.""15

It appears that some firms are dissuaded to move to the suburbs because of their dependence on low-skilled labor (which in turn depends on public transportation for the journey to work).
Those firms that do move experience great difficulties filling their positions for low-skilled labor, but some firms move anyway; the deprivation on the part of the worker who loses his job because he cannot follow the firm to its new location seems much greater than the loss suffered by the firm.

THE MOVEMENT OF SPECIFIC TYPES OF JOBS

With the preceding general background in mind, we can now test the proposition that the consequences of low mobility will be much more drastic in the future because job opportunities are being relocated beyond the range of mass transportation, which will make it more difficult for the poor to get a low-skilled job or to change to a higher-skilled job. To prove this proposition, we must show that (a) low-skilled jobs are indeed relocating in such areas; (b) higher-skilled jobs are relocating in such areas; (c) low-cost housing is not being built within walking distance of these new job locations; (d) mass transit extensions are not following these new job opportunities; (e) unemployment and other deprivations are greater among low-income persons than they were before; and (f), firms located beyond public transportation areas must pay higher wages than in the central city to their low-skilled workers to make up for the workers' greater transportation costs in the suburbs.
In trying to determine what kinds of jobs are moving to the suburbs, we run into the problem of obtaining a precise identification of the low-skilled workers within an occupational group or within a company. This task could probably be accomplished with existing directories, but it appears that no such compilation has been made to date. An overall view of the more than 200 firms around Route 128 suggests that relocation of firms dependent on low-skilled labor is much less pronounced than the relocation of "status industries" - metal fabrication, non-electrical machinery, electronics, and ordnance and instruments. The reasons for low rates of relocation among industrial concerns oriented towards low-skilled labor have been noted above.

Unlike the low-skilled jobs, the higher-skilled jobs are definitely relocating in the suburban areas. Figure 3.3 shows the MBTA service area in relation to Route 128, the major focus of growth and plant relocation in the Boston Metropolitan area for the past 15 years. In the electronics industry, the Waltham-Needham area of Route 128 has declined recently; the Billerica-Lowell-Wilmington area and southern New Hampshire, regions linked by the Boston radial highways 3 and 93, are now the major centers of electronics growth. While this one industry has been used only as an example, it is probably the most prestigious of the new industries in New England; the patterns for the location and relocation of other industries are similar (see Figures 3.1 and
Figure 3.3: MBTA Service Area vs. High Industrial Growth

- MBTA Area
- Past High Growth
- Present High Growth
3.2). That these areas are beyond the service area of the MBTA is obvious from Figure 3.3. While suburban bus lines do serve a few of the new industrial areas, it is important to note that all transit lines other than the MBTA accounted for only 9.4 per cent of the region's travel by public transportation. This implies that public transportation to the rapidly-growing industrial sectors of the region is almost non-existent.

The third sub-hypothesis concerns new residential construction in the suburbs. If job opportunities were being relocated beyond the range of public transit but low-cost housing were being built within walking distance of these new jobs, the jobs would still be accessible to those persons who could not afford to operate an automobile. The key to the discussion of this possibility is the definition of "low-cost" housing. If we assume that 25 per cent of a family's income may be spent on housing (many persons would set the "reasonable" ceiling at 20 per cent), this would mean that a family earning $5,000 yearly could not spend more than $105 per month (gross rent) for a dwelling unit. A family earning $4,000 per year could afford a unit at $84 per month. Housing in this cost range is not being constructed in the suburban areas of the Boston Metropolitan Area. Rents have sometimes fallen this low in recently constructed urban renewal projects within the city of Boston with the aid of 221(d)(3) financing (for example, the Academy Homes development in
Washington Park), but no comparable action is underway in the low density suburban areas of the metropolitan region.

The fourth area of concern is the extension of mass transportation service to connect the new employment areas in suburban communities with major centers of population. There has been only one major rapid transit extension since 1947; that was the Riverside line, which opened on July 4, 1959. There is no provision for the distribution of passengers at the end of the Riverside line at Route 128 which has meant that this line is not of much help to those holding jobs in the suburbs. Ridership patterns bear this out: the fact that inbound traffic is more than twice as great as outbound traffic during the morning rush hour (and vice versa in the evening) shows that the line is used primarily by those persons who live in the suburbs and work in the central city. 21

The fifth portion of the proof that lack of mobility will be a more serious problem in the future than it is now is to show that unemployment and other deprivations due to low mobility (see page 32) are increasing among low-income persons, who cannot afford the additional transportation costs necessary to get to the suburbs. Looking first at unemployment for the nation as a whole, Table 3.4 shows wide variations in unemployment over the years shown. If mobility problems affected a large segment of the population, we would expect to find increasing unemployment rates after 1945, when much decentralization occurred. Such a trend is not at all
evident from the data; it would appear that cyclical factors in
the national economy play a much greater role in the total rates of
unemployment than do problems of mobility (if such problems
operate at all).

Table 3. 5 begins to break down unemployment by skill level.
We find that unskilled workers have much higher rates of un-
employment than do semi-skilled or skilled workers, but the reason
for this fact is not apparent from the table. To find out if this
disparity is related to mobility differentials, we would have to study
the unemployment rates over a number of years. If we could
isolate unskilled laborers who lived in central cities and show a
continuing climb in their unemployment rates in spite of contrary
downward trends in national unemployment, then it would be
possible (but not conclusively proven) that mobility problems were
having a strong effect on unskilled laborers.

A similar analysis should be undertaken for the sub-
employed, the unemployed, the marginally employed, and the
unsatisfactorily employed. What it would be necessary to show
is that the number of and the deprivation of such persons has
increased while the rest of the population is becoming more
prosperous in comparison. To find out if this increasing
deprivation is related to the movement of jobs to the suburbs,
several metropolitan areas, with different rates of decentralization
must be studied. It should be then possible to show if the relative
TABLE 3.4:
THE LABOR FORCE AND ITS COMPONENTS, 1930-60

<table>
<thead>
<tr>
<th>Year</th>
<th>Total labor force</th>
<th>% of civilian labor force unemployed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in 1000's</td>
<td></td>
</tr>
<tr>
<td>1930</td>
<td>48,783</td>
<td>8.9</td>
</tr>
<tr>
<td>1931</td>
<td>49,585</td>
<td>16.3</td>
</tr>
<tr>
<td>1932</td>
<td>50,348</td>
<td>24.1</td>
</tr>
<tr>
<td>1933</td>
<td>51,132</td>
<td>25.2</td>
</tr>
<tr>
<td>1934</td>
<td>51,910</td>
<td>22.0</td>
</tr>
<tr>
<td>1935</td>
<td>52,553</td>
<td>20.3</td>
</tr>
<tr>
<td>1936</td>
<td>53,319</td>
<td>17.0</td>
</tr>
<tr>
<td>1937</td>
<td>54,088</td>
<td>14.3</td>
</tr>
<tr>
<td>1938</td>
<td>54,872</td>
<td>19.1</td>
</tr>
<tr>
<td>1938</td>
<td>55,588</td>
<td>17.2</td>
</tr>
<tr>
<td>1940</td>
<td>56,180</td>
<td>14.6</td>
</tr>
<tr>
<td>1941</td>
<td>57,530</td>
<td>9.9</td>
</tr>
<tr>
<td>1942</td>
<td>60,380</td>
<td>4.7</td>
</tr>
<tr>
<td>1943</td>
<td>64,560</td>
<td>1.9</td>
</tr>
<tr>
<td>1944</td>
<td>66,040</td>
<td>1.2</td>
</tr>
<tr>
<td>1945</td>
<td>65,290</td>
<td>1.9</td>
</tr>
<tr>
<td>1946</td>
<td>60,970</td>
<td>3.9</td>
</tr>
<tr>
<td>1947</td>
<td>61,758</td>
<td>3.9</td>
</tr>
<tr>
<td>1948</td>
<td>62,898</td>
<td>3.8</td>
</tr>
<tr>
<td>1949</td>
<td>63,721</td>
<td>5.9</td>
</tr>
<tr>
<td>1950</td>
<td>64,749</td>
<td>5.3</td>
</tr>
<tr>
<td>1951</td>
<td>65,983</td>
<td>3.3</td>
</tr>
<tr>
<td>1952</td>
<td>66,560</td>
<td>3.1</td>
</tr>
<tr>
<td>1953</td>
<td>67,362</td>
<td>2.9</td>
</tr>
<tr>
<td>1954</td>
<td>67,818</td>
<td>5.6</td>
</tr>
<tr>
<td>1955</td>
<td>68,896</td>
<td>4.4</td>
</tr>
<tr>
<td>1956</td>
<td>70,387</td>
<td>4.2</td>
</tr>
<tr>
<td>1957</td>
<td>70,744</td>
<td>4.3</td>
</tr>
<tr>
<td>1958</td>
<td>71,284</td>
<td>6.8</td>
</tr>
<tr>
<td>1959</td>
<td>71,946</td>
<td>5.5</td>
</tr>
<tr>
<td>1960</td>
<td>73,126</td>
<td>5.6</td>
</tr>
<tr>
<td>1966</td>
<td>-</td>
<td>3.8</td>
</tr>
</tbody>
</table>

x Age 14 and over
Source: Stanley Lebergott, Manpower in Economic Growth (1964), Appendix Table A-3
TABLE 3.5:
UNEMPLOYMENT RATES IN INDUSTRIES AND OCCUPATIONS MOST VULNERABLE TO TECHNOLOGICAL DISPLACEMENT, 1957 & 1962

<table>
<thead>
<tr>
<th>Industry or occupation</th>
<th>1957</th>
<th>1962</th>
<th>Change in rate, '57-62</th>
<th>actual</th>
<th>expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>All workers</td>
<td>4.3</td>
<td>5.6</td>
<td>1.3</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Experienced workers</td>
<td>3.9</td>
<td>4.9</td>
<td>1.0</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Workers in selected occupations (blue-collar)</td>
<td>6.0</td>
<td>7.4</td>
<td>1.4</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Craftsmen, foremen, and kindred workers (skilled)</td>
<td>3.8</td>
<td>5.1</td>
<td>1.3</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Operatives and kindred workers (semiskilled)</td>
<td>6.3</td>
<td>7.5</td>
<td>1.2</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Laborers, except farm and mine (unskilled)</td>
<td>9.4</td>
<td>12.4</td>
<td>3.0</td>
<td>2.6</td>
<td></td>
</tr>
</tbody>
</table>

1 Calculated by use of correlations of (1) unemployment rates by industry with the rate for all experienced wage and salary workers, and (2) unemployment rates by occupation with the rate for all experienced workers, using data for the period 1948-57 in both cases.

Sources: Department of Labor and Council of Economic Advisers.

deprivation in terms of employment were correlated with decentralization.

Another method of attacking this issue would be to establish by interview the numbers of people who suffer from one or more types of employment deprivation. If, in fact, their job situation is worse now than it was before (in absolute or proportional terms),
they should be able at least to indicate when the situation got worse, if not the actual reason for the deprivation as well.

The final test to prove that low mobility will be a more important cause of poverty in the future involves the contention that firms located beyond public transportation are forced to pay higher wages than in the central city to their low-skilled workers to make up for the workers' greater transportation costs in the suburbs. The previous discussion of Burtt's work (see page 86) supported this contention although Burtt did not specifically document this finding. Looking at the lowest-skilled laborers for the fabricated metals industry, this contention is not supported. In only two of the five labor groups shown in Table 3.6 are the wages higher in the suburbs than in the core area, which shows that employees of the metal fabricating companies are not having their transportation costs subsidized by their employers, with the possible exception of women assemblers. Clearly, more data is necessary to determine if this one particular industry is representative of all employment with respect to suburb-central city wage differentials. Burtt's findings and data from the BRPP surveys would suggest that the metal fabricating industry is not representative. On the other hand, only for this one industry do we have an adequately fine occupational breakdown to determine what low-skilled workers are being paid. Clearly, more research is necessary. (The significance of wage differentials will also be discussed in Chapter IV.)
### TABLE 3.6:

**CITY - SUBURB WAGE DIFFERENTIALS,**

**FABRICATED METALS COMPANIES**

<table>
<thead>
<tr>
<th>Location</th>
<th>Type of worker&lt;sup&gt;d&lt;/sup&gt;</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downtown Boston&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Companies Reporting</td>
<td>16</td>
<td>13</td>
<td>14</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Employees covered</td>
<td>153</td>
<td>57</td>
<td>155</td>
<td>181</td>
<td>424</td>
</tr>
<tr>
<td></td>
<td>Co. weighted average $</td>
<td>1.57</td>
<td>1.76</td>
<td>1.87</td>
<td>1.68</td>
<td>1.61</td>
</tr>
<tr>
<td></td>
<td>Employee weighted avg. $</td>
<td>1.56</td>
<td>1.75</td>
<td>1.90</td>
<td>1.93</td>
<td>1.44</td>
</tr>
<tr>
<td>Route 128&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Companies Reporting</td>
<td>11</td>
<td>11</td>
<td>10</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Employees covered</td>
<td>58</td>
<td>52</td>
<td>84</td>
<td>102</td>
<td>769</td>
</tr>
<tr>
<td></td>
<td>Co. weighted average $</td>
<td>1.50</td>
<td>1.73</td>
<td>1.84</td>
<td>1.76</td>
<td>1.55</td>
</tr>
<tr>
<td></td>
<td>Employee weighted avg. $</td>
<td>1.51</td>
<td>1.76</td>
<td>1.85</td>
<td>1.79</td>
<td>1.70</td>
</tr>
<tr>
<td>Waltham&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Companies reporting</td>
<td>6</td>
<td>8</td>
<td>6</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Employees covered</td>
<td>46</td>
<td>37</td>
<td>68</td>
<td>121</td>
<td>385</td>
</tr>
<tr>
<td></td>
<td>Co. weighted average $</td>
<td>1.53</td>
<td>1.71</td>
<td>1.80</td>
<td>1.95</td>
<td>1.61</td>
</tr>
<tr>
<td></td>
<td>Employee weighted avg. $</td>
<td>1.49</td>
<td>1.70</td>
<td>1.80</td>
<td>1.75</td>
<td>1.66</td>
</tr>
</tbody>
</table>

<sup>a</sup> Particularly firms in Boston, Cambridge, Watertown, and Somerville.

<sup>b</sup> Firms within a mile of Route 128 from Norwood to Beverly.

<sup>c</sup> Firms only in Waltham or firms reporting Waltham operations separately.

<sup>d</sup> Type of worker: 1, Typists B; 2, Keypunch Operators; 3, Laborers, Materials handling; 4, Janitors, Porters, Cleaners (Men); 5, Assemblers C, (Women).
### TABLE 3.7:

**MEDIAN\(^a\) INCOME\(^b\)** BY OCCUPATION, BOSTON AND FRAMINGHAM

<table>
<thead>
<tr>
<th>occupation(^c)</th>
<th>Boston</th>
<th>Framingham</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>$9,000</td>
<td>$12,500</td>
</tr>
<tr>
<td>Proprietors</td>
<td>9,000</td>
<td>12,500</td>
</tr>
<tr>
<td>Travelling Salesmen</td>
<td>7,500</td>
<td>12,500</td>
</tr>
<tr>
<td>Craftsmen</td>
<td>6,500</td>
<td>9,500</td>
</tr>
<tr>
<td>Salesmen</td>
<td>6,500</td>
<td>9,500</td>
</tr>
<tr>
<td>Protective Services</td>
<td>6,500</td>
<td>7,500</td>
</tr>
<tr>
<td>Operatives</td>
<td>6,500</td>
<td>7,500</td>
</tr>
<tr>
<td>Personal Services</td>
<td>5,500</td>
<td>7,500</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>5,500</td>
<td>9,500</td>
</tr>
<tr>
<td>Laborers</td>
<td>5,500</td>
<td>5,500</td>
</tr>
</tbody>
</table>

---

\(^{a}\) Median found by subtracting the per cent not answering the income question from 100 and dividing by two.

\(^{b}\) This is family income and thus does not accurately identify wages.

\(^{c}\) The full definition for these occupations is professional: professional and semi-professional; proprietors: proprietors, proprietors, managers and officials; travelling salesmen: travelling salesmen, agents, etc.; craftsmen: craftsmen, foremen, skilled laborers, etc.; salesmen: store and office clerks, salesmen (other than travelling), etc.; protective services; operatives: operatives and semi-skilled workers; personal services: personal service workers; miscellaneous: miscellaneous - not otherwise classified; laborers: laborers and unskilled workers.

Source: BRPP surveys
All in all, the data necessary to prove that mobility will be a greater problem in the future are not available. What little we have uncovered suggests the following: (1) Low-skilled jobs are not moving beyond public transportation in large enough numbers to cause large numbers of people to be deprived (in any of the ways listed) of employment; the large share of low-income jobs are still centrally located. (2) Higher-skilled jobs are moving to the suburbs at a much greater rate, which might mean that low-income persons would find it more difficult to change their status in the future. (3) The possibility of new low-cost housing or of mass transit extensions near these new jobs is negligible, which means that access to an automobile (at least as a member of a car-pool) is mandatory for access to future jobs in suburban areas, (4) Unemployment and other deprivations do not appear to be increasing as a result of changes in individual mobility, but the information uncovered certainly cannot elevate this statement to the status of a conclusion; much more research is necessary here. (5) Finally, more research is also necessary in the suburban-central city wage differential problem before any correlation with mobility can be made.

Another attack is open to us. We would expect that the increased use of the automobile and the concurrent decline of mass transit would continue (for the near future, at least, and barring unusual technological developments, in the long run as well).
one sense then, some of our cities are more "futuristic" than others because of their current quite heavy dependence upon automobile transportation. Therefore, we now turn to an analysis of mobility and poverty in Los Angeles in our attempt to predict what the magnitude of the role of mobility as a cause of poverty will be in future urban areas.

WATTS -- THE PATTERN OF TOMORROW'S GHETTO?

The explosive week of rioting in and around the section of Los Angeles known as Watts in August of 1965 focussed attention on the relevance of mobility as a factor contributing to poverty. The commission that investigated the riots, headed by John McCone, former director of the C.I.A., charged that the exceptionally poor mass transportation facilities in Los Angeles intensified the familiar problems of poverty and discrimination existing throughout America today.

Until 1963, the Watts area had been well served by mass transportation facilities; Figure 3.4 shows the former electric trolley lines, "once the world's largest interurban system." This interurban net was supplemented by an extensive feeder system of local bus lines. That Watts was a strategic location for persons without autos when this system was in operation is readily apparent from this map. "When the remnants of Los Angeles' once
Figure 3.4:
PORTION OF PACIFIC ELECTRIC INTERURBAN TROLLEY LINES

0 8 MILES
efficient trolley system were abandoned in 1963, large portions of what became the riot area were dependent upon the electric cars."26 There is ample evidence that the diversion of these trolley passengers to other modes was difficult for many and impossible for some. That walking once would have been a feasible mode for the journey to work is shown in Figure 3.5; employment was concentrated in central Los Angeles which is to say that the gradient of the employment density in the opportunities equation (p. 21) is steep. In 1924, there were few, if any, jobs beyond walking distance from the transit lines (the interurban system generally followed the railroad routes shown in 3.5). The situation today, forty-three years later, is quite different. Figures 3.6 and 3.7 show the present dispersion of industries and service activities in the Los Angeles area; the opportunity gradient is much lower.

Figures 3.6 and 3.7 also indicate that not even one per cent of the jobs in industry and service occupations of the area were within walking distance of the Watts area. In addition, the McCone Commission found that only fourteen per cent of the residents of the riot area owned cars.30 This left the burden of travel with mass transportation. Concerning the mass transit situation, the Commission found that:

"... the inadequate and costly public transportation currently existing throughout the Los Angeles area seriously restricts the residents of the disadvantaged area such as south central Los Angeles. The lack of adequate transportation handicaps them in seeking and
holding jobs, attending schools, shopping, and fulfilling other needs. It has a major influence in creating a sense of isolation, with its resultant frustrations.

... The SCRTD /Southern California Rapid Transit District/... depends for revenue solely on the fare box....

Traditionally, the bus systems in the Los Angeles area have met increasing costs in operations by increasing fares and cutting back service. The consequence of these actions has been a transportation service which is prohibitively expensive and inadequate in service. "31
Although there can be no question about the strength of this statement, it is still quite lacking in precision. What is the extent of the "hardships" that impose "serious restrictions" on the residents of the area? Such questions were unanswered by the McCone Commission, but a $2.7 million grant has been given by the
Department of Housing and Urban Development to the state of California to "test the validity of the assumption that increased public transportation service can substantially improve employment opportunities for the residents of a disadvantaged area."\textsuperscript{32} The project is to consist of three phases: (1) a two-year test of the above assumption; (2) evaluating existing transit service in light of the needs of the project area; and (3), operational tests on some of
the conclusions of the Phase II studies.

The team engaged in this demonstration project has noted that the pattern of development in the Los Angeles metropolitan area has, until recently, been unique among the major urban centers of America. This particular type of urbanization, along with its advantages, has created a unique challenge:

"It is well known that the Los Angeles area has been developed with relatively low population densities and with commercial and industrial centers widely scattered at great distances from the central core. It is also apparent that this trend is continuing, and that the economy of the area is ever more dependent upon the private automobile and the expanding freeway and highway system. Many large industries and commercial centers are being located or relocated 20 to 30 miles from the central city in order to gain the benefits of space and lower land values, and they are able to do so because of the so-called "mobility of the labor force." There is no longer a need to depend upon public transit, and car ownership is probably higher than anywhere else in the world.

In generalizing on the mobility of the work force, it is easy to overlook the fact that there are very substantial numbers of people who do not own, drive, or otherwise have available an automobile, and who must depend upon public transportation in order to move about. Large numbers of these people are concentrated in the South Central and East Los Angeles low-income areas.

As in most other large urban areas, the public transportation system has been oriented to the Los Angeles central business district, and during the years of decentralization there has been little opportunity for public transit to adjust its operations to meet the changing conditions. The relatively low traffic volumes between points other than to and from the central business district generally make the operations of such transit services economically unsound.

To put it simply, for persons living in or near the central city and working in locations other than the downtown area, the availability of an automobile is almost a necessity. Public transportation services to and from the outlying industrial and commercial areas are generally
poor or non-existent. If jobs are to be found for persons in the Project area who are not able to travel by private automobile, either the existing public transportation system must be vastly expanded in terms of new bus routes to serve the entire metropolitan area or other methods of providing the necessary transportation must be found."

After re-confirming the McCone Commission's conclusion that a major east-west transit line through the riot area was necessary, the Transportation - Employment Project established the Century Boulevard Line 100 which commenced operation on July 5, 1966 (see Figure 3.8). The steadily increasing ridership on this line is shown in Figure 3.9. The preliminary results concerning increased employment are also encouraging.

"Of the 1,022 westbound passengers who were interviewed, 582 or 57 per cent were making work trips. Two hundred and two or 35 per cent of these passengers stated that the bus line had enabled them to obtain their jobs, and an additional 185 or 31 per cent reported that the bus line made it possible for them to hold their jobs. Of the 387 passengers who indicated that Line 100 is of value to them in obtaining or holding jobs, 228 or 59 per cent are residents of the Project area."

Other tests also substantiate the relationship between mobility and employment:

"While separated by only two to three miles, it is not reasonably possible to travel by public transportation between residences in East Los Angeles and industrial plants in the adjacent City of Commerce where there are many job opportunities. The East Los Angeles State Service Center is experiencing great difficulty in placing job applicants because of the unavailability of private transportation."

While additional information on the "identification of the spatial
FIGURE 3.9:
CENTURY BLVD. LINE 100
TOTAL PASSENGERS PER WEEK

1966 | 1967

(1) Line 100 service commenced Tuesday, July 5. Passenger count for first week's operation covers only 5 days.

(2) Line 100 was extended 2.5 miles from Watts to Lynwood on September 18, 1966. Also, Los Angeles City Schools commenced fall term September 19, 1966.
distribution of jobs by requisite skill levels and also the classification
and location of the skills reservoir among residents of the project
area has also been completed, it is evident that more information
is needed, particularly on the numbers and types of actual job
placements for residents of the project area since the inauguration
of the new bus line. Further information is to be collected on the
home interview survey of the Los Angeles Regional Transportation
Study on the reliability of private transportation and the consequences
of the unavailability of transportation on securing or maintaining
employment.

These preliminary results indicate that there is an important
relationship between mobility and employment, and thus between
mobility and income level. The importance of these studies in Los
Angeles should not be underestimated. The data gathered on
locational trends in industry suggests that occupational (as well as
residential) densities will be much lower in our future urban centers than
they are today, approximating the present pattern of Los Angeles.
Equally plausible is the development of ghettos similar in nature and
scale to the present south central Los Angeles area. The teeming,
picturesque five-story tenement will be a thing of the past; future
slums will occur in what are now respectable single-family
residential areas. The "Watts problem" may become critical:
low-density slum areas could psychologically become "the ends of
the earth," because it would be so difficult to get out of them without
a car or extensive (and heavily subsidized) mass transit. Once out of these residential slums, employment opportunities will be spread over a wide portion of the metropolitan area at a low and fairly even density. Walking -- "the poor man's carriage" -- will be able to cover only a tiny fraction of the metropolitan area and a correspondingly small portion of the opportunities of the region. The message of the Watts riots is clear -- without "grants of mobility" to poor persons, the probable future physical and psychological isolation of those in poverty from the mainstream of our urban society could have explosive results.
NOTES TO CHAPTER III:

1. The BRPP surveys indicated that of all jobs within Route 128, 64 per cent were accessible by transit.


3. Creamer, Changing Location of Manufacturing Employment, p. 29

4. Ibid., p. 53

5. Meyer, Kain & Wohl, The Urban Transportation Problem, p. 28. These figures are corrected for annexations and are simple, unweighted averages of individual city percentage changes.

6. Vernon, Metropolis 1985, p. 154

7. Meyer, Kain & Wohl, op. cit., p. 50


9. Ibid., p. 39


13. Ibid., p. 13

14. Ibid., p. 35

15. Ibid., pp. 23-24

16. See, for example, *Commonwealth of Massachusetts Industrial Directory*, Massachusetts Department of Commerce; *Greater Boston and its Place in Research and Development 1963-1964*, Greater Boston Chamber of Commerce (titles vary by year).


19. Burtt, *op. cit*


21. Discussion with Robert Korach, Massachusetts Bay Transportation Authority. The inbound/outbound ratio is 2.35:1 in the morning rush hours.
22. Heller "Employment and Manpower", in Lebergott (ed.),
   *Men Without Work*, p. 78

23. Pardee, *A Study of Inter-City Wage Differentials*, p. 22


25. Ibid, p. 90

26. Ibid, p. 89

27. Pegrum, *Urban Transportation and the Location of Industry in Metropolitan Los Angeles*, p. 40

28. Ibid, p. 34

29. Ibid., p. 37

30. Governor's Commission on the Los Angeles Riots, *Violence in the City - An End or a Beginning?* in Crump, Appendix A

31. loc. cit.


34. Ibid., back cover

35. Ibid., p. 8

36. Ibid., p. 31
IV. POLICY PROPOSALS FOR MOBILITY FOR THE POOR
"But movement for movement's sake is, of course, not the purpose of most movement of people, and not at all of the movement of goods and messages. The purpose is exchange -- exchange of goods, of messages, and of personal contacts and services. The more efficient the means of transportation, the larger the range of exchange."

Hans Blumenfeld,
The Modern Metropolis

INTRODUCTION

We have been concerned with identifying persons whose inability to purchase high-speed transportation severely restricts their range of opportunities and exchange; we should also say what steps could be taken to alleviate their deprivation. The previous chapters could be summarized by saying that although the number of persons for whom low mobility currently causes deprivations of opportunity is not large (see pages 37 and 42), (1) for those affected the deprivation is severe (pages 102 and 103) and (2) the number of deprived persons may well increase in the future (see Chapter III). "Grants of mobility" will thus be necessary for some persons if they are able to carry out the daily tasks of life within our metropolitan areas. What sort of investment would be required to provide low-income persons with adequate mobility? What sort of returns might be expected from such investments?
This chapter will attempt to answer such questions. We will borrow a format for describing possible methods for improving mobility from John T. Howard: grants of mobility to poor persons might take either the form of measures to improve access without driving or measures to make driving possible.

IMPROVED ACCESS

Improved transit information could, in effect, provide some increase in mobility. One of the important findings of the research conducted to date in the Transportation-Employment Project in Los Angeles is that

"there are many people in the Project area who do not engage in various recreational, cultural or commercial activities outside their community because they lack knowledge of the existing public transportation facilities. Without such knowledge they gain the opinion that transit services are non-existent. For these same reasons many persons do not consider the possibility of employment in some areas that can be reached without too much difficulty...

It is often true, therefore, that people who are badly in need of transportation are not using the transit facilities that exist and the pseudo immobility thus created unnecessarily compounds their feeling of isolation."

To conduct a program to increase the level of information about existing facilities would appear to be a very worthwhile project. The capital costs of this project would be small. A $260,000 demonstration project is currently underway in the Washington Metropolitan Area
"to find out what kinds of information are needed by actual and potential riders in order to facilitate their use of existing services, to develop new or improved means of making such information readily available to the public, and to test the effectiveness of such methods, techniques and devices in actual use." 3

The results from this project in Washington could probably be modified to apply to other urban areas, thus eliminating future need for large expenditures on research and development.

Capital expenditures would not be large; if the Washington project is any indication, $150,000 should take care of new signs and route markings, identification on transit vehicles, and permanent information displays; $15,000 per year could take care of maintenance, operating expenses, and special information programs. The funding for these costs would come from the transportation authority in the metropolitan area. Although special efforts would be made to contact poor people, the entire population of the metropolitan area would benefit from such a program. Increased revenues for the transit authority would be expected from this program, although it remains to be seen from the Washington demonstration if these additional revenues would meet the costs involved. Because of the wide distribution of benefits, the ability of an existing agency with the proper authority to handle the matter, and the low costs, this type of a project is seen to have high political feasibility. Some of the particular problems of low mobility, such as access to suburban jobs and shopping areas, would
not be alleviated by such a program.

Extensions of rapid transit service could provide significantly more mobility for many poor people. One important method of extending service would be that of reducing or eliminating transit fares for persons whose incomes fall below certain specified levels. A number of troublesome details have to be resolved before such a program could become operational.

The first is defining what is a "reasonable" expenditure for transportation of persons according to their income level and what, therefore, is income level below which all persons receive subsidies for their transportation and above which all persons pay normal transit fares. One approach to this question would be to find what people are now paying for transportation. Taking 20 cents as a standard transit fare, if a person uses mass transit to and from work every working day of a year (two weeks vacation), he will spend $100 per year on work trips alone. If he and his family depend on mass transportation for other types of trips as well, his total yearly transit bill could be $200-$300 per year. For a family earning less than $3,000 per year, this travel expenditure would equal approximately one-tenth of their total income. While 10 per cent is much less than the 18 per cent of annual family income that is usually spent for transportation, 10 per cent may be too much for a family of low income to pay, because their other needs are
so great in relation to their income. Further studies into the income elasticities and substitutabilities of the very poor would be necessary to determine what a reasonable expenditure for transportation would be (it could easily vary quite a bit in different metropolitan areas) and how this reasonable expenditure is related to actual expenditures for transportation.

Another problem with reducing the fares of some people is the administrative work involved in checking income levels of families with its degrading effect on these people. Experience in public housing programs should indicate to us that the problems created by establishing a maximum qualifying income level are very large.

Since many of the present transit riders are persons who do not have access to an automobile (poverty being one of the major reasons for not owning a car), a program to let poor persons ride free or at reduced fares could substantially decrease the revenues of the transit authority. For example, letting Boston residents with incomes under $4,000 a year ride free would decrease transit revenues in Boston by 14.5 per cent; if the ceiling were upped to $5,000, the reduction would be 24.3 per cent. This means that subsidies to cover operating expenses would have to be paid to the transit company. Capital expenditures would probably be very small in such a program, if there were any at all.
The complexities of administering this program, the incidence of benefits among only a portion of the population, and the subsidies necessary to finance the program (probably through additional local and state taxes, possibly through Federal anti-poverty grants) make the possibility of passing the legislation necessary for such a proposal rather small.

An alternative proposal would be to institute a transit system with no cash fares for anyone. Besides involving no special administrative problems and benefiting all of the population (or at least appearing to), this program would improve transit service by eliminating travel time spent collecting fares. Tax revenues would have to pay for all capital and operating expenses. This program would require a new conceptualization of personal movement systems as a necessary public service in much the same way that public education is now provided. Until this new view of transportation can be "sold" to the general public, the political feasibility of this proposal is currently low because this "necessary public service" view of mass transportation is not commonly held at this time.

Another form of extensions of mass transit service would be to increase the area served by public transportation. Because of the expected movement of jobs away from areas currently served, this proposal would appear to be a required part of any program to
increase mobility by upgrading present transit facilities. What would be the costs of public transit service area extensions?

Let us assume that buses would be used since the capital costs of a fixed right-of-way for a rail rapid transit are so high. The capital cost for one 40 seat vehicle would then be $32,000, or $800 per seat. Operating expenses can be figured by several methods. On a mileage basis, the total cost of operating one bus is 90 cents per mile, of which 65 cents pays the driver's salary and benefits. On an hourly basis, the expenses would be $5.46 per hour for the driver and 42 cents for fuel, oil, and lubrication. Depreciation and maintenance charges would add another $7.49 per day.

Such expenses would probably not be met by fare box receipts if the new bus lines were to run in low density areas in the region. Table 4.1 shows total revenues and expenses for the Transportation-Employment Project experimental bus route in South Central Los Angeles. The revenues are based on an average fare of just under 25 cents. The substantial deficit of this system - 62 cents per mile - is probably higher than it would be in other metropolitan areas for the reasons noted above. It seems clear, however, that sizeable deficits in service costs will have to be made up from sources other than the fare box. In other words, public transportation is not available to many low-density areas today for a very good reason: such operations are not economically sound.
### TABLE 4.1:
**TRANSPORTATION-EMPLOYMENT PROJECT**

**EXPENSES vs. REVENUES**

<table>
<thead>
<tr>
<th>Month</th>
<th>bus miles</th>
<th>total revenue per bus mile</th>
<th>total expenses per bus mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 1966</td>
<td>31,684</td>
<td>18.2 ¢</td>
<td>102.8 ¢</td>
</tr>
<tr>
<td>August</td>
<td>37,302</td>
<td>22.5</td>
<td>94.4</td>
</tr>
<tr>
<td>September</td>
<td>38,729</td>
<td>23.8</td>
<td>88.5</td>
</tr>
<tr>
<td>October</td>
<td>43,373</td>
<td>24.6</td>
<td>92.2</td>
</tr>
<tr>
<td>November</td>
<td>43,334</td>
<td>24.3</td>
<td>88.1</td>
</tr>
<tr>
<td>December</td>
<td>44,374</td>
<td>24.0</td>
<td>88.2</td>
</tr>
<tr>
<td>January 1967</td>
<td>44,064</td>
<td>26.5</td>
<td>91.2</td>
</tr>
<tr>
<td>February</td>
<td>41,029</td>
<td>28.6</td>
<td>90.3</td>
</tr>
</tbody>
</table>

a. The expenses per bus mile are abnormally high because they include full system cost (excluding bond interest) and about 9 cents per mile for "diversion of revenue" payments to Southern California Rapid Transit District, Inglewood City Lines, South Los Angeles Transportation Company and Atkinson Transportation Company.

The benefits of transit extensions to low-density areas would be unequally distributed in the metropolitan area. Suburban residents would gain because new transit facilities would increase their mobility, particularly for families not able to afford two cars. Industrial and commercial concerns could move to the suburbs without losing access to low-skilled, low-wage workers. Suburban communities would gain additional tax revenues from these companies, whose workers they would not have to house: the new
transit connections would allow the workers to remain in the central city. All this would be as detrimental to the central city as it would be beneficial to the suburban areas. For this reason, and given the current high level of political power of the central city in comparison to the uncoordinated potential power of the suburbs, the proposal for extensions of the present mass transit service area would not be politically acceptable at this time. Suburban opposition to making up the deficit of such operations could also be expected. (Extensions of rail rapid transit may be a much different animal in terms of political acceptability because the beneficiaries of such improvements would mainly be suburban residents with centrally-located jobs. Extensive feeder bus networks at the low density end of the line would make this proposal more like the extensions of the bus lines.)

The **job jitney** is a possible solution to providing increased mobility (of a special type: to jobs) that has some attractive features. The capital costs of the vehicles would be low: a new ten-seat vehicle such as the Volkswagen Microbus could be purchased for $2,300 or $240 per seat. A non-profit organization would be able to get such a vehicle at a reduced rate. Gas, oil, and maintenance charges would be less than 2 cents per mile.

Companies would purchase the vehicles perhaps with some incentive in the form of subsidy or tax credit from the Federal or State government. One man would be hired by the company as a
driver, and it would be his responsibility to collect and distribute
nine other workers each morning and evening. This driver could
be employed as a courier for the company during the day if not in
some other capacity. An arrangement could be worked out
where the driver would get the use of the vehicle for the week-
end at some nominal charge or deduction from his paycheck.
This would raise insurance charges if the vehicle were "principally
garaged" in the central city instead of the suburbs. (In the Boston
area, central city insurance rates would be $119 per year for
statutory insurance coverage if the vehicle were not used for
business purposes during the day; other coverage (extra-
territorial and guest, property damage, and uninsured motorist)
would raise the rate to $178 per year. If the vehicle were also
used in the business, the total rate would be $250 per year for
insurance. Few insurance companies want to take the risk
involved in an operation of this sort, but some policy could be
written.

Fares for travelling could be deducted from the workers' salaries at a rate of one cent per mile, which would pay for the insurance and operating expenses of the vehicle (figuring on the basis of an average one-way trip length of 15 miles or 30 miles a day for 230 working days per year for the 9 passengers.

This program could be run entirely by private companies, which would take the administrative details out of the political arena.
However, since companies have not resorted to such actions by themselves, one may infer that their unfilled demands for low-skilled workers are not seriously curtailing operations at the present time; some inducement may be necessary to get them to embark on such a venture. If governmental financial aid was given, certain controls could also be exercised; for example, an application for jitney service might be granted only if most of the riders served were from depressed areas or were unemployed or sub-employed.

The benefits of this program are incurred by only a small portion of the population but the costs would be borne by these same persons. The overall costs would be quite low. Mobility would be expanded for low-income persons only in terms of access to jobs, but this could substantially increase incomes. The job jitney would appear to be an attractive proposal.

Strictly controlled land use patterns could also improve accessibility for poor people. Jobs and dwellings would be constructed at densities high enough throughout the entire region or in special "corridor" areas to make mass transportation economically sound. Even higher densities could make walking feasible for a larger portion of trips than it is now. Such action would be diametrically opposed to current locational preferences of most families and entrepreneurs; the consumption of land per
person is increasing very rapidly (that is, densities are getting lower). To run contrary to the preferences for space of home-owners would insure political defeat of the measure; to artificially try to reverse decentralizing trends in industry in the face of the technological advantages to be gained from suburban locations would be to court economic disaster. In addition, our technical capabilities are such that we should be able to design new transportation systems to meet our desired urban pattern; transportation is rightly a service function, and it seems inappropriate to seriously restrict the quality of a total system (the urban environment) merely to ameliorate the technological problems of one of its sub-systems (transportation).

CAR OWNERSHIP

The other important method of increasing the mobility of poor persons is to somehow enable them to drive cars. What might be the costs of such a proposal?

The range of opportunities open to an automobile driver is determined by the reliability of his vehicle and its costs of operation. The reliability of a vehicle is primarily determined by the care given to it and by its age. Few cars over ten years old are worth the expense that it takes to keep them running; their reliability would thus be very low, and so they are probably not
good buys even at the very low prices for which they sell - $100 to $150. On the other hand, new cars are highly reliable but their price would be prohibitive. An acceptable solution would be a used car, preferably a foreign one since the operating costs are lower. A five-year old Volkswagon sells for about $550, and would be good for possibly five years of travel.

Operating expenses (gas, oil, and maintenance) would be less than 2.5 cents per mile not including insurance, which would be a major factor in the cost. For a vehicle garaged in Boston, the yearly cost for insuring a pleasure vehicle (that is, one not used on the job) driven less than 20 miles (one way) to work would be $117 for an operator over 25 years of age. For someone under 25, the cost could be as much as $374.50. The comparable rates for suburban areas are much lower; in Framingham, the respective figures are $43.50 and $139.

How might a program of this nature be financed? One tack would be to say that since a poor person (over 25) already spends the equivalent of automobile operating expenses (driving an economy car 6,000 miles per year) on public transportation ($200 - 300), he should pay for this share and the capital cost of the car be subsidized by some governmental agency. If we could show that this increased mobility could raise his income to a level of economic self-sufficiency, the extent of the subsidy need only be a long-term loan for the capital cost of the car that would be
guaranteed by some governmental agency.

For those persons who are unemployed due to lack of mobility, access to a car could enable them to make a substantial improvement in their income. (These persons would probably need subsidy payments for operating expenses as well as capital costs in the beginning.) We should be very careful in saying that a car would enable persons already employed to raise their incomes. We noted in Chapter III it was not evident that taking a suburban job instead of one centrally located would necessarily lead to an increase in wages in the Boston region. In the New York region, jobs in the central city pay more than comparable jobs, although the differences are narrowing. For example, hourly earnings in breweries in the Inner and Outer Rings of the metropolitan area were 2 per cent less than those in the Core; in commercial printing, one per cent; in handbags and purses, 18 per cent; and in women's dresses, 7 per cent. In the Boston region, wages are fairly constant for comparable jobs from the central city to beyond Route 128, at which point wages decrease. This is true for many industrial concerns as well as the large commercial enterprises such as Jordan Marsh and Filene's Department Stores. The existence of union wages in many jobs tends to eliminate most central city - suburban wage differentials that might exist. For those jobs not covered by union wages, all wage differentials will be effectively eliminated February 1, 1968 when a $1.60 minimum wage law goes
into effect because this figure is higher than most employers are currently willing to pay for low-skilled labor (for example, part-time clerks and sales personnel). 16

Because of the existence of an extensive rapid transit network, automobile ownership for poor persons working in the central city would not be an appropriate way of solving their mobility problems. The out-of-pocket expenses for automotive transportation to the central business district range from 6 to 10 cents per mile versus 2 to 6 cents per mile for non-central destinations.

The effect of car ownership would be to give persons presently without cars a much greater effective range of job choice. This would lead to increased income only if they could obtain a full-time job where they had none before or if they could upgrade their occupational status. Our discussion in Chapter II showed that the available data indicated that low mobility did not appear to be curtailing such opportunities. This is unfortunate in a way because a program to provide persons with cars in order that they could become economically self-sufficient by raising their incomes would be much more politically palatable than one in which continuing subsidies were necessary. Another important problem is that of deciding who would be eligible. Some sort of dividing line would have to be established, with all the difficulties inherent in an income limitation, because it is not possible to give a person increased mobility by giving him one-half of a car.
Cash grants to low-income persons would solve this problem by providing assistance on a sliding scale according to income level. This type of subsidy has a great deal of flexibility, for a person could decide that the best way to increase their mobility would be to pay for a higher-priced centrally-located dwelling that would put them in close proximity to a great number of jobs. The high parking and insurance charges inherent in auto ownership in the central city would not be incurred but their mobility would still be increased.

In addition, it may be that the most pressing needs of the poor are not for mobility but are for other items - food, clothing, or medicine. Each family would be best equipped to determine its own greatest needs.

Such a program would probably have to be administered on the Federal level. One of the forms it might take could be that of a negative income tax, although this proposal currently has a low degree of political acceptability.

CRITERIA FOR AN IDEAL SOLUTION

Table 4.2 summarizes the discussion on these alternative proposals for increasing the mobility of the poor and Figure 4.1 compares the costs of these proposals. These tabulations indicate that the job jitney proposal would be the superior means of
increasing mobility with respect to job opportunities. These increased job opportunities could easily lead to higher wages, which would enable the poor to purchase more trips of other kinds (shopping and recreation, for example) than they can at present.

But the attractiveness of the job jitney is as an immediate and short-run solution; it does not deal with all the mobility problems that we would like to eliminate. What characteristics might we look for in an ideal solution to raising the level of mobility for poor persons?

1. The solution should increase accessibility for a variety of trips, not just the work trip. The major fault of the job jitney proposal is that it does not meet this important criterion, even though some of its other characteristics are quite attractive.

2. The benefits of the system, while having the highest incidence among poor persons, should be distributed throughout the population as a whole. This would greatly increase the political feasibility of any proposal. The idea that best meets this criterion is that of making mass transit free for all users.

3. The solution should not involve large public subsidies. This criterion might be eliminated by skillful salesmanship, but this elimination might take a number of years to accomplish before, for example, all capital and operating expenses of a transit system were paid for by tax monies.
(4) As much as possible, the door-to-door, on-demand features of automobile travel should be incorporated into any new system. This would require considerable rethinking of our current conceptions of fixed-route, fixed schedule mass transportation.

(5) Rigid income limitations constituting qualification for the benefits of any system should be avoided. The administrative problems are excessive and the process is degrading to the individual applying.

(6) Whatever form of public or quasi-public transportation is used, it should cover a large portion of the metropolitan region and grow with the region. This is necessary if the increase in mobility differentials, which leads to increased social economic, and psychological isolation of the portion of the population who are deprived of mobility because of their poverty, is to be halted or resolved.

There is no doubt that a system with the above characteristics would provide great benefits to poor people. Many of these benefits are not readily measurable. It would be helpful to know, for example, what the expected increase in the nation's Gross National Product might be if those persons currently impoverished because of their inability to contribute to the labor force were actually working. Some other benefits are apparent, however. One of the most important of these is the monetary expense saved by making a family
### TABLE 4.2:

**PROPOSALS FOR IMPROVING MOBILITY OF THE POOR**

<table>
<thead>
<tr>
<th>Program</th>
<th>Capital Costs</th>
<th>Operating Costs</th>
<th>Revenue from Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved transit information</td>
<td>$150,000 (total)</td>
<td>$15,000/yr</td>
<td>Increased (amount unknown)</td>
</tr>
<tr>
<td>Transit Extensions by trip subsidies</td>
<td>(no change)</td>
<td>(no change)</td>
<td>-14.5 to -24.3%</td>
</tr>
<tr>
<td>Free transit service</td>
<td>(no change?)</td>
<td>(no change?)</td>
<td>none</td>
</tr>
<tr>
<td>Extend transit service area</td>
<td>$800/seat at $32,000</td>
<td>90¢/mile</td>
<td>30¢/mile?</td>
</tr>
<tr>
<td>Job jitney</td>
<td>$230/seat at $2,300</td>
<td>2¢/mile</td>
<td>9¢/mile</td>
</tr>
<tr>
<td>Very high densities through land use controls</td>
<td>Very high</td>
<td>lower?</td>
<td>reduced?</td>
</tr>
<tr>
<td>Car ownership</td>
<td>around $550/car or $140/st.</td>
<td>2.5¢/mile</td>
<td>none</td>
</tr>
<tr>
<td>Cash grants</td>
<td>variable</td>
<td></td>
<td>if done within none</td>
</tr>
</tbody>
</table>

Costs and revenues are estimates and may vary. Costs and benefits may need to be adjusted for inflation and other factors.
<table>
<thead>
<tr>
<th>program</th>
<th>financing</th>
<th>incidence of benefits</th>
<th>incidence of costs</th>
<th>political feasibility</th>
</tr>
</thead>
<tbody>
<tr>
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<td>entire population</td>
<td>very high</td>
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<tr>
<td>Transit Extensions by trip subsidies</td>
<td>increased local taxes; state or federal grants</td>
<td>poor persons</td>
<td>entire population</td>
<td>low</td>
</tr>
<tr>
<td>Free transit service</td>
<td>increased local taxes</td>
<td>entire population</td>
<td>entire population</td>
<td>low</td>
</tr>
<tr>
<td>Extend transit service area</td>
<td>increased taxes</td>
<td>suburban communities</td>
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<tr>
<td>Job jitney</td>
<td>from revenue</td>
<td>poor persons</td>
<td>poor persons</td>
<td>high</td>
</tr>
<tr>
<td>Very high densities through land use controls</td>
<td>??</td>
<td>poor persons</td>
<td>poor persons</td>
<td>very low</td>
</tr>
<tr>
<td>Car ownership</td>
<td>capital costs subsidized by government</td>
<td>poor persons</td>
<td>entire population</td>
<td>low</td>
</tr>
<tr>
<td>Cash grants</td>
<td>increased federal taxes</td>
<td>poor persons</td>
<td>entire population</td>
<td>low</td>
</tr>
</tbody>
</table>
a. These costs include gas, oil, and lubrication charges, maintenance, and yearly insurance charges, which have been figured on the basis of 6,000 miles per year for a compact car and 13,000 miles per year for a job jitney. For transit, actual fares have been used.

b. Based on actual charges on MBTA lines. The subway-streetcar route used was the Boston College - Park St. line, and the bus route used was the Harvard Square - Dudley line.
economically self-sufficient. In New York City 81 women who
graduated from a job training program have saved the city $255,000
per year in welfare expenses. It seems reasonable to assume that
these people now have higher incomes than they did when on
welfare. Other factors, such as the psychological importance of
economic self-sufficiency, are very hard to measure but extremely
important.

This chapter has analyzed possible methods of increasing
mobility for persons of low income. None of the alternative
suggestions fulfill all the desired attributes, but expanded
information about current public transportation facilities and the
job jitney proposal appear to offer the greatest benefits at the
least cost at this time. For the future, in which the deprivations
cased by low mobility could be much more serious, consideration
should be given to technological innovations in urban movement
systems.
NOTES TO CHAPTER IV:

1. Howard, "The Mobility of the Poor," speech to the
   National Highway Research Board Conference, January 19, 1967

2. Transportation - Employment Project, State of California
   Transportation Agency, Progress Report No. 3, p. 42

3. U.S. Department of Housing and Urban Development,
   Directory of Urban Mass Transportation Demonstration Projects,
   p. 41

4. This was the median cash fare on public transportation lines
   in U.S. cities of 25,000 and over in 1963 according to the
   Committee for Economic Development, Developing
   Metropolitan Transportation Policies: A Guide for Local
   Leadership, p. 92

5. Oi and Shuldiner found that the per cent of average consumption
   expenditures spent in the lowest three income categories in
   1950 was: under $1,000, 7.2 per cent; $1,000 - 2,000, 7.92
   per cent; and $2,000 - 3,000, 10.89 per cent. (An Analysis
   of Urban Travel Demands, p. 160)

6. For example, in the Niagara Frontier (Buffalo) area of New York,
   78 per cent of the transit riders could not have used a car
   instead for the trip, 42 per cent because they had no car and
36 per cent because they could not drive, according to Roger Creighton, director of a transportation study in the area.

7. These figures are based on the 1963 usage of bus, subway and streetcar lines by income level for the city of Boston as documented by the BRPP surveys.

8. All cost figures in this section are from Robert Korach of the Massachusetts Bay Transportation Authority unless otherwise noted.

9. Transportation - Employment Project, op. cit., p. 4

10. Mr. Fiedler, Volkswagon Brookline, Inc.

11. Insurance information from the Francis Vita Insurance Agency

12. Automobile reliability, cost, and operating data from Mr. Fiedler.

13. Vernon, Metropolis 1985, p. 170

14. The following wage information is from Mr. Roger Jewett of the Commercial and Industrial Development Bureau of the Massachusetts Department of Commerce and Development, except as noted.

15. Data from Mr. Valway, Personnel Manager of Jordan Marsh Company and Mr. Nicholas Stevens of Filene's
16. Mr. Stevens, Filene's

17. Blumenfeld, The Modern Metropolis, p. 133

V. CRITIQUE OF EXISTING DATA SOURCES
"Cities happen to be problems in organized complexity.... They present 'situations in which a half-dozen or even several dozen quantities are all varying simultaneously and in subtly interconnected ways'."

Jane Jacobs,
The Death and Life of Great American Cities

INTRODUCTION

One of the primary purposes of this research was to determine whether or not the role of mobility as a causal factor in poverty could be described using existing data sources. In general, the answer to this question is negative; although existing data is suggestive of the strength and importance of the mobility-poverty relationship, it by no means provides a precise description. This is certainly not due to a lack of interest in such questions as the travel patterns and distribution of income in our metropolitan area; it rather stems from a failure on the part of those researching such subjects to include appropriate questions or to structure the data in a usable format.

The major data source used in this research was the interview surveys conducted by Wilbur Smith and Associates for the transportation inventory of the Boston Regional Planning Project (see Appendix A.) The amount of data gathered was quite substantial - a three per cent sample was conducted for the communities
inside Route 128 and a seven per cent sample was performed for all other towns in the study area. A survey of this magnitude should obviously be undertaken only after a careful study of what data is relevant and how it may best be used. The relationship between mobility and income level would appear to be an important sub-topic of trip-making behavior, one worthy of attention in the BRPP surveys. As previously noted, however, this data does not provide an adequate description of the relationship between level of mobility and level of income.

SINS OF OMISSION

The most critical defects in this data concern the information not collected in the survey. Granted that origin-destination traffic surveys collect far more information than they ever use, additional information needs to be obtained. The omission of walking trips is a fundamental deficiency in origin-destination studies. Past studies have concerned themselves with vehicular trips ("equivalent vehicle trips" is the term applied to the use of mass transit) to the neglect of person trips. This is an exceedingly serious omission for the following reasons: (1) Walking trips constitute a very significant portion of all trips. For trips under one mile, walking is used for at least half of all trips. In very large cities, the proportion is
much higher. Trips under one mile still constitute a major portion of work trips in smaller cities and an important share of trips in the larger urban centers. In particular, the walking mode is very important for the low-income person because of his inability to pay for some forms of mechanized transportation.

(It should be noted that walking to work was included in the BRPP data, although not in a usable form. More will be said about this in the next section.)

(2) Certain facilities are necessary to handle the demand for walking trips, just as vehicular flows have specific spatial requirements. One of the consequences of the failure of traffic engineers to plan for pedestrian movements is the inevitable delay to vehicular traffic in areas of intensive pedestrian activity.

(3) Walking could effectively handle a larger share of trips than it now does. The necessary prerequisite is, of course, that walking be an enjoyable experience, or at least not as stressful as driving or transit-riding. At the present time, walking in many areas of our cities is not only unpleasant but dangerous. Merely the efficiency of walking as a method for moving people over short distances should inspire us to make fuller use of this mode of travel.

(4) The complete - if you will, systems analysis - approach to travel demands the inclusion of walking trips, which are used, even for a small distance only, at the beginning and end of trips of almost every purpose. Until walking is recognized as an important part of our movement system, planning travel facilities from origin
to destination (that is, door to door) will be a myth.

The omission of unemployed persons from the occupation or industry classifications is also serious. One would suspect that those persons who are unemployed would exhibit different travel patterns from those who are working at a steady job. Since work trips constitute about 30 per cent of all travel, the demand for transportation facilities could deviate quite far from normal within local pockets of high unemployment within the metropolitan region. Lack of unemployment information has made the assessment of the effect of mobility on income level much more difficult.

The omission of the principal wage-earner's salary blurred our attempts to determine if the higher transportation and housing costs in the suburbs were in fact being subsidized by increased wages for jobs comparable to those in the central city. Perhaps this information would not be as relevant to trip generation as total family income; nonetheless, its omission was detrimental to this study.

The omission of some indication of the value of the housing unit (market value or gross rent) is perhaps not serious in terms of trip-making behavior, but such information would appear to be more explicitly related to trip generation rates than the mere "own or rent" data that were actually collected. In addition, this type of data could have given us a fine-grained description of the low-cost housing for the metropolitan area, which would be a necessary
prerequisite for the adequate description of the low-income journey to work, as well as providing the material for a detailed analysis of the cost of suburban versus central city living.

SINS OF COMMISSION

Perhaps less heinous, but certainly more tragic, than the sins of omission are those due to an inadequate conception (or none at all!) of how this mass of data would be utilized. Not to possess data is unfortunate, but to have expended scarce financial resources on an inappropriate format is unintelligent.

The information gathered for the Boston Regional Planning Project is stored on three computer tapes (see Appendix A). These tapes were set up with the intention that they could be used simultaneously, with the result that each tape contains information not on the other two tapes and an identification format so that the three tapes (or at least two) can be used concurrently. What actually happened was that the number of errors in the coding of the identification format made the simultaneous use of the tapes impossible. The probability of such an occurrence should have been foreseen, and while the data format probably could not have been "fail-safe," it should have been at least "fail-soft".

The lack of income data on the person tape is a deficiency of major proportions. Without this information, it was not possible
to correlate a person's workplace and income level. Using the other tapes, the relationship between income and occupation could be plotted and then compared to the occupation-workplace correlation to arrive at an estimate of the relation between income and workplace. It was felt that this estimate was not sufficiently precise to adequately describe differences in wages throughout the metropolitan area. Furthermore, it was not possible to correlate a person's income level and his mode of travel to work. Since our research was intimately concerned with income level, the lack of this information in usable form was quite detrimental.

Describing the length of the work trip was difficult with the data in its present form. Trip length in miles could not be determined without a high probability of error: the airline distance between the zone (or subzone) of origin and the zone or subzone of destination could have been calculated from a map, but the airline distance between zone centroids was felt not to be an adequate approximation of actual travel distance. This deficiency was an important loss for this study, for one would suspect that a poor person might be willing to travel relatively great distances to obtain a paycheck, and such a proposition obviously warrants testing. Unlike the spatial length of the trip, the temporal length was available. To get this information in usable form (the time the trip started and ended was on the tape, but not the relation between the two), much extra work was necessary. Again, trip length in terms of time
could vary significantly with a person's income level. It would seem that trip length would be one of the important variables with which a land use and transportation study would concern itself, which makes the difficulty encountered in obtaining this information even more unusual.

*Trip purpose* was also inexplicably imprecise in these data. Information on the land use at the destination of the trip was available, but is a trip ending at a retail establishment a work trip or a shopping trip or a recreation trip? We found that low-income persons took fewer trips than higher income persons, but what kinds of trips were omitted? We honestly cannot tell with the data in its present form. The inability to describe trips by purpose leaves us unable to describe *trip purpose* by mode. If a family can afford only one car, how is that one car used? Would low-income families use their cars primarily for work? for shopping? for pleasure? The length of the trip in time by purpose was also not obtainable. This was a serious deficiency in our description of the low-income work trip.

Finally, the lack of a scaling factor by which the number of persons interviewed could be multiplied to get a number representing the total population was troublesome. Conversion factors for the number of dwelling units and the number of trips represented by an interview were available on the tapes but their use was not always desirable. Furthermore, the sampling rate often varied
from area to area, so that a scalar could not easily be fitted by hand. This is a relatively minor detail, but the minor details that are resolved when the data format is planned can save a substantial amount of time and effort during the data processing.

Walking as a mode of travel to work or school was included in the questionnaire, but was coded on the tapes as "walk or no answer." This action, further evidence of the contention that the importance of walking in a systematic study of transportation is not recognized, destroyed any accuracy in what might have been a very important bit of information for this study.

These factors, sins of omission and commission, combined to produce a distinctly sub-optimal data bank. For the reasons listed above, it was not possible to describe to the desired degree of precision the relationship between poverty and mobility. That there is a relationship is readily apparent from the limited information gathered here; the precise degree to which mobility, in comparison to other factors, can be considered a cause of poverty remains to be demonstrated in future studies.

OTHER DATA SOURCES

The survey of travel patterns by the Boston Regional Planning Project was not sufficient to adequately test all our hypotheses on the relationship of low mobility to poverty. An
obvious source of further information is the U.S. Bureau of the Census and state censuses where applicable. Census data enabled us to locate unemployed and sub-employed persons, although we could not then describe the travel patterns of these particular people. This deficiency could be alleviated by the use of a different data format (that is, computer tapes instead of printed tables). Special Census surveys are sometimes taken in selected areas - poverty and slum areas seem to be of particular interest these days - and this can be an extremely valuable data source, as it was for us in the South End of Boston. Detailed occupation of the employed can be compared with income levels in the 1/1000 Census survey, which has the disadvantage of not listing the location of the interviewee other than by one of four regions of the country and by size of city. In addition, the Census can provide information on the distribution of housing by cost and type, although the two cannot presently be related except in the 1/1000 survey.

The state agency corresponding to the U.S. Bureau of Labor Statistics (which is an important source in and of itself) can often furnish much valuable information. In Massachusetts, this agency is the Division of Employment Security. This potential source of information holds vast promise if problems involving the confidential nature of some information could be overcome. The following types of information reside within the files
of the Division of Employment Security, and could possibly be obtained: the location (by postal zone) of persons receiving unemployment checks; the skill level of these persons; the location of all other persons seeking employment (that is, those wanting to change jobs); and a certain share (found to be about one-third) of the job vacancies in the region by skill level and location. The reference file of government documents pertaining to employment at the Division's research headquarters is also a valuable source of information.

Regional planning studies and transportation studies often contain much relevant data. The Boston Regional Survey done for the Mass Transportation Commission in 1963 is such a study. This particular survey was useful in terms of information on the distribution of population, economic projections, and the characteristics (routes, volume of riders, etc.) of mass transportation in the region. In a source such as this, the preliminary reports often contain more information than the final report and their use should be substituted for that of the final summary.

For employment data and job opportunities, the location of recent and expected industrial development, and the distribution of wages for comparable jobs, the state agency corresponding to the Massachusetts Department of Commerce and Development should be consulted. Additional information of this nature can sometimes be gathered through a regional Chamber of Commerce.
Previous research was of little help in testing the hypotheses proposed in the first chapter, except for clarifying small questions. Patterns of industrial location have received some attention, and the characteristics of poor people have been voluminously documented (although little has been written on their trip-making behavior). Only the Transportation-Employment Project in South Central Los Angeles has squarely faced the entire issue of the relationship between mobility and poverty. An auspicious start has been made; this could be an extremely valuable source of information.

All in all, the existing data is too weak in spots to adequately answer most of the questions asked. Additional research must more accurately measure the relationships found. The most notable case of insufficient information is the total inability to identify persons who have missed opportunities but are not unemployed, sub-employed, or under-employed. Original field research that has been organized with great care is the only method of locating these people and diagnosing the role of mobility as a cause of their impoverishment.

FUTURE DATA COLLECTION

Previous transportation studies have expended vast amounts of time and money on the collection of multifarious data about the
urban area, its residents, and their travel behavior. Most of this high-priced information is actually used only marginally in the design of transportation facilities, if it is used at all. Yet we have indicated that the data collected by the Boston Regional Planning Project was inadequate for the purpose of correlating mobility and income level. Is there an answer to this dilemma?

Two extreme solutions deserve examination.

The first possible approach to the problem of data collection for planning transportation facilities would be to utilize existing data sources for the majority of all information needed. The traffic engineer would use data from Census surveys for demographic information. These surveys could be expanded to include more specific information than is currently gathered on trip-making behavior. Secondly, land use data would be obtained from local and regional planning commissions. Thirdly, additional patterns of trip-making behavior could be ascertained by careful analysis of the 70 or more origin-destination studies by American engineers of travel in urban areas. Finally, the engineer would actually collect data on the spatial and flow characteristics of existing travel facilities in the field.

Such a process would be much cheaper than the existing inventory process. If a source such as the Census were used, time series data would be available, eliminating the need for the "one-shot" approach now practiced in so many transportation studies.
With data gathered over a period of time, it might be possible to isolate the reasons behind trip generation instead of merely documenting the rates.

There are drawbacks to this approach. The major one is that with several sources of data, precise cross-tabulations are not possible. This is the problem that we encountered with the BRPP tapes where work place information, for example, could not be compared with income level, car ownership, or trip length. The error in the analysis thus increases substantially. The second important problem involves the comparison of the populations of the different surveys: do the various sampling methods used give equivalent data? The third difficulty would be the cost of selecting, interviewing, and tabulating several different survey populations: much of this expense could be eliminated by using only one extensive interview.

The other extreme in future transportation study data collection would be to expand the information-gathering process substantially. This tack would also recognize that transportation studies collect much more data than they need; the added consideration is that many other people could put this data bank to good use. To fulfill such a requirement would mean that data collection would have to be greatly expanded in depth and in scope for each of the demographic, land use and transportation facilities file.
This approach would greatly increase the ability to describe the nuances of urban physical and flow systems in relation to the inhabitants of the area. It is questionable, however, whether such duplication of current efforts (for example, those of the U.S. and state censuses) would justify the additional expense. Allocating user charges for this information might prove difficult; the task does not seem insurmountable, however.

What suggestions could be made in light of this discussion of the extreme alternatives? First of all, it appears that one agency should be responsible for coordinating and collecting all pertinent information about the metropolitan area. This would reduce costs and increase the amount of interrelated information. Secondly, the data collection process should be an on-going event, with survey results published every five to ten years (five is preferable). This tactic could indicate those parts of the picture which are for some reason hidden by the current "snap-shot" technique.

What type of organization would handle such a task? The "urban observatory" proposal of Robert Wood, now Undersecretary of the Department of Housing and Urban Development, seems quite attractive. One way to conceive of this type of group would be as a greatly expanded, interdisciplinary Census Bureau. The expertise in surveying and statistical analysis gained from the decennial Census would provide a firm foundation for the urban observatories, while other disciplines could provide the theoretical
framework to decide what particular information was necessary to explain which kinds of behavior in our urban areas. The data files should be set up so as to facilitate computer processing of the data.

CONCLUSION

The population in this country's metropolitan areas will double in the next 40 years; the amount of land within such areas may increase much faster. It has recently been said that "...the next five years are the critical period. Between now and 1972 our nation will make basic decisions that will mean irrevocable commitments for the next 40 years to the form, pattern, and style of urban life, the direction of our urban thrust." In such a situation, a wrong guess could be very wrong, indeed. Our level of information is such, however, that we can now only guess at the magnitude of the relationship between mobility and poverty. Precise information is needed now to solve this and other burning questions that constitute our urban challenge.
NOTES TO CHAPTER V:

1. Wilbur Smith & Associates, Boston Regional Planning Project: Comprehensive Traffic and Transportation Inventory, appendix A. These sampling rates varied greatly from town to town. In some of the communities outside Route 128, as much as 14 per cent of the population appears to have been interviewed. Population figures from the U.S. Census had to be substituted when the BRPP data would have given highly inaccurate figures (for example, see Table 2. 5B on page 48).

2. Owen, The Metropolitan Transportation Problem, p.130; Lapin, Structuring the Journey to Work, p. 42.

3. Lapin, Loc.cit. He cites data showing that 44.7 per cent of all trips in towns under 25,000 populations are less than one mile; in cities of 100,000 plus, the figure drops to 14.5 per cent.

VI. CONCLUSION:
MOBILITY AND POVERTY
In order to gain a clearer perspective of the importance of low mobility as a causal factor of missed opportunities, we should step back a bit and relax some of the qualifying assumptions made in Chapter II. We mentioned on page 31 that a full definition of job accessibility would include knowledge of a job, the required level of skills for that job, and fulfilling the non-professional and personal requirements of that job. We assumed then that all of these requirements were met except the ability to travel, but what we really need to know is how often this is actually the case. What should be done is to take all persons that were unemployed (6 per cent of all those in poverty\(^1\)) and find for which of the four types of reasons listed above the job was inaccessible to them. This procedure would also be followed for those persons sub-employed, under-employed, marginally employed, and unsatisfactorily employed. The specific breakdown by numbers for each of these groups is unknown, but 42 per cent of all poor persons were not in the labor force in 1963, while 52 per cent were at least partially employed.\(^2\) In this manner, the importance of mobility in relation to other factors that make jobs inaccessible could be determined.
In the South End Census survey in Boston, we saw that the per cent of unemployed persons who attributed their lack of employment to transportation problems was only 2.2 per cent of the total unemployed. This shows that low mobility is not a significant factor in the elimination of job opportunities in the city of Boston. The results in other cities that were surveyed were similar. Since these surveys were made in areas of the highest unemployment of the respective cities, we can say that transportation is not recognized as a major stumbling block to employment by those who are not employed.

There is clearly much to be gained from a further analysis into such questions. For example, what increase in opportunity could be created by expanding the sources of information about job opportunities? What could be gained by providing the poor with newspapers, radios, or telephones? What impact on the poverty problem could be gained through education and job training programs? Much emphasis has been given in the past to skills training as a prime means of improving job accessibility, and it appears that there is much merit in this approach. What part of the poverty problem could be eliminated by strictly enforcing measures to combat discrimination in hiring and wage policies? This also deserves analysis.

We could now proceed to relax our assumptions one step further; to this point we have proceeded under the assumption
that jobs are not missing, they are being missed. This seems to be a fair assumption for the economy as a whole, but we saw on page 34 that 55 per cent of the unemployed persons in the South End survey area had the required skill level for only 27 per cent of the job openings in the Boston region. Particularly at the low end of the skills ladder, national policies to increase the number of jobs requiring little training (that cannot be gotten on the job) could make a significant contribution to the war on poverty.

Some persons are entirely outside the scope of this analysis. The first large group is comprised of all persons who could be classified as farm dwellers. This eliminates quite a number of persons, 14.7 per cent of the total poverty group. We have also eliminated from this analysis all those persons classified as persons whose poverty is not subject to remedy. As we saw on page 7, those persons whose poverty could not be remedied might be well over half of the total poor.

In short, the impoverishment due to lack of mobility appears quite small at this time in comparison to the total poverty problem. But while the overall effects of low mobility are not large, they are liable to be concentrated in the future among groups in our society who are deprived of much besides mobility. The consequences of such a concentration of deprivation may be serious, as they were in Watts. When social and physical isolation interact to deny segments of our population access to the opportunities of the
society as a whole, the tenuous thread of social order cannot survive.
NOTES TO CHAPTER VI

1. Orshansky, "Counting the Poor," in Ferman, Kornbluh, and Haber, (ed.), Poverty in America, p. 59

2. loc. cit.


4. Miller, "Changes in the Number of Poor", in M.S. Gordon (ed.), Poverty in America, p. 85
APPENDIX A:

THE BOSTON REGIONAL PLANNING PROJECT
The major data source for this study was the home interview surveys conducted for the Boston Regional Planning Project by Wilbur Smith and Associates. These interviews were reported to have covered three per cent of 741,000 dwelling units located generally within Route 128, and seven per cent of 348,000 dwelling units located outside of Route 128. Figure A-1 shows these areas. The information gathered in these surveys is shown in Table A-1. As mentioned in Chapter V, information contained on only one tape could not be tabulated against information contained on the other two tapes, which was a serious deficiency in this study.
In the shaded area, a 3 per cent sample was taken; in all other areas, a 7 per cent sample was said to have been taken.
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<th>Trip (02)</th>
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<td>x</td>
<td>x</td>
</tr>
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</tr>
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<td>First/Auto/Make (also Second/... &amp; Third/...)</td>
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<td>First/Auto/Model (also Second/... &amp; Third/...)</td>
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<td>Total/Trips</td>
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<tr>
<td>Weekend/Trips</td>
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<td>person (100)</td>
<td>tape household (01)</td>
<td>trip (02)</td>
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<td>--------------</td>
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<td>Weekend/Recreation</td>
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<tr>
<td>Trip/Number</td>
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<td>x</td>
<td></td>
</tr>
<tr>
<td>Origin/Town, O/Subzone, O/Zone, O/Superzone</td>
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<td>x</td>
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<tr>
<td>Origin/Land/Use</td>
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</tr>
<tr>
<td>Destination/Town, D/Subzone, D/Zone, D/Superzone</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Destination/Land/Use</td>
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<tr>
<td>Mode</td>
<td></td>
<td>x</td>
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<td>Start/Time</td>
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<td>Walk/From/Origin</td>
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<td>Walk/to/Destination</td>
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<td>Trip/Cost</td>
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<td>Type/Parking</td>
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<td>Car/Number</td>
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APPENDIX B:

TIME-LENGTH OF THE JOURNEY TO WORK

BY INCOME LEVEL AND PLACE OF RESIDENCE
In our second chapter we suggested that the number of opportunities of a particular type (jobs, stores, eating places, etc.) available to a person was determined by how fast and how long he travelled. We pointed out that persons of low income spent proportionally less on transportation than other persons, the major effect of this action being that the poor are relegated to slower modes of travel. We suggested that one method of overcoming the limitation on opportunities imposed by the inability to purchase speed would be to set a much lower valuation on one's time. In other words, the poor spend more time travelling.

Since work trips were not specifically identified in the BRPP surveys, the procedure used was to call all trips beginning and ending between 7.00 a.m. and 10.00 a.m. work trips. A first examination of the data revealed that the time distribution of the trips depended greatly on the time at which the trip started; that is, trips tend to peak substantially more according to the time of departure than the time of arrival. For this reason, the per cent of all trips ending at a particular time interval has been shown as a band width encompassing 75 per cent of all travellers in the following diagrams, instead of being shown as a single point.

Figure B-1 shows travel times in the entire BRPP study area; all towns and persons of all income are represented here. This figure indicates that persons tend to travel 6 to 11 minutes, 12 to 17 minutes and 30 to 35 minutes more often than any of the other 5-minute
time spans; with the highest proportion (averaging 19 per cent of all work trips) between 12 and 17 minutes. Very little travelling occurs beyond 35 minutes in length. The narrowness of the band width of the per cent of trips of a certain time length indicates that average travel times describe travel behavior relatively well for the people of all incomes in the entire region. The dispersion of trip by time length is much greater for specific areas and specific income levels, as we shall see.

Figure B-2 shows the distribution of time spent travelling to work for persons with incomes under $4,000 per year in Boston. The greatest number of these poor people travel from 30 to 35 minutes (average 21 per cent); the proportion travelling this length is greater than in the rest of the region or for persons with incomes above $5,000 per year, as we shall see in Figure B-4. Very few members of this group (average: 4 per cent) travel less than six minutes to get to work; this proportion is much lower than that of any other group in Boston or the regional average (11.5 per cent). In other words, the poor do travel longer than persons of higher incomes.

This variance is even greater for those persons in Boston with yearly incomes between $4,000 and $4,999, as Figure B-3 shows. The peak at 30 to 35 minutes is even more pronounced than for the lowest income group; on the average, 24 per cent of those in Figure B-3 travelled for 30 to 35 minutes to get to work.
Turning to those with incomes above $5,000 in Boston, we find the greatest peak in travelling at 18 to 23 minutes, followed by the 30 to 35 minute peak. Comparing Figures B-4, B-2 and B-3 shows conclusively that it takes persons of low income longer to get to work than it takes persons of higher incomes. In other words, persons of low income do travel for longer times to make up for their inability to purchase trips on faster modes of travel. This is true for trips over 35 minutes in length as well, as can be seen from a comparison of Figures B-2 and B-3 against B-4. The difference in per cent of trips over 35 minutes by income level is not great, however; the behavior of the poor makes it appear that, in Boston, they do not have a markedly different valuation of their time spent in travelling beyond the 40-minute limit.

The comparison between the poor in Boston and those families in poverty in Framingham leads to some surprises. The two most striking findings are that none of the poor travel less than six minutes to work, and that there is a very definite upper limit to the time that they will travel. For those with income under $4,000 per year, this limit is 35 minutes; for those between $4,000 and $5,000, it is 41 minutes. This is an unusual occurrence, and the explanation for it is not readily apparent. Figure B-7 shows that the distribution of trips for persons with incomes greater than $5,000 per year in Framingham is similar to that in Boston for this income group;
therefore it is not some feature of the town in general that strictly limits time spent in work trips by poor persons in Framingham. We would guess that the spatial distribution of low-cost housing in comparison to low-skilled jobs within the town would provide a partial explanation for this phenomenon. Whatever the explanation, it appears that the average time-length of trips does not vary greatly by income in this suburban community, in contrast to the variance in the central city.

Even in suburbia, though, the poor are forced into a greater expenditure of time than persons of higher incomes in order to obtain the same good: a trip to work. It is usually argued of course, that the poor have actually spent less money than others for the same trip, and that they have substituted a payment in time for what they could not pay in cash. As shown in Chapter IV, only for centrally located jobs do the poor pay less to travel than other persons; where the cost of automobile parking is small or nothing at all (more accurately, subsidized by taxes, which are paid by the poor as well) many automobile trips are cheaper than transit trips. Therefore, it is clear that the poor pay more to travel. The effects of their greater expenditure of time in travel are not readily apparent, and should be the object of future research.
PER CENT OF TRIPS ENDING IN EACH TIME INTERVAL
Figure B-2:

BOSTON
0-3,999

PER CENT OF TRIPS ENDING IN EACH TIME INTERVAL

TRIP TIME IN MINUTES
Figure B-3:
BOSTON
$4,000 - 4,999

PERCENT OF TRIPS ENDING IN EACH TIME INTERVAL
Figure B-5:
FRAMINGHAM
$6.0 - 3.999

PER CENT OF TRIPS ENDING IN EACH TIME INTERVAL

TRIP TIME IN MINUTES
Figure B-6:
FRAMINGHAM
$4,000 - 4,999$

PER CENT OF TRIPS ENDING IN EACH TIME INTERVAL

TRIP TIME IN MINUTES

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70

0-5 6-10 11-15 16-20 21-25 26-30 31-35 36-41 42-47 48-53 54-59 60-65 66-70

PER CENT OF TRIPS ENDING IN EACH TIME INTERVAL
Figure B-7:
Framingham
$5,000 +

Percentage of trips ending in each time interval.
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