

## APPENDIX A

### DESCRIPTION OF USER-REPORTED DATABASES

Much of the analytical work describing current transit markets was based on three national data sets, each of which contain sociodemographic and transportation information reported directly by respondents. These databases are as follows:

- 1991 American Housing Survey (AHS),
- 1990 U.S. Census, 5 percent Public Use Microsample (PUMS) Sample, and
- 1990 Nationwide Personal Transportation Survey (NPTS).

Each of these databases has strengths and weaknesses which may affect the analyses and conclusions. The main parameters of each survey are summarized in Table A-1 and described below.

#### THE AMERICAN HOUSING SURVEY, 1991

The American Housing Survey (AHS) provides extensive information on housing at the national and metropolitan statistical area (MSA) level; it also allows researchers to disaggregate market niches for the home-to-work trip. Conducted by the Bureau of the Census in odd-numbered years, roughly 50,000 housing units are surveyed in 44 selected metropolitan areas. There are four groups of metropolitan areas, each surveyed once every 4 years on a rotating basis; the same housing units are sampled each time (with adjustments for losses). The survey is undertaken in person by Census interviewers.

AHS transportation data are collected only as a supplement to housing data and only for the commute trip. Because the focus of the AHS is the housing unit rather than the household or its members, the uses to which the transportation data could and should be put are limited. Although the survey attempts to sample a wide variety of types of housing units, there is no effort to ensure a comprehensive sample of people by race, sex, income and so forth.

The Census Bureau provides weighting coefficients for the data, which allows data users to create a national sample—by housing type—but not by the characteristics of the people living in those houses. Because the 1991 data are not weighted by demographic variables, AHS data cannot be normalized to represent a national survey of transit users. However, as long as there are sufficient responses in specific demographic categories, the AHS can describe transit use by different kinds of people—so one can question, for example, what percentage of women or people making more than \$60,000 generally take some form of public transit to go to

work. One cannot ask what percentage of all transit riders are women or those making more than \$60,000.

#### NATIONWIDE PERSONAL TRANSPORTATION SURVEY (NPTS)

The Nationwide Personal Transportation Survey (NPTS) is sponsored by the U.S. Department of Transportation; it has been undertaken in 1969, 1977, 1983, and 1990 (a 1995 study should be available shortly). The target population is all people 5 years of age and older; the survey is based on a random digit dialing process using a computer-assisted telephone interviewing system. In 1990, a total of 21,869 households were interviewed; each person over 14 was asked to recall and report detailed information about every trip taken on a sample day. Information on children ages 5 to 13 was supplied by an adult in the household.

Each household in the sample was assigned a specific 24-hr "travel day" and a 14-day "travel period" for which detailed data were collected. One adult was asked information common to all respondents in the household (e.g., number of household vehicles, access to transit, and so forth); all respondents were asked about the trips they took on the day and period in question. Thus the NPTS provides the only national data which permit examination of non-work trips or evaluation of tripmaking by household structure and various sociodemographic characteristics.

The data collected were organized into the following files:

- Household file,
- Person file,
- Vehicle file,
- Travel day file,
- Travel day file (segmented trips only), and
- Travel period file.

The study analyses relied largely on the travel day and person files.

The NPTS data are not completely comparable with other data sets because individuals without phones were not covered, there was non-response at the household and person levels, and there were question-specific non-response and other response errors which could not be fully compensated for. As a result, very-low-income Blacks and Hispanics may be underrepresented in the NPTS, although the lower rate of Hispanic responses may be the result of confusion created by asking two separate questions about race and ethnicity. (Apparently many Hispanics, when asked their race, replied "other" rather than White or Black or Asian.)<sup>1</sup>

TABLE A-1 Attributes of user-reported data sets

	1991 American Housing Survey (AHS)	1990 Census (5% PUMS)	1990 Nationwide Personal Transportation Survey (NPTS)
<b>Original Sample Size</b>	50,000 Households	10 million housing units, 12 million people	21,869 Households
<b>MSA/PMSA Sample Size</b>	50,300 People (Unweighted)	3,331,125 Households (Unweighted)	149,546 Trips (Unweighted, in urbanized areas)
<b>Survey Method</b>	At-home administered questionnaire	At-home written questionnaire	Phone survey, recollection of one day's trips
<b>Type of Trip</b>	Work trip only	Work trip only	All trip purposes
<b>Weighting</b>	By housing unit only	By person and by housing unit	By final trip
<b>Transit Use Measured by</b>	Most frequent mode	Principal mode, longest distance	All trips counted
<b>Bias</b>	Misses those with fear of being interviewed	Misses those with fear of being interviewed	Misses people without phones, plus those with fear of being interviewed

The 1990 NPTS transit results differ considerably from those reported under Section 15 by transit operators; one explanation is that people may undercount transit trips—the least frequent trip mode—when asked to recall the trips which they made.<sup>2</sup> FHWA officials have found, however, that people tend to undercount the most frequent mode—the car—and thus undercount auto trips.

Some of the differences between the NPTS and Section 15 may be caused by how transit systems record unlinked trips so that a person transferring from one route or one type of transit is recorded as taking two (or more) trips in the Section 15 system but only one trip in the NPTS. Other differences may be caused by missing lower income travelers because they have no phone, are afraid to answer official surveys (because they are undocumented aliens or are fearful of authority figures), move frequently, or have no fixed residence.

The NPTS sample size does not allow analyses by specific service environments (because transit use for non-work trips is under 3 percent of all trips).

### 1990 U.S. CENSUS

The U.S. Census is undertaken every 10 years by the U.S. Department of Commerce as mandated by the U.S. Constitution. Theoretically, each person in the United States, regardless of status, is required to fill out a Census survey

instrument; adults are asked to fill out forms for children in the household. The Census actively seeks questionnaires from those who do not return them or fill them out properly. Each housing unit in the country received one of two versions of the Census questionnaire: a short form that contained basic demographic and housing questions or a long form that contained those basic questions and additional questions. In rural areas, roughly one in two households received the long form; in urban areas, roughly one in eight households received the long form.

The long form of the Census contained several questions on which the analyses relied. Questions 24b through 24d asked of those people who indicated that they had worked anytime in a referenced week what their principal means of transportation to work had been. Persons who used different modes on different days were asked to list the mode they used most often; people who used different modes on the same day were asked to list the mode on which they traveled the furthest. This approach clearly undercounts transit ridership by those who use transit 1 or 2 days a week and by those who make a multimodal trip whose transit component is shorter than the nontransit component (e.g., by car to train).

This approach also explains some reports of transit use in areas where transit is not available. For example, rural workers might drive to a suburban bus or rail terminal for a trip to the center of a nearby metropolitan area. Their commutes would show as transit trips in the rural county in which they lived and not in the metropolitan county which provided

the service. Or people might have worked outside their own residential area during the referenced week and reported the mode they used while away.<sup>3</sup>

Census data are available at many levels of geographic detail; however, only the PUMS data permit researchers to conduct detailed evaluations using their own independent and dependent variables. Although this permits substantial analyses of transit use, PUMS data are limited to fairly large levels of geographic aggregation. The research team used the 5 percent PUMS data which contained more than 10 million housing units; the research team then used only metropolitan-area-level data. Although the research team would have preferred to use Urbanized Area (which is available in the data set), research team personnel could not incorporate population density into the data set below the metropolitan county level.

The metropolitan area data included all metropolitan statistical areas (MSAs) in the country: MSAs, primary MSAs (PMSAs), and consolidated MSAs (CMSAs). MSAs are areas with a nucleus of 50,000 or more people or an urbanized area and a total population of 100,000; they stand alone. PMSAs are similar except that they are part of a larger metropolitan region with several PMSAs; those larger areas are called CMSAs. Tucson and Phoenix, for example, are MSAs because they meet the minimum population and other criteria

but stand alone. Tacoma and Seattle are each PMSAs because they meet the same criteria but are part of the Tacoma-Seattle CMSA.

Not being able to use Urbanized Area is a serious problem. Public transit services are usually provided only in the built up or urbanized area of a metropolitan region. This inability artificially lowers transit ridership by evaluating the ridership patterns of those who have no transit choices.

## REFERENCES

1. U.S. Department of Transportation, *1990 Nationwide Personal Transportation Survey; User's Guide for the Public Use Tapes*, December 1991, Washington, DC, pp. VI-2-3.
  2. *1990 NPTS Databook; Nationwide Personal Transportation Survey*, Vol. I, by Patricia S. Hu and Jennifer Gray, for the Federal Highway Administration, Office of Highway Information Management, Washington, DC, November 1993, p. 1-5.
  3. U.S. Department of Commerce, *General Social and Economic Characteristics; United States Summary*, PC80-1-C1, Washington, DC, December 1983, p. B-11.
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## APPENDIX B

### TRANSIT OPERATORS WITH 100+ BUSES BY SERVICE ENVIRONMENTS

#### CITIES IN SERVICE ENVIRONMENT 21: POPULATION 50,000–200,000 AND DENSITY LEVEL <50 PSM

Billings, MT  
Greeley, CO

Las Cruces, NM  
Redding, CA

Yakima, WA  
Yuma, AZ

#### CITIES IN SERVICE ENVIRONMENT 22: POPULATION 50,000–200,000 AND DENSITY LEVEL 50–1,000 PSM

Abilene, TX  
Alexandria, LA  
Altoona, PA  
Amarillo, TX  
Anderson, IN  
Anderson, SC  
Anniston, AL  
Asheville, NC  
Battle Creek, MI  
Bellingham, WA  
Benton Harbor, MI  
Biloxi/Gulfport, MS  
Bloomington, IN  
Brazoria, TX  
Bremerton, WA  
Bryan/College Station, TX  
Burlington, NC  
Cedar Rapids, IA  
Champaign-Urbana, IL  
Chico, CA  
Columbia, MO  
Danbury, CT  
Decatur, AL  
Decatur, IL  
Eau Claire, WI

Elkhart/Goshen, IN  
Fall River, MA  
Fayetteville/Springerville, AR  
Florence, AL  
Florence, SC  
Fort Collins, CO  
Green Bay, WI  
Hagerstown, MD  
Houma/Thibodaux, LA  
Jackson, MI  
Jacksonville, NC  
Jamestown/Dunkirk, NY  
Janesville/Beloit, WI  
Joplin, MO  
Kenosha, WI  
Lima, OH  
Manchester, NH  
Mansfield, OH  
Medford, OR  
Merced, CA  
Midland, TX  
Monroe, LA  
Muncie, IN  
Nashua, NH  
New Bedford, MA

Ocala, FL  
Odessa, TX  
Olympia, WA  
Pascagoula, MS  
Pueblo, CO  
Racine, WI  
Richland/Kennewick, WA  
Rochester, MN  
Santa Fe, NM  
Sharon, PA  
Sheboygan, WI  
Springfield, IL  
St. Cloud, MN  
State College, PA  
Terre Haute, IN  
Tuscaloosa, AL  
Tyler, TX  
Waco, TX  
Wausau, WI  
Wichita Falls, TX  
Williamsport, PA  
Wilmington, NC  
Yuba City, CA

#### CITIES IN SERVICE ENVIRONMENT 23: POPULATION 50,000–200,000 AND DENSITY LEVEL 1,000–2,000 PSM

Brockton, MA

New Britain, CT

#### CITIES IN SERVICE ENVIRONMENT 31: POPULATION 200,000–500,000 AND DENSITY LEVEL <50 PSM

Duluth, MN

Reno, NV

#### CITIES IN SERVICE ENVIRONMENT 32: POPULATION 200,000–500,000 AND DENSITY LEVEL 50–1,000 PSM

Albuquerque, NM  
Anchorage, AK  
Ann Arbor, MI  
Appleton/Oshkosh, WI

Flint, MI  
Fort Myers/Cape Coral, FL  
Fort Pierce, FL  
Fort Wayne, IN

Melbourne/Titus, TX  
Mobile, AL  
Modesto, CA  
Montgomery, AL

Atlantic City, NJ  
 Augusta, GA  
 Aurora/Elgin, IL  
 Beaumont/Port Arthur, TX  
 Binghamton, NY  
 Boise City, ID  
 Boulder/Longmont, CO  
 Bradenton, FL  
 Brownsville/Harlingen, TX  
 Canton, OH  
 Chattanooga, TN  
 Colorado Springs, CO  
 Columbia, SC  
 Corpus Cristi, TX  
 Davenport/Rock Island, IA  
 Daytona Beach, FL  
 Des Moines, IA  
 Erie, PA  
 Eugene/Springfield, OR  
 Fayetteville, NC  
 Gainesville, FL  
 Galveston/Texas City, TX  
 Jackson, MS

Johnson City/Kingsport, TN  
 Johnstown, PA  
 Joliet, IL  
 Kalamazoo, MI  
 Killeen/Temple, TX  
 Lafayette, LA  
 Lakeland/Winter Park, FL  
 Lancaster, PA  
 Lansing, MI  
 Lawrence/Haverhill, MA  
 Lexington/Fayette, KY  
 Lincoln, NE  
 Loraine/Elyria, TX  
 Lubbock, TX  
 Macon/Warner, GA  
 Madison, WI  
 McAllen/Edinburg, TX  
 New London/Norwalk, CT  
 Niagara Falls, NY  
 Pensacola, FL  
 Peoria, IL  
 Provo/Orem, UT

Reading, PA  
 Rockford, IL  
 Saginaw/Bay City, MI  
 Salem, OR  
 Salinas/Seaside, CA  
 Santa Cruz, CA  
 Santa Rosa/Petaluma, CA  
 Sarasota, FL  
 Savannah-Robins, GA  
 Shreveport, LA  
 South Bend/Misawaka, IN  
 Spokane, WA  
 Springfield, MO  
 Stockton, CA  
 Utica/Rome, NY  
 Vallejo/Fairfield, CA  
 Visalia/Tulare, CA  
 Waterbury, CT  
 Wichita, KS  
 Worcester, MA  
 York, PA  
 Youngstown/Warren, OH

**CITIES IN SERVICE ENVIRONMENT 33:  
 POPULATION 200,000–500,000 AND DENSITY LEVEL 1,000–200,000 PSM**

Bridgeport/Lowell, MA  
 Milford, CT  
 Pawtucket, RI

Salem/Gloucester, MA  
 Stamford, CT

Trenton, NJ  
 Woonsocket, RI

**CITIES IN SERVICE ENVIRONMENT 42:  
 POPULATION 500,000–1 MILLION AND DENSITY LEVEL 50–1,000 PSM**

Akron, OH  
 Albany/Schenectady, NY  
 Allentown/Bethlehem, PA  
 Austin, TX  
 Bakersfield, CA  
 Baton Rouge, LA  
 Birmingham, AL  
 Buffalo, NY  
 Charleston, SC  
 Dayton/Springfield, OH  
 El Paso, TX  
 Fresno, CA  
 Gary/Hammond, IN

Grand Rapids, MI  
 Harrisburg/Lebanon, PA  
 Hartford, CT  
 Jacksonville, FL  
 Knoxville, TN  
 Las Vegas, NV  
 Little Rock/North Little Rock, AR  
 Louisville, KY  
 Memphis, TN  
 Monmouth/Ocean, NJ  
 Nashville, TN  
 Oklahoma City, OK  
 Omaha, NE

Oxnard/Ventura, CA  
 Raleigh/Durham, NC  
 Richmond/Petersburg, VA  
 Scranton/Wilkes Barre, PA  
 Springfield, MA  
 Syracuse, NY  
 Tacoma, WA  
 Toledo, OH  
 Tucson, AZ  
 Tulsa, OK  
 W. Palm Beach, FL  
 Wilmington, DE

**CITIES IN SERVICE ENVIRONMENT 43:  
 POPULATION 500,000–1 MILLION AND DENSITY LEVEL 1,000–2,000 PSM**

Honolulu, HI  
 Lake County, IL

New Haven/Meriden, CT

Providence, RI

**CITIES IN SERVICE ENVIRONMENT 44:  
POPULATION 500,000–1 MILLION AND DENSITY LEVEL >2,000 PSM**

Jersey City, NJ

**CITIES IN SERVICE ENVIRONMENT 52:  
POPULATION >1 MILLION AND DENSITY LEVEL 50–1,000 PSM**

Atlanta, GA  
Baltimore, MD  
Charlotte/Gastonia, NC  
Cincinnati, OH  
Columbus, OH  
Dallas, TX  
Detroit, MI  
Denver, CO  
Ft. Worth/Arlington, TX  
Houston, TX

Indianapolis, IN  
Kansas City, MO  
Miami/Hialeah, FL  
Milwaukee, WI  
Minneapolis/St. Paul, MN  
New Orleans, LA  
Orlando, FL  
Phoenix, AZ  
Pittsburgh, PA  
Portland, OR

Riverside/San Bernadino, CA  
Rochester, NY  
Sacramento, CA  
Salt Lake City, UT  
San Antonio, TX  
San Diego, CA  
Seattle, WA  
St. Louis, MO  
Tampa/St. Petersburg, FL  
Washington, DC

**CITIES IN SERVICE ENVIRONMENT 53:  
POPULATION >1 MILLION AND DENSITY LEVEL 1,000–2,000 PSM**

Boston, MA  
Cleveland, OH  
Ft. Lauderdale, FL

Newark, NJ  
Oakland, CA  
Philadelphia, PA

San Francisco, CA  
San Jose, CA

**CITIES IN SERVICE ENVIRONMENT 54:  
POPULATION >1 MILLION AND DENSITY LEVEL >2,000 PSM**

Anaheim/Santa Ana, CA  
Bergen/Passaic, NJ

Chicago, IL  
Los Angeles/Long Beach, CA

Nassau/Suffolk, NY  
New York, NY

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## APPENDIX C

### EVALUATION OF SOCIETAL TRENDS

#### INTRODUCTION

This section of the report describes the analyses undertaken in Task 2 and Task 3A. The objective of Task 2 was to, first, identify a range of projected societal trends—sociodemographic, economic, social, and policy—and then evaluate how these trends would affect the current transit markets identified in Task 1. Task 3A was designed to identify societal trends which might create new or future transit markets—in the absence of any remarkable changes in the transit service offered. Discussed in later work were those markets that might be created by implementing new or different service concepts.

The section below describes the major societal trends which could have, or may, affect travel behavior and ultimately transit use in the United States. Each subsection describes the factors most likely to change and how those factors will affect tripmaking behavior. The overall implications of changing tripmaking on transit markets are summarized and evaluated in the closing section of the chapter.

There are two serious problems with this approach. First, aggregate societal trends are unlikely to have the same effect on each metropolitan area; each trend will have to be evaluated by a community in terms of its own situation and environment. The Task 1 analyses showed that transit use is uneven; in all metropolitan areas combined, it accounted for less than 3 percent of all trips and 7 percent of work trips. However, ridership is substantially higher in certain areas. For example, in communities as disparate as San Francisco, Pittsburgh, Atlanta, and Boston more than 20 percent of all workers take transit to work. Conversely, Miami, which has roughly the same population as Atlanta, Detroit which is roughly the same size as Boston, and San Diego which has roughly the same population as Pittsburgh, each have substantially lower mode splits—12.9 percent, 10.7 percent, and 4.2 percent, respectively.

Second, these societal trends are strongly interrelated and breaking them apart for the purposes of analyses—while necessary—is often artificial. For example, it is difficult to talk about the growth of service-sector employment—a discussion included in the Economic Section—without talking about the growth of the population or immigration, both of which are discussed in the Demographic Section. It is even difficult to choose which factor to describe first. For purposes of analysis, each major set of societal trends is discussed separately, recognizing that such divisions may be arbitrary.

The discussions below focus on net changes in transit use and attractiveness created by the interplay of the complex societal trends described below. In some sense, the positive

effects are being subtracted from the negative ones. Although the trends which reduce the attractiveness of transit or the ability of transit operators to provide effective services often swamp the trends which make transit more attractive, the positive trends can and should be the focus of transit operators who seek to maintain or improve ridership. Many such trends give individual operators opportunities to increase ridership—if not overall, at least in certain service areas or among certain riders—by targeting key markets with appropriate service options.

#### SOCIETAL BACKDROP

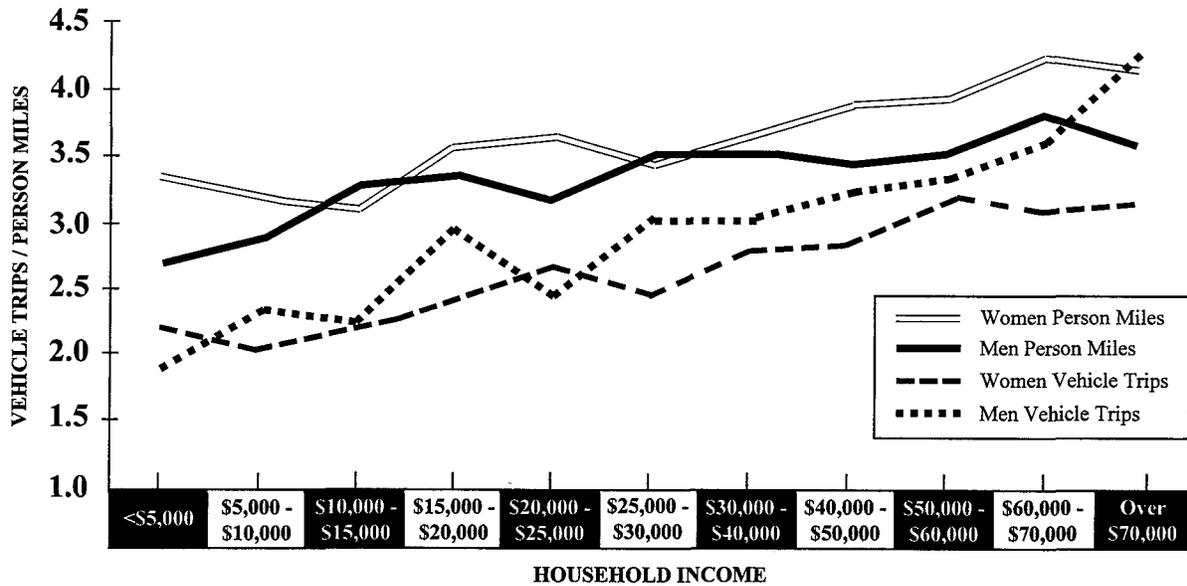
The societal trends examined take place in a world where transportation choices have already been changing substantially. This section opens with a description of the transportation environment in which the examined trends come together.

#### Income

Income is closely related to travel behavior; increasing income is directly linked to the desire for more travel, longer trips, and a greater dependence on the private car—here in the United States and throughout the world. Traditionally lower income has been associated with fewer and shorter trips, more often using transit or other alternatives.

All indexes of travel increase with income; for example, in 1990, households with annual incomes more than \$40,000 made almost 3 times as many vehicle trips and traveled more than twice as many vehicle miles per year as those making less than \$10,000. Figure C-1 provides 1990 NPTS data which show how both total person-trips and person miles increase with household income for men and women in urban areas. At very low incomes, people average around 20 person miles and 3.0 person-trips per day while at very high incomes people may travel more than 50 miles, making almost 4.5 person-trips per day. At the same time, women in urban areas usually take more trips than men with comparable household incomes, while men travel more miles than women with comparable incomes.

Figure C-2 shows that average work trip lengths in urban and rural areas increase for both men and women as household income increases. However, low-income people sometimes travel substantially farther to work than those making more. For example, urban men in households making between \$5,000 and \$10,000 travel 17 percent farther to get to work than men in households earning between \$25,000



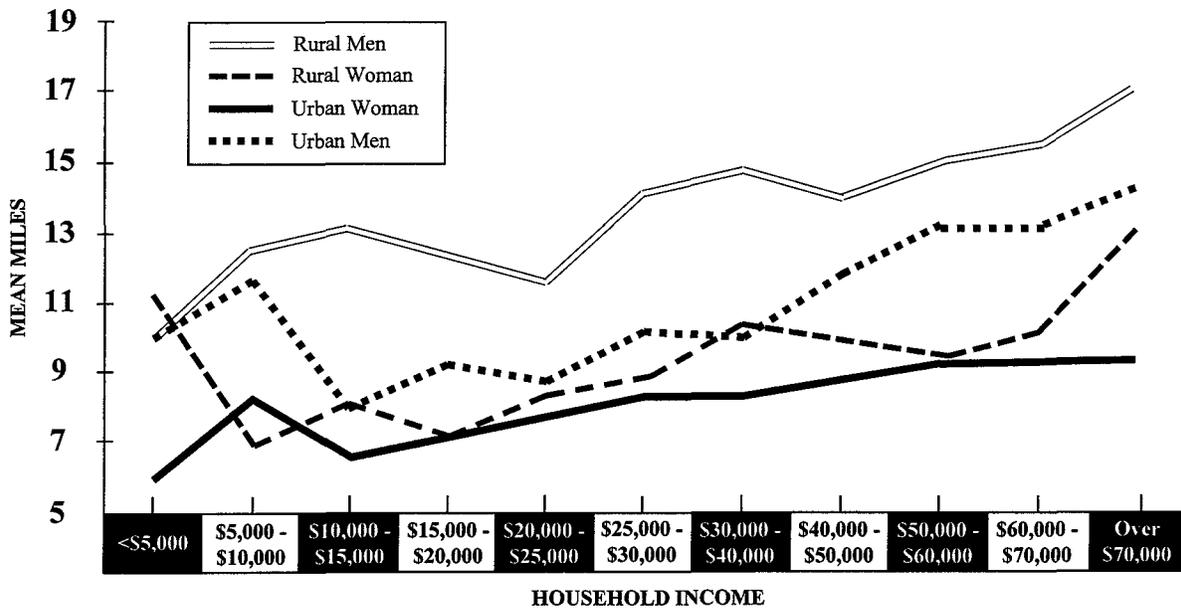
Source: S.Rosenbloom. "Travel by Women" in 1990 NPTS Report Series: Demographic Special Reports. pg 2-27

Figure C-1. Urban daily person trips and miles; people age 16 to 64, by sex and household income categories.

and \$30,000. These differences among low-income workers may be a result of the growth of the service economy to be discussed below.

For most of the last three decades, there have been significant increases in American household income—which in turn have strongly contributed to the growth of auto use

and ownership and the corresponding decline in transit's market share. From 1967 to 1991, median household income increased 14 percent in the United States in constant (real) dollars. The Bureau of Labor Statistics has predicted that, between 1992 and 2005, per capita disposable income will increase at an average annual rate of 6.4 percent, reaching



Source: S.Rosenbloom. "Travel by Women" in 1990 NPTS Report Series: Demographic Special Reports. pg 2-26

Figure C-2. Average trip length for work and work-related trips in urban and rural areas; people age 16 to 64, by sex and household income categories.

\$39,000 in 2005—an increase of \$21,000 from 1992. When controlled for inflation, this is a 1.5 percent annual growth rate in real disposable per capita income<sup>1</sup>.

However, the first half of the last decade of this century has seen fairly weak income growth; overall real median income grew by only 0.4 percent since the mid-1970s while employer-provided nonwage benefits fell substantially. Moreover, the income gains of the past 30 years have not been distributed equally across the population; in many cases, population groups more dependent on transit have not fared as well as the overall population. In fact, some groups of Americans—particularly women heading households with children and elderly women living alone—have actually suffered real declines in income in the last decade. For example, the real earnings of young families and those with a high school education or less declined 30 percent from the early 1970s to the late 1980s<sup>2</sup>.

Even among those with increasing real incomes, several subgroups have not seen their incomes increase as rapidly as the total population. For example, in 1987, Hispanics, who are both the fastest growing group in American society and disproportionately more dependent on transit, had a median family income of \$20,300, two thirds of the median income of non-Hispanic families. In real dollars, the income gap between Hispanics and non-Hispanics grew between 1978 and 1987. Poverty rates for Hispanics increased in those 10 years as well; in 1987, 26 percent of all Hispanic families had incomes below the poverty level—compared with 10 percent of non-Hispanic families<sup>3</sup>.

In 1987, the median annual income of Black families was \$20,200—compared with \$31,600 for White families. The ratio of Black to White income had actually fallen—to 56 percent since 1969, when Black family earnings were 61 percent of that of White families. The poverty rate for married Black couples was almost twice that of White couples, and higher in 1990 than it had been in 1978<sup>4</sup>. There may be two messages in these data; the first is that most income trends foreshadow declining transit use. The second trend, however, is that there may be growing transit market niches among those with low incomes. A large increase in any one market niche may have a major effect on overall transit ridership rates.

### **Growth in Drivers Licensing and Vehicle Ownership**

U.S. transit markets exist, decline, or grow in a world where most people drive and either own a vehicle or have access to one. Between 1969 and 1990, the number of licensed drivers went up almost 60 percent and today licensing is almost universal among drivers of both sexes under 50. Licensing is growing rapidly among the elderly as younger drivers age; among those 30 to 49 almost 96 percent of the men and 90 percent of the women were licensed in 1990. This suggests that within 20 years there will be no more

than a 5 percentage point difference in the licensing rates of any group of men and women under 70 and that most older drivers (i.e., those over 70) will be licensed.

Not only are the elderly almost as likely to be licensed; but so are people living in poor households. According to the 1990 NPTS, more than 70 percent of all people ages 16 to 64 with household incomes below \$5,000 had licenses (71 percent of the men and 68 percent of the women). More than 90 percent of people ages 16 to 64 had licenses if they lived in households making only \$25,000 per year.

Increased licensing is directly linked to the growth in travel in the last two decades. Table C-1 shows that people with licenses in both urban and rural areas travel substantially more than comparable people without licenses. In 1990, urban women 16-64 with a license made 76 percent more person-trips and traveled 191 percent more miles than comparable women without licenses, while urban men with licenses made 42 percent more trips and traveled 137 percent more miles than comparable men without. Most important, people with licenses traveled substantially more by car; men in urban areas made 2.8 vehicle trips per day—compared with 0.1 vehicle trips made by those without licenses.

Tripmaking and the distance covered in each trip grows substantially when licensing is combined with employment. In 1990, employed people with a license commuted roughly 10 miles to work while those without a license commuted 2.5 miles. Given that almost 96 percent of people working full time were licensed drivers, it is easy to see why increased licensing, combined with employment, has contributed to a major increase in the miles traveled by Americans. There are equally similar gaps in mileage for other trip purposes as well; for example, in 1990, a woman with a license traveled almost 3 times farther on average to conduct family and personal business than a woman without a license (11.3 versus 3.2 miles).

Vehicle ownership is also related to differences in travel patterns. Between 1969 and 1990 the average number of vehicles per household rose from 1.16 to 1.77 while households having two vehicles jumped 117 percent—an annual growth rate of almost 4 percent. At the same time, the number of households without a car fell by a third so that only 9.2 percent of U.S. households did not have a car. At the same time almost one in five households had three or more cars. As a result of these trends, in 1990, there were actually more cars than licensed drivers (or 1.01 cars per licensed driver) in America.

Of course, vehicle ownership is not distributed evenly through the population. Households headed by older adults are the most likely to be car-less; over 23 percent of all households without a car were headed by a person over 75 years of age, although they constitute only 6 percent of all U.S. households. More than 20 percent of one-adult households did not own a car in 1990 (compared with well over half in 1969). Also less likely to own a car were Black households, those headed by immigrants, and those without children<sup>5</sup>.

**TABLE C-1 Average daily travel parameters by sex and license holding, people age 16-64**

	URBAN		RURAL	
	WITH LICENSE	WITHOUT LICENSE	WITH LICENSE	WITHOUT LICENSE
<b>PERSON TRIPS</b>				
WOMEN	3.7	2.1	3.7	1.9
MEN	3.4	2.4	3.3	2.1
<b>PERSON MILES</b>				
WOMEN	30.9	10.6	37.3	16.0
MEN	37.5	15.8	43.0	16.5
<b>VEHICLE TRIPS</b>				
WOMEN	2.8	0.1	2.7	0.1
MEN	2.9	0.1	2.9	0.2
<b>VEHICLE MILES</b>				
WOMEN	18.5	.04	22.7	0.9
MEN	27.7	1.1	3.6	1.4

Source: S.Rosenbloom. "Travel by Women" in *1990 NPTS Report Series: Demographic Special Reports*. pg 2-23

Thus, in the midst of increased travel associated with the use of the private vehicle there are people who cannot physically drive a car or afford to maintain one. But the number of people in this position is declining; in 1990, less than 10 percent of U.S. households did not have at least one car—compared with more than 20 percent in 1969<sup>6</sup>. Because carless households were smaller, in 1990, only 6 percent of the entire population lived in a car-less house—compared with more than 21 percent in 1969. In short, most people have either a license or access to a car. Both the ever expanding number of drivers and the declining number of people without other options pose serious challenges to those trying to provide effective, appropriate transit service.

The sections below describe five categories of trends likely to affect the demand for transit in the future. The five categories are as follows:

- Economic,
- Demographic,
- Social,
- Land use, and
- Transport policy.

Each major set of trends is analyzed below. In general, most of the discussions below focus on the net effect of a series of complicated issues—that is, the result of subtracting those that create opportunities for transit operators from those trends which adversely affect transit. Although the negative trends tend to swamp the promising ones in the aggregate, many of the positive trends create micro-markets and the potential for transit operators to capture a significant number of riders—relative to their current ridership.

## ECONOMIC FACTORS

### Background

From 1970 to 1990, while the population of the United States grew 1.6 percent annually, employment grew 2.0 percent per year. As a result, in 1992, there were 20 million more people employed than there had been just 10 years earlier<sup>7</sup>. As the workforce grew, some industries gained a disproportionate part of the growth; the number of executive and managerial and technician jobs grew more than 50 percent from 1979 to 1990 while professional specialties grew

more than 40 percent. Jobs in the service sector grew almost 25 percent—while jobs in agriculture and those of operator and laborer actually fell more than 10 percent<sup>8</sup>.

In the next decade, 25 million new jobs will be added to the U.S. economy; 94 percent of all those non-farm wage and salary jobs will be in service-producing industries. Within the whole set of service-producing industries, the Labor Department expects just one, the services division, the largest source of employment in the economy, to account for nearly one-half of all new jobs created in the next 15 years. More than one-quarter of the projected growth in non-farm salary employment (7.1 million jobs) will occur in just health and business services<sup>9</sup>. At the same time, most experts think that the major industries which lost jobs before 1990 would show modest growth; the number of agriculture jobs, for example, is expected to increase by roughly 3 percent by 2005<sup>10</sup>.

As the job market has changed, so has the racial and ethnic composition of the entire labor force. In 1980 (the first year in which data were available), minorities of all kinds composed 18.1 percent of the U.S. civilian labor force; by 1992, that had grown to 22.2 percent<sup>11</sup>. Blacks increased their share of the labor force by 1 percent annually in those years—roughly the same rate seen during the previous decade—but Asians and others doubled their share of the labor force. In 1980, Hispanics accounted for 6 percent of the labor force compared with 8 percent in 1992. The growth in both Asian and Hispanic employment is tied to immigration; among Hispanics it is also tied to a higher birth rate, leading to a younger age distribution<sup>12</sup>.

These changes encompass four significant trends likely to have important implications for transit markets and users:

- Industrial restructuring,
- Flexible labor force,
- Work at home and telecommuting, and
- Women's labor force participation.

Each of these trends is strongly related to one another; the second and third are largely a subset of the first, industrial restructuring; for clarity, however, each trend is discussed separately.

## Industrial Restructuring

The change in employment called restructuring has been associated with

- The growth of service-sector employment and
- A growing gap in incomes among workers.

### *The Growth of a Service Economy*

One of the most striking economic factors of the last three decades has been the significant change in the sectoral com-

position of the labor force—that is, changes in the industries and occupations in which most workers are employed. The most remarkable sectoral change is the shift from production and agriculture to service industries, that is, from work in factories or farms or mines to jobs, for example, in retail sales, public administration, private household work, banking, or communications. In the United States, the total number of service-sector jobs grew 73 percent from 1970 to 1990 while those in manufacturing grew only 2 percent and jobs in agriculture actually fell 6 percent. As a result, in 1990, there were almost 85 million jobs in the service sector in the United States—72 percent of total civilian employment<sup>13</sup>.

The disproportionate growth of service-sector employment results from several factors. First, service work is laborintensive, requiring more employees per unit of output. Second, global trade has created the demand for more services, particularly what have been called "knowledge-based services" as well as finance, insurance, and personal services. In fact, Finance, Insurance, Real Estate (FIRE) employment is growing at 4 percent per year in the United States.

Third, service-sector employment is less sensitive to downturns in the economy; between 1970 and 1990, there were several periods when the goods-producing sector lost jobs while the service sector continued to increase employment. Finally, the aging of the population and the substantial increase in salaried women has itself created a rapidly growing domestic demand for services in health care, day care, food, and leisure activities.

At the same time, the absolute number of jobs in the goods-producing sector will continue to grow in the next decade—even though that sector's proportion of all nonfarm jobs will drop to 13.2 percent (from 16.7 percent in 1992)<sup>14</sup>. In fact, a U.S. Bureau of Labor Statistics scenario projects that manufacturing employment will reverse its downward trend in the next decade, although the proportion of employment will continue to drop. In 1992, employment in manufacturing accounted for only 16.6 percent of the labor force—compared with 33.7 percent in 1950—but it had 2.5 million more jobs than in 1950<sup>15</sup>. Even within the goods-producing sector there will be winners and losers; manufacturing and mining are expected to show absolute job losses while construction industries will gain just over a quarter of a million new jobs by 2005.

Job change in the goods-producing sector, notably in manufacturing, has not been even across regions of the United States—this creates differential employment patterns in different parts of the country. In 1990, the Frost Belt (the Northeast and Midwest together) had 1.5 million fewer manufacturing jobs and, consequently, \$37 billion less in worker earnings, than in 1980. At the same time, however, the Sunbelt (the South and West together) added 450,000 manufacturing jobs and gained \$19 billion in worker earnings. So higher density parts of the United States are losing the kind of jobs that tend to be the most concentrated spatially and those with the most concentrated and consistent work schedules.

For example, retail trade will soon replace manufacturing as the second largest source of total U.S. employment; it is expected to generate more than 5 million jobs by 2005. This industry is dominated by part-time, low-skill, "demand little" jobs which offer little chance for advancement. Women have traditionally been the dominant participants in this division, accounting for 52 percent of the jobs in 1990 and holding 68 percent of the part-time jobs<sup>16</sup>.

### *Income Disparities*

Ironically, service-sector growth is such that there will be substantial growth in both jobs requiring a bachelor's degree or post-secondary training and jobs where a high school education is not required<sup>17</sup>. This trend may increase the gap between the wages of low- and high-skill workers; this will change the resources and options available to many workers, ultimately having a major effect on their transportation choices. Labor Secretary Robert Reich remarked in 1992,

If you're not college educated, you're seeing your real income stagnate or even decline ... If you are college educated, your income is growing. The gap between the two is widening.<sup>18</sup>

The United States has seen substantial widening of wage differentials as real wages fell 1.28 percent for low-skilled workers between 1980 and 1989. This drop is linked to the drop in demand for low-skilled workers even as the number of such workers has increased (largely because of immigration). As a result, today, the United States leads most of the world in the incidence of low-paying jobs<sup>19</sup>.

Although many service jobs will be highly technical and well paid—jobs created in large measure by advances in technology—several experts expect that many lost production jobs will be replaced with lower paid service-sector jobs<sup>20</sup>. In 1990, roughly 66 percent of all service-sector jobs were white collar jobs; of those, however, only 43 percent of these white-collar jobs were highly paid "knowledge workers" (i.e., managers, executives, and professionals ranging from scientists to lawyers)<sup>21</sup>. The remaining white-collar workers were lower paid, as noted in a 1991 *Harvard Business Review* article,

At the lower end of the pyramid in services is an enormous support staff—fully 57 percent of the White collar sectors workforce—that toils on the new assembly line of the information economy. Occupations in this category range from sales workers to secretaries to bank tellers and computer operators. In general their educational records are not particularly impressive, nor are their earning power and career opportunities.<sup>22</sup>

In other words, more than 70 percent of all service-sector employees (the one-third non-white-collar workers and 57 percent of white-collar workers [or 38 percent of all

workers]) are not in well-paying jobs with meaningful advancement potential.

The rapid changes in the industrial structure of the economy have forced many of those already in the labor force to make drastic changes, often called "downward mobility"<sup>23</sup>. Few former production workers have a meaningful chance for a smooth transition from declining industries into growing ones, largely because of their lack of education and skills; displaced from production jobs they will be unable to qualify for any of the better paying positions<sup>24</sup>. As a 1992 report by *Congressional Quarterly* noted,

In many cases the jobs that have been lost will not come back ... That means that today's unemployed will have to look elsewhere for jobs. For many that means changing not only employers but also industries, or moving to other parts of the country. Still others will have to undergo retraining in an effort to move into new occupations altogether.<sup>25</sup>

Young people coming out of high school will not have the jobs that were available to their counterparts two decades before. As a result, the U.S. Bureau of Labor Statistics has predicted that the trend toward income disparity will increase between 1992 and 2005.

Many large groups of American workers fall into the "bottom of the pyramid" because they are poorly educated or have low-skill levels; this means that they will be limited to low-paying jobs in the service sector, such as janitors, maids, restaurant workers, or sales clerks. The reasons for the lack of education or skill training are complex but discrimination is clearly part of the problem. For example, several minority groups achieve lower returns from additional educational training than do Whites; that is, they are likely to be paid less than other workers with comparable training or degrees<sup>26 27</sup>.

These trends have significant implications for specific groups in society, particularly Hispanics and African Americans. In 1988, Hispanics made up only 7 percent of the total U.S. civilian labor force. However, since 1980, the number of Hispanic workers has increased 65 percent—4 times the rate of non-Hispanics—and a substantial expansion is expected as the Hispanic population continues to grow<sup>28</sup>. Hispanics have greater problems in the labor market than do non-Hispanics; in 1992, an average of 11.5 percent of Hispanic workers were unemployed—compared with 7.1 percent of non-Hispanics. Among the reasons are low average educational attainment, language problems, a large number of young workers, concentration in occupations with high unemployment rates, and discrimination<sup>29</sup>.

As a result, Hispanic men and women are markedly overrepresented in low-paying occupations. For example, Hispanic men are more likely to be in lower paid factory, construction, and blue-collar work and Hispanic women more likely to be in lower paid service, operator, fabricator, and laborer positions than comparable non-Hispanics. As a result, the median weekly earnings for Hispanics employed full time were one-third lower than for non-Hispanics. However, even

when employed in the same occupational category, Hispanics made less; for example Hispanic men in managerial and professional jobs made 87 percent of the salary earned by non-Hispanic men<sup>30</sup>.

Not all subgroups of Hispanics have the same employment opportunities, skill levels, or educational attainment—and these differences are reflected in income and participation rates. For example, although Puerto Ricans, when employed, are more likely to work in higher skilled occupations and have higher median earnings, an unusually large proportion of Puerto Ricans of working age are not in the labor force. Immigrants from Mexico and Central America have come to areas with expanding employment opportunities<sup>31</sup>, while others, like Puerto Ricans, live in areas with declining labor markets, particularly for low-skilled workers<sup>32</sup>.

Central Americans who have settled in Washington, DC, a community with a very rapid job growth rate, account for more than 20 percent of the janitors, cooks and construction workers—although they account for less than 6 percent of the District's population<sup>33</sup>. Houston, the entry point for many of those from Mexico and Central and South America, has also had a growing number of entry-level jobs which may explain the higher employment rate among those immigrants there.

A recent study on Hispanics commented,

Their lack of educational preparedness is of increasing concern to business, industry, and government, particularly in light of the structural changes in the economy that require higher skill levels for entry-level employment ... [there is] a growing mismatch between the skills new jobs require and the skills Hispanics acquire ... Hispanics are over represented in the lower-skilled jobs that are expected to decline in coming years, and under represented in service-sector occupations that demand more education.<sup>34</sup>

African Americans have also been strongly affected by industrial restructuring. Between 1990 and 2000 African American employment is expected to grow between 10 to 20 percent so that these workers will compose as much as 20 percent of the entire U.S. labor force. Black women and men have long participated in the labor force in equal numbers; in the 1950s more than one-half of Black women were in the paid labor force compared with less than one-third of White women. However, while Black women's rates have continued to increase, reaching 58 percent in 1990, rates among men have been dropping; in 1990, only 70 percent of Black men over 16 were in the labor force compared with 77 percent of White men<sup>35</sup>.

African Americans also have significant problems in the labor force. Blacks have higher rates of unemployment and remain unemployed longer than other workers; in addition underemployment—working fewer hours than desired—is thought to be more common among Blacks<sup>36</sup>. Even controlling for differences in age and education, Blacks have a harder time finding a job; for example, among men with 5 or more years of college, Blacks are more likely to be unemployed and to work fewer hours than Whites.

The occupational status of Black workers has improved over the last three decades—although not as fast as among White workers; as a result, a larger number are unskilled workers. In 1990, White men were twice as likely as Black men to hold jobs in administration, management, or a profession; conversely Black men were 1.5 times more likely to have semi-skilled jobs. For example, more than 33 percent of Black men but only 19 percent of White men were unskilled workers<sup>37</sup>. Moreover, most of the shifts of African Americans into more prestigious jobs occurred before 1980<sup>38</sup>.

A recent study of African Americans noted,

Many policy observers are concerned that the American economy will evolve into a two-tiered system of high- and low-wage jobs, and that Blacks who lack the educational training required for upward job mobility will become disproportionately clustered in the bottom tier ... this two-tiered occupational structure will divide Blacks along educational and socioeconomic lines, creating a class of persistently poor Blacks.<sup>39</sup>

As a result of the growing wage gap accompanying deindustrialization, there will be a large and growing number of low-income workers, particularly among Blacks and Hispanics—both groups seen in Task 1 to depend disproportionately on transit in most service environments. As a result, transit use among these groups may actually increase in the coming decades.

## The Flexible Labor Force

A key component of the service sector is the flexible labor force, which contains roughly one-fourth of all American workers. Flexible workforce commonly refers to people with variable work schedules with a given employer; those who work at different locations in a given period; those who consistently work for multiple employers in a given period; people who are not always employed full time, although they might wish to be; and the growing number of contract workers—people who do not work for a company but instead contract to sell their services for finite periods to different employers, often without receiving traditional benefits.

Associated with the growth of the flexible labor force are people working

- Schedules which vary over a short period;
- Multiple schedules, often going from one job to the next;
- At widely dispersed locations in short periods; and
- At multiple locations in short periods.

Although estimating how many people actually make up the flexible labor force, clearly these trends are strongly related to the growth of the service economy discussed above and have very important transportation implications which translate into very different demands on the nation's transit systems. Today, perhaps 34 million people compose the flexible

workforce—"contingency workers" who are available to respond to different employers' needs. Estimates are that by the turn of the century, almost half of the workforce will be contingency workers.

One component of the flexible labor force is people in temporary employment; temporary help employed by the business sector added one million jobs between 1980 and 1992<sup>40</sup>. Estimates are that between 1982 and 1993, temporary employment increased almost 250 percent while total employment grew only 20 percent. Temporary employment services place 1.4 million temporary employees each day—3 times as many as they did just a decade ago; 40 percent of the companies who are frequent users report that they use temporary employees as replacements for full-time workers<sup>41</sup>. In fact, Manpower, Inc., with more than 500,000 workers, has a larger workforce than either General Motors or IBM<sup>42</sup>.

Another component of the flexible workforce are those working variable work schedules; in 1991, more than 15 percent of the U.S. workforce, or 12 million Americans, had flexible schedules which either allowed or required them to vary the hours they started or stopped work. This was a 25 percent increase in just 6 years<sup>43</sup>. Slightly more men (15.4 percent) than women (14.5 percent) worked variable schedules. Workers between 25 and 54 were substantially more likely to work flexible hours as were those working in the public sector (particularly the federal and state governments) and those in managerial and professional occupations.

A third component of the flexible workforce consists of those with multiple employers at the same time, including contract workers. In 1991, roughly 6 percent of the U.S. labor force, or 1.2 million workers, had more than one job, including contracts with more than one employer; men were more likely (6.4 percent) than women (5.9 percent) workers to have multiple jobs. The frequency was higher among both very high- and very low-paid workers. More than 9 percent of those engaged in public administration and more than 7 percent of those in professional or managerial occupations fell into this category as did almost 8 percent of service workers<sup>44</sup>.

A 1994 study of workers with two jobs, or "moonlighters," found that the substantial growth in workers with multiple employers resulted largely from increasing rates of moonlighting among women. In 1970, roughly 2 percent of women versus 7 percent of men moonlighted; men's rates continued to drop and women's to increase slightly so that by 1994 they converged at 5.9 percent. The study attributed these patterns to several societal trends,

In many cases, moonlighting reflects the individual's best choice when faced with the need for a flexible work schedule, but in many others it reflects growing economic hardship that threatens the financial stability of families. Moonlighting trends are linked to growing divergence between rich and poor, as well as a general sense that families are working more for less. Multiple-job holding by women has increased in recent years as a result of the increasing percentage of families headed by females, low relative wages, and stagnant male earnings.<sup>45</sup>

Married women, as well as younger and older workers, might prefer temporary employment because it gives them time to study or pursue personal interests<sup>46</sup>. However, several researchers have concluded that the growth of the contingent workforce is almost entirely the result of changes in the economy, including intensified competition among firms, the volatility of demand for products, and the declining bargaining power of workers<sup>47</sup>.

The last key component of the flexible workforce consists of those who work less than 35 to 40 hours per week. The expansion of the service sector has been coupled with the rapid growth of part-time jobs; the rate of growth of part-time jobs has outpaced that of full-time jobs in almost all developed countries in the last two decades<sup>48</sup>. For example, between 1973 and 1990, the annual rate of growth of part-time jobs in the United States was 2.4 percent compared with 1.8 percent for full-time jobs. A recent Census study estimated that as many as 90 percent of the new jobs created each month are "involuntary" part-time jobs. With an expanding part-time workforce comes an expanding variety of work schedules and trip patterns.

The growth of the flexible labor force and service-sector employment itself have work schedule implications; together they involve various work schedules which change the traditional home-to-work commute. Recent Census data show that almost 40 percent of all women workers—who are disproportionately represented in service-sector employment—do not have a day shift job (defined as a work schedule where at least one-half of the hours fall between 8:00 AM and 4:00 PM). Twenty-three percent of all full-time working mothers and almost 60 percent of those working part time not only do not work the classic 9-to-5 day, they do not even work most of their hours during that traditional period<sup>49</sup>. Such schedules have tremendous effect on the transportation options open to workers, the safety problems which various modes may entail, and the home-to-work routes which they take.

The transportation implications of the growth of the flexible workforce are clear; commuting will be profoundly altered as the characteristics of the daily home-to-work trip change rapidly and frequently. Workers will see little point in choosing a home with some relationship to their job because their work location will change so frequently<sup>50</sup>; they may be less likely to walk or to try to find transit services and they will find it difficult to join carpools. It will be equally difficult for transit systems to provide convenient service to all the destinations to which workers could be sent—and for the variety of schedules they might be working.

### *Tourism*

One of the fastest growing parts of the service sector is tourism travel, generated by both Americans and visitors from overseas; one of the largest components of the flexible labor force is people who work in this industrial sector. In 1990,

more than ten million Americans worked in all aspects of the U.S. tourist and travel industry—almost double the comparable 1975 total. Today, tourism is one of the largest employers in the United States and is among the top three industries in 39 out of the 50 states<sup>51</sup>. Both the clients and the workers in the tourism industry create a web of transportation patterns with significant implications for transit operators.

Much tourism activity and employment resemble all service-sector employment; that is, job sites may be widely dispersed, work schedules may be far different from the traditional 9-to-5 pattern, and average wages may be fairly low. However, tourism also displays significant seasonal peaks which have both direct and indirect transportation implications. In addition, several states are making tourism an economic development tool for rural areas so that very rural destinations are becoming major tourist and employment attractors.

The economic changes surrounding the development of tourism could alter the commute patterns of local residents and local workers and change inter-city and inter-regional travel patterns as travelers detour to take advantage of growing rural tourist attractions. Many of the resulting trip patterns—for both workers and tourists—will have distinct seasonal peaks, stressing transit systems greatly at certain times of the year while leaving them underused at other times. Overall, these very highly peaked seasonal demand patterns will be hard for transit operators to respond to, even in urban areas; because many may be in rural or low-density locations, transit service may not be able to respond at all.

### Working at Home and in the Car

Two related employment trends within the flexible workforce have strong transportation implications: people who run businesses at home and people who telecommute to work. It is not always easy to differentiate these two trends and analysts have not always been clear about the distinction. Telecommuting usually involves working at different locations over the course of a work week or month; perhaps at home a few days, perhaps at the office other days. Running a business at home, however, generally means having only one work location, although the proprietor may travel to visit clients. Both trends create nontraditional commute patterns—patterns which may vary greatly from day to day.

The 1991 American Housing Survey found that roughly 2.6 percent of the population worked at home, roughly the same percent as in 1989 and lower than in 1985. However, these figures may blur some important distinctions between those who are self-employed, those working for pay at home, and those taking home work for which they are not additionally paid.

The Bureau of Labor Statistics found that of 20 million people who reported engaging in some work at home as part of their primary job in 1991, only 2 million were actually paid for working at home while 5.6 million were self-

employed. The remaining 12 million nonfarm workers working at home were just "taking some work home from the office" and were not paid specifically for that work. Most of those who did work at home did not do so for much time; more than half of those paid for home employment, as well as those self-employed, worked at home for more than 8 hours per week<sup>52</sup>.

People reporting any type of at-home work were slightly more prevalent in the West and least prevalent in the South. Poverty-level workers, elderly workers, those living in the suburbs, and those in rural areas were more likely to work at home. Many poverty-level workers were day care employees or ran their own day care homes. Overall, a greater percentage of women performed job-related work at home, although in numbers more men were home workers. That is, 3.5 percent of all women at work, or 1.8 million, were home workers—either wage and salary workers paid for hours worked at home or self-employed—while 3.2 percent of male workers, or 1.9 million, worked at home.

The propensity to be a home worker varied substantially with race—Whites were 3 times more likely to work at home than Blacks, and this went up with age. Salesworkers were the most likely to work at home; managers and professionals also had a high rate of home work (about 3 percent). Those who worked at least 35 hours a week at home were more likely to be in service occupations, generally hairdressers and child care workers.

Those people who work for pay at home are generally the focus of "telecommuting" discussions. A 1993 survey found that there were 7.6 million telecommuters—those working part of their paid week at home; approximately 75 percent were people working in information industries such as programming, accounting, data processing, marketing, planning, and engineering<sup>53</sup>. These are clearly professions that lend themselves more readily to work at home than do most production jobs. Because these industries may have substantial numbers of employees within the next 30 years, there is a strong possibility that telecommuting may have a substantial effect on transportation patterns in the future. The most likely effect on transit use of increasing telecommuting is negative.

At the same, there have been reports of the growing number of sales and other people who no longer have an office and use their cars as offices as they travel from one site to another. A recent *Wall Street Journal* article estimated that more than 6 million U.S. workers used their cars each day in lieu of offices—a number which some experts think will increase 25 percent by the end of this decade<sup>54</sup>.

These trends will change commuting in many ways. Travel may be reduced as the number of days people must commute to work is reduced. It is, of course, possible that people will move much further from their workplace if they need not travel there daily, "using up" any mileage saved on the days they do not report to an external job site. It is also possible that those working at home or telecommuting will make longer non-work trips than they had previously. But

whether or not total trip making or mileage increases, all of these patterns will create work trip "commutes" that defy the traditional definition of the term. As such, they will be hard to serve with traditional transit services.

### Women's Labor Force Participation

The aggregate growth rates of the labor force described above obscure the differences between the sexes; from 1970 to 1990, the participation rate of American women increased more than 14 percent—while dropping almost 4 percent for men<sup>55</sup>. The participation rate of women age 35 to 44 has grown most rapidly; in 1992, more than 75 percent of women in that age group were in the paid labor force<sup>56</sup>. As a result, almost 60 percent of all women have paid employment and they now account for close to half of the labor force; in 1992, women composed 46 percent of the total civilian workforce<sup>57</sup>—compared with 38 percent in 1970<sup>58</sup>. The Bureau of Labor Statistics estimates that by 2005, almost 64 percent of women but only 74 percent of men will be in the civilian labor force<sup>59</sup>.

Participation rates are different among various subgroups of the population. Black women and men have long participated in the labor force in equal numbers; in the 1950s more than 50 percent of Black women were in the paid labor force compared with less than 33 percent of White women. However, while Black women's rates have continued to increase, reaching 58 percent in 1990, rates among men have been dropping; in 1990, only 70 percent of Black men over 16 were in the labor force compared with 77 percent of White men<sup>60</sup>. As a result, the participation rates of White women are roughly comparable to those of Black women.

Hispanic women are less likely to be in the labor force than non-Hispanics; in 1992, 52.8 percent of Hispanic women were employed compared with 57.8 percent of non-Hispanics. Women from Central and South America, however, were more likely to be employed than other Hispanic women and equally as likely as non-Hispanic women, while those from Puerto Rico were the least likely to be employed. The differences narrow when controlled for education; 81.2 percent of Hispanic women with a college degree were in the labor force in 1992—compared with 84.5 percent of non-Hispanic women<sup>61</sup>. Among women from Central and South America without a high school degree, participation was actually higher than among comparable non-Hispanic women<sup>62</sup>.

A more striking fact than the increasing number of employed women is the growth in the number of married women who work outside the home. In 1990, almost 60 percent of all married women were employed, in contrast to 1960 when less than 33 percent of married women were in the paid labor force<sup>63</sup>. The aggregate figures also hide the dramatic increase in the labor force participation of women

with children. In 1986, more than 61 percent of married women with children under 18 worked outside the home—compared with only 27 percent in 1960.

Aggregate data also obscure the even more substantial increase in the labor force involvement of married women with very young children. In 1960, only 18 percent of married women with children under 6 were in the paid labor force; the comparable number was 30 percent in 1970 and 33 percent in 1976. Today, almost 60 percent of married women with young children have salaried employment (while almost 75 percent of married women with children from 6 to 17 are in the paid workforce)<sup>64</sup>.

Moreover, many of the employed women with children under six had very young children. In 1990, more than 50 percent of women 18 to 44 who had given birth in the previous year were employed—compared with 30 percent in 1976<sup>65</sup>. In fact, in 1990, almost 50 percent of all mothers of babies under 6 months were in the paid labor force—1 in 12 employed women had an infant<sup>66</sup>. A 1990 Department of Labor study found that more than 44 percent of all women return to work before their babies are 6 months of age—more than 66 percent of those on a full-time basis<sup>67</sup>.

Although societal trends have increased both aggregate and per capita trip rates among women as they have among men, women seem disproportionately affected by the suburbanization of so many jobs, the growth of service-sector employment, and other demographic variables discussed below. The ways in which salaried women balance their domestic and employment responsibilities given these trends create substantially greater and different effects on the modes they chose, the hours they travel, the routes they take, and how they organize and combine their out-of-home activities. Table C-2 shows these patterns; at most income categories, working women always make more trips than comparable men, even though men travel more miles than women except at low incomes.

Other aspects of women's travel patterns are different than otherwise comparable men. How—and where—working women take care, or arrange for care, of their children while they work have important transportation implications. In 1988, less than 28 percent of all young children with salaried mothers were cared for in their own homes. As women increasingly find care options outside their own homes, they need to transport their children as part of their home-to-work commute. Between 1983 and 1990, women increased their per capita trip making by more than 10 percent—compared with just 6 percent for men—and increased their person miles traveled by 20 percent—compared with 17 percent for men.

Table C-3 shows how much the presence of children in a household affects the travel patterns of women, particularly single mothers. Women in two-adult households with children 6 to 15 make 21 percent more person-trips than comparable men; those with children under 6 make more than 9 percent more trips than comparable men. Single mothers always make more trips than either comparable women or

**TABLE C-2 Indicators of travel by sex, selected income categories, and work status, 1990**

	<b>DAILY PERSON TRIPS</b>	<b>DAILY PERSON MILES</b>
<b>HOUSEHOLD INCOME</b>		
<b>UNDER \$5,000</b>		
FEMALE WORKERS	4.4	28.1
MALE WORKERS	2.4	15.0
<b>\$25,000-\$30,000</b>		
FEMALE WORKERS	3.8	28.1
MALE WORKERS	3.6	31.9
<b>OVER \$70,000</b>		
FEMALE WORKERS	4.1	36.6
MALE WORKERS	3.7	55.9

Source: S.Rosenbloom. "Travel by Women" in *1990 NPTS Report Series: Demographic Special Reports*. pg 2-29

men, probably because they have no one to share the obligations which require travel.

Because they retain multiple responsibilities when they enter the paid labor force, women often "link" trips together, dropping children at day care on the way to work or going grocery shopping on the way home. Table C-4 displays 1990 NPTS data showing how often comparable men and women link trips together on the way home from work; in all circumstances, women workers are substantially more likely to link trips and to link multiple trips when they do.

But the mothers of small children, particularly single mothers, are much more likely to link trips than comparable male parents. For example, more than 40 percent of married mothers with children under 6, but only 30 percent of comparable fathers linked trips home from work; moreover, those employed mothers made slightly more multiple trip "chains." At the same time, single mothers were substantially more likely to link trips than either partnered parent; 47 percent of single mothers with children 6 to 15 linked trips home from work compared with roughly 36 percent of comparable married women and 27 percent of comparable married men.

Almost all studies have shown that women are substantially more likely to link trips home from work than comparable men; women are also more likely to form

complex chains, that is, to link many trips together. For example, a 1992 survey in Southern California found that 29 percent of female workers made a stop on the way home compared with 19 percent of men<sup>68</sup> and that more women made stops on the way to work as well<sup>69</sup>. More than 25 percent of women workers making a stop to work were dropping off children, a detour almost always made 5 or more days per week<sup>70</sup>. A 1993 study of Seattle trip diary data found that women were less likely than men to go straight home from work; the authors concluded that, "this reflects the role of females in society and the variety of activities they pursue (e.g., shopping, personal business, and recreation) to satisfy personal and household activities."<sup>71</sup>

As a result of trip linking, women may take longer to make a shorter home-to-work trip<sup>72</sup> and may be more dependent on the car to do so<sup>73</sup>. An indirect indication of the second point—an Arizona study found that the more children a woman had and the younger those children, the more likely she was to drive to work while the number and age of children had no effect on men's mode choice<sup>74</sup>. Data from the 1990 NPTS show that women in households earning less than \$30,000 took a higher percentage of all trips in a car than comparable men.

The differences were the greatest at the lowest income levels: women in households making less than \$5,000 annually

**TABLE C-3 Differences in average daily urban person trips by sex and selected lifecycles, 1990**

	<b>TWO ADULT HOUSEHOLD</b>	<b>ONE ADULT HOUSEHOLD</b>
<b>CHILDREN 0-5</b>		
MEN	3.2	3.1
WOMEN	3.5	3.6
DIFFERENCE	9.40%	16.10%
<b>CHILDREN 6-15</b>		
MEN	3.3	3.7
WOMEN	4.0	4.1
DIFFERENCE	21.20%	10.80%
<b>CHILDREN 16-21</b>		
MEN	3.3	3.8
WOMEN	3.4	3.6
DIFFERENCE	3.00%	-5.20%
<b>NO CHILDREN</b>		
MEN	3.3	3.6
WOMEN	3.4	3.7
DIFFERENCE	3.00%	2.80%

Note: Percentages computed before rounding.  
 Source: S.Rosenbloom. "Travel by Women" in *1990 NPTS Report Series: Demographic Special Reports*. pg 2-32

made 74 percent of all trips in a car compared with 61 percent of the trips of comparable men. At all household income levels less than \$25,000, women were more likely to go to work in a car than comparable men.

Even though employed women are a growing group and women are more likely to use transit than men, these trends are not likely to lead to increased transit ridership or increased market share in the long run. Women with children often have to make trips solely to meet the needs of their children<sup>75</sup>; therefore they may be less able to use alternative modes which are not conducive to chauffeuring small children on the way to or from work. Many workers report that their inability to stop driving alone is the result of their need for their car immediately before and after work, to their child care needs, and to their concern that they might be faced with a family emergency during the middle of the work day<sup>76 77 78 79</sup>.

### **The Effect of Economic Factors on Current Transit and Future Markets**

The major transportation and, ultimately, transit effects of the overall restructuring of national and international indus-

try will arise from (1) different locational decisions made by service firms and industries, (2) growing income disparities, (3) the drop in the number of home-to-work trips, (4) wide variations in many individuals' work schedules and job location, and (5) the complicated travel patterns of working parents, particularly women and single parents.

The growth of the entire service sector has important implications—the growing suburbanization and even exurbanization of jobs are linked closely to the growth of the service sector. Service industries tend to be smaller and they do not need to be near one another in the way in which goods-producing firms traditionally did. Service firms tend to be widely dispersed within metropolitan and even exurban areas—rather than clustered and concentrated within the core of the city<sup>80 81</sup>.

With the growth in communications technology and the substantial increase in various service-sector jobs has come dispersed employment locations which can create very non-traditional commute patterns<sup>82 83</sup>. For example, the commutes of suburban and rural residents are twice as likely to be destined for suburban and rural work places as they are for the central city<sup>84</sup>. In fact, in the 35 metropolitan areas which had

TABLE C-4 Urban trip-linking behavior by sex and lifecycle, 1990

	PERCENTAGE WHO LINK TRIPS FROM WORK TO HOME	NUMBER OF ADDITIONAL LINKS (%)			
		1	2	3	4+
<b>ALL WORKERS</b>					
MEN	28.7	49.5	28.8	11.6	10.1
WOMEN	38.8	46.1	28.8	13.4	11.7
<b>SINGLE ADULT, CHILDREN &gt;6</b>					
MEN	*	*	*	*	*
WOMEN	56.1	50.0	22.7	13.6	13.7
<b>SINGLE ADULT, CHILDREN 6-15</b>					
MEN	*	*	*	*	*
WOMEN	47.4	47.2	25.0	13.9	13.9
<b>TWO ADULTS, CHILDREN &gt;6</b>					
MEN	29.8	53.5	27.5	11.5	7.7
WOMEN	40.6	51.5	25.7	14.5	8.4
<b>TWO ADULTS, CHILDREN 6-15</b>					
MEN	26.7	46.7	31.8	10.3	11.2
WOMEN	36.4	43.1	33.5	12.5	11.0

\* = too few entries

Source: Compiled from unpublished tape readable data from 1990 NPTS

more than one million people, fully 27 percent of all workers crossed a county line to get to work—a 50 percent increase since 1980<sup>85</sup>. All of these patterns are difficult to serve with transit, so as they increase, transit use will fall.

TCRP Project H-3, studying ways to attract automobile drivers to transit, undertook an analysis of the relationship between transit and sectoral employment patterns in more than 1,000 U.S. cities in 1990. The H-3 researchers found that employment in manufacturing and in two of the largest service sectors (i.e., wholesale and retail trade) was linked to lower use of transit. For example, an increase of 10 percent in the share of retail trade employment translated into an 11 percent reduction in transit use. The authors conclude that manufacturing employment now discourages transit ridership because so many facilities are in suburban and non-central areas and workers have variable shifts. They conclude that wholesale and retail trade jobs are associated with less transit ridership because these types of jobs are widely dispersed in neighborhood centers and malls<sup>86</sup>.

The growth of low-income workers may, however, increase transit ridership because those with lower incomes have a greater tendency to use transit for both work and non-work trips. On the other hand, the location of even low-paying service-sector jobs may not be well-served by transit;

it is difficult to provide traditional service in low-density communities. So the growing number of service workers with low or falling incomes may actually have to travel further to work simply because most available jobs are widely dispersed in suburban and even rural communities.

The changing industrial base of the country is also substantially altering the commute trip patterns of many workers; they are traveling at different hours, along different routes, and on different days in the week than comparable people two decades earlier. Commuter trips are now spread over a much longer day, with a sizable minority of travelers having variable work schedules or working late at night or early in the morning<sup>87</sup>. As a result of these trends, many low-income workers may be forced to depend on a private vehicle as much as those with much higher income and may be forced to spend proportionately more—in time and money—for their home-to-work commute.

At the same time, the absolute number of jobs in the central city will continue to increase in many metropolitan areas, particularly in the West and South. Many of these jobs will be high-paid highly technical service-sector jobs—in banking, technology, and communications, for example. Even the absolute number of low-skilled jobs in the central core may increase. This means that, although most jobs will not be in

the central city, some will—and transit operators will continue to serve several market niches by providing service to the core. Moreover, in many suburban areas there are high employment concentrations—at malls, medical centers, and research parks. Workers at such facilities may be more able and willing to use available transit options.

Finally, many women—even those with low incomes—have responded to their complicated domestic and employment activities with substantial changes in the mode, time, routes, and destinations of their travel. Their choices are often very different than otherwise comparable men because they work in different places or on different schedules; have different concerns about safety; or must combine domestic, childcare, and employment travel to optimize their time. These choices and complicated patterns create significant barriers to their use of transit services.

So, although more women are entering the labor force and the absolute number of women using transit may go up in the near future, over time the percentage of working women using public transit may drop substantially—data from both the Census and the NPTS suggest that the drops in transit use are substantial even among low-income women and those with a greater dependence on it, such as Black women. Over time, given the other pressures at work, the market share among women workers might even fall low enough to cause a drop in absolute ridership.

## DEMOGRAPHIC FACTORS

### Background

The U.S. population has been growing 1.16 percent per year since 1980 reflecting (1) a rise in the frequency of childbearing, (2) a decrease in death rates, and, most significantly (3) sustained immigration<sup>88</sup>. Large and growing numbers of the U.S. population are from different cultural, racial, or ethnic backgrounds. In 1993, approximately 15 percent of the population was Black, 11 percent Hispanic (of any race), 4 percent Asian and Pacific Islander, and just under 1 percent were American Indian, Eskimos, or Aleuts<sup>89</sup>.

By the turn of the century, the U.S. Census predicts the White population will account for 84 percent of the total population—down from 87 percent in 1993—while roughly 13 percent will be Black, 4 percent Asian or Pacific Islander, and 11 percent would be of Hispanic origin (of any race). However, by 2050 Hispanics may well compose 23 percent of the population while the White proportion will drop to just over half.

Population increase because of births is actually on the rise in the United States. There has been a substantial increase in the number of births in the United States—the number of annual births rose to 4.2 million in 1990, for the first time in a quarter of a century. Yet just a decade ago, demographers predicted a drop in fertility—they estimated that up to 25

percent of all women born during the "Baby Boom" would remain childless<sup>90</sup>. In fact, the rates of childlessness among this group are running only 17 percent—largely because so many of these women simply shifted childbearing to older ages. Most demographers feel that much of the increase in the entire population in the last decade was "catch-up" childbearing among "baby boomer" women in their 30s.

Immigration is also related to the growing number of U.S. births. Given that fertility rates differ by both race and ethnicity as well as country of origin for the foreign born, there are substantial questions about the effect of immigration on overall U.S. fertility rates<sup>91</sup>. Yet, as with native-born women, most variation in fertility rates is the result of demographic factors (education and workforce participation) rather than the mother's place of origin/birth, the duration of her stay in the United States, or whether she is naturalized<sup>92</sup>. This has led some Census analysts to conclude that the fertility patterns of immigrants "may eventually resemble those of native-born women."<sup>93</sup>

Immigration itself is one of the largest causes of this country's population growth and Latin America has been the major source of legal immigration to the United States since 1969—the primary country of birth being Mexico. More than 43 percent of the current foreign-born population came from Latin American countries; the bulk of the remainder of legal immigrants has shifted from those of European origin to those from Asia. Today, those born in Asia account for 25 percent of the foreign born compared with 21 percent from European countries. In fact, in the last half of the 1980s, the total number of Asian immigrants even outnumbered those from Latin America—1.32 million Asian immigrants arrived in the United States compared with 1.02 million Latin Americans<sup>94</sup>.

These shifts are the direct result of major U.S. statutory and policy changes, including the 1965 Immigration and Nationality Act and the 1986 Immigration Reform and Control Act. As a result, the total number of American residents over 14 who were born in other countries grew 12.4 percent, or 2.7 million people, between 1983 and 1988. This increase was far from uniform; the number of those born in Latin America grew 56 percent while those from Asia grew 35 percent in the same period<sup>95</sup>.

Most analysts believe that the growth of the Hispanic-origin population will be the major element in total population growth; a recent Census report predicted that the Hispanic population will contribute 32 percent of the nation's growth to the end of the century and almost 40 percent to the year 2010<sup>96</sup>. By 2000, there will be 31 million Hispanics; by 2015, the Hispanic population will be double what it was in 1990. In fact, much of the growth predicted for the West and South will come from the 8 million Hispanics that will be added to the population before the end of the century. Almost 81 percent of that number will reside in those two regions, more than half in just Texas and California<sup>97</sup>. This trend explains why Texas in 1994 replaced New York as the nation's second most populous state.

This section examines six major factors underlying the population growth of the United States; although overall population growth increases the aggregate amount of travel, these factors help to explain differences in the amount of travel by each individual:

- Growth of the aging population,
- Growth of single-parent households,
- Growth of single-adult households,
- Suburbanization,
- Migration, and
- Immigration.

## The Aging Population

### *Background*

American society is aging rapidly; in 1990 more than 25 percent of the entire population was over 60. Indeed, the elderly are the fastest growing component of the U.S. population; the number of those over 65 grew more than 20 percent between 1980 and 1990. Moreover, in 1990, there were 6.2 million Americans over 85, a number the Census expects to increase more than 400 percent by 2050. By the first decade of the next century, almost 50 percent of all elderly people will be over 75—and almost 5 percent of the entire U.S. population will be over 80. If birth rates continue to drop and migration does not increase, it is entirely possible that more than 50 percent of the U.S. population will be over 50 by the middle of the next century<sup>98</sup>.

Among the elderly, women outnumber men by 3 to 2 and are overrepresented among the very old<sup>99</sup>. In 1991, almost 46 percent of women but only 37 percent of men over 65 were over 75 while more than one in four older women were over 80 (compared with less than one in five men). The U.S. Census Bureau predicts that, by 2010, more than 50 percent of all women while only 41 percent of all men will be over 75. Partially because of the age gap between men and women, older women are substantially more likely to be unmarried or to live alone. In 1990, almost 54 percent of women were widowed or divorced—only 19 percent of men over 65 were widowed or divorced, and more than 42 percent of women over 65 were living alone while 16 percent of men over 65 were living alone.

The diversity of America is increasingly being reflected in the makeup of the elderly; in 1990, roughly 7 percent of those over 65 were Black while 5 percent were of Hispanic origin (of any race). However, the Census Bureau predicts that by the middle of the next century, 12 percent of older Americans will be Black, almost 9 percent will be of races other than Black or White, and more than 15 percent will be of Hispanic origin. Hispanics were, on average, the youngest population group in 1990—with roughly half their population under 26.

The aging of the population has transportation implications because the elderly have different travel patterns than

younger members of society, those elderly today have different travel patterns from those over 65 two decades ago, and a large and growing number of elderly need help in transporting themselves—or in obtaining services that substitute for travel.

The travel patterns of the elderly have been changing with the rest of society; many aspects of the travel patterns of those over 65 mirror those seen in the younger population. The elderly as a group are taking more and longer trips, traveling to new and different destinations. The elderly do take fewer trips than younger people, but largely because they have stopped going to work. For at least a decade after retirement, the only real difference between younger and older travelers is the absence of work-related travel.

Older people between 65 and 75 make as many or more trips than slightly younger workers for shopping, personal business, and recreation, traveling as many miles. This strongly suggests that those who retire retain all their "usual" travel patterns except the work trip for as long as they can; that they shop at the same stores and travel to the same doctors and visit the same friends, largely because they stay in the same neighborhood where they lived while members of the labor force and continue to drive to meet their needs.

### *Elderly People and Private Vehicles*

Today, in contrast to 20 years ago, most older people are drivers; between 1983 and 1990 the increase in licensing among both older men and women was substantial—not, of course, because older people learned to drive but because younger drivers were aging. In 1992, almost 90 percent of men and 50 percent of women over 70 were licensed drivers; more importantly, almost 100 percent of men and 90 percent of those who will be over 70 in 2012 are currently licensed drivers.

The dependence of the elderly on the car creates major safety concerns; as the elderly population increases, so may accident rates. NPTS data show that those over 65—who constitute roughly 13 percent of the population and 12.4 percent of licensed drivers—account for only 8 percent of all accidents. But when the accident rate of the elderly is calculated by exposure, that is, by miles driven, the result is the well-known U-shaped curve; older and very young drivers have more accidents per mile driven than those in the middle. Moreover, the rate of accidents per exposure increases rapidly with increasing age after 60. In reality, older drivers have lower overall accident rates simply because they drive less<sup>100</sup>.

Whether per capita increases in accident rates among the elderly will occur will depend on whether the newer generation of older drivers continue to drive less as they age—people used to driving may keep doing so—unlike previous generations. However, even if all older drivers either reduce their driving as they age, or newer generations of older people have better driving records per mile driven, a growing number of older people will still need travel options.

Some states are taking drivers licenses from older people, even empowering physicians and family members to "turn in" older unsafe drivers<sup>101</sup>. Most communities are offering these people few appropriate transit options to replace the mobility lost with their cars<sup>102</sup>, although such travelers constitute a large, growing market of potential transit users. The absence of alternatives is one reason why some older drivers continue to drive, even if they recognize that their driving skills are deteriorating.

### *Residential Patterns*

The travel patterns of older people, as well as the ability of transit operators to develop alternative services, are strongly influenced by residential patterns. Like most Americans, in 1990, more than 75 percent of all those over 65 lived in metropolitan areas, with almost two-thirds in the suburbs of those areas. Elderly people who live in the central cities of metropolitan areas are more likely to be members of ethnic or racial minorities and are also more likely to be women living alone and poor.

At the same time, more than 8 million elderly people lived in non-metropolitan, or rural, regions in 1990; because younger people have been moving out of nonmetropolitan counties, the actual concentration of rural elders has been increasing substantially. Nationally, the rural elderly constitute more than 15 percent of the population in the areas where they live<sup>103</sup> and the oldest old (over 85) are more concentrated in rural areas<sup>104</sup>.

These patterns reflect the fact that, for more than three decades, the residential mobility of older Americans has been dropping. Most elderly people live in the homes in which they lived as younger members of the workforce<sup>105</sup>. Between 1986 and 1987, less than 2 percent of those over 65 moved far enough to change counties and fewer than 1 percent moved to another state<sup>106</sup>. In fact, among the elderly who do move, the largest percentage stay within the same region but merely change counties—for example, 60 percent of all moves by those over 65 living in the Northeast in 1986 to 1987 were to another county within the region.

From 1965 to 1970, roughly one in four older people changed their residence compared with only one in five from 1975 to 1980. Moreover most movement is among the very old, leading to speculation that those moves are related to health problems and may reflect relocation to nursing homes and care facilities<sup>107</sup>. For example, almost 30 percent of the elderly over 85 moved in the period from 1975 to 1980, compared with 20 percent of those in their 70s.

In short, most older people continue to live where they lived while working; increasingly, these are low-density or rural communities where it is difficult to access services or facilities without a car and where it is difficult to provide transit services.

### *Income Disparities Among the Elderly*

Significant income differences among groups of the elderly may have transportation implications. Many elderly are wealthy; many are very poor. The poor elderly are largely single women, often minorities. At the upper end, the real median income of elderly households increased almost 20 percent between 1979 and 1989—or 4 times the increase for all households<sup>108</sup>. Moreover, although 3.4 million elderly people had incomes below the poverty line in 1989 (roughly one in ten) that rate was well below the overall poverty rate of the nation or of the elderly in the past<sup>109</sup>.

However, at the low end, in 1990, two out of every five poor households in the United States were elderly households. A recent Census study concluded

Growth in real income [in the 1980s] was weakest for elderly single householders, especially women, and those elderly households slightly above poverty. The situation was particularly acute for elderly Black women living alone—a group whose poverty rate changed very little in the decade. Elderly married couple households, on the other hand, appeared to have fared best during the decade.<sup>110</sup>

There will be little growth for those on fixed income, even if those income sources have automatic cost-of-living increases.

In general, elderly people living alone have the lowest median incomes; most of those over 75 who lived alone in 1990 had incomes below \$10,000 and were 50 percent more likely to have poverty-level incomes than married couples. Elderly women living alone were more likely to have low incomes than comparable men. In 1990, for example, 58 percent of women over 75 living alone but only 42 percent of comparable men had incomes less than \$10,000; 40 percent of women over 85 living alone were poor compared with 27 percent of comparable men. As a result, although women constituted 58 percent of those over 65, they accounted for almost 75 percent of the poor elderly. Living alone and in poverty is a potent constraint on travel.

### *Ethnic and Racial Diversity Among the Elderly*

The ethnic and racial makeup of the older population may have travel implications as well. Several major studies have found that cultural and ethnic preferences have important transportation implications; there is a growing body of literature which shows that cultural or ethnic differences may well create variations in the kind and amount of ridegiving either requested by or provided to older relatives as well as older people's attitudes about transit safety and security<sup>111 112 113 114</sup>. Wachs found, for example, that elderly Mexican-American women were significantly less likely to have a drivers license but more likely to make trips in autos than other minority women or comparably situated Whites—generally traveling with relatives and family members.

Table C-5 shows that there are indeed differences in the travel of American elderly by ethnic and racial background; in 1990, Whites and Hispanics (of any race) were much more dependent on the private car and much less dependent on walking or public transit than Black or other older people. The table also shows that there are greater differences between men and women in some groupings; there is, for example, a substantial difference in dependence on the private car among Hispanics—older Hispanic men are much more likely to use a private vehicle and much less likely to walk than Hispanic women.

Older people from different ethnic and racial backgrounds also have different daily trip rates and cover different distances; for example, older White men make 32 percent more person-trips than older Black men and 22 percent more than older Hispanic men. Older White women travel more than 3 times the daily miles covered by older Black and Hispanic women.

Figure C-3 suggests that differences in income level do not explain these disparities in travel patterns; at all income levels, older White women made substantially more trips per day than did older women from other backgrounds and there were important differences between those women. Why people from different backgrounds have different travel patterns and whether these differences reflect the need for

additional services or just variations in life style or personal and family norms about travel is not yet clear.

Overall, the growth in the elderly population might increase total transit ridership but transit's share of the total elderly market will certainly drop. Most elderly people will be well-off drivers, living in suburban areas where it is difficult to provide cost-effective transit services. Even that part of the elderly market more likely to use public transit—single women, those living in the inner city, and racial and ethnic minorities—may be dissuaded from using public transit by concern for their personal security, the fact that traditional services do not well serve the destinations to which they wish to travel, or the willingness of their relatives to provide mobility. In the absence of new carefully tailored service options, ultimately transit ridership will drop among the elderly as a group.

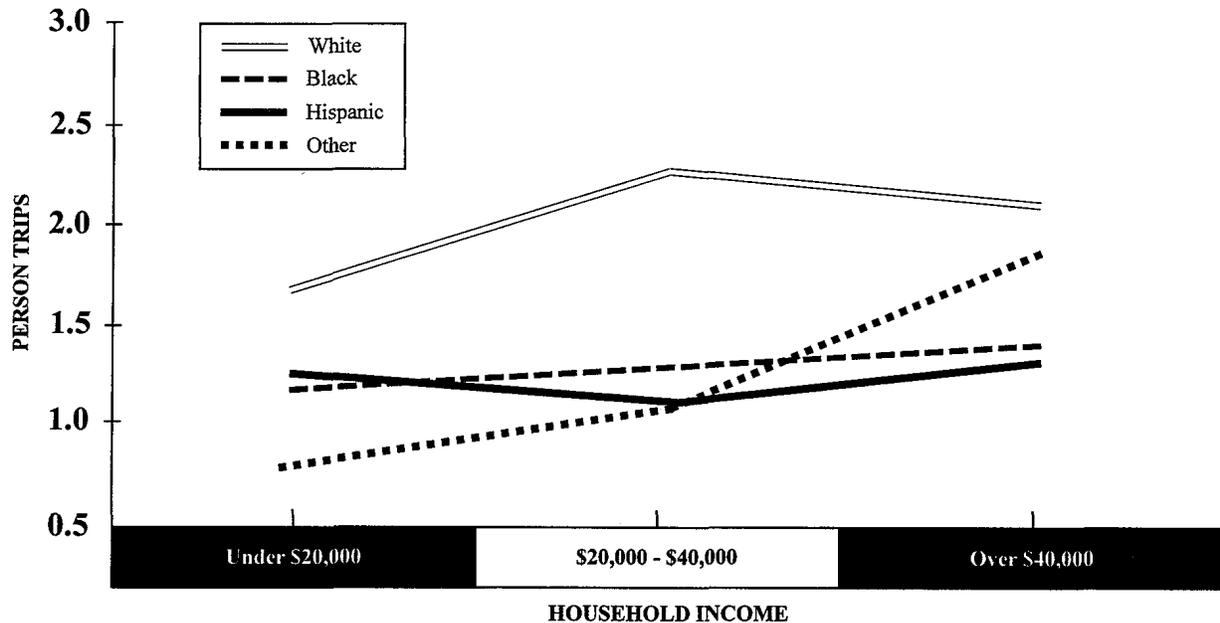
### Single-Adult and Single-Parent Households

Between 1969 and 1990, the number of American households grew almost 50 percent while the population grew only 21 percent. The largest share of the growth was created by single-person and single-parent households. The number of one-person households grew almost 41 percent while the

**TABLE C-5 Urban travel mode for all trips, those over 65, by sex, race, and ethnicity**

	PRIVATE VEHICLE	TRANSIT	WALK	TAXI	ALL OTHERS
<b>HISPANIC (ANY RACE)</b>					
MEN	85.6%	3.6%	9.0%	-	1.8%
WOMEN	3.6	4.6	15.2	1.5	4.5
<b>WHITE</b>					
MEN	91.6	1.4	6.2	0.2	0.6
WOMEN	88.4	1.7	8.7	0.5	0.7
<b>BLACK</b>					
MEN	71.0	13.7	13.7	-	1.6
WOMEN	69.7	13.5	15.4	1.4	0.0
<b>OTHER</b>					
MEN	70.7	12.1	14.1	-	3.1
WOMEN	70.0	16.3	12.5	1.2	0.0

Source: S. Rosenbloom. "Travel by the Elderly" in *1990 NPTS Report Series: Demographic Special Reports*. pg 3-34.



Source: S. Rosenbloom. "Travel by Elderly" in *1990 NPTS Report Series: Demographic Special Reports*, pg 3-41

Figure C-3. Average daily person trips; total by women over 65 by race and ethnicity, 1990.

number of single-parent households grew 36 percent; as a result, the average household size fell roughly 20 percent between 1969 and 1990. During the same period, the growth rate for more "traditional" families was only 8 percent. The substantial growth in these new, smaller, family units is linked to divorce, children born to never married parents, and young people leaving their parents' homes to be on their own.

Over the last two decades, the number of families headed by women alone has increased from 11 percent to 20 percent. As a result, the percentage of children living with both parents dropped more than 15 percentage points between 1960 and 1990 while the percentage of children living with just one parent tripled. In 1990, 3 percent of all children lived with only their fathers while 22 percent of all children lived with only their mothers.

The Census Bureau recently reported

In 1990, one-parent family groups accounted for 22.6 percent of all White, 60.6 percent of all Black, and 33.2 percent of all Hispanic family groups. For Black children, the one-parent family group is now the most common living arrangement. For White and Hispanic children, the one-parent family group is now a common arrangement, but not the most common one.<sup>115</sup>

Families headed by a woman alone have considerably higher poverty rates than any other type of household—in 1990, more than 33 percent were living below the poverty level<sup>116</sup>. In fact, the income of families maintained by a woman with no spouse dropped 5 percent in real dollars between 1967 and 1991<sup>117</sup>. As a result, families headed by a

woman alone constituted a substantial portion of all poor families: more than 50 percent in 1978 and more than 53 percent in 1990<sup>118</sup>. To raise themselves just over the poverty line, the average family headed by a woman alone would require an additional \$5,661 per year in 1990 dollars<sup>119</sup>.

The growing number of smaller households has important transportation effects; one person in a small household is likely to make more trips than the same person in a larger household. For example, in 1990, the total daily trip rate of a two-person household was 5.87 trips; this was an average of 2.87 trips per person, compared with 2.94 daily trips for an individual living alone<sup>120</sup>—an 11 percent difference in daily per capita trip rates.

The difference is even larger in households with only one car. In 1990, a person living alone who had one car made 3.24 person-trips per day, which was 19.5 percent higher than the average per capita trip rate in a two-adult household with only one car<sup>121</sup>. Also one-person or one-adult households are more likely to have one car per person than are two-adult households. For example, in 1990, almost 80 percent of single-adult households had at least one car, and thus one car per adult, while only 76 percent of two-person households had one (or more) cars per person<sup>122</sup>.

That many single-parent households are poor also has transportation implications. Many low-income women who head households may live in the central city but commute out to the suburbs for employment because that is where jobs matched to their skill levels exist. As a result, they may be traveling longer than workers making more money. This may explain why, in 1990, urban women with household incomes

less than \$5,000 traveled 33 percent more person miles each day than both men with incomes below \$5,000 and than women in households making \$20,000 to \$25,000. Those in households making between \$5,000 to \$10,000 traveled more than 8.5 miles to work; no other group of women traveled that far until they had incomes in excess of \$25,000<sup>123</sup>.

Poor central city residents may also be disproportionately dependent on the private car, given their low wages. Probably because many trips from the central city to the suburbs are so difficult to make using public transit, in 1990, urban women with household incomes between \$5,000 to \$15,000 were more likely to use a car for their work trip than comparable men. Women in households with incomes between \$10,000 to \$15,000 were more likely to travel to work in a car than men in households making \$10,000 more<sup>124</sup>.

Conversely, low-income urban women were less likely to use public transit for their work trip than comparable men; more than 8 percent of men but only 5 percent of women in households with incomes between \$10,000 to \$15,000 used mass transit for their home-to-work commute<sup>125</sup>. In fact, transit use on the work trip dropped twice as fast among women from 1969 to 1990 as it had among men<sup>126</sup>. Thus poor urban women heading households may expend substantially more of their income on transportation than comparable men or than either sex with more resources.

Overall, the growth in both single-adult and single-person households does not bode well for public transit. People living in smaller households travel more and do more of that travel in a car. Moreover, single parents must juggle employment and domestic responsibilities; this tends to reduce their ability or willingness to use public transit, even at low incomes. As the preceding section describing women's labor force participation detailed, salaried single mothers often make the most number of trips per day and are the most likely to link multiple trips together; patterns that defy easy transit use.

## Increased Suburbanization

### *Overview*

Coupled with most of the demographic and economic trends previously addressed—and the ones below—are the suburbanization of both employment and the population, issues addressed at greater length in a major subsection below. Within metropolitan areas, most population growth in the last three decades has been in what can be classified as suburbs<sup>127</sup>. Unfortunately, there is little good information on what most people would consider a suburb—that is, lowdensity development far from the traditional core of the city. Most analysts base their definition on U.S. Census data, which do not actually define suburbs.

With no clear definition of suburb in the Census, most authorities define suburban as that part of the urbanized area of a metropolitan area which is not central city. This creates

ambiguities. The Census defines central cities as jurisdictions with at least 50,000 people serving as the economic and social center of a metropolitan area; however, a metropolitan area can have several central cities and the central city may not be in the center of the metropolitan area. Using the actual legal boundaries to define central city both undercounts and overcounts low-density residential and employment development, even in the same metropolitan area.

Low-density development is overcounted by considering older incorporated suburbs—that is, not within the jurisdiction of the central city—as suburban even though they have high density and are very near the traditional downtown of the central city. On the other hand, the central cities in many Southern and Western metropolitan areas have annexed substantial low-density and even undeveloped land; regardless of the distance from the traditional core or the density of development, these areas are not considered suburban. So both Compton (California) and Yonkers (New York) are considered suburban—although they are fairly old and dense communities, while people living and working 20 miles from downtown Houston (Texas) or Jacksonville (Florida) in very low-density settings are considered central city residents.

In short, the suburban data can only give a general idea of the patterns occurring across the country; they are not very useful for looking at individual metropolitan areas unless there is additional local information. The undercounting of suburban residents occurring in some metropolitan areas may be matched by overcounting of suburban residents in others—but this has not been verified.

### *Population Growth*

The dimensions of this suburban population growth are staggering: while U.S. population rose 56.1 percent in the 40 years since World War II, central cities only grew 49.9 percent. In contrast, the suburban population grew almost 200 percent in the same years. In short, most of the increase in metropolitan population was actually in the suburbs. As a result, even older cities are becoming less dense as lowdensity suburbs grow up at their peripheries<sup>128</sup>.

Since 1950, about 33 percent of the total U.S. population has lived in the central city, but the suburban portions of metropolitan areas increased from 23 percent of total U.S. population in 1950 to 46 percent in 1988<sup>129</sup>. Although central cities grew faster after 1980 than they had after 1970, their growth rate was less than half that of the suburbs<sup>130</sup>. In fact, the suburbs absorbed almost 76 percent of metropolitan growth in the decade of the 1980s<sup>131</sup>. Thus, overall, central cities have grown but at not nearly the rate of their suburbs.

Analysts have seen a slight turnaround from 1980 to 1990. The average annual growth rate of all central cities in the United States was up—to 0.64 percent from 0.09 percent during 1970 to 1980 while the suburban growth rate had declined—to 1.42 percent from 1.73 percent in the previous

decades. There were important regional differences. The drop in absolute population in Northern central cities continued between 1980 and 1990—but at a slower rate of decline.

On the other hand, the growth rate of Southern central cities dropped while that of Western central cities experienced the largest increase in the annual rate of growth—from 1.53 percent for the 1970-80 decade to 1.95 percent. Although many are hailing these patterns as a mini-urban revival, the growth rate of suburbs substantially exceeds that of the central cities—even if that growth rate has dropped a bit. In both the South and the West, annual suburban growth rates exceed 2.2 percent a year<sup>132</sup>.

As suggested by the figures above, not all central cities grew; 43 percent of the central cities of recognized MSAs (or 222) lost population in the last half of the 1980s. The incidence of loss was highest in the Northeast where more than 70 percent of the central cities lost population (and where over half of the central cities had been declining in population since 1950)<sup>133</sup>. Conversely, fewer than one in five central cities in the West experienced absolute losses.

These trends do not always have the same effect on land density, the relevant factor for transit use. As described in a subsequent section, suburbs may become denser if more housing units are built per acre, or if proportionately more multi-family housing is built, or if more people live in each housing unit. They will continue to decrease in density to the extent these conditions are not met. For example, TCRP Project B-6 reported that most multifamily housing built in the 1980s was built in inner suburban corridors in low-density configurations—12 to 18 units per acre. The study reports that

... forecasters predict that much of apartment and condominium construction in the mid-to-late 1990's will be in the new outer suburbs, near emerging edge cities (e.g., Gainesville in northern Virginia and Peachtree City outside of Atlanta) or immediately adjacent to inner-ring edge cities (e.g., Ballston, Virginia, and Atlanta's Buckhead district).<sup>134</sup>

Given the low densities in many suburban areas, it is not surprising that travel patterns are affected. NPTS data show that those living in suburban and rural areas in 1990 traveled 26 percent longer to work (or for work-related activities) than those living in the central city. For non-work trips, those living in suburban areas traveled 10 percent longer, and those in rural areas 17 percent longer, than central city residents.

### *Suburban Employment Growth*

In 1980, 23 percent of all jobs in the United States were in the traditional downtown but this percentage was lower the larger the city. For example, only 7 percent of all jobs were downtown in the 10 largest metropolitan areas. Between 1980 and 1990, most employment growth occurred in suburban areas, either in concentrated centers outside the traditional core or more generalized dispersion in low-density

suburban patterns. In 1990, in the metropolitan New York area, only 5 percent of the work trips from the six most rapidly growing northern New Jersey counties were destined for Manhattan. In Bergen County, New Jersey, an older "bedroom" suburb for New York, employment grew 24 percent (or 80,000 jobs) between 1980 and 1990; the new jobs were filled by reverse commuters from New York, by a 33 percent reduction in workers commuting to New York, and by a substantial increase in workers from other suburban counties<sup>135</sup>.

Joel Garreau, in *Edge Cities*, describes many of the concentrated suburban centers (which he calls "edge cities") that constitute a stage of urban development in American metropolitan areas which, he claims "has moved the central historic purpose of cities—jobs—to where people have been living and shopping for two decades."<sup>136</sup> In 1990, 18 of the 40 largest job centers in the United States were outside of traditional downtowns; moreover, all of the 18 had more jobs than downtown Pittsburgh. In 19 edge cities, as defined by Garreau, most residents live in buildings with ten or more housing units—for example, the Crystal City neighborhood of Arlington, Virginia, and Houston's Galleria area. Moreover, in many edge cities, there is a better ratio of jobs to residents than in the central city, which often leads to shorter average commutes.

TCRP Project B-6, studying ways to enhance suburban mobility, noted that,

... while the emergence of suburban downtowns and edge cities have brought about more multi-centered settlement patterns, these patterns do not generally follow a well ordered central place hierarchy ... The decentralization process in contemporary urban America is complex and not easily characterized, ranging from scatteration on one extreme to more ordered, central-place type hierarchies at the other, with small-scale clustering along corridors ... occupying the middle ground.<sup>137</sup>

Pivo's study of six large metropolitan areas found that most office jobs were in relatively small, low-density clusters along highways or what he termed "the net of beads."<sup>138</sup> In the Los Angeles region, Giuliano and Small found that, although there were a few large suburban clusters, most suburban centers were small scale<sup>139</sup>.

In Los Angeles, Gordon, Richardson, and Giuliano found that in 1980 there were 23 different "centers" which attracted a substantial density of trips (1.8+ standard deviation from the mean), with 19 accounting for only 17 percent of all jobs in the region<sup>140</sup>. Centers were defined as clusters of census tracts with job densities above 12,500 per mile. However, by 1990, the proportion of jobs in LA centers had dropped drastically so that only 7 percent of regional employment was in centers and the number of centers had dropped to 12<sup>141</sup>.

Using the Bureau of Economic Analyses Regional Economic Information System (REIS) data files, Gordon and Richardson found that, from 1972 to 1992, substantial

employment decentralization occurred almost everywhere in the United States, with the outer suburbs reaching levels of employment previously achieved by inner suburbs<sup>142</sup>. Between 1982 and 1987 metropolitan employment growth was the highest in the outer suburbs for all industrial sectors except manufacturing; for example, it exceeded 3 percent in all metropolitan areas (except Milwaukee) and was over 5 percent in five large cities. This outer suburban employment pattern was not a Sunbelt/Rustbelt phenomenon—the highest rate of outer suburban employment growth in the United States was in four disparate communities: Houston, Detroit, Philadelphia, and Los Angeles<sup>143</sup>.

Several different suburban trends are at work, several of which have different implications for transit use. Overall, metropolitan areas are becoming denser but this may be because formerly undeveloped land at the fringe is developed, existing housing stock has more inhabitants, and/or existing communities are redeveloped at higher density. It is difficult to gauge the relative strength of each trend without knowing the extent to which additional suburban employment growth will be in concentrated centers versus dispersed locations, the rate of population growth in close-in older suburbs versus suburbs on the fringe, or whether the increased number of people per housing unit within older suburbs (often associated with immigrant populations) will outweigh development in the outer suburbs. Growing land use costs and land use regulations will lead to more housing units per acre; the question is where this higher density development will occur and when.

### *Concentration of Central City Populations*

Suburbanization has led to profound changes in central cities. The mass movement of American families and business to the suburbs has helped to create central cities which differ sharply from those of 50 years ago—in terms of the kind of economic activity and the kinds of families which live there.

Today, almost all U.S. neighborhoods characterized by extreme poverty are in the nation's 100 largest central cities. Moreover, the percentage of the population in central city census tracts living at "extreme poverty" more than doubled between 1970 and 1990, from 5.2 to 10.7 percent of the central city population. As the sheer numbers of the poor increase, they are being more concentrated not only within the central city but within small areas of the central city; the total percentage of the 100 largest central cities' poor populations living in extreme poverty tracts increased from 16.5 to 28.2 percent<sup>144</sup>.

In 1980, 2.4 million poor people, or 8.9 percent of all poor people in the United States, lived in areas of concentrated poverty in a central city. In 1991, the poverty rate of all families was 17.2 percent in the central cities and 7.2 percent in the suburbs. Over 26 percent of central city families with children were considered poverty households compared with

11.9 percent of those in the suburbs—the ratio of poverty households to total households was 2.5 times as large in the central cities as in the suburbs<sup>145</sup>.

The concentration of the poor has two major effects on an urban economy: the concentration of low-income households increases the per capita cost of public service provision and the pressure to provide these services creates substantial budgetary pressures on local governments which have a disproportionate share of the responsibility for service provision. Thus they are forced to raise taxes, which in turn accelerates the flight of higher income households and employment to suburban jurisdictions<sup>146</sup>.

At the same time, the employment base in central cities frustrates attempts to decrease poverty by matching central city residents to central city jobs. Most central cities experienced absolute job growth but those new jobs are very different from those traditionally found in the CBD—there are few manufacturing or production jobs and many high skill information processing and professional jobs<sup>147 148</sup>.

Thus low-skilled inner-city workers are disadvantaged by both the jobs left in (or coming to) the central city and by the movement of other jobs to the suburbs. As a result, they are often forced to seek the suburban jobs still matched to their skills and become reverse commuters<sup>149</sup>; generally incurring more expensive and longer commutes in both time and distance—with fewer and poorer transit options<sup>150 151 152 153</sup>. Many low-skilled jobs remain in the core of the central city; however, there are not enough to match all the low-skilled workers. Moreover, the skill needed for many low-skilled jobs is higher than that required in the past.

Between 1960 and 1980, the reverse commute, from central city to suburb, grew as much as did the central city to central city commute—8.5 percent—to constitute 8 percent of all commuter travel but over one-fourth of the trips of central city workers. In 1980, roughly five million American workers were traveling from the central city to the suburbs for work, more than double the 1960 number. Strikingly, 5.6 percent of all those workers used transit for their work trip (compared with 1.6 percent of workers living and working in the suburbs), despite the real disadvantages involved.

Some of these reverse-commute data represent people traveling a short distance to suburban employment concentrations just over the central city border, such as the Cities of Industry and Commerce, located very close to the traditional downtown of Los Angeles. However, these same figures undercount those living near the core of a central city like Oklahoma City or Jacksonville or Houston and commuting out a substantial distance without leaving the jurisdiction of the central city. The distances traveled by very-low-income people suggest that many of those with low job skills living in the central city are forced to commute some distance to suburban employment locations—whether or not defined as reverse commute.

Nationally, reverse-commute trips increased almost 9 percent between 1970 and 1980. However, these are aggregate

metropolitan figures: 25 percent of those living in the inner city were making reverse-commute trips in 1980. Moreover, some individual metropolitan areas experienced even greater changes in traditional commute patterns. A 1985 study found that, between 1960 and 1980, reverse-commute travel increased 66 percent in the Baltimore region<sup>154</sup>. A 1991 study in the Washington metropolitan area found that reverse commuting from the core increased 45 percent between 1980 and 1988, to account for one in five trips in the region in 1988<sup>155</sup>.

### *Low-Density Neighborhoods*

One of the signal features of suburbanization is low-density neighborhoods designed to separate homes both from one another and from any type of business or commercial activity. As a result, people must rely on cars to meet even their smallest needs; many trips that could be neighborhood-based in denser communities have now become very long.

Between 1983 and 1990, a remarkable array of trips taken for different purposes grew longer; every single non-work trip purpose except shopping grew in length. The average car driver or passenger in 1990 went almost 13 miles to visit friends, 11 miles to the doctor or dentist, and 7 miles to conduct personal business. Indeed, the average car traveler increased his or her mileage to school or church by over 25 percent, traveling almost 7.5 miles to go somewhere many people think of as "neighborhood-based."

Suburbanizing neighborhoods have their effect on older people living in the suburbs or rural areas as well; today, they travel farther and more often in a car than their central city counterparts. For example, all suburban women over 65 drove 6 percent more than central city women while suburban men over 65 drove 14 percent more than comparable central city men. The patterns are even sharper when the elderly are grouped by cohort; for example, suburban men 75 to 79 drive 20 percent more than their central city counterparts<sup>156</sup>.

There has long been a debate over how much the way communities are structured creates the need for a car, particularly for non-work trips. In part to respond to the declining ability to use public transit or to walk in our current neighborhoods, neotraditional urban design advocates a return to more traditional, higher density, mixed-use neighborhoods. In such neighborhoods, transit and walking are viable options and required drives are shorter<sup>157</sup>.

Most of these calls for new communities are based, at least in part, on research which shows that denser communities in the United States and around the world have lower car use and higher transit use. Unfortunately, it is unclear which attributes of those denser communities are linked to decreased auto use or increased walking or cycling, or if it is possible to manipulate or develop certain kinds of urban form or design neighborhoods in ways which will really influence travel behavior.

Analysts are hopeful about certain kinds of design changes and less sanguine about others. Critics have serious

doubts about neotraditional design features: narrow streets and other changes in the streetscape that make automobile use less attractive, building at a more "human scale," and pedestrian amenities; many think that simple design features will not affect travel in a meaningful way, even if such features create a difference in whether or not people perceive walking as a realistic alternative to driving.

If neighborhoods are designed so that distances are short, major arterials are avoided, the orientation of commercial activities is carefully handled, and there is pedestrian circulation within commercial activities, residents will take more walking trips. Whether they will also take fewer auto trips or significantly change their entire travel patterns is still open to debate. The idea of redesigning neighborhoods to enhance accessibility and mobility is a promising one but requires additional research.

### **Migration**

Most population growth in the last two decades has gone to the South and the West—with inherently lower metropolitan area density. The largest component of the U.S. population (34.3 percent) lives in the South while the Northeast region has the smallest share of the population (less than 20 percent). However the fastest growth in population has been in the Western region where many states showed double-digit population increases since 1980; Nevada grew almost 40 percent in the last decade while Alaska and Arizona grew more than 30 percent. In contrast, in the Southern region, West Virginia and the District of Columbia actually declined in population, while most of the rest of the Southern region grew less than 7 percent since 1980<sup>158</sup>.

Much of these differences in population growth are because of migration—that is, people already living in the United States moving from one part of the country to another.

High mobility underlies many fundamental institutions of American society; business... the military, higher education, and more frequently the family. Young adults in the United States are highly mobile because they tend to leave home and live independently before marriage. In addition, Americans' older ages at marriage, low fertility, and high rates of divorce and separation, along with the growth in single-parent households, are consistent with elevated levels of residential mobility.<sup>159</sup>

The major internal migrations of this century were the movement of southern Blacks to the northern industrial cities and the movement of large numbers of people to the South and West, particularly California and Florida. In 1920, millions of poor Blacks left the rural South looking for better opportunities and jobs. As a result the distribution of the African American population changed—from one where over 90 percent of Blacks lived in the rural South to one where almost half did not<sup>160</sup>. After the Second World War,

... migration streams flowing from industrial core regions to the southern and western periphery. Industrial cities became major sources of out-migration. The former periphery in the South and West (led by California and Florida) became the cutting edge of economic development and the hot spots on the migration map.<sup>161</sup>

Migration streams, for example, connected Florida with both New York and New Jersey as retirees moved there following World War II. Over time, however, the migration stream changed; between 1985 and 1990 there were as many workers moving to Florida from these states as there were retirees.

In the last decade, while migration to the South has continued, it has slowed to the West, particularly to California. Most migration in the past decade has been from the Northeast and Midwest to the South. So, despite disproportionate Western growth, some analysts believe that the "westward movement of the U.S. Population may be coming to an end" as internal migration slows; for example, net internal migration to the West was almost zero in 1988<sup>162</sup>. The most conspicuous indicator is that California, the principal recipient of westward migration in the last 40 years, has seen a marked downward trend in migration.

Within regions, most population growth has gone to metropolitan areas. Between 1910 and 1988, while the national population grew 167 percent, the metropolitan population grew by 449 percent—or more than 600 percent in areas over one million<sup>163</sup>. Metropolitan growth in the last decade has been almost 4 times that of non-metropolitan or rural areas. Moreover, the annual rate of metropolitan growth has been increasing over the last two decades—it was 1 percent in the 1970s; since 1984, the growth rate has been 1.2 percent<sup>164</sup>. (This was a sharp reversal from the 1960-1970 decade when nonmetropolitan areas grew faster.) Today, almost 80 percent of the total U.S. population live in metropolitan areas.

Conversely, a significant number of non-metropolitan areas lost population; between 1980 and 1988, 18 states (mostly in the Midwest) had one or more non-metropolitan counties which lost population. Nationally non-metropolitan growth overall fell to 0.3 percent annually but there was wide variation in growth rates. Almost 60 percent of counties in the Midwest and over one-third of those in the Northeast lost population in the 1980s. However, those non-metropolitan counties which were closely linked to metropolitan areas (for example, having a high level of commuting) generally had much higher growth rates and this pattern was uniform across regions of the country<sup>165</sup>.

Not all parts of the country experienced equivalent metropolitan growth. Consistent with the regional population differences discussed above, metropolitan population in the West grew roughly 2 percent annually since 1980 while that in the Northeast grew less than one-half of one percent annually. Metropolitan growth in the South was the second fastest growing at roughly 1.53 percent annually<sup>166</sup>.

Not surprisingly, the South and the West, housing half of the country's population, recorded 61 percent of U.S. employment growth between 1960 and 1980<sup>167</sup>. In themselves these patterns have transportation implications; in general, people have been moving from higher density industrial cities to lower density service-oriented cities. Even the goods-producing firms in the South and West have been able to locate in suburban areas to take advantage of cheaper land costs. As a result, the worktrip patterns of internal migrants may change remarkably—even if they keep the same occupation in the same kind of firm.

Overall, most internal migrants have moved from higher density places to lower density places. As such, they have generally moved from places where it is both possible and relatively easy to use transit, at least for the work trip, to communities where transit services, even for the work trip, are very limited. Unpublished data from the 1991 AHS show, for instance, that people of working age who moved to Phoenix were substantially more likely to move further out from the traditional core than those already in the MSA who moved.

Although low-density Southern and Western communities have some (relatively) high-density corridors and concentrated areas where transit services are practical and well-used, the overall movement of population from the Northeast to the South and to the West is not likely to lead to greater transit use overall or to increase transit's share of the market of any of the migrants—even among those more likely to use transit.

## Immigration

The patterns created first by migration have been strengthened by immigration. Almost 40 percent of all immigrants live in the West: 43 percent of those from Latin America and almost 50 percent of those from Asia. In fact 4 of every 10 foreign-born persons from Latin America lived in California in 1988<sup>168</sup>. However, more of those born in Latin America lived in the Northeast (27 percent) than the South (24 percent). Census analysts attribute part of the regional concentration of those with different backgrounds to the ports where the migrants entered the United States.

The Port of entry for Cuban-born immigrants is more likely to be Miami and hence their greater concentration in the South. For Mexican born immigrants, it is San Diego or El Paso and for East Asian-born immigrants, it is Los Angeles or San Francisco, hence they are most likely to reside in the west.<sup>169</sup>

Not only are the South and the West the fastest-growing and now the largest areas of the country, they are also the home of large concentrations of recent immigrants to the United States—people who tend to have poor education and low-skill levels and who may be limited to low-end servicesector jobs. Immigration tends to produce concentrations of low-skilled and poorly educated workers who are competing

with comparable native-born workers for a declining number of low-end service-sector jobs.

The low levels of pay among immigrants alone may create a new market for transit operators; to the extent that these low-skilled migrants bring a "transit habit" with them, they may stay transit riders even as their lot improves. On the other hand, the dispersed nature of the jobs open to them, coupled with variable work schedules, may well pose substantial difficulties in providing useful service.

A recent University of Southern California study of immigrants in Southern California found trends similar to those found in national data (reported on in the Task 1 report); immigrants were more dependent on transit but rapidly became drive-alone commuters. Of immigrants' greater dependence on transit, Dowell Myers notes,

... this modest transportation behavior is not a permanent characteristic of individual immigrants. Over time, recent arrivals adapt themselves to California society and improve their economic status. Their convergence on the commuting behavior of native-borns is one demonstration of the immigrants' assimilation ... Transit planners have been the unintended beneficiaries of a liberalized immigration policy and the post-1965 surge in immigration.<sup>170</sup>

### **The Effect of Demographic Trends on Current and Future Transit Markets**

Public transit ridership in the aggregate will be negatively affected by many of the trends just discussed but strengthened by others. On the positive side, the growth of immigrants will have a substantial favorable effect, even in the absence of new services. The potential growth in young people and single-parent households might also lead to increased transit ridership, especially in the face of real income losses because of industrial restructuring.

The growing number of higher skill-level workers traveling to the traditional core of the city may also increase transit ridership; indeed, this group of higher income, generally more highly educated travelers create transit markets in several different service environments. The growing number of elderly people, many of whom are more dependent on transit today and who may be less sensitive to time constraints in the future, may also increase overall transit ridership.

However, it is not clear that transit will capture a larger share of these growing market niches, even if transit increases overall transit ridership. Most of the other societal trends are likely to have negative effects on transit ridership—in the absence of new or different services—even among most groups proportionately more likely to use transit and even if the total population within each group increases.

First, the aging of the population may increase transit ridership but only for a short time, in the absence of new service arrangements, even though older people constitute a strong transit market. One reason is that most higher rider-

ship by older people is probably a generational artifact; there is no evidence that people rely more on transit as they age. It is more likely that the higher transit use now seen among the elderly reflects the "transit habit" of a previous generation. Moreover, almost all older people will be licensed in the near future and most will live in suburban or rural communities with few alternatives to driving alone. Although older people who are poor may continue to disproportionately depend on transit, the percentage of older travelers who are poor has declined substantially.

The NPTS data support this conclusion, showing that transit ridership among the elderly fell faster from 1983 to 1990 than for almost any other group of people<sup>171</sup>. In addition, suburbanization increases the distance which people have to travel to get to and from a bus; older travelers are less likely to be willing or able to walk to transit stops. So as the nontransit habituated population ages, transit use among older people will drop substantially.

Second, the growth in the number of households is linked to the growth in per capita car ownership; that growth rate alone poses serious problems for transit operators. Once any traveler has purchased a car, the marginal cost of additional trips may be small; the cost of driving may even be perceived as less than the cost of a transit fare.

Third, the growth in the number of single-parent households may increase transit ridership because so many are poor. However other societal trends act in ways likely to lead to lower market share among single parents. Both Census and AHS data presented in the Task 1 report show that poor women (those with incomes less than \$20,000) were substantially less likely to use transit than comparable men. Moreover, women with incomes less than \$5,000 were less likely to use transit than those with incomes of \$15,000; conversely they were more likely to drive alone to work. These patterns may reflect the continuing suburbanization of the low-skill jobs available to many single female parents, the need to reverse commute, as well as the demands created by balancing work and home without a resident partner. So again, while total transit ridership may go up as this group increases numerically, transit will probably capture a smaller and smaller share.

Fourth, suburbanization coupled with the migration to the lower density West and South by residents and immigrants will work against transit use. Residential suburbanization supports the deconcentration of industry and business leading to widely scattered job sites and widely scattered residential locations, neither well served by traditional transit options. Transit may increase total ridership from the growing number of low-income reverse commuters, but—in the absence of new service arrangements—it is also likely that transit will lose market share among those reverse commuting, because these trips are often the most difficult to take using traditional transit alternatives.

At the same time, of course, there will be some increased densification within suburban areas and the development of

some fairly high-density suburban employment centers, as typified by the Houston Galleria or Tysons Corner outside Washington, DC. Workers traveling to these kind of destinations may be more willing to use public transit, but generally only if they live in areas with the density needed to support acceptable levels of transit.

Finally, the aggregate trends described above will not have the same effect in all communities or on all current or prospective market niches. First, aggregate or national figures often blend what is happening in low-density western and southern areas with what is happening in older, denser, mid-western or northeastern areas—giving "averages" which accurately describe no one. Second, and more importantly, every community is different; the same trends which reduce ridership in one community—such as suburban development—may help create new market opportunities in another community—for example, densification in older suburbs or concentrated suburban employment centers.

## SOCIAL FACTORS

Three complicated sets of responsibilities and perceptions underline the travel patterns of most Americans as a result of many of the trends previously discussed:

- Family support relationships,
- Division of household responsibilities, and
- Perception of crime.

### Family Support Relationships

Those currently of working age have been called the "sandwich generation" because they may have responsibilities to both their children and their parents at the same time. This situation arises because many people have delayed the birth of their children while their older parents are living longer. A 50-year-old woman could easily have both a 15-year-old child and an 85-year-old parent. In fact, the ratio of those 50 to 64 to those over 85 has tripled since 1950 and will triple again over the coming 60 years<sup>172</sup>.

This has created a situation without historical precedent; in 1940, only 1 in 3 50-year-old women had a living mother—that figure had doubled to 2 in 3 by 1980.

More people will face the concern and expense of caring for their very old, frail relatives because so many people now live long enough to experience multiple chronic illnesses ... the oldest old [those over 85] are the most likely to have pressing needs for economic and physical support.<sup>173</sup>

One of the major implications of the growing percentage of the population over 65 is that there will be fewer and fewer younger workers available to pay for, or to directly provide, services for those seniors who increasingly require assistance—including transportation or services which take

the place of transportation. The changing population structure has both a societal and personal dimension; at a societal level there are fewer people to support governmental programs while on a personal level there are fewer people to provide individual assistance. Those living alone may be particularly needy—and far less likely to receive assistance from non-governmental sources.

While the ratio of those over 65 to those 16 to 64 will actually drop—that is, get better—in the next 15 years as the disproportionately large group of baby boomers provide personal and societal support for their parents, in the subsequent two decades, the ratio will climb substantially—that is get worse. This worsening of the dependency ratio is the result of the aging of the baby boomers which leaves fewer younger people to pay for needed services. In 2030, when the last of the baby boomers leaves the workforce, there will be more than 83 dependent people to every 100 working age adults<sup>174</sup>—or almost 50 percent higher than 1990.

Several studies have shown that "intergenerational linkages" between older people and their younger relatives has been decreasing for years. Between 1962 and 1982, the number of elderly people who saw one of their children at least once a week decreased 25 percent. There has been an even greater decline in the number of men providing household repairs and women providing domestic help to their aging parents. Most experts see these trends resulting from the substantial increase in the employment of daughters and daughters-in-law as well as the high level of divorce, which weakens intergenerational links<sup>175</sup>.

How to pay for as well as provide appropriate services, including transportation, is an important societal concern. For example, because the distribution of older people, particularly the very old, is not evenly divided across the states, several states will be in the position of having large numbers of both very young and very old people who may need special services. Four states projected to have the largest percentage of the population under 20 by 2010 are also the states projected to have the highest percentage of the population over 65: California, Illinois, Michigan, and Texas.

The personal dimensions of providing assistance to an aging population are also significant. A 1990 study found that almost one in five men and one in three women older than 75 required assistance to conduct some of their daily activities (such as bathing, dressing, or eating)<sup>176</sup>. Between 80 and 90 percent of this kind of personal care, as well as help with household tasks—including transportation—are provided to the elderly by family members, usually daughters and daughters-in-law<sup>177 178 179 180</sup>.

The need of people, and particularly women, to care for older people has transportation implications. The overall level of care required by our rapidly aging population is much more physically and psychologically demanding than that needed four decades ago, in part because of the increased number of cognitive diseases among the growing number of people older than 80. At a minimum, the needs of their

elderly parents will constrain the schedules and travel choices of many women relatives, particularly those in paid employment; at the worst, middle-aged women may actually leave the workforce to care for frail older relatives<sup>181 182</sup>.

These caregiving activities affect the transportation patterns of both the caregiver and the older person. Families, and older people themselves, may vary in the degree to which they offer rides to others, accept rides instead of driving or staying at home, or accompany family members on a bus or public transit vehicle. Differences in cultural norms about family support may affect the amount of assistance offered to older people to help in carrying out their daily activities; these norms may equally affect the kind of help older people expect from friends and relatives (either the kind of assistance which reduces their own need to travel, or the offer of a ride or escort when travel is required). Because most caregivers are employed, these patterns will ultimately affect the commute mode they choose as well as their trip-linking behavior.

### Division of Household Responsibilities

Women in two-worker families are generally assumed to be performing most of the childcare and domestic responsibilities; this is reflected in their travel patterns. However some researchers have questioned whether men with employed spouses, particularly younger men, will take on more caretaking responsibilities, altering their travel schedules—and perhaps those of women whom they are relieving of such obligations.

Several researchers have found that men are spending more time with their children and doing more housework than comparable men a decade before. A recent article in the *Wall Street Journal* reported that,

Most couples today are in what sociologists call the transition stage—evolving between "traditional" roles, with women taking sole responsibility for homemaking and "egalitarian" roles with men and women sharing equally the burdens of homemaking and earning money.<sup>183</sup>

A 1993 study concluded that, in the last three decades, men have spent more and more time on household activities; between the early 1970s and the mid-1980s they did more "traditional male tasks" such as household repairs and lawn care. Since 1985, men have also helped more with what the researchers call "female tasks," such as cooking, cleaning and laundry<sup>184</sup>. But part of what fueled the closing gap was that the total time a household spent on domestic responsibilities declined as women entered the labor force; men, therefore were doing a higher proportion, but of less work.

A 1988 study found that male household responsibilities have changed to accommodate the employment status of their wives—men in households with a non-salaried wife contribute 30 percent less time to household duties than those with

a salaried wife. However, the same study found that husbands still carry only a third of the household task load, even when the wife has full-time salaried employment<sup>185</sup>. In fact, most studies still find that women, even when fully employed outside the home, take on most household responsibilities<sup>186 187</sup>.

A study of panel data from the Michigan Study of Income Dynamics for the years 1979–1987 found that large disparities in the time spent on housework between men and women have continued, even when the wives are also in the full-time labor force. In households in which both spouses had paid employment, men averaged 7 hours per week on housework while women averaged 17 hours—in no case, did men conduct, on average, more than 29 percent of all household activities. When there were children present, working women averaged 23 hours per week of housework while men still spent 7 hours per week on all household activities<sup>188</sup>.

The Michigan data also showed that the more a man earned, the less he worked around the house; while women also decreased the amount of housework they did as their income went up, men's household activity dropped at a faster rate than comparable women's. In addition, while employed women's household activity was inversely related to the hours their husbands worked outside the home, the number of hours worked by women had no effect on the amount of housework which her husband did<sup>189</sup>.

Data from the 1987 National Survey of Families and Households indicated that employed women put in an average of 33.8 hours per week in household labor while employed men, by their own report, averaged less than 19.1 hours per week of housework. If the paid labor of both sexes were added to household work, men worked 52.6 hours per week while women worked 67.4 hours<sup>190</sup>. A study based on Dutch panel data found that the partners of employed women did not increase their "maintenance" activities when their wives worked; moreover the presence of children had more effect on female workers than male workers, clearly increasing maintenance activities by women<sup>191</sup>.

An analysis of 120 households from the 1991 data Boston Region Household-Based study showed that while men and women in households with workers had significantly different allocations of time for various activities, the differences were generally less when both men and women worked<sup>192</sup>.

Most transportation studies still show little evidence that men are taking on substantial domestic responsibilities in ways that affect their travel patterns<sup>193 194 195 196</sup>, although such responsibilities seem clear in the travel patterns of women. A 1992 survey in Southern California found that employed women were more than twice as likely as employed men to report needing a vehicle to take children to daycare and school<sup>197</sup>. A 1990 study in four Chicago suburbs found that employed women made twice as many trips as comparable men for errands, groceries, shopping, and chauffeuring children<sup>198</sup>. An analysis of the 1994 Portland, Oregon, activity and travel survey found that women heads of household per-

form more activities, travel more, are more likely to link trips together, and tend to tie more trips into trip chains when they do link trips than comparable men<sup>199</sup>.

The 1994 Portland study found the more that men worked outside the home, the less they engaged in maintenance activities—and the more their spouse did. While the study also found that the more that women worked out of the home the less discretionary travel they engaged in, they found no change in the travel patterns of their male partners. The authors concluded that even among employed women, there "are important gender role differences" which are reflected in their travel patterns<sup>200</sup>.

Analysis of 1990 NPTS data shows that neither marital status nor the presence or age of children in the household had any effect on the travel patterns of husbands while having substantial effect on the travel patterns of wives. Men in two-adult households made 3.2-3.3 person-trips per day regardless of any other factor; women with small children made 3.5 trips a day (or 9.3 percent more than men with the same responsibilities) while women with children 6-15 made an average of 4.0 trips per day (or 21.2 percent more than comparable men)<sup>201</sup>.

Given the need to respond to children in an emergency, to chauffeur those children needing rides, and to conduct much of the personal business supporting a household, it is not really surprising that women have been abandoning transit in droves—even though they are more dependent on it than comparable men. At the same time, as a result of the often lopsided distribution of household responsibilities, comparable men are free to become or remain transit users. This is probably part of the reason that transit ridership is higher among some groups of men than among comparable women.

But if household duties are becoming more evenly distributed—as may happen among younger workers—both parents may be precluded from using public transit. The responsibilities which require women to drive alone, for example, might just as easily require men to drive alone, rather than rely on transit. The best transit scenario is that one parent would agree to conduct all domestic and childcarerelated travel on one day, taking the car while the other parent took transit. A far worse scenario is that the parents will equally divide the domestic travel each day so that both would need to drive to work.

## Perception of Crime

Many Americans are fearful of walking to transit stops, waiting there, or riding on transit vehicles. Statistics on the actual incidence of transit crime are unsatisfactory because of the way such crimes are reported. In general, an assault or other incident is only considered "a transit crime" if it happened on a vehicle or in a station; if a crime is committed while a person is walking to or from a bus, or waiting at an

ordinary bus stop, the crime is rarely categorized as having anything to do with transit.

However, actual crime statistics are probably not the issue; studies have found that perception of crime is more important than actual crime rates in motivating people's behavior. In many studies, women have reported being more fearful on transit vehicles, waiting at stops, or walking to or from a station; a disproportionate share of older women report such concerns. Several large employers or Transportation Management Associations (TMAs) have surveyed workers, asking why they will not or cannot use alternative modes like the bus; women are 2 to 4 times more likely to report fear for their personal safety as a reason in their mode choice<sup>202 203</sup>.

Transit systems are affected by being part of a society in which personal crimes against people are significant. These fears are part of the reason why the growing number of female service workers have not used transit more frequently. For example, it is not uncommon for women who do use transit to report riding the bus only during the summer when it is light when they go home, or only to work—but not home from work.

To be able to reach several large and overlapping markets, such as elderly women or service workers who may work late night or all night shifts, transit operators will have to alter their services or facilities in a way that actually keeps riders safe and convinces them that they are safe. In the absence of such service changes, the perceptions of street crime will act to lower transit ridership even among groups seen to be disproportionately dependent on transit today—including young workers, women, and the elderly.

## Impact of Social Trends on Current and Future Transit Markets

The social trends just described—family members caring for older parents, people being afraid of traveling, and working parents (particularly salaried mothers) having multiple responsibilities that constrain their mode choice—all have a net negative effect on fixed-route transit ridership. Overall, a lower percentage of elderly people will be inclined to use public transit; as their mobility declines their children and younger relatives will have to transport them. As a result, transit ridership may not only drop among the elderly but among their caregivers as well.

## LAND USE FACTORS

Intensity of land use has a profound influence on transit markets; density of dwelling units and population are associated with trip production while density of employment influences trip attraction. This section focuses on recent changes in urban land use and how these changes have, and will,

influence existing and emerging transit markets, focusing on the following four specific issues:

- Decreasing population density,
- Decreasing employment density,
- Increasing downtown employment density, and
- Increasing density in older suburbs.

Although improvements in transportation have structured land use in previous decades, this is no longer true in most American cities. The overall level of accessibility is so high that any improvement resulting from transit can cause only micro changes<sup>204 205</sup>. These micro changes, however, can still create potential transit niches and markets.

**Evolution of American Cities**

Land use in American cities has changed over time resulting from technological developments that have reduced the cost of travel, and most cities continue to reflect these patterns of sequent occupance; these are illustrated in Figure C-4. In the early decades of the nineteenth century, most people walked, and the condensed, monocentric city developed from the principle of reducing the number and length of trips required. This monocentric pattern survives at the center of the modern metropolis.

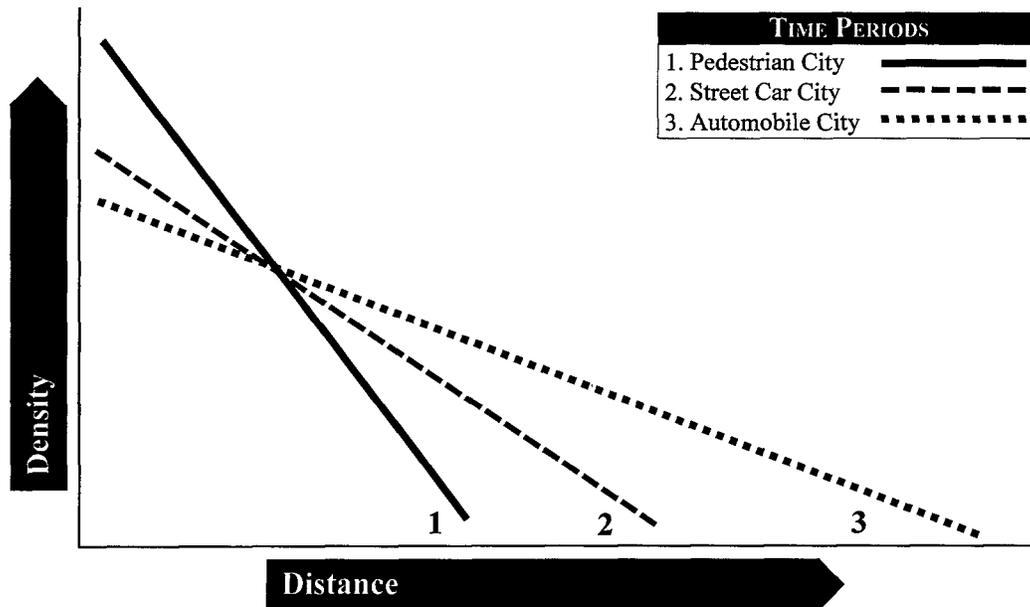
Introduction of the horse-drawn omnibus in the 1840s and later horse-drawn trams increased travel speed. This allowed workers to live further from their employment and facilitated

development of "districts" devoted to residential and industrial uses. Commercial use remained concentrated downtown—the location of maximum accessibility.

Invention of the electric streetcar in the late 1880s brought a quick end to the construction of tram lines. Faster streetcars permitted longer commute trips and allowed increased separation of home from work. This was also spurred on by the noxious environmental effects of industries. Suburban convenience centers, which developed at major stops, resulted in a linear development along the streetcar lines. But suburban commercial zones were still "united" with the more specialized commercial activities in the city center by the termini of transit lines. Major purchases, and most business decisions, were made in the central business district (CBD).

Adoption of the automobile in the 1930s, and even more dramatically, following World War II, transformed accessibility. No longer were commuters tied to linear streetcar and commuter rail lines; traffic congestion ruined the accessibility advantages of the central city. Both shoppers and businesses began to avoid going downtown because congestion costs lessened the accessibility advantage. Low-density neighborhoods were constructed, competing commercial centers developed, and industry began to relocate from older multistoried, central city buildings into suburban industrial parks accessible by automobile. The multi-nucleated city was the result. The relative importance of the downtown has been reduced, but it persists as the largest and most specialized center for business employment.

Chicago epitomizes the sequence of urban activities. Downtown—the CBD, within the "Loop" of rapid transit



Note: Converting density and distance to logarithms creates a straight-line, density profile. The density gradient flattens out over time with changes in technology that allows workers to move to less-dense, suburban, residential areas.

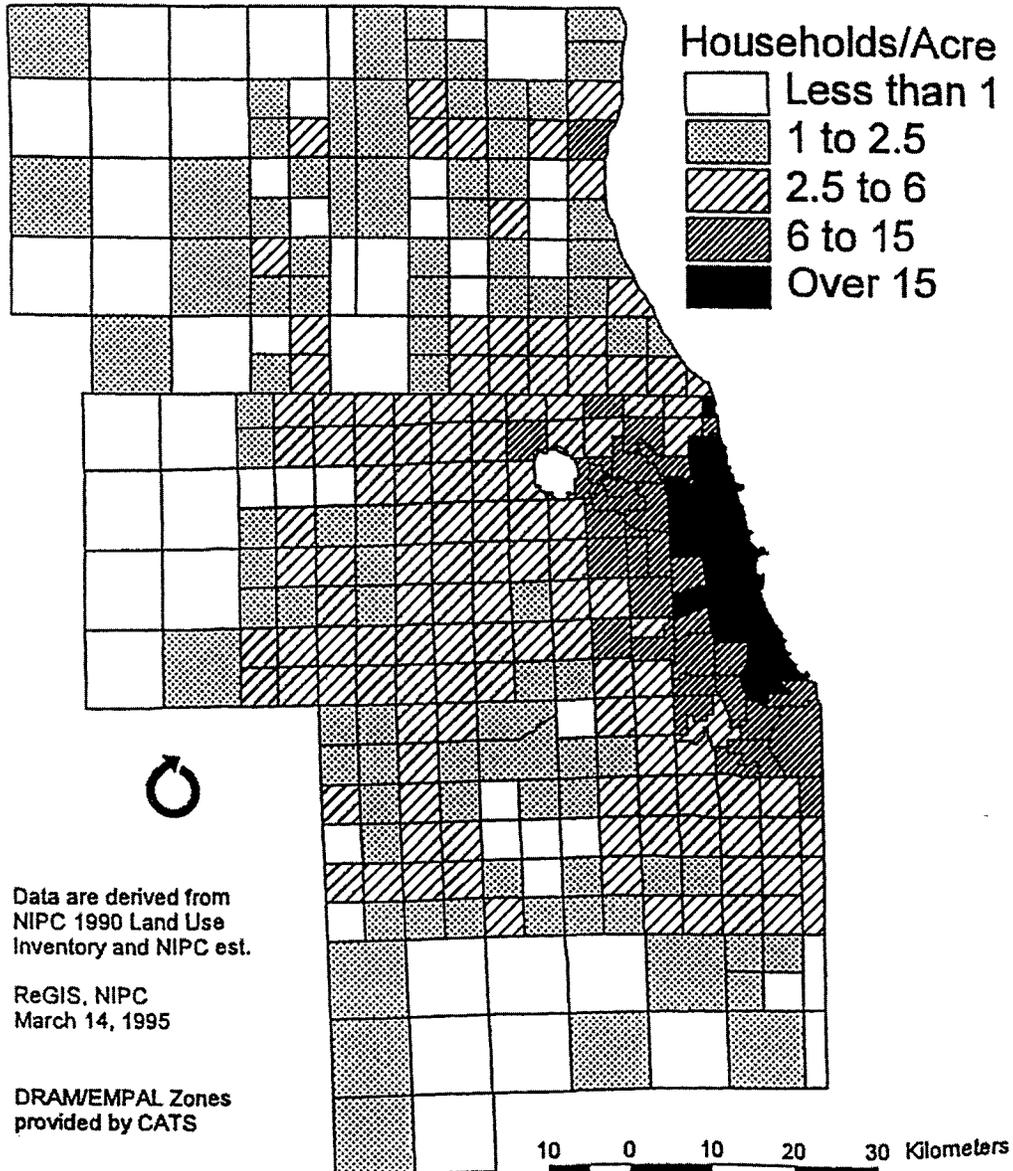
Figure C-4. Population density gradients in American cities at different time periods.

lines, and the near West and South sides—contains 63 percent of commercial office space. Immediately surrounding the central core of high-rise buildings are the original suburbs. Some have preserved their nineteenth century charm, but most of the two and three storied walk-up flats have been replaced by public housing—now in the process of conversion to private ownership. High densities (over 15 dwelling units per acre) prevail as shown in Figure C-5.

Population densities exceeding 60,000 per square mile are frequent with more than 10 percent of residents over the age

of 65. Corridors of median residential density (6-15 dwelling units per acre) remain in suburbs along streetcar (now rapid transit) lines to the north (Evanston and Skokie), west (Oak Park and Cicero), and south (Englewood and Jackson Park). But the most extensive transformation has occurred beyond the streetcar suburbs and adjacent to the freeway suburban centers of Oakbrook, Naperville, Hoffman Estates, and Schaumburg.

There office, research and shopping plazas are surrounded by bookstores, coffee shops, restaurants and parking lots.



Note: Patterns of high and low density of dwelling units reflect the evolution of Chicago land use in association with changes in transportation technology. Source: Northeastern Illinois Planning Commission

Figure C-5. Population density of dwelling units in northeastern Illinois, 1990.

Residential density is low—less than six dwelling units per acre—and schools, universities, golf courses and forest preserves occupy extensive areas. Downtown persists as the dominant commercial center, but its role is challenged by suburban central places and strip malls that are more conveniently located to serve the needs of suburban customers.

The entire Chicago region has been transformed by these redistribution trends. The Northeastern Illinois Planning Commission reports that between 1970 and 1990, the region's population grew by a modest 4.1 percent while the amount of urban land increased by 47 percent. During this same period, Cook County, the core of the region, lost population. But new trends are increasing population densities in some of the inner suburbs. Skokie and Cicero, for example, are gaining households and increasing population density with the arrival of migrant households.

Similar transformations have occurred in most American metropolitan areas. Although overall density has declined as activities have dispersed, concentrations of people remain in central cities and the older suburbs and these people provide both an existing and potential market for transit. For example, in Cook County, Chicago, 19 percent travel to work by transit while 4.7 percent walk and use transit occasionally. Availability of transit for social and medical travel is even more critical. Some 404,000 households (21.6 percent) do not own an automobile.

Communities are beginning to rethink the way in which they will allow growth to occur. Unfettered sprawl burdens tax payers with higher costs that have been borne by the federal government. If these costs were shifted back to state and local governments, public agencies might seek to make more efficient use of land already developed by allowing higher density, residential development.

### **The Role of Population Density**

Although density is positively associated with transit patronage, density is actually a surrogate for other population and economic characteristics that create a demand for transit. Pushkarev and Zupan describe these relationships, but have been criticized for conclusions they drew from their analyses<sup>206</sup>. Their data show that transit use increases with residential density; low residential densities are associated with marginal use, but use increases in medium- and high-density areas. Densities of 7 to 30 dwelling units per acre were described as necessary to sustain significant transit use—in the range of 5 to 40 percent of all trips. Additional evidence was provided for the role of density of attraction. A strong, positive relationship between percent of persons using transit and the magnitude of office space in the largest CBD was shown. Regions with substantial employment in the central locations were described as likely to be more successful in sustaining fixed-route transit than those where employment is dispersed.

Conclusions based on the Pushkarev and Zupan analyses have been criticized, but the density relationships they pro-

posed have not been rejected. Handy and Cervero criticize the aggregated nature of the data used and point out that density is merely a surrogate for socioeconomic variables that are more influential<sup>207 208</sup>. And Hanson and Schwab suggest that low-income and pedestrian-oriented neighborhoods are the true determinants of transit demand, and these tend to be correlated with high population density. Although these criticisms are justified, they do not invalidate the relationships between density and transit demand that is helpful when seeking to understand the association between land use and potential transit markets.

Neither Pushkarev and Zupan nor their critics adequately controlled for the level of transit service available. Thompson used 1990 data for Sacramento, California, to analyze the Census tracts<sup>210</sup>. The size of a tract's population was significant in explaining the potential for producing trips and employment density had, by far, the most influence of the variables explaining attraction potential. Because of the variation in the area of census tracts, absolute magnitude of population, rather than population density, was the significant variable explaining potential trips. The importance of density, however, is revealed when only the more compact, census tracts adjacent to downtown Sacramento are examined as shown in Figure C-6.

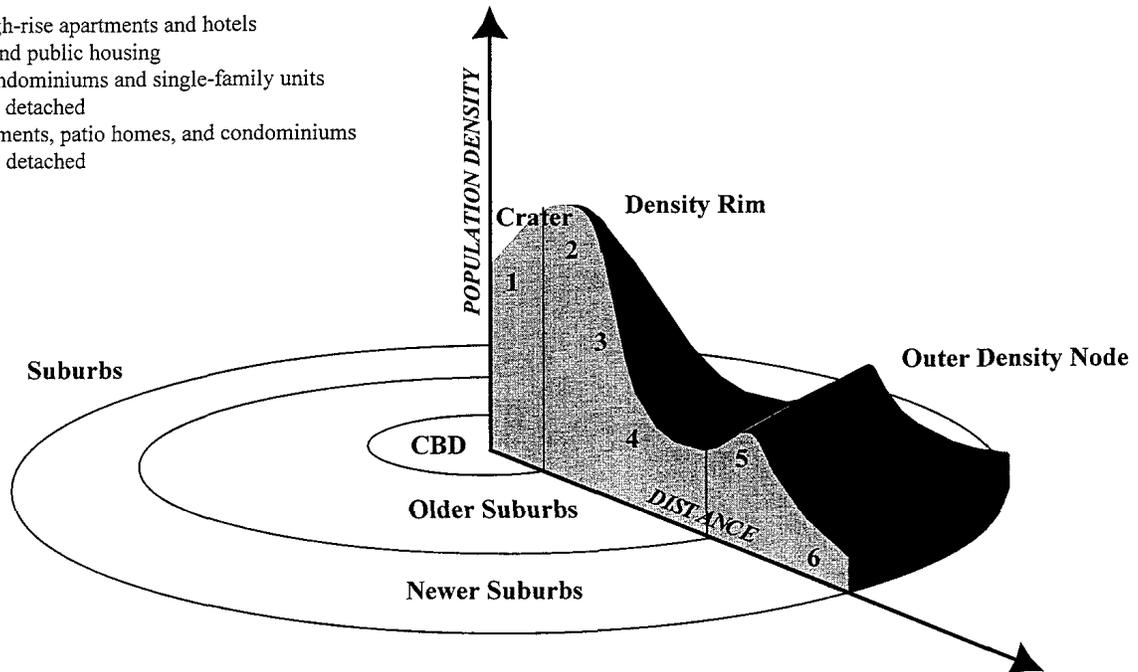
### *Increasing Population Density*

After many decades of decline, population density in urbanized areas is beginning to increase. In Task 1, transit agencies were grouped into transit markets using population size and density for 1990. Surprisingly, placed together with agencies from New York in the highest density category, were agencies from the Los Angeles and Miami urbanized areas. And the medium density areas include agencies from newer areas such as Portland, Sacramento, and San Diego, as well as those in Boston, Chicago, and Philadelphia. Redevelopment of outmoded houses, constructed following World War II, together with the arrival of immigrant populations, have increased density in urbanized areas that experienced high population growth during the 1980s.

Increasing density is most apparent in medium-sized metropolitan areas with about one million inhabitants. Their population density gradient is steeper, because their inner neighborhoods have not deteriorated, and more people dwell closer to the center. In addition, their downtowns frequently contain regional offices for financial, legal, and administrative functions who employ large numbers of middle-income workers on regular schedules. Hartford, Albany, Buffalo, Columbus, Cincinnati, Sacramento, Portland, and Honolulu are examples. The older cities adjacent to the City of San Diego illustrate the changes that are occurring as seen in Table C-6. Population density in Chula Vista, El Cajon, La Mesa, and National City are increasing to the level which can sustain fixed-route transit.

Changing population density has been a feature of American cities. This is continuing and provides potential

- 1 Core with high-rise apartments and hotels
- 2 Apartments and public housing
- 3 Duplexes, condominiums and single-family units
- 4 Single family detached
- 5 Garden apartments, patio homes, and condominiums
- 6 Single family detached



Note: Few people dwell in the CBD; density at first increases with distance (to the density rim) and then declines in the older suburbs. Another cone of density develops adjacent to "edge cities," while density is much lower in the new suburbs. As the area for development is larger in the newer suburbs, there is less competition for residential land, and densities are lower. (Adapted from Hartshorn, 1992)

Figure C-6. Density in a major metropolitan area, diagrammatic representation.

markets for transit. The pedestrian city of the early nineteenth century was compact and the density gradient was quite steep with distance from the city center as Figure C-6 indicates. Streetcars facilitated the dispersal of residents although many commuted to work in the central city and adjoining industrial suburbs. Use of the automobile for commuting allowed families to travel farther and move away from rail-oriented, suburban centers; density gradients were lowered because central cities, congested by traffic and afflicted by air pollution, became increasingly unattractive as residential areas.

Newling showed that population densities in modern American cities are not highest at the center, but in a ring around the center<sup>211</sup>. His model resembles a volcano with density peaking about a mile from the city center and declining further outward, as shown in Figure C-7. There is a population density crater at the center, and then a rim that merges with a somewhat, steeply-declining curve (cone) towards the outer suburbs.

Canadian cities differ from American cities in the rate at which population density declines, because population in the central suburbs tends to increase proportionately with that in the outer suburbs. The gradient away from the density rim is more gradual for two reasons: first, the large number of immigrants who came to Canada in the 1950s and 1960s located in the central cities and replenished the population density, and second, houses are more expensive. Higher down payments are required in Canada, and interest charges

on housing loans are not deductible from income taxes. Households move less frequently, are satisfied with less living space, and cities do not discourage multi-household dwellings.

Some older American suburbs, like those described for Chicago and San Diego, are experiencing societal trends similar to those in Canada. As population growth occurs—caused largely by immigration of Hispanic and Asian families—older suburban cities, where these families choose to cluster, are becoming more tolerant of shared housing, and willing to allow increased density by rezoning areas for multi-family redevelopment.

Garden Grove, in Southern California is a prototypical example. Founded in the 1920s adjacent to a streetcar station on the Pacific Electric Railway, it was an agricultural center until the 1950s. As housing tracts were begun, Garden Grove incorporated as a city in 1956 and by 1960 had a population of 84,330 with a density of 4,560 persons per square mile.

There was little change in density until the early 1980s when Korean businessmen from Los Angeles began to purchase the aging tract houses, converting them to multi-unit dwellings and expanding commercial lots into strip malls oriented to an Asian clientele. By 1990, population density had increased to 7,730 per square mile with highest concentrations adjoining arterial streets. Units in medium- and high-density residential areas now account for 35 percent of the housing.

**TABLE C-6 Population density per square mile for inner cities in San Diego County, California, 1960–1990**

	YEAR			
	1960	1970	1980	1990
<b>CHULA VISTA</b>	4723	4782	4742	4991
<b>EL CAJON</b>	3839	4393	5242	6422
<b>LA MESA</b>	4756	5023	5528	5832
<b>NATIONAL CITY</b>	5852	6748	6774	7554

The steady increase in population density has accelerated between 1980 and 1990, with the arrival of additional Hispanic households.

As a result of increased density and changed social composition, bus routes traversing the area have become some of the most productive in Orange County. Changing occupation of land, similar to that which has occurred in Garden Grove, is happening in other urbanized areas and offers opportunities for transit agencies to expand markets by restructuring routes and schedules to accommodate the different travel needs.

Land use in the contemporary metropolitan area exhibits the sequence of occupancy that has occurred. The research team has chosen to illustrate these changes in terms of population density because density is associated with the production of transit trips. Population density is highest in the rim of older apartments and public housing that surrounds the CBD. It then declines in both directions—toward the center, commercial use predominates, and, as is typical, density declines steadily as one moves farther from a city's center.

Population density increases at nodes on the edge of the central city where perimeter beltways intersect arterial freeways and transit lines. Increased density results from the clustering of apartments and condominiums near "edge cities" offering employment opportunities for research, education, recreation, and administrative activities. Single-family

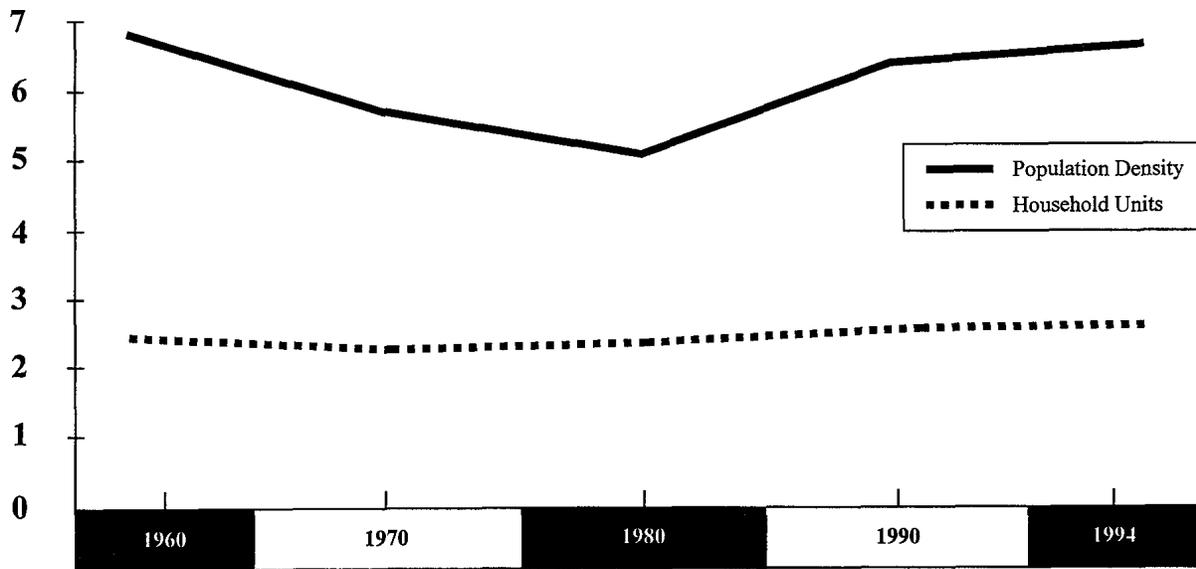
dwellings extend beyond the nodes of outer density and merge with the rural fringe.

For transit markets of the future, changes occurring in older suburban areas present an opportunity. As residential density increases, more residents will be within walking distance of transit stops, making them more likely to use transit. The challenge, however, will be to determine what activities will attract them and where will these be located.

*Employment Density*

Employment opportunities are dispersed widely throughout the metropolitan area. The societal trends presented earlier in this chapter are likely to expand the dispersal process by continuing the

- Suburbanization of employment;
- Contracting out of industrial production to small, specialized factories;
- Growth of the flexible workforce;
- Expansion of home or out-of-car working; and
- Improvement in communication technology.



Source: Derived from data from Sacramento Area Council of Government

Figure C-7. Population density and housing units in the southern section of Sacramento, California, 1960–1994.

Commercial employment in metropolitan areas exhibits a central place hierarchy. A network of commercial centers (central places) is created by the consumer's need to access different functions and the willingness of firms to supply these goods and functions. For example, high order goods, like special legal representation or fashion clothing, are seldom required and are in the CBD together with superior courts and specialist advertising agencies. The CBD offers both the largest number of functions as well as the most specialized; it is the highest order center in a network of central places.

Regional centers compete with the CBD by offering goods like clothing, professional services, and entertainment that consumers require occasionally and for which they are not willing to travel to the CBD. And nested within the service territory of each regional center are several neighborhood centers (lower order central places) providing goods that are required most frequently—groceries, health supplies, doctors, and dentists—which are more convenient if nearby.

A true nested hierarchy of commercial land use and employment seldom occurs. Accessibility by auto has facilitated the development of commercial strips that compete with neighborhood and regional centers because of their superior access. And automobile dealers and doctors have found it easier to attract customers by agglomerating similar services into auto malls and medical plazas. Nevertheless, the central place model does explain the major clusters of commercial land use that transit agencies use as regional centers. Some recently established agencies, like the Orange County Transportation Authority in California, have planned their bus network using the hierarchy of regional centers as transfer locations.

The CBD remains the single largest and most specialized employment center. A survey of 60 large metropolitan centers, summarized by Sullivan, found that, although CBDs averaged only 17 percent of total employment, they retained 24 percent of the specialist jobs in finance, insurance, and real estate (FIRE)<sup>212</sup>. Only 10 percent of retail employment remained in the CBD. TCRP Project H-3 studied more than 1,000 U.S. cities in 1990 and found that employment in FIRE sectors was positively associated with increased transit use; a 10 percent increase in this sector's share of employment increased transit ridership by roughly 3.5 percent. The authors conclude that this type of employment has remained in central locations, easily served by transit<sup>213</sup>.

The combination of distance and the costs of congestion, especially in those downtowns without rapid transit, has allowed regional and specialty centers to compete for activities that formerly clustered in the CBD. Even in Los Angeles, the prototypical dispersed city, the Downtown core continues to be the largest of 29 employment centers with almost half a million employees.<sup>214</sup>

Industrial areas are even more dispersed than commercial activities, and there is little incentive for modern industry to cluster so as to facilitate travel by public transit. Location adjacent to port and railroad terminals once reduced costs for industry, but since the advent of freeways and increased truck haulage, the advantage of these sites has been reduced.

Agglomeration economies—having parts suppliers near manufacturing plants—remain essential in the automobile, machinery, and electronic industries. But "just-in-time" deliveries can be maintained without proximity. Agglomeration

economies still facilitate regional specialization so that industrial firms can access trained labor and consultants in financing and marketing, but with telecommunications, these advantages do not require proximity.

Manufacturing of clothing is an exception; piecework by contractors, access to specialized cutters, and design and marketing consultants is facilitated by agglomeration in garment districts. And the need for access to workers, willing to accept low wages results in the concentration of clothing factories near the CBD. Some 12 percent of manufacturing employment remains in the CBD. Because these employees are primarily low-paid, they provide an important market for bus transit.

### **Impact of Land Use Trends on Current and Future Transit Markets**

The link between transit and land use is indirect; residences, stores, and factories do not make trips, people do. The density of dwellings is influential, because this creates an aggregation of people, some of whom are willing to use transit when service is convenient, fast, and safe. Density of attraction to employment opportunities at commercial and industrial sites, and to social and educational facilities, is more influential than residential density when explaining travel by transit. But, as these land uses have become increasingly dispersed, transit has lost markets to autos which have given individuals metropolitan-wide choices for shopping, employment, education, and social activities. Transit has been reluctant to serve these dispersed markets as well as it has served downtown.

Some of the significant trends that affect transit use are

- Changes in land use have been closely associated historically with improvements in transportation technology.
- Population density provides a surrogate for the socioeconomic variables that influence demand for transit.
- Older, transit-oriented neighborhoods could produce 3 to 4 times as much transit traffic as newer, post-World War II suburbs, after controlling for transit connectivity.
- Population density is increasing in some older suburbs and will increase transit ridership if existing service is improved.
- The population density gradient in medium-sized metropolitan areas—those with about one million inhabitants—is becoming steeper and similar to the gradient in Canadian cities. Their inner-city neighborhoods have not deteriorated to the same degree as those in the largest, American metropolises, and they have become attractive to immigrant households who are more dependent on public transit.
- Employment density is a surrogate for land uses that attract transit users. Although both commercial and industrial land uses are continuing to disperse, commercial centers, especially the downtown (i.e., the CBD and the adjacent office buildings) continues to attract trips.

## **TRANSPORT POLICY FACTORS**

### **Background**

The growth and change in national travel patterns, as well as differences among individual travelers or groups of travelers, are not independent of a host of transportation and nontransportation policies. The suburbanization of employment, for example, was accelerated by both local and national policies permitting or encouraging development in undeveloped or low-density areas. The growth of both tourism and large concentrations of retirees in very rural areas has often been the result of conscious state or local economic development strategies.

Along with policies which have been in effect for several years, the four major policy trends likely to affect transit ridership in the coming decade are

- Decreasing federal transit assistance,
- Relaxation of transportation control mandates,
- Service to people with disabilities, and
- Diversion of highway funding ("flexing").

### **Long-Term Policies**

Many federal and state policies affect the financing, operation, and competitiveness of transit. Through home mortgage guarantees, disproportionate subsidies to highways, and tax laws which have made it possible for businesses to claim deductions for the parking provided employees—but little of the cost of transit services\*—the federal government has helped provide incentives for the creation of communities where transit is not a competitive option. By not requiring the auto to pay a larger share of the costs it creates—for example, by enacting policies which directly and indirectly tax driving and auto ownership to a substantial degree—and by not providing significant support to transit systems, U.S. public policy has accelerated growth in the use of the private car.

Local governments, too, have contributed to the development of low-density suburbs where it is difficult to provide meaningful transit options. By implementing zoning and building codes which require neighborhoods of single-family housing, prohibit or discourage a mixture of commercial and residential land uses, require developers to provide abundant parking but little transit access or service, and limit how many units can be built on an acre of land (ironically, often for environmental reasons), local governments have created substantial disincentives to transit use.

\* In 1993 tax exempt parking subsidies were limited to \$155 per month while exempt transit benefits were capped at \$60 per month. Moreover, the only parking subsidies affected are direct cash payments; employers may continue to provide unlimited free parking to employees.

## Current Policies

The most important governmental policy affecting public transit operators is the continued reduction in federal funding assistance. In November of 1995, federal funding of transit's overall appropriations was reduced by 12 percent to \$4.1 billion. Operating assistance was reduced 44 percent, from \$710 million in 1995 to \$400 million in 1996. Larger transit agencies felt the reduction more deeply; those in urbanized areas with more than 200,000 lost almost 48 percent of their operating assistance while rural operators lost 17 percent of their operating assistance. Federal funding has constituted less and less of total transit operating and capital expenses for some time; in 1993, federal assistance accounted for only 4 percent of the total operating expenses of the 30 largest transit operators.

The next most important governmental initiatives likely to affect transit markets today and in the future are those requiring significant changes in transport policy and pricing to meet environmental standards. The 1990 Federal Amendments to the Clean Air Act (CAAA) contain explicit provisions about the responsibility of communities to reduce air pollution. ISTEA establishes a specific process to integrate transportation planning and air quality goals in state and sub-state regional planning processes. In particular, Section 1034 of ISTEA requires states to develop, establish, and implement a system for managing traffic congestion. The CAAA also requires states to develop state implementation plans which explain how they will come into conformity with the clean air standards.

Section 182 of the CAAA requires states with "Severe" or "Extreme" nonattainment areas to develop employee trip reduction programs, also known as employee commute options (ECOs). This policy was designed to require employers and local governments to correct or change policies which have made transit less attractive than driving alone. That is, in contrast to voluntary ridesharing and marketing programs, the act requires the active participation of employers in the travel decisions of their workers.

All employers with more than 100 workers in nonattainment areas must develop programs of transportation control measures that increase employee work trip passenger occupancy by 25 percent above the area average—which creates an ever increasing target. So employers would be forced to move increasingly from carrots (e.g., rideshare matching programs, free parking spaces for carpoolers, and free passes for transit users) to sticks (e.g., banning parking and changing work schedules [e.g., shortening workweeks—to limit the number of home-to-work trips]).

In theory, these programs should encourage the use of public transit options, but the effect of such mandates on transit use have not yet been so encouraging. Experience from the Southern California area, as well as from states and regions with similar legislation, shows that many people switch to ridesharing modes rather than public transit when faced with sanctions on driving alone. However, these kind of

regulations may still be creating potential transit markets—markets that would be realized if matched to the appropriate service concepts.

Unfortunately for those looking to these regulations to increase transit markets, both the federal and state governments have stopped enforcing such measures—largely because so many workers have already made inter-linked housing, domestic, transportation, and employment choices which are not or cannot be well served or replaced by transit. As such, these measures would create substantial disruptions in people's lives.

In Illinois, implementation of the ECO program was suspended. ECO programs have also been suspended or disbanded in Pennsylvania, New Jersey, and Texas<sup>215</sup>. These states have adopted policies stressing voluntary compliance and incentive programs instead. Most striking, the mandatory programs of the South Coast Air Quality Management District's (SCAQMD) Section XV have been discontinued.

As of January 1, 1996, California abolished regionally and locally imposed employer trip reduction requirements; local governments are expressly forbidden to require trip reduction efforts unless they are required by federal law. In response to their remaining federal requirements, Southern California's SCAQMD approved a new rule (2202) requiring employers to choose from various options that would produce emission reductions at least equivalent to those that had been claimed from previous programs. One of the four options is for employers to pay \$60 per worker into a fund that would finance emission reduction projects. Given that the San Francisco Bay area was never subject to federal trip reduction requirements, the Bay Area Air Quality Management District and several local jurisdictions in the area may have to immediately rescind their carpool and transit requirements<sup>216</sup>.

The federal government has also reconsidered such measures. In December of 1995, the Employee Trip Reduction (ETR) requirements were repealed. Employee travel reduction programs are now optional, at the discretion of individual states. The December legislation (HR 325) even allows states to remove required ETR measures from previously submitted state implementation plans.

Ken Orski, a keen observer of the transportation scene, has noted,

ECO's repeal, however, does not consign travel demand management to oblivion ... Local communities [have] little choice but to continue pursuing demand-reducing strategies. Without the authority of the law behind it, however, public authorities will need to rely on incentives and persuasion rather than on regulatory commands and sanctions to influence commuters' driving habits.<sup>217</sup>

Transit systems may have difficulty providing incentives, given anticipated reductions in financial assistance. The FTA FY 1996 transit budget was reduced by \$563 million with operating subsidies the hardest hit—down 44 percent from FY95 to \$400 million. This will put increasing pressure on

transit systems to find additional local sources of funding and to cut low-productivity or high-cost services. A survey by APTA found that as many as 40 percent of the systems they surveyed may increase fares while over a third may cut service or postpone planned improvements. One in five might lay off employees because of these cuts<sup>218</sup>.

Finally, the 1990 Americans with Disabilities Act (ADA) requires substantial obligations on transit systems. The ADA became law in July of 1990, extending to eligible people with disabilities the comprehensive civil rights conferred on racial minorities by the Civil Rights Act of 1964. Title II of the act requires transit systems to provide both fixed-route accessible transit (i.e., lifts or ramps on buses) and complementary paratransit, or special demand-responsive, services. After August of 1990, transit operators may only purchase or lease accessible vehicles. Light rail and rapid rail systems are required to have at least one accessible car per train by July 1995. Rapid rail systems must also make key stations accessible "as soon as practical" but no later than July 1993.

Section 223 of Title II mandates that transit operators providing fixed-route bus services also provide complementary paratransit services which "shadow" fixed-route operations, serving those who cannot use fixed-route buses. These services must be provided in areas  $\frac{3}{4}$  mile on each side of existing fixed-route operations and 1.5 miles at the end of routes; coverage must be total within the core of the service area. The required paratransit services must be comparable—in schedule, fares, and coverage—to traditional services offered the general public. Only systems operating commuter rail and inter-city rail services or commuter or school buses are exempt (and only for those services). Systems have until January of 1997 to comply but they must be making steady progress prior to that date.

Complementary or comparable paratransit must be provided for the following classes of eligible riders:

- Those who cannot independently board, ride, or disembark from accessible vehicles;
- Those who need a lift or ramp to access a traditional bus but are not currently served by accessible buses; and
- Those who have a specific impairment-related condition which prevents them from traveling to a stop or boarding even an accessible bus (or which, in combination with environmental barriers prevent them from boarding).

Because fixed-route and paratransit services are inherently not comparable, the regulations give some operational measures of comparable paratransit service as follows:

- Paratransit users may be charged double the base transit fare—reflecting the higher service level.
- Users may be required to call for service the night before (but no earlier) and they must be given the opportunity to call on weekends.
- Users may be asked to reschedule a trip—but by no more than 1 hour.

- Users cannot be refused service if they cannot or will not reschedule to a better time for the system—this is often called the "no capacity constraint rule."
- Users cannot be asked why they are traveling or refused (or granted) service based on the purpose of their trip.
- The system cannot accept "subscriptions" (or standing reservations) for more than 50 percent of capacity in any hour, and they do not have to accept subscriptions at all.

Almost all of these service requirements conflict with the way in which most communities provided pre-ADA paratransit. So meeting these requirements can require a significant expenditure of funds. In 1993, the FTA estimated that annual costs of only the mandated paratransit services would be about \$700 million per year (in 1993 dollars)—the bulk being operating costs. A recent study reported that U.S. systems were spending \$100 million per year on paratransit equipment and roughly \$700,000 million per year on paratransit operating expenses—all coming from existing transit budgets. As a result the average paratransit trip cost approximately \$15 in 1995 dollars<sup>219</sup>—up almost 50 percent from 1989 to 1990<sup>220</sup>.

### Impact of Transport Policy Trends on Current and Future Transit Markets

At this time (1996), changes to federal, state, and local government policies are not anticipated. In the absence of policy changes, the effects of current policies on transit are likely to continue. However, that ISTEA permits the diversion of highway funds to projects supporting transit may help—several cities are planning to use these funds to build joint developments, park-and-ride facilities, and childcare centers at transit stations.

## SUMMARY

### Travel Patterns Created by Societal Trends

Most of the trends described above will have sometimes profound affects on both home-to-work commutes and non-work travel. Overall they will lead to a substantial increase in the total number of trips and the total number of miles traveled by all Americans. Some of the aggregate changes will be a response to growth in the number of travelers. However much of the aggregate growth in travel will reflect sometimes remarkable changes in the patterns of individual travelers—changes also created by the same combination of societal trends.

Overall, the societal trends just reviewed will affect the characteristics of individual trips by

- Increasing the per capita number of trips,
- Increasing the number of non-work trips relative to work trips,

- Increasing the length of both work and non-work trips,
- Increasing the variability of trip scheduling,
- Increasing the number of linked trips or trip-chaining, and
- Increasing the number of trips made outside the "traditional" peak periods.

These trends will also affect the origins and destinations of individual trips by

- Increasing the number of suburb-to-suburb trips,
- Increasing the number of suburban or central city trips to rural areas,
- Decreasing the relative importance of central city destinations, and
- Increasing the number of central city to suburb trips.

Many of these changes in individual trip patterns work to the detriment of public transit. Transit is best at serving large groups of travelers going to one or a few destinations along concentrated corridors of demand in concentrated peaks—most of the changes described above reduce the net number of such travelers. Longer trips incur more severe time penalties using transit; suburban densities are not generally as well served by transit as are more central destinations. Although the number of people dependent on transit may also increase as the population increases, the percentage of each group using transit will generally decline because of such trends.

At the same time, current transit ridership accounts for such a small portion of current U.S. travel that even a tiny diversion from driving alone would translate into a substantial increase in transit ridership in most service environments. Many of the trends just reviewed may increase transit ridership in the short term simply because groups more likely to use transit are growing and give transit operators the opportunity to increase ridership by doing niche marketing and by taking advantage of land use changes which have made transit more attractive in some areas or to some riders.

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