Analysis of Demographic Trends and Travel Patterns: Implications for the Future of the Portland Transit Market

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ABSTRACT

Demographic changes affect the market for urban transportation in many ways. Identifying these changes and monitoring demographic trends can give the planner better insight into the future nature of the transit market. An inductive approach is used to examine some of the demographic variables most important to the transit market. Then the market segmentation that exists in the Portland standard metropolitan statistical area is identified.

The provider of transit service in the Portland standard metropolitan statistical area (SMSA) is the Tri-County Metropolitan Transit District (Tri-Met). Tri-Met is currently reevaluating its mission and goals. The agency has been faced with difficult financial circumstances in recent years. These financial difficulties have prompted the formation of a task force on mass transit policy charged with redefining the agency's direction. The central debate is whether to expand service and to garner new revenue sources to support that service or to reduce the role of the agency in the provision of transit service. Given the recent difficulties of the agency, the issue of increased funding for transit is politically quite sensitive.

An examination of the markets that exist for transit in terms of travel behavior and demographic composition can be used to identify the markets that are most promising for the future. The types of transit service that might be necessary to meet future and existing needs can also be evaluated. A clear understanding of the nature of the population and its travel habits could aid substantially in the formation of local transit policy.

Significant shifts in demographics and travel patterns are occurring nationwide. In 1984 UMTA released a report on the status of the nation's local public transportation (1). This report was candid in its observations and insightful in its conclusions. A key part of this report is a synopsis of nationwide demographic changes that will affect the nature of urban public transportation in the future. This section of the report will be reviewed and the trends and conditions observed in the Portland area will be compared with national trends. From this comparison, it may be possible to tell if the problems faced in Portland are typical of those that might be faced by any metropolitan area.

Demographic changes will be assessed through the Census of Population and Housing for 1970 and 1980 (2). Specific areas to be addressed include the changes that have occurred between 1970 and 1980 with regard to the distribution of the transit-dependent population. Changes in travel patterns will be assessed by using the Bureau of the Census journey-to-work data for 1972 and 1982 (3) and origin-destination surveys undertaken by Tri-Met in 1980 and 1983 (unpublished data, Roberts and Zatarain, 1984). By using these two types of data it will be possible to identify transit markets both in terms of the person who is dependent on public transportation and in terms of discretionary transit riders (i.e., those who choose to ride transit). Examination of these two areas may reveal a complete picture of the market segmentation that exists in the Portland SMSA.

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REVIEW OF NATIONAL DEMOGRAPHIC TRENDS

The population of the United States grew from 179 million in 1960 to 227 million in 1980. Population is forecast to increase, but at a decreasing rate. Almost three-fourths of the nation's population lives in urban areas. More important than the general increase in population is the change in distribution of that population increase. The population of central cities increased only 0.2 percent from 1970 to 1980 compared with 18.2 percent for other metropolitan jurisdictions. This relative decline in central city growth has implications for public transportation service, which has traditionally been oriented toward the central business district (CBD) travel market.

In the next 20 years much greater growth is expected in suburban areas than in central cities. As detached housing becomes more expensive, it is likely that households will locate in areas where housing is less expensive and trade off transportation costs. This could result in more dispersed single family housing growth and leave central city higher density housing to those who have lower incomes and cannot make a transportation trade-off.

Changes in the nature and location of urban jobs strongly affect the market for transportation. Nationally, manufacturing employment is on the decline and service sector employment is growing. In all geographic areas, employment is growing fastest in the suburbs, and central cities are growing at a lesser rate or stabilizing. Industry is also exhibiting a preference for locating in suburban areas. Reasons for this preference include the inability of central area transportation facilities to expand significantly to accommodate increased automobile travel to the work site, the complications of social and fiscal problems in central areas that offset the benefits of a central location, and the reduced travel time to work that can be experienced by workers who often live in suburban locations.

The transit-dependent population is also growing and changing in its distribution across urban areas.

The proportion of the population aged 65 and older is increasing. These elderly people have different travel patterns than does the general population. They make few trips, tend to have greater physical disability, and tend to use transit for a higher proportion of trips. It is quite likely that in the future the elderly population will move in greater numbers to suburban locations and will make greater use of the automobile than has been the case in the past.

The transportation-handicapped population is expected to increase only slightly. The majority of this increase can be attributed to the growth of the elderly population. These persons often require special transportation services that take the form of on-demand door-to-door service.

Those with low incomes are also identified as transit dependent. Poverty is increasingly concentrated in the central cities. In 1980, 36 percent of the 28.3 million people below the poverty level lived in central cities. However, 25 percent of those with incomes below the poverty level lived in suburban areas. In the 1970s, growth of the central city poor averaged 2.7 percent per year. Transit will remain a major component of the mobility of poor persons.

The automobile has had a profound impact on the pattern of urban development. In 1980 only 15.9 percent of all households were without automobiles. Decentralization and suburbanization have meant that those areas that formerly displayed substantially lower automobile ownership (more no-car households and fewer many-car households) have moved closer to the national average. During the 1970s the cost of owning an automobile increased substantially, and gasoline prices increased by 249 percent. Average transit fares rose only 62 percent.

In addition to the areas just discussed, the UMTA report also mentioned several macroeconomic factors that influence public transportation. These include the price and availability of fuel and the structure of employment and its effect on automobile ownership and transit patronage. It is beyond the scope of this discussion to try to forecast macroeconomic trends or the foreign oil situation. The difficulty of such forecasting was exemplified by the oil embargo of 1973, an event that had significant transportation effects but was not predictable. For purposes of this discussion, it is assumed that the macroeconomic climate will remain relatively stable in the near future and that no catastrophic disruptions are likely to occur.

The UMTA report concluded that there are four main areas in which external factors will have a significant impact on the market for transit. These include downtown-oriented travel, intrasuburban work trips, public transportation for the elderly, and public transportation for the handicapped.

An increase in downtown employment will generate more peak-period travel. It is likely that the automobile will serve a majority of these trips but that transit may capture a higher market share in areas where parking limitations and congestion are pervasive conditions.

The intrasuburban work trip is the travel market most likely to show the largest increase in the next 10 to 15 years. Because suburban areas are capturing high percentages of housing and employment growth, greater amounts of travel within suburban areas will occur. This market is served mainly by the automobile, and this is likely to remain the case until CBD-like congestion in suburban areas makes transit a more attractive option.

The elderly and handicapped travel markets represent challenges for transit agencies. As the elderly become more suburbanized, some special problems will become apparent. In particular, service will need to be designed to minimize long walks from cul-de-sacs to arterial streets and to serve a more dispersed elderly population. The role of fixed-route service will likely diminish in these areas.

DEMOGRAPHIC TRENDS IN PORTLAND

The Portland SMSA is made up of four counties: Washington, Multnomah (containing Portland), and Clackamas counties in Oregon and Clark County in Washington. Figure 1 shows the Portland SMSA, including the city of Portland and its satellite suburban cities. The Willamette River divides Portland into a west and an east side. Reference will be made to the east and west sides in relation to the river. The east side of Portland is generally flat with a few rolling hills. Consequently, there is a strong grid street pattern on the east side. Bordering the CBD to the west, the Tualatin mountains form a strong physiographic barrier and rise to an elevation of approximately 1,000 ft. The street pattern on the west side is less gridlike close to the city and more gridlike farther to the west.

For purposes of this analysis, the region has been divided into 18 subdistricts as shown in Figure 2. The CBD and suburban and city subdistricts have been highlighted.

Population

The decade of the 1970s was a time of growth for the Portland SMSA as a whole. Population increased from 1,000,129 to 1,242,594, an increase of 24.24 percent. This growth was not evenly distributed, however. The suburban counties of Washington, Clark, and Clackamas grew 55.7, 45.7, and 49.6 percent, respectively, while
the city of Portland lost 4.2 percent of its population. Multnomah County, which includes the bulk of the city, grew only 1.1 percent.

That such lopsided suburban growth is typical of many cities is evidenced by the UMTA report. However, many of the cities with declining population are older, eastern cities of larger population. However, Portland is a prime example of decentralization. As its satellite communities have grown, the central area has declined.

Washington County to the west is experiencing the most dramatic growth, much of which is in anticipation of a high technology "boom" in the Sunset Corridor area. As this area grows, it is likely that a large percentage of the population will both live and work in Washington County, which will increase the market for intrasuburban work trips and decrease the Portland CBD travel market.

Median Income

Median income increased in all counties between 1970 and 1980. The greatest increases were in Washington and Clackamas counties with 87.9 and 98.3 percent, respectively. Multnomah County and the city of Portland median income increased proportionately less at 50.9 and 58.6 percent, respectively. Median income was highest in 1980 in the outlying counties, and the lower income areas were in the central city. For example, the median income for residents of the CBD and the northwest areas of the inner city was $7,659 and $8,487, respectively. Median income in the southwest portion of the city and Beaverton ranged from $22,589 to $23,375. The SMSA average was $15,230.

Portland closely mirrors national trends. Median

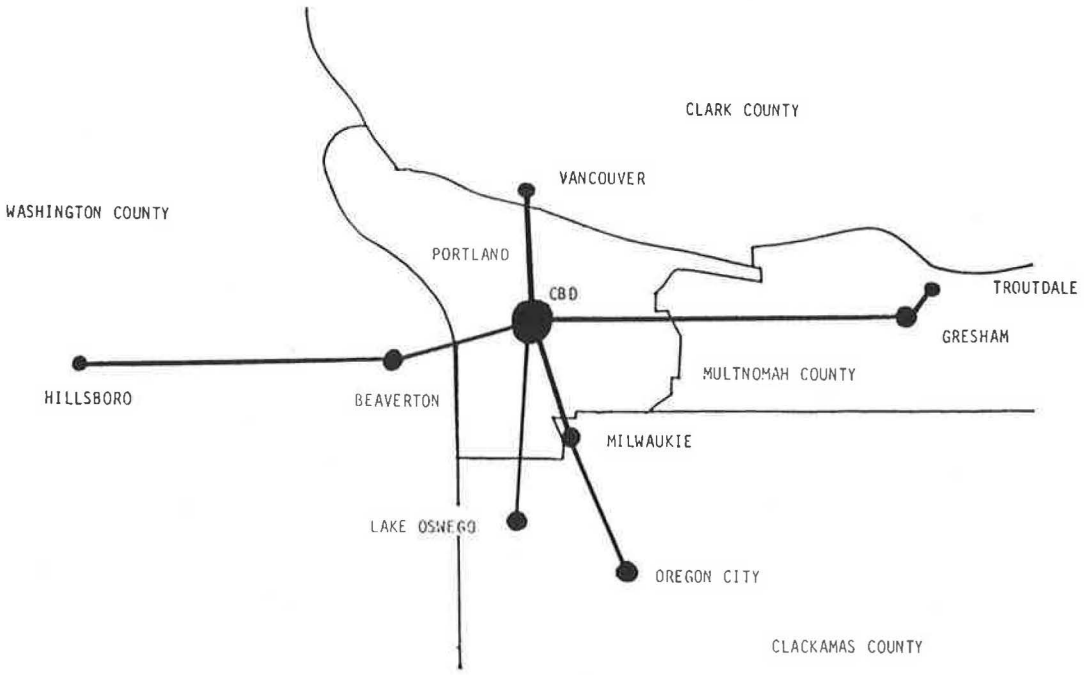

FIGURE 1 Portland SMSA with suburban cities (1 in. ≅ 5 mi).

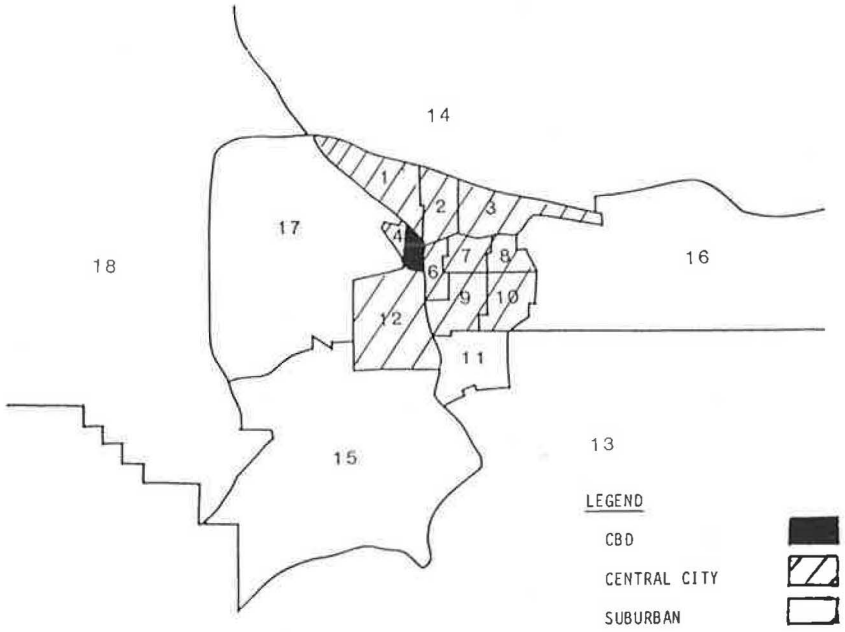

FIGURE 2 Analysis subdistricts.

income overall is increasing, but suburban areas tend to exhibit a higher median income than do central city areas. By the criterion of income, it is quite likely that a high proportion of central city residents are transit dependent.

Elderly Population

For the Portland SMSA as a whole, the population of elderly persons increased 23.9 percent. The highest increase was in Washington County at 66.7 percent, whereas the city of Portland showed a slight decline of 1.3 percent.

The CBD population has the highest concentration of elderly persons; more than 25 percent of all residents in the CBD are over 65. This is in comparison with the SMSA average of 11 percent. Conversely, the smallest concentrations of elderly persons occur in suburban areas where they range from 5.9 to 9.0 percent of the total population. The trend toward an increasingly large elderly population can be somewhat illuminated by this uneven distribution. Although the actual numbers of elderly people are increasing in outlying areas, it is likely that they form a more dispersed pattern than in the central areas.

In general terms, the concentration of the elderly

population in Portland forms a decreasing gradient from the central city outward. It is likely that there are some anomalies in this pattern produced by residential care facilities that could be tapped as significant point-specific transit trip generators. If the elderly population is indeed spreading outward to the suburbs, this trend has not significantly altered the pattern just described.

When income and the concentration of the elderly are viewed together, it becomes increasingly clear that the central city will form the core of the transit-dependent travel market.

Automobile Ownership

Automobile ownership is a valuable indicator of where a transit market may be strong in addition to showing where it may have difficulty competing with the automobile. To a certain degree, income can be used as a surrogate variable for automobile ownership, assuming that households that can afford an automobile will purchase one and use it for some or all of their transportation needs. It is expected that low-income areas should be highly correlated with areas of low automobile ownership.

Automobile ownership, particularly multicar households, is increasing in the SMSA. Between 1970 and 1980 the number of households without automobiles decreased by 3.2 percent. Households with one automobile decreased by 11.1 percent, and the number of two-car households held relatively constant with a 0.1 percent gain. The number of households with three or more automobiles increased by 14.2 percent, the biggest change in any category.

Seventy-five percent of the total households in the SMSA without automobiles are located in Multnomah County, and 85 percent of the carless households in the county are located in the city of Portland. The area with the highest concentration of households without automobiles is the CBD (72.2 percent of households). This is not unexpected given the expense of parking an automobile in the CBD and the low median income of area residents.

Because census data are compiled in intervals of 0, 1, 2, or 3 or more automobiles per household, it was necessary to devise a way to evaluate uniformly the distribution of multicar households. A measure of per capita automobile ownership was used with the condition that households with three or more automobiles would be treated as though they had exactly three automobiles. This condition will result in per capita rates that will be slightly lower than actual rates.

The highest per capita automobile ownership occurred in suburban areas and ranged from 0.63 to 0.76 per capita. In contrast, the central city per capita ownership rates ranged from 0.25 in the CBD to 0.66 in an outer city area. A gradient of automobile ownership can be visualized from the CBD to suburban areas ranging from a high percentage of households without automobiles to a large percentage of households with more than one automobile.

Automobile ownership is a good indicator of transit market expansion potential. Households without automobiles are likely to rely on transit for a high proportion of trips whereas, depending on their size, households with one automobile will have a diminished need for transit. Households with two or three automobiles are probably not using transit for a very high proportion of their travel needs. As can be seen from this analysis, it is likely that the suburban areas will be the most difficult areas for transit market expansion. The trend is toward higher automobile ownership in suburban areas where parking is inexpensive and plentiful and where there is a well-developed highway system that allows speedy travel to suburban shopping and work destinations. This is consistent with the trends outlined in the UMTA report.

Employment Characteristics

The number of employed persons increased in all areas between 1970 and 1980. The smallest increase was in Multnomah County at 18.8 percent, and the largest was in Washington County at 93.7 percent. Again, the trend toward decentralization is apparent in these growth comparisons. Washington County's strong growth is likely to continue, especially with the anticipated high technology boom in the area. In Washington County the number of manufacturing and wholesale and retail workers nearly doubled. As this particular suburban area develops, it is quite likely that it will have a significant degree of autonomy from the Portland central area. The intrasuburban work trip will likely be an increasing factor in this area's travel market. If this trend toward suburbanization continues, and it is quite likely that it will, the nature of the work trip will change and the central area and suburbs will have quite different travel and transit needs.

The Portland city area is still the SMSA's largest employer of workers. Portland has 34.6 percent of all professional workers in the SMSA, 30 percent of wholesale and retail workers, and 23.7 percent of manufacturing jobs. However, the Portland city area experienced a total growth in employment of only 10.9 percent, and most of this was in the professional area. It appears that the Portland city area is becoming more specialized in professional employment while service sector employment is becoming redistributed toward suburban areas. Again Portland holds true to the national model as delineated in the UMTA report.

Summary of Demographic Trends

To a large extent, the Portland SMSA exhibits many of the trends identified at the national level by the UMTA report. Portland's suburban areas are growing at a faster rate than the central city in both population and employment. Portland exhibited a decline in central city population, a trait usually found in much larger eastern cities.

The elderly, those with low incomes, and those without automobiles tend to be concentrated in the central city. This concentration decreases as distance from the central city increases. Portland's suburban areas have higher median income, higher employment, and a greater number of households with high per capita automobile ownership rates.

What these trends imply for transit is that the central city is and probably will continue to be an areas where a high proportion of residents will depend on transit to serve a high proportion of their travel needs. This transit-dependent population makes up transit's "captive" market, those without any other modal choices. Transit ridership and journey-to-work data will be examined next to identify other, more discretionary transit markets. From the discussion of demographic data it becomes clear that the central city is the area where inherent attributes of the population will most assuredly guarantee a high level of transit ridership.

JOURNEY-TO-WORK AND ORIGIN-DESTINATION PATTERNS

In the previous section, areas in which transit use is likely to occur, given certain demographic char-

acteristics, were reviewed. Now it is necessary to see where transit use is occurring and what travel markets exist in Portland. Tri-Met's 1980 and 1983 origin-destination surveys and the 1970 and 1980 Bureau of the Census journey-to-work information will be used to evaluate current travel patterns. The journey-to-work data will be examined first because a high proportion of all transit trips are work related.

Journey to Work

The Bureau of the Census compiles data documenting the place of work and the place of residence of workers in the SMSA in both its journey-to-work (3) and Census of Population and Housing (2) publications. The data are aggregated to the county and city level for this analysis and will be used to examine the flow of commuters in the Portland SMSA. This information is important in determining how the work trip market is distributed. The trips to be discussed may be made by automobile or by transit (Figure 3).

In 1980 the city of Portland was the strongest work destination with 58.2 percent of all work trips in the SMSA ending in Portland. The CBD accounted for 7.5 percent of all work destinations. Between 1970 and 1980 trips to the city of Portland excluding the CBD increased by 48.2 percent. CBD commutes increased by 27.3 percent. The highest percentages of commutes both to the CBD and to the rest of the city originated from within Multnomah County; smaller numbers of trips were accounted for by the more suburban counties.

Of the remaining counties, Washington had the largest share of work trip destinations in 1980, with 17.5 percent of all work trip ends in the SMSA. This is in contrast to the smaller shares of Clark and Clackamas counties at 10.4 and 11.5 percent, respectively. Of these counties, Washington showed an increase in work trip destinations of 101.3 percent for the largest suburban increase. Washington County also had the single largest increase in work trip destinations in the entire SMSA. The number of work trips originating in Washington County also increased, by 86.3 percent, for the largest increase in the SMSA. The discrepancy between the increases in origins and destinations indicates an increasing flow of trips to the county from points outside Washington County.

Work trips that both begin and end in the same county are also increasing in the suburban counties. The largest increase again was in Washington County, at 107.25 percent. Clackamas County also increased within-county trips by 69.5 percent. Trips within Multnomah County also increased, but at a smaller rate of 27.8 percent. The number of trips from Portland to the rest of Multnomah County decreased by 44.4 percent. Trips within the city increased by 12.6 percent and represented more than 20 percent of all work trips in the SMSA in 1980.

Several important trends emerge. First, more than half of all work trips in the SMSA occur in Multnomah County, and the largest percentage of these occurs within the city of Portland. The city- and CBD-destined work trips are increasing but at a slower rate than those of suburban areas. Second, trips within suburban jurisdictions are also increasing at a rate greater than trips within Multnomah County and the city; however, these trips represent a smaller proportion of total trips in the SMSA. Third, the greatest increases in work trip activity are occurring in Washington County with increases in trips to the CBD, Multnomah County, and within the county. Also, the largest increase in trips from the city of Portland was to Washington County. Fourth, the only

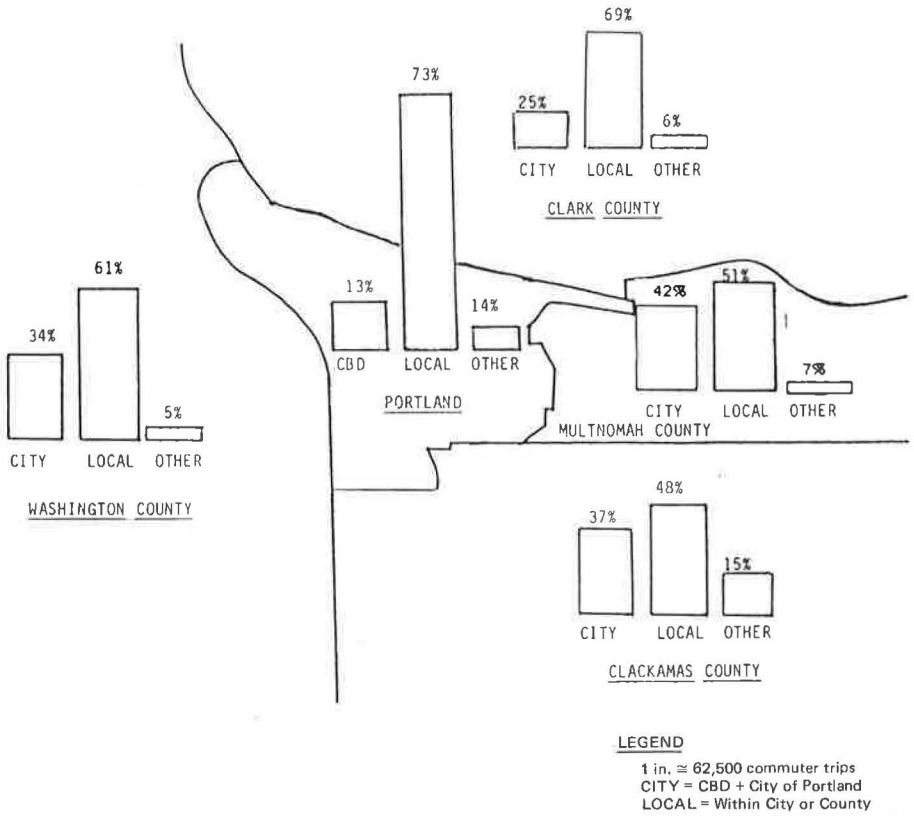

FIGURE 3 Commuter flows by county and city of residence *(2, 3).*

commute to decrease significantly was from the city of Portland to the remainder of Multnomah County.

Multnomah County forms the heart of the work trip travel market. Although this market is large, it is increasing at a lesser rate than that of suburban jurisdictions, particularly Washington County. This indicates a pattern of shifting growth in the work trip travel market. For a more complete picture of the shifts in the SMSA travel market, the patterns and trends in transit use will be examined and compared with the journey-to-work patterns. This will also give insight into the transit market share of these work trips.

Transit Origin-Destination Patterns

Total ridership on Tri-Met decreased by 11 percent from 138,860 to 123,180 daily weekday originating rides from 1980 to 1983. There are numerous reasons for this decline in ridership including the adoption of higher fares for long-distance trips; the decreasing population of the area due to the economic recession of 1982, which, in turn may have reduced work trips; and the restructuring of the east side system into a grid in 1982.

Looking at total origins and per capita transit rides by subdistrict, it can be seen that, even though transit trip origins are high in the suburban areas, actual transit use in rides per capita is rather small, which indicates that suburban areas are largely transit independent. This pattern is inversely related to the higher-than-average rates of automobile ownership in these areas. The central city population appears to be using transit on a more regular basis than are suburban residents.

Despite significant increases in total trips within and between neighboring subdistricts, system ridership is still heavily oriented to the CBD, although this orientation decreased between 1980 and 1983 with the implementation of the east side grid system. Roughly one-third of all trips on the system begin or end in the CBD.

The average 1980 share of trips originating in suburban areas and destined for downtown was 40.9 percent. For city subdistricts, this figure is 39.0 percent, excluding trips that originated in the CBD. This shows that there is a nearly equal CBD orientation in suburban and city areas. The CBD therefore is a uniformly strong destination for trips across the system.

The city-to-CBD market accounts for the greatest share of trips destined to the CBD. City subdistricts accounted for 52.5 percent of the total trip volume destined to the CBD in 1983 compared with 37.7 percent for suburban locations. Again, trips originating in the CBD were factored out. The share of trips destined to downtown from individual subdistricts is relatively uniform across the system, but the actual percentage of trips destined to the CBD that is accounted for by any given subdistrict may vary greatly. The CBD market is the single largest travel market in the system.

Within this market two submarkets can be identified. These are the suburban and the city commuter. The city market has the greatest share of trips and is the single largest transit travel market in the system.

The conclusions regarding CBD travel drawn from the origin-destination (O-D) survey are consistent with the census journey-to-work data. The proportionately smaller share of trips to the CBD accounted for by suburban riders is borne out by the small numbers of suburban residents who work downtown. These comparisons can only be drawn if it is assumed that work trips account for the largest share of trips by purpose on the system, as indeed they do.

Aside from the CBD, local trips comprise the next largest share of trips on the system. Within-subdistrict travel accounts for between 5.7 and 23.0 percent of origins from any given subdistrict. The average trip share across the system for within-subdistrict trips is 13.0 percent. The largest percentages of within-subdistrict trips appear to occur in suburban subdistricts, but this is slightly distorted because of the large size of the suburban subdistricts compared with other subdistricts in the system. However, it is important to note that short local trips make up a large share of trips on the transit system. This has been facilitated to some extent by the implementation of a grid system on the east side.

Despite the exaggeration of within-subdistrict trips that occurs because of the large size of the subdistricts, the relatively high percentage of trips that remain in suburban areas is significant. This supports the journey-to-work data on intrasuburban work trips and is consistent with the pattern of growth and development in these areas. It is important to note that as a share of trips from suburban areas, a high percentage stay in suburban areas, but as a share of trips on the entire system, suburban areas have less transit ridership than the central city areas. The high rates of automobile ownership and the large and inexpensive supply of parking in suburban areas will continue to suppress transit ridership in these areas.

To summarize transit trip patterns, the CBD is the single largest travel market in the transit system. Of the non-CBD travel market, short within-subdistrict trips and trips to neighboring subdistricts make up the largest market. Intersuburban and reverse commute trips do not appear in any large proportion with the exception of some trips east from the city to east Multnomah County and from the inner city to Washington County.

MARKET SEGMENTATION

From the discussion in the previous sections it is now possible to identify the market segmentation for transit in the Portland SMSA. The categories to be described consist of both transit-dependent and discretionary riders, who may not depend on transit to serve a high proportion of their trip needs. The market segments include

1. Central city transit dependents,
2. Suburban transit dependents,
3. City-to-CBD commuters,
4. Suburban-to-CBD commuters,
5. Intrasuburban commuters, and
6. Central city-to-suburban commuters.

Each of these markets will be discussed in terms of its current status, future prospects, and overall importance to the success of transit service in Portland.

Central City Transit Dependents

As noted in the section on demographic trends, this market is characterized by those who live in the central city and are elderly, have low incomes, or have no automobile in their household. All of these demographic characteristics are in high concentrations in the central city, which makes it the largest portion of the transit-dependent travel market.

Given the demographic changes that occurred be-

tween 1970 and 1980, it is quite likely that the transit-dependent population will remain in large numbers in the city. Currently, most transit dependents, with the exception of those who have a handicap that prohibits them from using conventional bus service, are being served by conventional fixed-route bus service. A small proportion of transit dependents does use dial-a-ride service that allows door-to-door travel for elderly and handicapped persons. This service is not extensive at present. Users of the service must schedule their trip 1 to 2 days in advance and must plan around a 2-hour window for their departure time.

If the assumption is made that most elderly transit dependents do not make long-distance transit trips on a regular basis and few work trips, some generalizations can be made about the type of service they are receiving. If most elderly people are making short shopping or medically related trips, the conventional bus service currently on the street should serve their needs reasonably well. For example, the east side grid system has made possible a number of short trips that were difficult or impossible with the previous system configuration. Given that the grid system is being used for short trips that often are not in peak periods, it can be assumed that a high proportion of these trips is by elderly persons or other transit dependents who are using the local service for a variety of trip purposes.

The inner city transit-dependent population should continue to be a stable market for public transportation. Depending on the financial health of the transit system and the changing role of private service providers, the type of service provided for these residents might be improved in terms of ease of accessibility and convenience, but at present it appears that the system is being used by this group on a regular basis without substantial difficulty.

Suburban Transit Dependents

This is currently a small market for transit, given the dispersed nature of the population in suburban areas. These dependents are currently being served in the same manner as are those in the central city but with more trunk lines and radial service as opposed to a grid. Short trips are being made in suburban areas, but it is likely that, on the whole, these riders must travel farther for shopping, medical, or some work-related trips. Also, in outlying areas, service is more dispersed than in the central areas, and there are longer headways in some areas.

In suburban areas, the household without an automobile is less common than in the central city, as are elderly persons and low-income persons. It would appear that a large number of elderly people might be better served in suburban areas by service that is oriented toward a residential care facility or areas where high concentrations of low-income or elderly people may live. To a certain extent, current service tries to include these point-specific generators. Given the nature of suburban street grids, serving all residential care facilities in suburban areas would be difficult because of the circuitousness of the routes that would result. It would appear that the suburban transit-dependent market is one that might be best served by a system of on-demand service of a door-to-door nature. At least this is a type of service that should be considered if the suburban transit-dependent population continues to grow and is spatially distributed in a manner similar to current patterns.

In summary, the suburban transit-dependent population does not currently represent a large portion of the market for transit. It is uncertain how much this market can be expected to grow in the future, given the increasing rate of automobile ownership and a higher proportion of the elderly population driving automobiles than in years past.

City-to-CBD Commuters

This market forms the largest single share of transit ridership in Portland. This market is oriented toward the work trip, with a high peak demand on service. Other nonwork trips in off-peak hours are also important to this market. The city-to-CBD commute is currently served by fairly high frequency fixed-route bus service. It appears unlikely that this market will change significantly in the future. The number of transit riders to the CBD decreased in the period from 1980 to 1983, but this does not appear to be a reflection on the vitality of downtown as a workplace. As mentioned earlier, systemwide ridership dropped for a variety of reasons that cannot be directly tied to downtown.

If there is any area that should remain stable as a firm ridership base, it is the city-to-CBD market. Many riders have been discouraged by parking costs and congestion. For short trips from the city, transit is a good competitor with the automobile, with an estimated 30 percent downtown modal split. This percentage may increase because the downtown parking lid, or limitation on number and types of parking spaces, will be reached soon. A policy has been adopted by the city to increase total trips to downtown and to have that increase in trips carried on transit, which should eventually give the CBD a 75 percent transit modal split. Also, the inclusion of the Banfield light rail line to downtown in 1986 will further the downtown orientation of the system, although it will probably draw most of its passengers from existing bus ridership.

Conventional fixed-route bus service appears to be the best way to serve the downtown city commuter market. Innovations such as flexible working hours might help reduce the cost of additional peak-period service in addition to reducing some congestion problems.

Suburban-to-CBD Commuters

This market does not represent a large portion of transit ridership. The current trend is toward more local trips in suburban areas. The increase in long-distance fares in 1982 was seen to have been a major contributor to the reduction in ridership from suburban areas to the CBD. The journey-to-work data show that the reduction in trips may also be a function of more suburban residents working closer to home.

The suburban service is currently provided on conventional sized buses. This service is expensive, especially in the peak period. There are several options that might improve the attractiveness of this service in terms of convenience and reduce the cost to the service provider. These include subscription service, vanpools, commuter clubs, and carpools. In some instances, removing the paid driver from the service and sharing driving would reduce costs substantially and provide a more personalized, higher level of service.

At present it appears that the long-distance commuter market will continue to diminish and that those who make the commute will do so increasingly in private automobiles or carpools. Competition with the automobile in suburban areas is stiff, and it is probable that the longer the trip and the higher the value of travel time, the more likely a commuter is to use an automobile.

Intrasuburban Commuters

This market currently does not represent a large share of the market for transit in Portland, but it is the fastest growing of the market segments that have been identified. The future of this market appears to be one of increased expansion. Again, this is a market that might not be best served by conventional fixed-route bus service given the low population densities in the areas and the often circuitous street patterns.

A large number of firms that will employ sizable numbers of workers are locating in the Portland SMSA, particularly in Washington County. These destinations could be well served by vanpool or subscription service. Because in many cases conventional bus service would be underutilized, and because of the peaked nature of the trips generated by these workplaces, it makes sense to look to other means of serving this market. Again, this is a market that does not have a sizable transit-dependent population or a low level of automobile ownership, which makes the automobile a strong competitor. Also, the large supply of inexpensive parking in these areas makes the incentive to use transit quite small.

This market will likely be served in the near future by the automobile. If transit is to make a serious attempt at capturing a larger share of this market, some innovative service may be necessary. In the distant future, it is possible that the suburban centers will begin to take on more CBD-like characteristics, in which case the incentive to use transit would increase. At present, this is a rapidly growing travel market that helps to solidify the autonomy of these suburban centers from the central city. Given the abundance of free parking and the ease of automobile access, this solidification is likely to continue with the automobile dominating the travel market.

Central City-to-Suburban Commuters

This market is at present quite small. The reverse commute of lower income inner city residents to suburban service sector employment does not appear to be evident in Portland either from the journey-to-work data or the O-D surveys. This market could grow in the future if the right chemistry of inner city resident and suburban employment develops.

CONCLUSION

The identification of the market segmentation that exists in the Portland SMSA allows some conclusions to be drawn about the current policy dilemma faced by Tri-Met. First, the structure of the population is changing, both in its characteristics and in its geographic distribution. These changes have brought and will continue to bring the emergence of new transit markets that may or may not be served adequately by the conventional fixed-route bus service that the agency currently provides.

Second, automobile ownership is increasing and, unless drastic macroeconomic or petroleum-based disruptions occur, is likely to continue to increase. As mentioned earlier, the fastest growing, and as yet largely untapped, transit market is that of the intrasuburban commuter. It is unlikely that conventional fixed-route bus service will be able to attract a larger share of this travel market. The type of transit service extended to this market must be able to compete favorably with the automobile in terms of travel time and convenience. With the abundance of free parking in suburban areas and the ease of automobile access in these areas, some rethinking will be necessary to increase transit's share of the travel market.

Third, it appears that the days of the dominant CBD market are beginning to fade. Portland's transit system is still heavily CBD oriented and may not be able to rely solely on this market to carry the system forever. This market is currently quite strong and an immediate downturn in the CBD market is not expected. Because this market may provide a relatively stable base for transit service, any future expansion potential in the transit market will be in the suburban areas.

Given the uncertain financial future of Portland's transit system, it is difficult to make any predictions about what future transit service may be. It is possible to say what the transit system should do in order to capture a larger share of the new markets that have been discussed, and this is to tailor the transit service provided to the type of market it is to serve. The alternative would be a more modest role for transit, scaling back service to serve only the existing transit-dependent and CBD markets. This scaling back would be in contradiction to Portland's existing commitment to a strong CBD market, particularly in light of the Banfield light rail service that will begin operation in 1986.

The policy dilemma faced in Portland is not an easy one. The decision to aggressively pursue revenue for expanded service will have to be based on a clear understanding of the form that service is to take and the markets to which it will be directed. The decision to scale back service would have repercussions throughout an area that has based many other land use and development decisions on what was thought to be expanding transit service and an expanded role for transit in the region.

From this analysis, it can be seen that the role of transit in the Portland area may have to change if larger shares of the new and expanding markets are to be obtained. Careful attention must be paid to the nature of the markets for transit service if that service is to adapt to the changing needs of the population.

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The views expressed in this paper are those of the author and do not reflect policies of the City of Portland Planning Bureau.

Publication of this paper sponsored by Committee on Transportation Data and Information Systems.