FARE-FREE POLICY: COSTS, IMPACTS ON TRANSIT SERVICE, AND ATTAINMENT OF TRANSIT SYSTEM GOALS

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16. ABSTRACT

This study sought to understand the potential and problems associated with fare-free transit policy. Washington state is extraordinary in the number of such systems that are fully fare-free. Experiences with fare-free policy in Washington are overwhelmingly positive; a result that is consistent with other completely fare-free systems in the U.S. identified in this research. We conclude that fare-free policy does make a difference and that smaller communities especially are better served by a fare-free policy. This positive review of fare-free policy conflicts with common thinking about the policy within the transit industry. We conclude that much of the negative interpretation of the policy is based on a very limited set of experiments with the policy at larger systems. This research points out why these experiments should not be used to dismiss the policy and why the policy's potential success is largely dependent upon transit agency management issues. Furthermore, we present a conceptual overview of why the removal of the fare box results in substantial ridership increases above the levels predicted using standard fare elasticity relationships. This conceptual overview of the relationship between fare-free policy and ridership levels is also suggested as a helpful tool for interpreting the value of increased ridership in juxtaposition to the different objectives of public transportation.

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Fare-Free Transit: Prospects and Problems in Washington State

FARE-FREE POLICY: COSTS, IMPACTS ON TRANSIT SERVICE, AND ATTAINMENT OF TRANSIT SYSTEM GOALS

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SUMMARY

This study sought to understand the potential and problems associated with fare-free transit policy. Washington state is extraordinary in the number of such systems that are fully fare-free. Experiences with fare-free policy in Washington are overwhelmingly positive, a result that is consistent with other completely fare-free systems in the U.S. identified in this research. We conclude that fare-free policy does make a difference and that smaller communities especially are better served by a fare-free transit policy.

The cost of adopting a fare-free policy is minimal. Half of the transit systems in Washington return less than a 10 percent fare box recovery rate. Our analysis demonstrates that once the costs of collecting fares are deducted (usually from 2 percent to 7 percent of operating costs), little, if any, net revenue is generated. The gains in ridership from fare-free policy are impressive. We estimate that ridership under a fare-free policy would increase at least 25 percent to 50 percent. New fare-free systems have found ridership to be three to four times that predicted under a fare policy.

A fare-free policy is almost certain to increase crowding on transit vehicles. Otherwise, the possible impacts are mixed. Fare-free policy has the potential to either improve or detract from the quality of transit operating service, depending on both the geographic context (i.e., size of community) and institutional context (i.e., the degree of commitment from management and the rest of the agency). Smaller communities and cities are more likely to encounter fewer problems and more success; those agencies totally committed to fare-free policy are much more likely to enjoy better operations and greater community support.

The most commonly used measure of system effectiveness is the fare box recovery rate, a measure that cannot be computed for a fare-free system. We conclude, however, that the measure's usefulness is limited in any case and that other measures,

which are more appropriate (e.g., cost per rider), provide evidence that overall system effectiveness is improved with fare-free transit. An over-emphasis on fare box recovery rates is likely to be counterproductive. Focusing on fare policy is likely to decrease transit ridership and undermine efforts to meet other system goals related to mobility and environmental concerns that rely heavily on ridership totals.

In addition to its direct impact on ridership, fare-free policy also impacts the community transit culture. The experiences of Washington state transit agencies argue strongly for the better community relationships that result from fare-free policy. Once again, however, it is important to stress the key role played by management in defining the service quality of transit. If transit's service quality is defined properly, superior community reaction and support are virtually assured. In part, support comes from the public's perception of higher transit use, which is demonstrated most emphatically by higher passenger load factors and the visible presence of riders waiting at stops. Nevertheless, the service-oriented philosophy that comes naturally with fare-free policy fundamentally redefines the relationship between transit operations and the community.

CONCLUSIONS AND RECOMMENDATIONS

Fare-free transit has been implemented in a variety of settings and for a variety of purposes. It is clear that context does play a role in determining the degree of success of these programs. In general, smaller communities are more likely, indeed almost certain, to enjoy substantial improvement in the quality of transit service and in the number of riders. **Thus, we recommend that fare-free transit policy be considered for all small- to medium-sized transit agencies in Washington state and especially for all new systems.** The creation of a new system is a unique opportunity that presents a compelling reason for considering fare-free policy. At that time, and perhaps only at that time, it is possible to create a transit system environment, both internal to the agency and external to the community, that will most readily ensure the success of the fare-free policy and the transit agency in general. All three of Washington state's existing system-wide, fare-free systems began this way and undoubtedly owe much of their success to the opportunity to begin with a fare-free policy.

The success of fare-free transit is also strongly influenced by institutional commitment and strategy. Given the experiences elsewhere, **we recommend that any system adopting a fare-free policy**

- clearly identify the objectives addressed by the fare-free policy,
- recognize the importance of total organizational commitment to the policy,
- clearly communicate objectives and policy to the community,
- set in place processes to assess the extent to which objectives are met,
- deal firmly with problem riders, but use education to reduce problems, and
- be prepared for substantially more riders and requests for service changes.

A majority of these strategies are most easily dealt with in new systems, and little is known about converting existing systems. Given the lack of experience with conversion to fare-free transit and the substantial potential benefits associated with such a

policy, **we recommend that the Washington State Department of Transportation (WSDOT) consider funding a multi-year demonstration project to assess the potential of converting more Washington state agencies to system-wide, fare-free transit.** The majority of the funding for such a project would be dedicated to off-setting the initial loss of fare box revenue. The remaining funds would be used to provide technical support for planning the transition to fare-free transit and to document the process so that it could be applied elsewhere around the state.

This report has found that the prospects of fare-free transit are best for smaller communities. The potential difficulties associated with fare-free programs in larger urban settings appears to favor targeting specific markets with pre-paid programs (like the University of Washington's U-Pass or Intercity Transit-South Puget Sound Community College No Pay), which provides many of the advantages of a fare-free system but in a form more suited to large cities. However, this assumption has not been documented. Thus **we recommend that pre-paid transit funding options, as well as the potential target markets for such programs, be further analyzed and encouraged.**

Public transportation needs to be more effective if the economic, environmental, and social challenges of the 1990s and beyond are to be successfully addressed. The fundamental differences associated with fare-free public transportation may be the changes that are needed to invigorate public transportation in many settings. Several transit systems in Washington state have boldly embraced the idea and serve as successful examples for other systems in similar, and perhaps different, contexts. These systems have clearly demonstrated that fare-free transit policy can provide a superior public transportation environment when adopted and supported in appropriate settings.

INTRODUCTION

This project is an evaluation of the potential problems and prospects associated with the implementation of fare-free transit policy. At a time when local government budgets are under severe pressure, it seems odd to consider a policy that would reduce fees paid by users of a publicly provided service. At the same time, public transit is also under increasing pressure to meet a broadening set of community objectives. In other words, transit is expected to do more with no more, if not fewer, resources. Thus, this is a critical time to be creative in thinking about transit services and to explore all possible ways to more effectively and efficiently use scarce public resources. Ironically, eliminating fares can be a very effective and efficient strategy, even in the current austere fiscal environment.

The results of this study are based on a thorough assessment of all known systems that have implemented a fare-free policy, discussions with transit officials throughout the state (including two presentations/discussions at the Washington State Transit Decision Makers Conference and a special session at the state DOT Conference), and a survey of state transit officials (board members, managers, marketing staff, and operators). Detailed results of the program assessment and the state survey are contained in separate working papers. In this final report we highlight major findings and emphasize their connection to policy evaluation.

The report is organized around three fundamental policy questions. First, how much would a fare-free policy cost? The real issue here is net cost. Most transit systems, especially smaller transit systems, generate a small amount of their operating revenues through the fare box, and a large proportion of those funds are spent collecting the fares.

Second, what is the impact of fare-free policy on transit service? Two important dimensions to this question are ridership and quality of service. The first dimension includes the amount that total ridership will change and the type of additional riders that

will be attracted to the system. The second dimension, quality of service, is also potentially affected in terms of the system operating characteristics (e.g., schedule adherence) and in-vehicle behavior. Quality of service is one of the most intriguing aspects of the impact of fare-free policy in that very different outcomes, from negative to positive, may be experienced.

Third, how will fare-free policy affect the attainment of the transit system's goals? There are at least three facets to this question. First, to what extent will increased ridership affect internal effectiveness, and how should that effectiveness be measured? A standard measure used across systems as an indicator of efficiency is the fare box recovery ratio (fares/cost), which is not measurable in a fare-free environment. Second, how will changes in patronage affect the attainment of specific goals related to mobility, environmental quality, and land-use patterns? Through many regulatory and legislative changes, public transit has many missions to fulfill. To what extent will adopting a fare-free policy increase public transit's ability to meet those missions? Finally, how will the community's relationship to public transit change as a result of fare-free policy? Will transit be viewed more or less favorably and/or in a different way?

This report begins with a brief overview and summary of the experiences of fare-free systems. The next three sections address the three questions outlined above. The report concludes with a summary section that includes recommendations and issue identification for consideration by systems in Washington state.

FARE-FREE SYSTEMS

The term "fare-free" transit is used in this report in preference to the alternative description "free-fare." The former does not imply that the ride is free, only that the traditional fare box revenue source has been eliminated. Several definitions of fare-free transit have been identified in the transit literature. (1) For the most part, the definition of fare-free transit, as reviewed in this report, does not include other incentive polices such as tokens or subsidized transit passes that may be more broadly defined as "pre-paid" transit pricing alternatives. Our primary emphasis is on fixed-route systems that are completely fare-free; we do not consider fare-free, demand-response services.

Much of the information presented in this section was contributed by transit professionals who have had experience with fare-free transit after the project team submitted a brief article about the research project in the trade journal *Passenger Transport*. Thus, the following list of examples represents the current state of fare-free transit, but it should not be considered exhaustive with respect to all fare-free experiences, especially those that are/were limited geographically or restricted to short periods of time. The content of this program review (summarized in Table 1) is primarily descriptive, emphasizing the context and type of programs, along with the programs' underlying objectives. Results of the various programs are also noted, with particular emphasis on the perceived success or failure of the program, determined from its initial objectives.

TEMPORARY, FARE-FREE SERVICE

Although the implementation of fare-free policies was suggested as early as 1959 (2), the issue did not receive serious attention until the 1970s. In 1974, the Service and Methods Demonstration Program (SMD), authorized by the National Mass Transportation Assistance Act of 1974, provided federal funds to sponsor local service

Table 1. Fare-Free Transit Programs Reviewed

Location	Time Frame	Description	Objectives	Results
Amherst, Massachusetts	1976--Present	System wide; multiple university setting	Mobility and congestion	On-going; successful on both objectives.
Austin, Texas	Oct.89--Dec.90	System wide; medium size city	Promotion and education	Considered successful as an education and promotion device. A 75% ridership increase; some problem riders.
Burlington, Vermont	One year (1991) Spring of 1992	One single route to airport. K-12 school program.	Promotion mobility/ education	Considered highly successful; 56% ridership increase, 25% carryover. Successful in building new feeling about transit among students.
Chelan-Douglas Counties, Wash.	Dec. 1991--Present	System wide; small city/rural area	Mobility	On-going; actual ridership has exceeded forecasts 3-4 times.
Commerce, California	1962--Present	System wide; near large metropolitan area (LA)	Mobility	On-going successful small city program. No significant problems with riders.
Corpus Christi, Texas	Summer of 1987	System wide for kids	Mobility	Unsuccessful. In-vehicle problems related to students.
Denver, Colorado	Feb.78--Jan.79	Off-peak only; large city	Congestion, pollution, and promotion	Inconclusive because of program design and implementation.
Island County, Washington	1987--Present	System wide; small city/rural area	Mobility	On-going successful program. Ridership continues to increase.
Juneau, Alaska	1985	Special shuttle along one route	Congestion and promotion	Considered successful as a promotion.
Logan, Utah	April 1992--Present	System wide; small city	Mobility	On-going. Ridership started at 2500/day, already at 3700/day.
Marin County, California	1989--Present	13 special commuter shuttles to ferry	Congestion and transit promotion	Successful in attracting commuters
Mason County, Washington	To begin December 1992	System wide; one small city in a pre-dominantly rural area	Mobility	NA
Monterey Park, California	1986--1988	System wide; small city in large metropolitan area	mobility, connection to regional transit	Considered unsuccessful because of joy-riding.
Olympia, Washington	1990--Present, Fall 1992--Present	Special shuttles community college "no pay" program	Congestion and mobility campus congestion	Considered highly successful. Some difficulties with park & ride from local mall.
Salt Lake City, Utah	October 1979	System wide; medium size city	Promotion and education	Considered successful with a 13% increase in ridership.
Skagit County, Washington	Under consideration	Small cities/rural area	Mobility and congestion	NA
Topeka, Kansas	May 1988	System wide; small city	Promotion and education	Considered successful as a promotion and education device.
Trenton, New Jersey	Mar.78--Feb.79	Off-peak; large city	Mobility and revitalization of CBD	Inconclusive; some initial service quality and in-vehicle problems associated with users.
University of California, Davis, California	1990--Present	System wide for entire city	Mobility	Highly successful university-community program.
University of Iowa, Iowa City, Iowa	1971--Present	System wide for university area	Mobility	On-going successful university market program.
Various CBD programs	Varies with program	Downtown areas of medium to large cities	Congestion, mobility, and CBD economic vitality	Results vary. Generally considered successful.

improvement experiments, including fare-free demonstration projects. (3, 4) Under this program, several transit agencies experimented with fare-free service, including the most commonly noted off-peak experiments in Denver, Colorado, and Mercer County (Trenton), New Jersey. In both cases, the experiments lasted approximately one year (1978-1979) and *were implemented only on an off-peak basis.*

However, the motivations for the experiments were different. In Denver, the project was primarily promotional and emphasized the objectives of reducing air pollution and auto use. In fact, the Denver experiment evolved out of what was originally planned as a one-month promotion. In Trenton, the motivations were primarily social and economic, including the goal of revitalizing the CBD. The results from the experiments included a 36 percent increase in total ridership for Denver and a 16 percent ridership increase in Trenton. (3) The specific effect of the fare-free policy in Denver was difficult to determine because of a major system restructuring that was completed during the experiment. In Denver, the estimated reduction in weekly car vehicle miles traveled (VMT) was 0.5 percent to 1.0 percent. In Trenton, similar reductions in VMT were noted, as well as a slight increase in savings related to the labor costs of fare collection. Both programs experienced initial problems with crowding, rowdiness, schedule adherence, and vandalism, which subsided as service and policy adjustments were made. (4)

Current opinions on fare-free transit policy are largely based on these experiments (see, for example, "Transit Pricing Research: A Review and Synthesis" (5)), and opponents of fare-free policy have pointed to the results of these two experiments to criticize the policy. However, in doing so, critics have ignored the "off-peak" structuring of these fare-free programs as a factor that contributed to their apparent lack of success. In light of the programs' initial objectives to promote transit use and reduce congestion, the emphasis on off-peak service may not have been the best strategy; instead, *peak period* commuters need to be reached for significant reductions in VMT. For practical

purposes, cost efficiency concerns related to the loss of fare box revenue and the increased cost of operation (i.e., extra buses) may have outweighed the other stated objectives of the experiments. Whatever the reasoning may have been, **the structure and implementation of these two, often-cited experiments prevent any firm conclusions about fare-free policy potential in similar or different contexts.**

There are additional and more recent examples of fare-free transit programs outside of the SMD program. Several transit agencies have experimented with short-term fare-free programs (e.g., Topeka, Kansas) and longer-term promotional programs (e.g., Austin, Texas).

During the month of May 1988, Topeka, Kansas, conducted a month-long fare-free program. The motivations for this experiment were primarily promotional and educational, with a particular emphasis on route extensions to a new mall. The marketing effort included the delivery of a free system map to every household in Topeka. The promotion was funded by petroleum overcharge monies distributed by the state of Kansas. The program resulted in an 83 percent increase in riders, 36 percent of whom were choice riders (i.e., they had a car available at the time of the trip). However, ridership measured 3 months after the promotion revealed a relatively modest increase of 5.5 percent over the previous year. Nevertheless, the program was viewed as successful in achieving its goals of educating the public about the new services. (6)

A more extensive example of fare-free transit, and certainly the most well-known (if misunderstood) example, is the program implemented in Austin, Texas. This program ran 15 months, from October 1989 through December 1990. It was originally conceived by the Capital Metro board of directors as a promotional and educational program to help increase ridership after a major service expansion. Ridership numbers increased dramatically (approximately 75 percent) during the program, but again, expanded service accounted for part of this increase. (7) According to a representative of Capital Metro, the program was ended because it had achieved its purpose as a promotion and because of the

increased number of security incidents related to problem riders, particularly intoxicated passengers. For example, in the last month of the program 52 incidents involving intoxicated passengers were reported, whereas in the 4 months following the reintroduction of fares 24, 28, 14, and 17 incidents were reported, respectively. (7)

Conversations with a former employee of the Austin system revealed that a large number of the transit-system employees resisted the idea of the fare-free program at its outset. The concerns of those inside the agency centered on operations and planning issues (i.e., the level of effort required to make the transition to a free system in which ridership was less predictable) and on driver concerns about security and school children. The Austin, Texas, case highlights the importance of the institutional context (e.g., management attitudes) to the success of a program, and the institutional difficulties associated with changing from a fare-based system to a fare-free system. In this case the objectives of the program were not clear at the outset. Some board members viewed the program as a long-term policy mission and others as a short-term promotional device. The local labor group voiced opposition from the beginning of the program.

The benefits derived from the policy included increased name recognition for the system, increased boardings, and more efficient boardings. Some vehicle operators also were very pleased that they did not have to argue with riders over fares. The problems associated with the implementation of fare-free service in the Austin context included decreased passenger comfort and security, related to crowding and transient problems, although significant efforts, such as hiring off-duty police officers, were made to mitigate these problems. Other problems with Austin's program were associated with planning and scheduling for overloading on certain routes.

PERMANENT, SYSTEM-WIDE, FARE-FREE SERVICE

Although only a handful of systems operate fare-free on a system-wide basis, they are all very successful. The oldest fare-free system still operating is located in and around Amherst, Massachusetts, which has operated a fare-free system since 1976. The

system of 39 buses provides transit service for the University of Massachusetts, Amherst, plus four other colleges (Smith, Mt. Holyoke, Amherst, and Hampshire). Ridership is 85 percent students, but the service is not exclusively for students. Other residents of Amherst, Belchertown, Sunderland, South Deerfield, Grandby, Hadley, South Hadley, and the city of Northampton can also use the system free. The system is partially funded by a $15 per year student charge, while the remainder of funds come from local, state, and federal sources. The system has a total annual ridership of 3.1 million trips.

The University of California at Davis started a similar program in 1990, although it is fare-free only for university students. The 1992 fiscal year ridership was estimated to be 1.3 million. The system has recently received an American Lung Association "Tow Award" for the outstanding design and implementation of a cost-effective clean air program. The "no boarding fee" policy, funded partially by a $13 per quarter student charge and local taxes from the city of Davis and from Yolo County, resulted in a nearly 100 percent increase in boardings in one and a half years.

The city of Commerce, California, located 6 miles east of downtown Los Angeles, has operated a fare-free system since 1962. This system includes five buses and two paratransit vehicles, along with two excursion buses for use by local civic organizations within a 220-mile radius of city hall. Total ridership on the system is approximately 1 million trips per year. The system's annual budget is $1.3 million, which is funded by a combination of federal, state, and local sources. According to the manager of transportation, riders present few problems other than occasional graffiti.

Logan, Utah, has very recently implemented a fare-free transit program aimed at increasing the mobility of senior citizens, public school children, and university students at Utah State in Logan. The system was initiated on April 25, 1992, and includes seven fixed-route and two paratransit vehicles. Ridership started at 2,000 trips per day and climbed very quickly within the first year of operation to 3,700 trips per day. The Logan example is interesting in that the initiative for system development came from the

residents of the city after a county-wide transit vote failed. In a recent (July 1993) discussion, the system manager, Michael Noonchester, noted a dramatic increase in community support for the system by those who were initially critical. There have been very few problem riders; and the agency has implemented an outreach and education program at the middle school to train young people about system use and safety. The success of the system is beginning to result in increased demands for service extensions to outlying areas (areas that originally voted against transit district formation).

Washington state has been the nation's leader in implementing and supporting fare-free transit. Island County, the first totally fare-free transit agency, has operated a fare-free system since its 1987 beginning. Fare-free services include both fixed-route and commuter links to ferry services. Ridership continues to grow; for example, ridership increased 30 percent between February 1991 and February 1992. In comments at the 1992 fall WSDOT Transportation Conference, Martha Rose, executive director of Island Transit, noted two current concerns with the fare-free program. First is the challenge associated with park-and-ride lot development. The demand for park-and-ride lots has been difficult to keep up with as ridership has continued to increase. Second is the problem of overloading. All of the buses are packed all day, requiring further acquisition of vehicles.

Chelan and Douglas counties in central Washington started a fare-free transit system (LINK Transit) in December 1991. Ken Hamm, general manager of LINK, also summarized the experiences of the program at the fall WSDOT meeting. In his comments, Hamm noted that public transit was seen as key to several issues associated with quality of life in the area, including air quality, congestion, and tourism. Transit is viewed as a public utility and is seen as a key service in community promotion. Transit is also seen as an important part of the community outreach to transit-dependent populations, including the elderly and others who lack transportation options. System ridership has exceeded forecasts by three to four times and continues to grow, with an

average of 4,500 daily boardings. The system has been recognized by the downtown business community for increasing business and was voted the best new "business" in the area for 1991-1992. Furthermore, LINK Transit System tied with another "business" for best customer service.

Mason County recently (October 1992) decided to make its newly formed transit program fare-free. Initially, the system is operating as a dial-a-ride program with eight vehicles, but a fixed-route system is expected to follow soon. In Skagit County, planning for a transit system is currently underway after a portion of the county successfully passed a transit initiative on November 3, 1992. The Board of Directors recently decided to institute a fare-free policy at the beginning of service. Grant County is in the process of attempting to create a transit authority and is looking closely at the fare-free option.

THE COST OF FARE-FREE SERVICE

Although the implementation of a fare-free policy eliminates the revenues collected, it also eliminates the costs associated with setting and collecting fares, such as equipment, personnel, and insurance costs, which together can outweigh the revenue collected. (8, 9) For example, the analysis of potential fare collection costs in Seattle's new bus tunnel revealed that these costs would equal, or exceed, the potential revenue gained. (10) Consequently, the bus tunnel was added to the existing "Magic Carpet" fare-free zone in the CBD. Similarly, an evaluation of fare box collection costs in Island County contributed to the decision to adopt a fare-free system there. Island County estimated that fare collection costs, combined with decreased ridership, would far outweigh the revenue gained from the fare box. In other words, there would be **no net usable income from the fare box.**

The percentage of system costs related to fare collection varies by system, but past studies have given some indication of fare collection costs' general importance. Scheiner and Mundle, for instance, surveyed six systems and found fare collection operating costs to be roughly 1 percent to 3 percent of total operating costs, or 1.24 to 3.22 cents per vehicle-kilometer, while fare collection capital costs (i.e., depreciation costs) ranged from 0.050 to 0.725 cents per vehicle-kilometer. (9) These costs varied by the size of the system (fare collection costs in smaller systems were generally a higher percentage of operating costs) and by the sophistication of an agency's fare collection equipment. Domencich and Kraft found that the elimination of fares in Boston would have cut system costs by $3.5 million, or about 5 percent. (11) (However, $2 million of these savings would have resulted from the elimination of station booth agents at subway stations, a form of cost savings not available in most transit systems.) An informal survey of transit system managers at the beginning of this project suggested that for smaller systems, total collection costs range from 5 percent to 7 percent of operating costs.

General administration and budgeting tasks may also be simplified if alternative revenue sources, less likely to fluctuate over time, are used instead of fares. A good deal of overhead is associated with fare policy planning and research within transit organizations, not to mention the time and expense of soliciting public input every time a fare change is contemplated. The elimination of fares removes these costs and may free staff to attend to more pressing concerns related to the effectiveness of the transit program. (These cost savings, however, relate mainly to long-term policies rather than short-term promotional efforts.)

Overall, the impacts of these costs and cost savings will affect the bottom lines of different transit systems to varying degrees. The goal here is to provide a simple estimate of the net revenues that would be forgone through a fare-free policy. The gross fare box recovery ratio of half the transit systems in Washington state is below 10 percent; only three systems have recovery ratios greater than 20 percent (see Table 2). To estimate the net impact on revenue we subtract 4 percent of the operating costs for each system. In general, this figure is too small for smaller transit systems, which are more likely in the 5 percent to 7 percent range, and too large for the larger systems, which may be as low as 2 percent. Using this estimate, 10 of the systems would have no more than a 5 percent net fare box recovery rate. In absolute terms, the total amount necessary to support those systems under 1 million annual passengers varies from $8,000 to $161,000 annually. Half of these systems generate less than $30,000 worth of net usable revenue annually. For these smaller transit systems operating at low levels of fare box recovery, eliminating fares may be worthwhile strictly because of the costs associated with fare collection. However, many other impacts of a fare-free policy may be more important. We turn to those issues in the next section.

Table 2. Selected Operating Statistics For Washington State Fixed-Route Transit Systems (1990)

Transit Agency	Annual Ridership	Annual Operating Budget (000's)	Cost Per Rider (in dollars)	Fare Box Recovery Percent	Net Fare Box Recovery Percent[3]	Estimated Net Fare Box Revenue[4] (000's of dollars)
Metro (Seattle)	95,410,000	167,119	1.75	21.0	17.0	28,410
Pierce	10,383,804	25,323	2.44	13.5	9.5	2,405
Spokane	6,975,070	18,192	2.61	16.4	12.4	2,255
Community (Snohomish)	4,004,748	17,522	4.38	20.2	16.2	2,838
C-TRAN (Clark)	3,041,000	7,792	2.56	16.6	12.6	982
Intercity (Thurston)	2,526,107	6,472	2.56	7.2	3.2	207
Ben Franklin	2,439,729	4,481	1.98	7.4	3.4	164
Kitsap	2,376,390	3,994	1.68	19.3	15.3	611
Whatcom	1,705,759	3,274	1.92	10.2	6.2	202
Everett	1,480,351	3,771	2.55	8.1	4.1	154
Grays Harbor[1]	1,256,534	3,192	2.54	7.6	3.6	114
Yakima	1,246,966	2,287	1.83	11.3	7.3	166
Valley (Walla Walla)	747,726	1,338	1.79	8.2	4.2	56
Pullman (Whitman)	692,145	653	0.94	28.7	24.7	161
Clallam	613,081	2,352	3.84	7.1	3.1	72
Island	353,094	923	2.62	NA	NA	NA
Cowlitz	304,132	860	2.83	5.6	1.6	13
Jefferson	196,056	770	3.93	7.8	3.8	29
Twin (Lewis)[2]	191,170	506	2.65	6.9	2.9	14
Pacific	160,874	536	3.33	8.5	4.5	24
Prosser (Benton)*	24,197	62	2.59	17.6	13.6	8

Source: WSDOT 1990 Summary of Public Transportation Systems in Washington State (12)

[1] unlinked, fixed-route passenger trips

[2] data include demand-response service

[3] computed at the rate of .04 of operating expenses

[4] net fare box recovery percent multiplied by annual operating budget

THE IMPACT OF FARE-FREE POLICY ON TRANSIT SERVICE

The introduction of fare-free service raises the potential, at least, to significantly affect transit service. Our concern is for two types of impacts: ridership and quality of service.

IMPACT ON RIDERSHIP

As the previous section demonstrates, fare-free policy generally results in a significant increase in ridership. This section reviews the reasons for this increase in ridership and the use of fare elasticity for predicting ridership increases in order to demonstrate some of the unique aspects of fare-free policy.

The impact of changes in transit fares on ridership is commonly assessed with elasticity estimates. (5, 13, 14, 15) Fare elasticity can be defined as the percentage of change in ridership created by a 1-percent change in fares. The industry standard has been the Simpson-Curtain rule, which sets fare elasticity at about -0.3, meaning that a 1 percent increase (decrease) in fares will cause, all else being equal, a 0.3 percent decrease (increase) in ridership levels. While this standard is perhaps a useful, time-tested rule of thumb, "true" elasticity levels vary by type of passenger, type of route, time of day, and length of time since the change in fares. (5, 14)

Moreover, standard elasticity estimates may be less applicable when fares are eliminated. The total cost considered by an individual traveler consists not only of the actual fare charged, but also various time and psychological costs. (5, 16) Of particular importance is how ridership increases associated with fare-free policies can largely be explained by a significant drop in the psychological costs associated with the fare box. The removal of the fare box can eliminate a barrier in the minds of potential passengers, many of whom may see the fare box as a source of confusion and possible embarrassment.

This relationship between ridership levels and the user costs associated with riding transit is important for understanding the effects of fare-free transit. The stacked bar in Figure 1 characterizes the user costs of riding transit. These costs include: the fare; the psychological costs associated with the fare box; other psychological costs associated with personal security, safety, and overall "comfort" in the transit environment; and costs associated with service frequency and convenience. Our concern here is primarily with the significant decrease in total user costs when fares are eliminated. In this case, the financial and psychological costs associated with the fare box as a barrier are removed, leaving potential users to contend with only two remaining cost categories in their mode-choice decision. The impact of these remaining categories on mode-choice decisions and the extent to which fare-free policies may positively, or negatively, influence the relative sizes of these other costs are discussed in detail in the efficiency section.

Another way to display the discontinuity in transit ridership (and elasticity) under fare-free policies is with a demand curve that shows the general elasticity of demand with cost. As in all demand curves, the quantity demanded (here, ridership) increases in a regular fashion as price (here, fare) approaches zero. Figure 2 portrays, in the form of a demand curve, the discontinuity in ridership when the fare is removed. Because of this discontinuity, the demand curve for transit jumps abruptly along the ridership axis, generating a larger increase in ridership than standard elasticity estimates would suggest. (17)

The most important aspect of this diagram is the size of the discontinuity in user costs when the fare is zero and the fare box is removed. It is unclear how large this discontinuity will be in every case, but the significant ridership increases seen in most fare-free transit programs suggest that it is quite large. The successes of fare-free programs in Island and Chelan-Douglas counties in Washington state, for example, particularly support this observation.

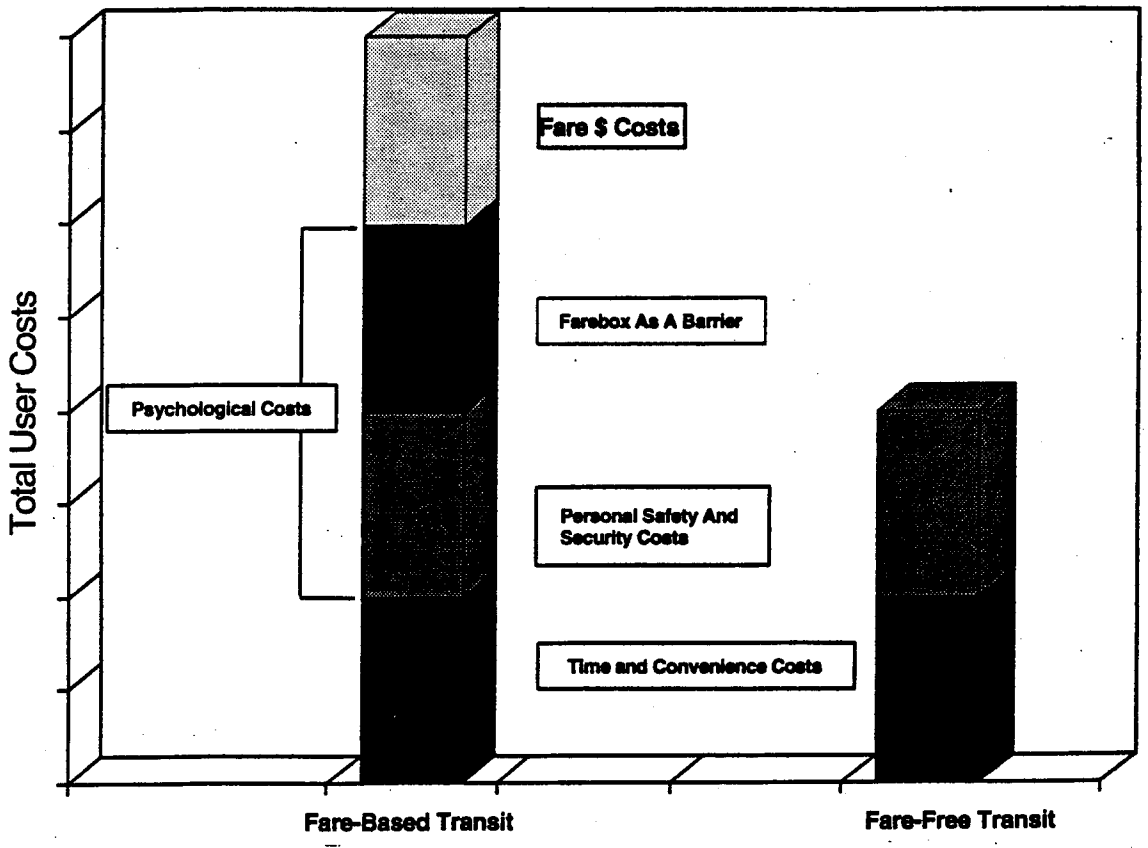

Figure 1. User Costs Under Fare-Free Policy

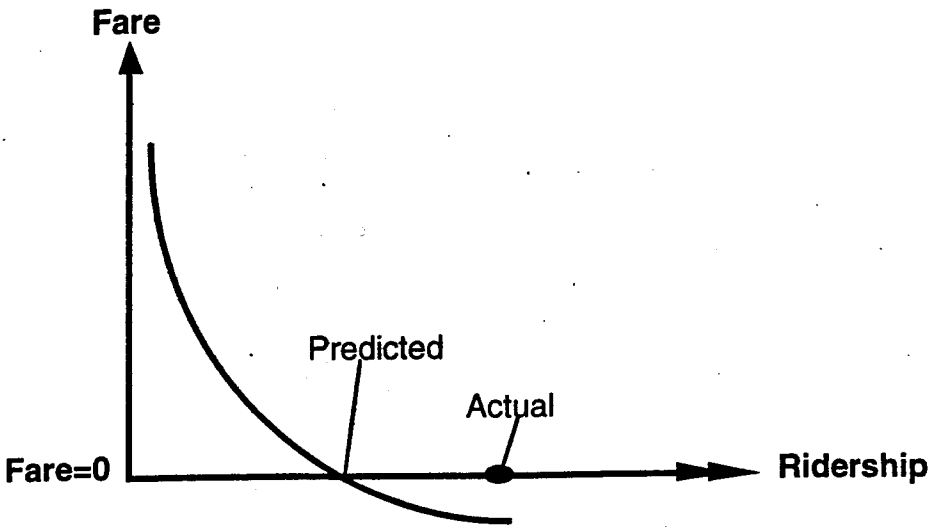

Figure 2. Fare vs. Ridership Demand Curve Under Fare-Free Policy.

Unfortunately, there is little experience on which to estimate the size of the discontinuity that occurs when fares drop to zero. For the short-term experiments noted above, ridership increased from a low of 13 percent for Salt Lake City in 1979 to a high of 83 percent for Topeka in 1988. Experiences with more than a 50 percent increase in ridership were common. Many of the most successful system-wide operations started with a fare-free policy; thus, it is not possible to ascertain the true impact of the fare-free policy. However, in the case of LINK, at least, system ridership turned out to be three times the conservative number forecast. In our survey of transit officials, about two-thirds of the respondents expected an increase in ridership between 0 percent and 25 percent, with most of the rest expecting an increase above 25 percent. We conclude that **for most systems that change to a fare-free policy, ridership can be expected to increase by at least 25 percent and more likely closer to 50 percent. New systems can be expected to have the greatest increase, at least as measured by greater than expected ridership.**

It is important to understand the type of ridership increases that are likely to occur. Several sources of ridership change are relevant.

- Transit riders who would have otherwise driven their cars are attracted to transit, decreasing auto use and fulfilling environmental objectives.

- Transit riders who would not have otherwise been able to make a trip to a job, social activity, personal appointment, or shopping are provided additional mobility, fulfilling social objectives.

- Transit riders who would otherwise have walked, carpooled, or ridden bicycles use transit because of its convenience, thereby potentially burdening the system and not necessarily fulfilling any of the objectives of the transit program.

- Transit riders enter the system for purposes of "joy-riding" or vandalism and work against the objectives of the transit program by degrading the system's service and its attractiveness to other potential users.

The first two categories of riders are clearly the target populations for transit agencies. Unfortunately, we do not have reliable information about either of these groups. In the case of Topeka, 36 percent of the riders during the fare-free month were choice riders. In the case of LINK, a recent survey indicated that about 42 percent of the riders are "regular" riders, 47 percent are seniors, and 47 percent are youth. While these categories do not indicate the number of choice riders, the substantial increase in the number of regular riders over the past year (a growth of over one-third) and the substantial seasonal variation (winter boardings are 30 percent higher) suggest that a significant proportion of riders on fare-free systems are, in fact, choice riders. Results of our survey of transit officials support this view.* On the basis of a five point scale (where 1 = not significant, 3 = somewhat significant, and 5 = very significant), 73 percent of respondents gave a score of 3 or above for increased use by existing transit riders, followed closely by 70 percent who gave a score of 3 or above for those currently driving. Only 57 percent assigned values of 3 or greater to increased transit use by those who would have walked or biked. The perception of these transit officials, at least, suggests that ridership in targeted categories will increase substantially.

One point of significant debate concerns the number of young riders. Given the public, big-city concerns for reducing congestion, attention has been focused on choice

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* Forty surveys were returned (out of 106), representing 21 of the 23 agencies that were contacted.

riders. In this context, serving youth is seen at best as a secondary concern and can be viewed, as in the Austin case, as a negative aspect of ridership changes in fare-free systems. However, this attitude contrasts with experiences in Logan, Utah, and by Washington state's Island Transit and LINK. In all of these systems, serving youth is considered one of the major missions of the transit agency. Such service relieves parents of a difficult transportation responsibility and greatly increases the ability of young people to take advantage of other community resources.

The second aspect of providing transit to young people is the concern for an increase in problem riders, including youth, under fare-free conditions. Although observers and critics of fare-free policy commonly associate problem riders (e.g., transients, unsupervised children, intoxicated persons) and vandalism with fare-free programs (5, 7, 13, 17), the evidence is mixed. In the case of Austin, Texas, both anecdotal and reported data suggest that problem riders increased substantially during the fare-free experiment. Joy-riding youth and inebriated adults each appeared in greater numbers. Seattle Metro curtailed the hours of fare-free service in downtown Seattle because of the number of intoxicated people riding buses in the late evening hours. In general, the most common perception in the transit industry is that a fare-free policy will increase problem riders. In our survey, 57 percent of respondents expected that the number of problem riders would increase at least somewhat with a fare-free policy. On the other hand, the transit systems in places like Logan, Utah, Island County, and Wenatchee have had very few problem riders. There appear to be at least two reasons for this difference in experience. First, smaller communities are less likely, in general, to be confronted by such problems. Second, these example transit systems have had an aggressive policy from the beginning that has included both education (especially in the schools) and suspension of the rights of those who cause problems. Because riding the bus in these communities is considered a privilege, the threat of suspension is credible. **The result has been almost no problem riders.**

IMPACT ON QUALITY OF SERVICE

Changes associated with fare-free policy are likely to affect the overall quality of service both inside transit vehicles (especially driver-passenger and passenger-passenger interactions) and in terms of system operating characteristics (e.g., schedule adherence). However, the experiences that would substantiate whether these impacts are generally positive or negative are contradictory.

The removal of the fare box changes the **vehicle-level** environment of transit use and user costs. These changes include driver-passenger interactions directly associated with the fare box barrier and other psychological and service-related user costs (Table 3).

Table 3. Issues Related to Transit Operating Effectiveness

Positive
• The fare box barrier is removed.
• Drivers' job satisfaction and interaction with passengers can improve when the fare box is removed, thereby contributing to a positive change in the vehicle environment.
• Fare-free policy eliminates fare disputes and can help to eliminate the abuse of drivers by passengers who equate fare payment with "ownership" of the vehicle. In general, this should contribute to higher driver morale.
Negative
• Fare-free systems can attract problem riders, resulting in vandalism and problems for other riders. This may increase the personal security and psychological costs of transit use.
• Drivers' job satisfaction may decline as a result of problem riders.
• Crowded and uncomfortable buses may raise user costs unless service adjustments are made.

On the positive side, removal of the fare box **eliminates the problem of fare disputes, the source of many driver-passenger conflicts.** In fare charging systems, drivers assume the unfortunate role of fare collection enforcement. For example, to minimize the potential for violent attacks against drivers over fare disputes, the policy at Seattle Metro is to ask for the fare one time only and to not press the issue after that.

Closely related to this type of conflict is **a propensity of some passengers to equate the payment of a fare with the right to verbally abuse drivers.** The elimination of fares may remove the motivation for this type of driver abuse. Because driver job satisfaction is closely tied to interactions with passengers, the introduction of fare-free policies may contribute to higher driver morale.

On the other hand, the absence of fares can also translate into **a lack of "ownership" or responsibility on the part of some riders,** resulting in a negative impact on driver satisfaction. For example, a decrease in driver job satisfaction was noted in a survey of drivers during the Trenton, New Jersey, fare-free experiment. (17) This survey reported that 92 percent of the drivers found their jobs to be "less enjoyable" as a result of the program. Unfortunately, the results did not explain all of the factors associated with the implementation of fare-free policy in Trenton that may have contributed to this decrease in job satisfaction. Increases in other user costs can also result from fare-free policies. When problem riders get out of hand, they may increase the personal security costs of transit use and thereby discourage both new and existing riders. Physical crowding on buses may also increase the psychological costs associated with transit use.

Washington state transit officials said that they expect the quality of the in-vehicle environment to degrade somewhat (Table 4). Almost all officials (86 percent) expected crowding to increase, while nearly two-thirds expected driver and rider complaints to increase. However, respondents were split as to whether they thought *driver-passenger conflict* would increase. Note that in all of these cases, respondents who expected some increase or decrease did not expect a large change (i.e., they indicated 2 or 4 on the 5-point scale).

While the *perception* of Washington state transit officials and much of the transit industry is that more negative than positive in-vehicle changes will result from fare-free

Table 4. Perceived Effect of Fare-Free Policy on Transit Operations[1]

Perceived Effect of Fare-Free Policy	Decrease	No Change	Increase
Rider Complaints	19	17	64
Driver Complaints	22	14	64
Driver-Passenger Conflict	39	19	42
Crowding	0	14	86
Schedule Adherence	37	46	17
Frequency of Service	13	44	44
Total Boarding Time	29	17	54
Number of Stops Required	3	37	60
Average Speed	61	25	14
Agency Planning Effort	6	40	54
Agency Marketing Effort	28	41	31
General Administrative Effort	27	45	27

[1] Percentage of responses on a 5-point scale in which 1 indicates large decrease, 3 indicates no change, and 5 indicates a large increase. Responses 1 and 2 are grouped as decreases; responses 4 and 5 are grouped as increases.

policy, we contend that the negative aspects of fare-free policy have been over-emphasized by fare-free critics on the basis of a lack of a full understanding of fare-free experiments. A closer examination of these issues within particular settings suggests the following.

- "Problem riders" are not always an issue.
- Policy adjustments (such as asking problem riders to leave the bus after a complete round trip) and educational programs directed at school-age children may effectively resolve these problems. (For example, soliciting help from professional athletes to serve as role models was found to be effective in the case of Denver, Colorado.) (4)
- The severity of these problems may vary between systems that start as fare-free and those that convert to fare-free from an existing fare-based approach.
- Management attitudes toward the policy, and the communication of these attitudes to other agency personnel, can affect the strategies developed to deal with the predictable negative aspects of fare-free policy.

The positive experiences of Island Transit, LINK, and Logan, Utah, provide compelling evidence that a combination of service in a smaller community and a positive attitude on the part of the community's transit agency will minimize the potential negative aspects of fare-free policy on the quality of in-vehicle operations and dramatically increase the positive outcomes.

A second area of impacts on quality of service focuses on operational efficiency. The issues in this area are categorized (and summarized in Table 5) as either vehicle-level or transit agency-level operating efficiency.

From an efficiency perspective, **vehicle-level** issues relate primarily to boarding time and schedule adherence. Aggregate boarding times may increase because of a greater number of passengers; on the other hand, with no fare box to hinder the movement of passengers into and out of the vehicle, average boarding times should decrease. Scheiner and Starling estimated that boarding times may decrease as much as 18 percent when the fare box is removed because multiple doors can be used for boarding

Table 5. Issues Related to Transit Operating Efficiency

Vehicle Level
• Average boarding times should decrease with the elimination of the fare box.
• Aggregate boarding times may increase because of increased ridership.
• Schedule adherence may be affected by riders who might otherwise walk.
• If a bus stops at more stops, average speed may decrease.
Transit Agency Level
• Marketing, planning, and service adjustments may demand extra attention during fare-free policy implementation, particularly in systems that are changing from a fare-based program.

and disembarking. (18) This difference is likely to be most important on congested routes where bigger vehicles are used; in such circumstances multiple door use may prove to be a relatively inexpensive way to improve transit service.

However, increased ridership can also result in more crowding, negatively impacting boarding times. Poor schedule adherence may result from the crowding, as well as from a larger number of people riding the bus for short distances who might otherwise walk. With fare-free transit, the probability of a bus stopping at any one stop increases, and aggregate boarding time increases as more passengers get on and off the bus. This is an interesting issue that requires more research; specifically, should route stops be adjusted with a fare-free policy? The extent to which these in-vehicle efficiency issues counteract each other is not clear. Domencich and Kraft suggested that the net change in travel time related to these issues is small. (11:43) If the net change among all of these concerns is negative, such issues may affect an individual's choice to use transit.

Within the **transit agency**, various management problems must be addressed. A number of these issues, particularly marketing, planning, and service adjustments, are affected most at the beginning of the fare-free program. In the study that led to the implementation of the fare-free program in Austin, Texas, Albee et al. noted marketing

and ease of administration as two factors important to the assessment of fare policies and pricing strategies. (19)

These issues may be more severe in systems that are shifting to a fare-free policy than in new systems starting fare-free. With an existing system, operating procedures and attitudes must be changed as part of the policy implementation. Starting a new fare-free system only requires procedures to be streamlined as they are implemented.

In general, Washington state transit officials said that they anticipate that operational efficiency will decrease somewhat with a fare-free policy (Table 4). A majority of respondents felt that in a fare-free system, total boarding time and the number of stops requested will increase and average speed will decrease (although in none of these areas did respondents expect large changes). Surprisingly, while a majority of respondents expected the agency planning effort to increase, less than one-third expected either the marketing or general administration effort to increase. As we suggested in our review of other systems, opinions about whether the introduction of a fare-free policy will improve or detract from operational efficiency are contradictory. Once again, we conclude that **the nature of the impact of fare-free policy is likely to be the result of a combination of context (most notably the size of the community) and the attitude of the transit agency itself.**

FARE-FREE POLICY AND THE ATTAINMENT OF SYSTEM GOALS

It is critically important that transit agencies be able to evaluate the success of their system. Success can be measured in at least three ways. First, is the system as a whole effective? Second, does the transit system meet its broad goals, which usually emphasize mobility and environmental objectives? Finally, and most importantly, how is the agency thought of within the community? Community opinion is partially a response to the degree of success in the first two areas noted above, as well as a function of the character of the system itself. This is the reason that a fare-free policy may create a distinctively different community reaction.

SYSTEM EFFECTIVENESS

It is very important that scarce public resources are used well. This is certainly the case for public transportation. In public transit, the most commonly cited measure of system effectiveness is the fare box recovery rate. Obviously, such a statistic cannot be computed in a fare-free policy system. In this section, we first argue that focusing on the fare box recovery ratio is counterproductive. We then show, using another measure of efficiency, that fare-free policy can substantially increase overall system effectiveness.

Fare box revenue ratios (and fare policies based on this approach) are concerned with the amount of revenue that is needed from each passenger to cover a share of operating expenses. The fare box recovery rate is considered an indicator of how well the system is delivering services that the public is using. In this sense, fare box revenue ratios are best characterized as an assessment tool by which system efficiency is gauged and by which federal, state, and local subsidies are balanced with user fees according to prevailing attitudes toward transit and fare policy. The fare box recovery ratio often becomes the implicit system goal and overall performance indicator. Because most transit agencies have significant constraints on service delivery, such as minimum geographic coverage and mobility for disadvantaged populations, patterns of service

delivery prevent them from returning the highest fare box recovery rate. Therefore, fare policy becomes the most critical factor influencing fare box recovery rates. Unfortunately, raising fares to increase the fare box recovery rate introduces all of the problems associated with fare box elasticities. While it is possible to increase aggregate fare box revenues by raising fares, such increases are almost always at the expense of ridership levels. Thus, **an over-emphasis on fare box recovery rates is actually counterproductive, in most instances, with respect to the broader goals associated with increasing ridership**. Moreover, given the relatively small amounts of money generated by the fare box in most systems, focusing on the fare box recovery rate is even more difficult to support.

Alternative measures, in general, compare output to input in one way or another. Examples include cost per rider or cost per passenger mile. However, even these measures need to be considered carefully because of the tremendous influence of context. Some transit agencies operate in environments that are much more (or less) expensive than others. The case of Pullman is a good example of the importance of context. Pullman has by far the lowest cost per rider of any system in the state of Washington, but it operates in a limited geographic area and serves a population that is disproportionately dependent on transit.

At the very least, it is possible to compare these measures over time within a particular context. In this way, some estimate of the impact of fare-free policy on overall system efficiency can be determined. Consider once again the case of Austin, Texas. In the 12 months prior to the fare-free experiment the cost per rider averaged $2.51 (varying from a monthly low of $2.21 to a high of $3.18). During the 15 months of the experiment the average dropped to $1.51 (varying from a low of $1.22 to a high of $1.86). For the year after the experiment the average cost per rider rose back to $2.18 (varying from a low of $1.90 to a high of $2.72). Although not all riders attracted to the system during

the experiment were those targeted, clearly transit users were getting much more service for their money with the fare-free policy.

Cost per new rider, a figure used to assess large-scale urban transit projects, may also be useful. This number can be derived by dividing the change in costs by the change in ridership. In the Austin case, the cost per new rider averaged less than $1. This number compares favorably with the $10 cost per new rider standard used in planning many light rail projects under consideration across the U.S. In other words, changing to a fare-free policy may be a very cost-effective way to increase ridership to meet other community goals.

GOAL ATTAINMENT

Transit agencies face a number of objectives and criteria that define their mission and serve as measures by which their public-subsidized status is justified. Transit pricing policy is complicated by the fact that some of these objectives and criteria overlap and some conflict with one another. As Cervero notes, "The fact that fare policies often embody multiple objectives that are inconsistent hampers any evaluation of the behavioral outcomes of pricing changes." (5:118)

The implementation of certain fare levels and types affects the attainment of a transit agency's objectives; however, the overall impact of a given fare policy is often mixed. A fare increase, for instance, may increase revenue and decrease subsidies (improving the fare box revenue ratio), but it may also decrease ridership and the mobility of various social groups. This change may cause contention between transit organizations and the public. A recent example is the debate over fare increases in Seattle, where public outcry over the initial proposal to raise fares 25 cents eventually resulted in a more modest increase of 10 cents. (20)

On the other hand, a fare-free policy may increase ridership (and, thus, help reduce congestion and pollution) and increase the mobility of the transit dependent, but decrease the fare box revenue ratio, usually deemed the most important fiscal measure, to

zero. **Thus, the final evaluation of a given fare policy depends both on the objectives that the transit agency must attain and on the measures used to assess the attainment of those objectives.** As noted above, what we measure has a major impact on how we evaluate the performance of a system. **In general, the attainment of transit objectives can be more difficult to measure than the associated costs.**

The expectations placed on public transit have increased dramatically over the past 10 years as a reaction to major changes in U.S. urban areas. Especially important are the expectations regarding environment and mobility. Thus, the environmental objectives of transit are becoming more important and must be better integrated into the cost/benefit analysis associated with transit funding policies. The magnitude of environmental costs supports the active consideration of all pricing policies, such as fare-free transit, that have the potential to dramatically increase transit ridership. The mobility objectives of transit serve both the transit dependent and the business community by providing better access to services, shopping, and jobs.

Environmental Objectives of Transit

An important objective of transit is to increase transit use in order to address environmental problems, specifically problems created by the automobile. (21, 22, 23, 24) The justification for transit is the need to reduce air pollution and gasoline consumption through reduced automobile use and congestion. The Federal Clean Air Act Amendments of 1991, the State of Washington Clean Air Act of 1991, and the Transportation Demand Management legislation of 1991 all direct government to reduce automobile usage. The evaluation of fare-free policy requires better integration of the transit costs and benefits related to these environmental objectives. Unfortunately, this integration is not an easy task, as it is difficult to quantify the environmental costs and benefits of alternative transit policies, particularly fare-free policy.

The general magnitude of the costs of transportation-related environmental damage and the reduction of this damage has been estimated in recent studies, although

the estimates have varied greatly. The annual cost to the U.S. of air pollution from mobile sources has been estimated at roughly $7 billion in 1983 prices. (9:70) In 1991 the Regional Institute of Southern California estimated that air pollution in the South Coast Basin of California alone cost $7.4 billion, with over half that pollution coming from vehicles; congestion costs for the same area were estimated at $9.4 billion. (25)

The general magnitude of congestion and pollution costs and the benefits of reducing them should encourage the use of fare-free policies if these policies can help reduce air pollution. This caveat is significant. One question important to the analysis of the fare-free option is whether it can significantly reverse the trend of decreasing transit use noted by Pisarski. (26) Moreover, what levels of transit ridership will reduce congestion and air pollution enough for a fare-free policy to be considered a success?

For instance, Orski estimated that "Travel allowances and transit fare subsidies as high as $60/month per employee might be the price that employers have to pay to attain the 20 percent to 30 percent trip reduction targets implied in the federal air quality standards." (27:497) Even Scheiner, a proponent of fare-free policy, cautions about overselling the potential of fare-free programs to reduce air pollution.

> One of the major hurdles that prepaid [fare-free] transit must overcome is that, in the past, it has been oversold. Some proponents have suggested that prepaid transit alone will cure traffic congestion, will achieve downtown air quality and will solve the energy crisis. Yet, in many metropolitan areas prepaid transit would have only second order beneficial effects in the areas of congestion, air quality and energy. (8)

Transit, we thus conclude, is a necessary but not sufficient element for mitigating environmental problems. By itself, transit is unlikely to have a great impact on the growing environmental problems urban areas face, but in conjunction with other actions, such as land-use control and transportation demand management (TDM) policies, transit can be more effective. Conversely, those other actions are less likely to succeed without effective transit policies and systems. Thus, the evaluation of transit, and particularly the potential of fare-free transit, should be considered in terms of the degree to which transit

policies contribute to the solution of these important problems. **If fare-free policies can make a larger contribution to the reduction of auto use and air pollution than alternative transit pricing policies, they should be further considered.**

Mobility Objectives of Transit

A second category of transit objectives relates to the goal of increasing mobility. This goal includes both the mobility associated with reduced congestion and the personal mobility of transit-dependent social groups (people who would not otherwise be able to travel in an automobile because of income, age, reduced physical abilities, or simply lack of access to a car).

These mobility objectives stem from the view that transportation is a basic, necessary social good that should be accessible to all members of society. Traditionally, much of the justification for public transportation has been based on concerns related to serving the "transportation disadvantaged" (i.e., individuals whose transportation options are diminished because of financial or physical limitations). The passage of the Americans with Disabilities Act, for instance, indicates that some "rights" are considered fundamental, including that of every citizen to have a certain level of mobility.

The mobility that public transit provides for society helps people get to jobs and other activities that would otherwise be inaccessible. Thus, from a societal perspective, transit serves not only the general mobility but also the economic interests of the community by delivering needed workers to employment sites. (18:180) Transit mobility also helps businesses by improving customer access to stores. (28)

Like the environmental objectives discussed above, the benefits of the mobility objectives, and the costs of not addressing these objectives, are difficult to quantify. In general, the mobility objectives of transit are often measured against service standards (e.g., access to and frequency of service) for specific transit dependent groups, such as the elderly. It is more difficult to estimate the benefits of increasing the mobility of transit riders and improving their access to employment opportunities, even though studies of

traditional public support for service to the transportation disadvantaged indicate that society associates real, albeit difficult to measure, benefits with the provision of transportation services to all of its members.

At the same time, the costs directly associated with addressing these mobility objectives are easily identified in the capital and operating budgets of transit organizations. Therefore, the evaluation of pricing alternatives, such as the fare-free option, can be misleading if attention is focused solely on easy-to-measure costs to the exclusion of difficult-to-measure benefits. A more comprehensive view of transit that incorporates this evaluation perspective may prove the fare-free option to be more viable.

The recent implementation of a fare-free transit system in Logan, Utah, illustrates the point that difficult-to-measure benefits must be considered for a thorough evaluation. In Logan's case, the community chose to view transit as an essential public service, like police or fire protection and approved a dedicated transit tax to better meet the mobility objectives of its system. (29, 30) Specifically, the citizens of Logan were concerned that the difficult-to-measure benefits of mobility for their children and elderly, among others, were worth the additional tax cost.

Ridership, Fare-Free Policy, and Goal Attainment

Earlier in this report we described the effect of fare elasticity on ridership, noting the discontinuity that exists when fares are eliminated. This demand-curve perspective can be used to consider how large the increase in ridership must be for a fare-free policy to better address the objectives of a given system. Specifically, do ridership levels under a fare-free policy achieve environmental and mobility objectives? Figure 3 displays a ridership scenario under a fare-free policy that would enable a system to reach its minimum mobility objectives when they would not otherwise have been met. However, this ridership scenario would not meet the environmental objectives.

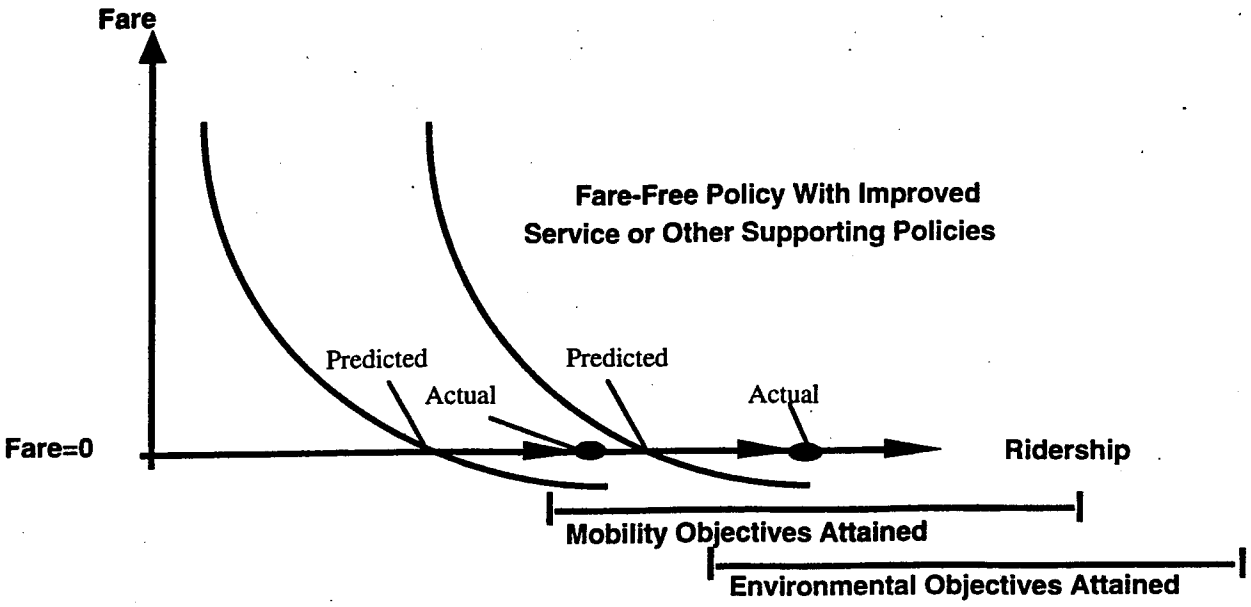

Figure 3 Fare vs. Ridership Demand Curve and Transit Objectives Under Fare-Free Policy and in Conjunction with Improved Service or Other Supporting Policies.

This perspective can be extended by considering how decreases in the other user cost categories (such as personal safety or service convenience), in combination with the user cost-savings associated with the removal of the fare box, may affect the overall effectiveness of a transportation program. A significant improvement in service, for example, may produce a rightward shift in the demand curve, that is, increase ridership at all fare levels, including fare-free, and achieve environmental objectives.

Figure 3 suggests that there is probably a range of ridership levels and a range of public transportation policies in which the transit objectives are attainable, depending to some degree on the nature of the objectives. Figure 3 also suggests that the realization of the environmental objectives of transit may require a more significant jump in ridership than is required to meet the social objectives.

The important point to remember is that, to some extent, fare-free policy introduces a new environment for transit use that is not addressed by the traditional interpretation of fare policy impacts. **Fare-free transit does not simply change prices at the margin, but rather, it creates a sharp discontinuity in actual and perceived**

user costs, resulting in significant jumps in ridership because the form of the service changes.

However, the extent to which this discontinuity in ridership under a fare-free policy can effectively achieve transit objectives in different settings must be evaluated for each setting. **The context, implementation of the fare-free program, and supporting transportation policies (e.g., transportation demand management (TDM), congestion pricing, parking, high-occupancy vehicle (HOV)) will affect the effectiveness of transit at meeting its objectives.**

COMMUNITY ROLE

At the **community level**, "transit culture" refers to the role and perception of transit within a community. In the auto culture of the U.S., transit has often been perceived as the transportation mode of last resort. If transit is to be integrated into communities, and particularly if it is to significantly reduce automobile use, this perception will have to change. Evidence from the programs reviewed in the following section suggests that fare-free policies can contribute to this change in perception.

Different groups within a community place different values on transit. Existing users, who ride transit by choice or who are transit dependent, view transit differently than non-users. These differing community perceptions of transit should be assessed as part of any fare-free policy evaluation to better understand the underlying factors that contribute to the political support for and resistance against transit, and the viability of fare-free policy in specific settings. This report is concerned primarily with the institutional perspective of fare-free policy. Further research may be needed to better ascertain differing community perspectives on transit value and how these perspectives may change under the effective implementation of fare-free policy.

Ultimately, increasing the effectiveness of transit requires increased transit ridership and decreased single-occupant automobile use. **Increasing transit ridership to address these goals will depend largely on attracting those who use transit by choice,**

those individuals who are most influenced by the transit culture in a community. Improving the community transit culture requires breaking down the barriers that separate the transit-dependent rider from the rider who has a transportation choice, and the frequent rider from the occasional rider or non-rider. The fare box is one of the barriers that deflects the occasional or choice rider from the bus and into the automobile. In many important ways the fare box is the defining element of the transit environment.

In our survey of Washington transit officials, 50 percent of the officials indicated they expected a fare-free policy to increase public support for transit, while an additional 31 percent expected no change. Only 19 percent expected a decrease in public support. Still, it is difficult for transit officials to embrace the idea of fare-free transit, even though more than half the officials rated customer satisfaction as a top agency objective. While most of these officials did have an opinion about fare-free policy (only 10 percent were neutral), 45 percent had a negative attitude and an identical number, 45 percent, had a generally positive attitude. Note that most of those with a negative attitude were only somewhat negative, whereas most of those in favor of fare-free policy were strongly in favor. Finally, one-third of all respondents viewed transit as a primary public service, and all but one of the remaining respondents indicated that it is a secondary, but important, public service. Together, these data about both riders and transit officials suggest an optimistic picture for improving the community transit culture.

SUMMARY AND RECOMMENDATIONS

Washington state is extraordinary in the number of transit systems that are fully fare-free. Experiences with fare-free policy are overwhelmingly positive, a result that is consistent with all other completely fare-free systems throughout the U.S. Unfortunately, the experiences of some systems that have experimented with either a limited time or geographic area have been mixed and, as a result, have erroneously served as models for other systems considering fare-free policy. We conclude that fare-free policy does make a difference and that, by and large, small- and medium-sized communities are better served by fare-free policy. In this final section we review the major findings of our study and then offer recommendations regarding the extension of fare-free systems.

SUMMARY

Our analysis of fare-free policy focused on identifying the cost of such a policy, the impact of fare-free policy on ridership and service quality, and the extent to which fare-free policy affects the attainment of public transit goals. Estimating the cost of fare-free policy is relatively straightforward with little other than the size of the transit system affecting the costs for collecting fares. Assessing the impacts of fare-free policy and the attainment of transit goals, on the other hand, requires a better understanding of the context within which such a policy is implemented. We consider each of these issues below.

Net Cost of Fare-Free Policy

As we noted at the outset of this report, to consider eliminating what might be regarded as "user fees" at a time of budget austerity may at first appear untimely. However, our analysis has demonstrated that **little, if any, net revenue is generated by the fare box in most smaller systems** (with less than 1 million annual passengers). For the ten smallest systems in Washington state, the net fare box recovery rate is less than 5 percent. After extra administrative costs are added for determining new fares and

special fares, the end result is that very little new revenue, if any, is produced by the fare box.

Impacts of Fare-Free Policy

Eliminating fares yields substantial gains in ridership. Traditional elasticity measures (such as the Simpson-Curtain rule) do not adequately estimate ridership change because of the substantial discontinuity that occurs when fares drop to zero. We estimate that switching to a fare-free policy will increase ridership between 25 percent and 50 percent. Not all of the increase will be in targeted market segments, but the increase overall remains impressive. The experience of new systems starting out is even more impressive. LINK, for example, has a ridership that is 3 to 4 times greater than ridership predicted under conventional arrangements.

A fare-free policy is almost certain to increase crowding on transit vehicles. Otherwise the possible impacts are contradictory. **Fare-free policy has the potential to either improve or detract from the quality of transit operating service, depending on both the geographic context (i.e., size of the community) and institutional context (i.e., the degree of commitment from management and the rest of the agency).** The biggest concern of most people is with the potential increase in the number of problem riders. Experiences in larger places with limited programs (e.g., Austin, Texas, and Seattle Metro) have been somewhat negative, with more problem riders than expected. Experiences in smaller places with full fare-free programs, on the other hand, have been very positive; problem riders have been few, and other problems have been quickly resolved. Much of this success should be credited to management who are totally committed to making fare-free policy a success. Crowding is expected to generate more rider-complaints, but the removal of the fare can be expected to reduce conflicts between passengers and operators. Gains in average boarding times are likely to be offset by higher ridership, which may lead to slightly increased aggregate boarding times and slower average speeds. Administrative costs can be expected to decrease, but pressure to

add service to new areas is likely to add to some administrative activities and to political pressure.

Attainment of Transit Goals With Fare-Free Policy

The primary internal system goal, and the major indicator for comparative purposes, is the fare box recovery rate. Obviously, with a fare-free policy this measure cannot be computed. We conclude, however, that this measure's usefulness is limited in any case and that other measures, which are more appropriate, provide evidence that **overall system effectiveness is improved with fare-free transit.** Although the logic behind the fare box recovery rate measure is intuitively appealing (the willingness of people to pay is an indicator of the success of the service), an over-emphasis on this measure is counterproductive. Increasing revenue by increasing fares is the most logical action, but it also reduces ridership. Eliminating fares, on the other hand, will substantially increase ridership because of the discontinuity in the elasticity curve. Thus, fare-free policy, especially when combined with other supportive actions, has the potential to increase ridership sufficiently to meet broader environmental and mobility goals. In general, however, systems are more likely to achieve mobility goals rather than environmental goals through fare-free policy.

In addition to its direct impact on ridership, fare-free policy also impacts the community transit culture. The experiences of Washington state transit agencies strongly suggest that better community relationships will result from fare-free policy. Once again, however, it is important to stress the key role played by management in defining the service quality of transit. If fare-free policy is implemented and managed properly, superior community reaction and support are virtually assured. In part, support comes from the perception of higher use that is demonstrated most emphatically by higher load factors and the visible presence of riders waiting at stops. In addition, the service-oriented philosophy that comes naturally with fare-free policy fundamentally redefines the relationship between transit operations and the community.

RECOMMENDATIONS

Fare-free transit has been implemented in a variety of settings and for a variety of purposes. In many of these settings, the policy and the results achieved have been considered positive. This does not mean that difficulties were not encountered as a result of the policy; few policies are implemented without any difficulties. However, we conclude that the case for fare-free transit policy is compelling, and **we recommend that all small- to medium-sized transit agencies in Washington state seriously consider implementing a fare-free transit policy.** [For larger systems, we suggest that many similar benefits may be gained by emphasizing pre-paid fare policy.]

It is important to distinguish between new startups and the conversion of existing systems. Both situations present challenges, but the conversion from a conventional fare system is undoubtedly more difficult. Thus, **we further recommend that all new transit systems make consideration of fare-free policy a priority.** The creation of a new system presents a unique opportunity, and thus a compelling reason, to consider fare-free policy. At that time, and perhaps only at that time, it is possible to create a transit system environment, both internal to the agency and external to the community, that will most readily ensure the success of the fare-free policy and the transit agency. All three of Washington state's system-wide fare-free systems began this way and undoubtedly owe much of their success to the opportunity to begin with a fare-free policy.

In fact, to the best of our knowledge, not one transit agency that has converted to a fare-free system is operating today. Although the potential benefits from the conversion to a fare-free system are substantial, there are also several major challenges associated with changing both the mind set of the agency and the mind set of the community. The experience in Austin, Texas, is an especially good example of the problems that can occur in such a transition. At a minimum, the following guidelines should be followed:

- clearly identify the objectives addressed by the fare-free policy;
- recognize the importance of total organizational commitment to the policy;

- clearly communicate system objectives and policy to the community;
- deal firmly with problem riders, but use education to reduce problems; and
- be prepared for substantially more riders and requests for service changes.

Given the lack of experience with conversion to fare-free transit and the substantial potential benefits associated with such a policy, **we recommend that the WSDOT consider funding a multi-year demonstration project to assess the potential for converting more Washington state agencies to system-wide fare-free transit**. The majority of the funding for such a project would be dedicated to off-setting the initial loss of fare box revenue. The remaining funds would be used to provide technical support for planning the transition and for documenting the process so that it can be applied elsewhere around the state.

Another issue that needs further research is how fare-free policy intersects with other pre-paid transit options. The potential difficulties associated with fare-free programs in larger urban settings appears to favor targeting specific markets with pre-paid programs (like the University of Washington's U-Pass or Intercity Transit-South Puget Sound Community College No Pay) so that larger communities may be able to enjoy many of the advantages of a fare-free system. However, this assumption has not been documented, and pre-paid transit funding options, as well as the potential target markets for such programs, need to be clarified.

This research on fare-free transit policy has identified personal security and safety issues as important costs associated with transit use. The environment of public transportation can be intimidating for many; concern for security and safety may present significant barriers to the use of public transportation. However, little is known about the extent to which these concerns impact or even prevent the use of public transportation. The relationship between fare-free policies and personal security in public transportation is also unclear. Moreover, the degree to which civil or criminal infractions contribute to the perception of a growing transit security problem must be ascertained, in contrast with

the "uncomfortable" feeling many people may have about the public environment of the services themselves. An assessment of the situation in the state of Washington, with a special emphasis on the differences between small and large systems, is needed.

Public transportation needs to be more effective if the economic, environmental, and social challenges of the 1990s and beyond are to be successfully addressed. The fundamental differences of fare-free public transportation may be the changes that are needed to invigorate public transportation in many settings. Several transit systems in Washington state have boldly embraced the fare-free idea and serve as successful examples for other systems in similar, and perhaps different, contexts. We hope that this research will help other systems better evaluate all the alternatives available to them in meeting the important objectives for public transportation in their communities.

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